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GROUNDWATER COLLECTION AND TREATMENT SYSTEM

OPERATIONS AND MAINTENANCE MANUAL

CITY OF ROCHESTER
FIRE TRAINING ACADEMY
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ROCHESTER, NEW YORK
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ROCHESTER FIRE TRAINING ACADEMY
OPERATIONS AND MAINTENANCE MANUAL

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1.0 INTRODUCTION

1.1 PREFACE

The original operations and maintenance manual for the Rochester Fire Training Academy (RFA) groundwater extraction and treatment system was prepared by Malcolm Pirnie of Buffalo New York, dated March 1998. Multiple changes have been made over the years to the treatment system and associated remedial program, including:

- Equipment and instrumentation changes (pumps, level instrumentation, pressure controls, electrical starters, etc.)
- Process changes (removal of carbon filtration stage, bypass of discharge tank and pump system, change in sequestering agent, etc.)
- Control modifications (reprogramming and wiring for centralized control, addition of web server with cellular data connection for remote monitoring capabilities, addition of radio frequency telemetry tie-in for monitoring TGA pump station level, etc.)
- Monitoring modifications (Monroe County effluent permit changes, process and monitoring well parameter and analytical method changes, etc.)

As a result of the changes summarized above, the original operations and maintenance manual had become of limited usefulness, as it no longer reflected the current groundwater treatment system processes and components, monitoring program, well locations, etc. Revision of the outdated operations and maintenance manual was recommended in recent Periodic Review Report submittals to improve Site and remedial operations, monitoring, and efficiencies.

This manual has been revised to address these deficiencies. Portions of the original operations and maintenance manual, including formatting, text and figures, have been retained as deemed appropriate and applicable for continuation of Site remedial activities. In the future, equipment lists, engineering and electrical drawings and the like should be updated as needed to reflect current operating conditions and to maintain this manual in a useful and functional condition (see Section 8.0); however, no significant changes to the primary groundwater collection and treatment process, or to the associated monitoring plans, may be made without NYSDEC approval.

1.2 SITE DESCRIPTION

The RFA site (Site) is an approximately 18-acre site located on the west bank of the Genesee River at 1190 Scottsville Road in the City of Rochester, Monroe County, New York. A Site location map is included as Figure 1. The Site is divided into six areas, which include the North Disposal Area (NDA) (2.5 acres), Training Grounds Area (TGA) (5.4 acres), Police Obstacle Course/Firing Range (PFR), South Disposal Area (SDA) (1.0 acres), and the Genesee Valley Park Area (GVPA) (1.0 acres). A Site map is

included as Figure 2. Areas within the NDA, TGA, and SDA were historically associated with chemical use and disposal.

Based upon the results of remedial investigation activities, the types of contamination at the Site which were identified to require remediation included:

- Polychlorinated biphenyls (PCB's);
- Heavy metals, including lead and cadmium; and
- Volatile Organic Compounds (VOC's).

Remedial actions performed at the Site in accordance with the March 1993 Record of Decision include:

- Excavation and treatment of selected soils in the SDA and TGA, followed by on-site soil conditioning and placement in the NDA (completed);
- Excavation and off-site disposal of a smaller volume of soils (completed);
- Excavation and placement of GVPA soils in the NDA (completed);
- Restoration of the remediation areas (SDA, TGA and GVPA) (completed);
- Capping of the NDA (completed);
- Groundwater collection and treatment in the SDA (ongoing); and
- General Site management activities (ongoing).

As part of the restoration and capping activities referenced above, the SDA was backfilled with clean fill, and the ground surface was restored using six inches of seeded topsoil. TGA grades were re-established with clean fill up to a prevailing grade of approximately 523 feet above mean sea level (msl) in the eastern portion of the area to 522 feet above msl in the western portion, which is above the I00-year flood elevation. An impermeable asphalt and concrete cover system was placed over the TGA under a separate Monroe County Construction contract. The GVPA was backfilled with clean fill, and the asphalt bicycle path was replaced. GVPA, SDA and TGA soils placed and compacted in the NDA are at a minimum four percent (4%) grade, covered with a composite synthetic/soil cover system consisting of a 6-inch sand layer, 40-mil HDPE synthetic membrane, geocomposite drainage layer, 24-inches of barrier soil, and six inches of seeded topsoil. And lastly, storm water drainage was provided in the TGA, NDA and PFR.

The groundwater collection system installed in the SDA consists of a 200-foot long, 22-foot deep groundwater collection trench installed in the overburden. The trench consists of two layers of gravel with a slotted 6-inch collection pipe that slopes from the manhole at each end to the sump (i.e., pumping station) in the center. Groundwater is collected in the sump and pumped to the on-site treatment system. The treatment system is located in a clear-span, rigid-frame premanufactured metal building.

Groundwater from the collection trench is conveyed to the treatment system via PVC piping. A process schematic of the groundwater treatment process is provided in Figure 4. The groundwater treatment system utilizes particle filtration and air stripping to remove contaminants (including VOCs) from the collected groundwater. The first step in the groundwater treatment process is the addition of a sequestering agent to minimize scale buildup in the process equipment. The groundwater then passes through a bag filter system to remove particulates. The filtered groundwater enters a 1,500-gallon feed tank and is pumped to the air stripper. The low profile air stripper removes VOCs from the groundwater. After flowing through the air stripper trays, the groundwater is pumped from the air stripper sump to the sanitary sewer pump station located at the TGA, near the Fire Training Academy buildings.

The groundwater treatment system is designed to handle continuous or intermittent flow rates of up to 40 gallons per minute (gpm) with minimal operator attention. The programmable logic controller (PLC) based control system operates in an automated, on-off batch mode when influent flows are less than 40 gpm.

2.0 GROUNDWATER COLLECTION AND TREATMENT SYSTEM

A general flow schematic for the groundwater collection and treatment system is provided as Figure 4. The major components of the groundwater collection and treatment system are discussed below. This section describes the collection trench and process equipment, as well as control schemes, common operating problems, and laboratory controls (where appropriate). Appendix A presents a standard operating procedure (SOP) for start-up and shut-down of the overall collection and treatment system (Appendix A.1), as well as individual SOPs identifying several start-up, shut-down and maintenance procedures for the individual process units.

2.1 GROUNDWATER COLLECTION TRENCH

Hydraulic containment within the SDA is provided by the groundwater collection trench, which collects and extracts overburden groundwater and maintains an inward hydraulic gradient in the water-bearing zone within this area. The collection trench is comprised of a 6-inch diameter slotted drain pipe enveloped in permeable backfill material. The drain pipe is connected to a 24-foot deep, 5-foot diameter collection sump located in the middle of the trench. Groundwater levels within the trench can be monitored from the treatment system control panel (which displays reading from an ultrasonic water level sensor located in the collection sump), and/or by using a water level indicator in piezometers installed within the trench backfill material between the collection sump and the end of the trench. The collected groundwater is pumped to the treatment system via force main.

The groundwater collection trench contains piezometers. The piezometers should be checked periodically with a water level indicator to monitor the level of the groundwater (see Section 3.4).

The major components of the collection trench are the 6-inch diameter slotted drain pipe and the 24-foot deep collection sump. There are no common operating problems associated with the groundwater collection trench. The level sensor inside the groundwater collection sump transmits the sump water level to the PLC control system for use in operating the groundwater pumps (see Section 2.2). During the start-up period, water elevations in the piezometers and sump should be monitored to ensure drawdown to the desired elevation, and to ensure that the level sensor is properly calibrated to the normal sump operating levels. Specifically, the groundwater should, within a period of approximately 2 weeks or less, be fully drawn down and continuously maintained at an elevation between the pump start and stop levels (user setpoints entered into the PLC control panel).

In normal operating mode, the groundwater collection system draws down the surrounding groundwater through the collection trench into the collection sump and transfers this water to the groundwater treatment system via a PVC force main, thus effectively providing hydraulic containment and some removal of contaminants. Further enhancement to the remedial performance of the treatment system is possible if the groundwater collection system is periodically operated in a “pulsed” mode, wherein occasional resting periods are used to allow partial groundwater recharge to aid in

flushing of soils located above the elevation of the depressed groundwater table. Potential benefits of pulsed GWTS operation include improved remedial effectiveness (flushing of soils increases overall contaminant removal and minimizes potential for "rebound" effect following completion of site remediation), and reduced energy usage and operating costs (pulsed systems typically require fewer total hours of pump operation to achieve remedial objectives).

Based upon observations made following previous groundwater collection trench shutdown periods, it does not appear that short-term shut-down of the groundwater pumps has a significant impact upon hydraulic containment and contaminant migration. As such, it is recommended that occasional groundwater collection pump resting periods (up to 1 or 2 per year) be utilized. This can be done manually, or can be automated, as long as the groundwater recharge process is monitored daily to ensure that a degree of hydraulic containment is maintained throughout each pump resting period. Once the rate of level increase in the groundwater collection trench slows over time, this indicates that the hydraulic containment is weakening, and the groundwater pumps should be restarted. Maintenance activities that require the system to be off-line (such as cleaning and maintenance of the air stripper) can be completed concurrent with the pump resting periods.

When operating the groundwater collection system, the groundwater elevation must remain above the sand bedding surrounding the collection trench, an approximate elevation of 499.5 feet above msl or 22.5 feet below the finish grade elevation of 522 feet above msl. If the groundwater elevation drops below this level, oxidation within the pores of the sand bedding may occur, resulting in clogged sand bedding. An SOP for maintenance of the groundwater collection trench and pump station is presented in Appendix A.2.

2.2 PUMP STATION

The groundwater collection pump station is located in a pit at the center of the groundwater collection trench. This pump station transfers the collected groundwater to the treatment system. The pump station consists of two submersible, end suction, centrifugal type pumps. The groundwater collection pumps are automatically operated based on level of water in the sump reported by an ultrasonic pressure transducer in the pump station. The programmable logic controller (PLC – see Section 2.9) monitors water level in the pump station and operates the collection pumps as needed to maintain levels specified by the plant operator at the PLC interface panel. A flowmeter is also attached to the pump station force main to measure the influent flow to the system.

Major components in the pump station are the pumps (various manufacturers have been used, most recent installation in 2014 was a Liberty FL154M) and level controller (most recent replacement was a Emerson-Rosemount 3107HP1PN1I5, 4-20 mA output).

Design data for the pumps:

45-55	Capacity (gpm)
80	Total Dynamic Head (ft)
3450	Speed (rpm)
2	Pump Discharge (in)
1.5	Motor Horsepower (HP)
460V/3Ø	Motor Voltage
3/4	Solid Size (in)

Refer to the collection pump manufacturer's literature for detailed maintenance procedures of the groundwater collection pumps. The pumps must be removed from the collection sump using the lift cables and a tripod hoist setup. An SOP covering general maintenance of the groundwater collection trench and pump station is presented in Appendix A.2.

2.3 SEQUESTERING AGENT FEED SYSTEM

The sequestering agent feed system consists of one 55-gallon sequestering agent feed drum and two feed pumps as illustrated on Figure 4. The feed pumps are variable-speed diaphragm metering pumps. An external backpressure valve is provided to maintain metering pump discharge pressure above the manufacturer's recommended minimum pressure. A pressure relief valve is provided to protect the piping system from over pressurization. The sequestering agent is introduced into the groundwater upstream of the bag filters. The sequestering agent complexes with iron, manganese and hardness (calcium and magnesium) ions in solution, minimizing scale buildup in the process equipment. The groundwater then passes through the bag filters which remove suspended solids.

The major components of the sequestering agent feed system are:

(i) Sequestering agent feed tank (55-gallon drum).
(ii) Two sequestering agent feed pumps (one online, one spare)
(iii) External backpressure valve.
(iv) Pressure relief valves to protect the piping system from overpressure (each pressure relief valve is factory preset for 50 psig).

Only one of the sequestering agent feed pumps is used at a time, with the other left offline and unplugged (as a spare). The online pump is normally operated in an automated mode, at 50% stroke setting, and at variable pump speed that is proportional to the influent flow rate. The automatic speed control input is via a remote 4-20 mA signal from the influent flow meter (FE002). If changing pumps, the 4-20 mA analog input cable must be switched from one pump to the other.

The chemical currently used as a sequestering agent is Rochester Midland CD900 calcium dispersant and scale inhibitor, which is manually mixed up in the feed tank at a rate of 10:1 (5 gallons chemical is mixed with 50 gallons of water). A hand pump is used to removed 5 gallons of concentrated chemical from the chemical drum, and is mixed with 50 gallons of fresh water (from a hose) in the feed tank. Once mixed, the chemical solution remains homogeneous and further mixing is typically not required.

Chemical feed rates (i.e. stroke setting) should be periodically checked in accordance with the chemical manufacturers recommendations to confirm that sufficient chemical dispersant and scale inhibitor residuals are being fed given the groundwater characteristics. The metering pumps will receive routine maintenance on an annual basis or when a calibration check indicates wearing of pistons or seals. General sequestering agent feed system maintenance procedures are presented in Appendix A.3.

2.4 BAG FILTER

After addition of the sequestering agent, the groundwater is filtered through bag filters to remove particulates which could accumulate in the feed tank or air stripper. Filtration is accomplished using two multiple bag filter vessels. Each filter housing is made of epoxy-lined carbon steel with eight filter bags. The filter bags are 30 inches long and equipped with handles for easy removal. The bag filters are piped to allow single, series, or parallel operation.

The operation of the bag filters is manually controlled by ball valves BV-6, BV-7, BV-11, BV-12 and BV-16 which allow the filters to be used in single, series, or parallel operation.

The major components of the bag filter system and design data are listed below.

(i) Bag Filter Housing:

- No. of units: 2
- Epoxy-coated carbon steel vessels, each with eight #10 wire mesh filter bag support baskets
- Pressure gage connections equipped with gauge guards and liquid-filled pressure gauges (0-50 psi)
- Liquid displacers for each filter basket to assist in filter bag changeout.
- Pressure Rating: 150 psi

(ii) Filter Bags:

- Standard #2 size bags, 30 inches deep, each with 4.4 square feet of surface area and equipped with handles for easy removal from filter vessel.
- 8 filter bags per vessel
- 10 micron woven nylon bags
- 30 micron woven nylon bags

In normal operating mode (i.e., after steady-state conditions have been reached, and few solids are expected to be present), one bag filter is adequate for service, and the second bag filter can be left in standby mode. Woven nylon 10 micron filter bags are recommended for use during normal operations. Filter bags should be changed when the differential pressure exceeds 10 psi. To accomplish bag changeout, the standby vessel can be placed in operation and the previously active vessel placed in standby mode by opening and closing the appropriate ball valves. Alternately, the feed pumps can be shut down for a brief period while the bags in the primary vessel are changed out. Under typical operating conditions, the bags will only need to be changed out twice per year or so.

When changing the bag filters, after taking the filter off-line, the bag filter vent should be opened first, followed by the drain valve (either BV-10 or BV-15) to allow the groundwater remaining in the vessel to drain. Loosen the lid eyebolts and use the hoist to lift the lid, then swing the lid to the side to expose the filter bags. Once the water has drained from the unit, the filter bags can be removed and replaced. Used bags must be disposed of in accordance with applicable state and federal regulations. Once the new filter bags are installed in the vessel, the vessel lid is swing back in place and tightened, and the drain valve and vent valves are closed. When restarting the system with new bag filters, air will need to be bled from the vent valve until the vessel fills with water and is air-free.

If the collected groundwater exhibits a high solids concentration for any reason (soils disturbance or other), the bag filters may be operated in series mode, with the first bag filter fitted with coarse bags (30 micron) and the second filter fitted with 10 micron bags. Oil adsorbing bags (25 micron) may also be used in place of the 30 micron bags if DNAPL is present.

A small amount of grease should be applied periodically to the swing davit which is used to lift the lid off the vessel. As noted above, it is essential that either the standby vessel is placed in operation or the feed pump is shutdown prior to filter bag changeout to avoid operating the pumps against a closed valve or overflowing the open vessel. An SOP covering general operation and maintenance of the bag filter system is presented in Appendix A.4.

2.5 FEED TANK

The feed tank is designed for equalization and storage of the filtered groundwater prior to treatment in the air stripper. The tank has a capacity of 1,500 gallons and is constructed of linear high density polyethylene (HDPE). The feed tank is located downstream of the bag filters and upstream of the air stripper. Duplex horizontal centrifugal feed pumps deliver groundwater from the feed tank to the air stripper.

The feed tank is equipped with an ultrasonic liquid level transmitter to regulate the stripper feed pumps as described in Table 2-1. At a low liquid level, the controller will shut off the feed pumps. A rising level in the feed tank re-starts the feed pumps. At a high liquid level, the controller will shut off the collection trench pumps and the building sump pumps (building sumps discharge to the feed tank) to prevent the feed tank from overflowing. A falling level in the feed tank allows the collection trench pumps and the building sump pumps to re-start.

The major components of the bag filter system and design data are listed below.

- One 16-inch manway with non-vented cover
- Four 2-inch side wall mounted PVC bulkhead fittings
- One 1-inch side wall mounted PVC bulkhead fitting
- One 2-inch flange top mounted vent connection
- One 3-inch diameter top mounted level transmitter stillwell
- One bolt-on 130-inch high steel ladder to provide access to the manway

During normal operation, groundwater will be pumped into the feed tank from the groundwater collection trench pumps (and through the bag filters). The tank provides liquid inventory for the air stripper feed pumps, which withdraw collected groundwater from the tank. Depending on the flow rate being delivered by the collection trench pumps and the flow rate of the air stripper feed pumps, the treatment system will operate in either continuous or batch mode.

The feed tank does not require any routine maintenance.

2.6 AIR STRIPPER FEED PUMPS

Two self-priming, centrifugal, seal-less, magnetic drive pumps are used to transfer the stored water from the feed tank to the air stripping unit. Air stripper feed pump operation is based on both feed tank level and liquid level in the air stripper sump as described in Table 2-1. Under normal operating conditions, the feed pumps deliver groundwater from the feed tank to the air stripper, and pump operation is controlled automatically. Only one pump operates at a time, and the pumps alternate usage by day. High level in the stripper sump will cause the feed pumps to cease operation until a normal working level in the air stripper is observed.

The characteristics of the air stripper feed pumps are provided below.

Design Capacity (gpm)	40
Design Total Dynamic Head (ft)	38
Speed (rpm)	3450
Pump Suction (inches)	1-1/2" FPT
Pump Discharge (inches)	1" MPT
Motor Horsepower (HP)	3/4
Motor Voltage	460V / 3Ø / 60Hz
Motor Type	TEFC

Refer to the feed pump manufacturer's operation and maintenance manual for a detailed description of pump maintenance requirements. General maintenance requirements are identified in the SOP presented in Appendix A.6.

2.7 AIR STRIPPER

The low profile air stripper is designed to remove volatile organic compounds from a 40-GPM contaminated groundwater feed rate by forced draft, countercurrent contact of the inlet air stream with the contaminated water. Air is drawn from outside the treatment system enclosure and discharged to the atmosphere through a 38-foot (above ground level) stack. After flowing across the multiple air stripper trays, the treated groundwater is collected in the air stripper sump and discharged to the sanitary sewer. The air stripper is comprised of four aeration trays, a collection sump, duplex blowers, duplex discharge pumps (see Section 2.8), and a control panel.

Under normal operation, the air stripper blowers cycle on and off as described in Table 2-1 to treat the incoming water from the feed tank feed pumps. The blower provides both aeration and backpressure in the trays to retain a certain amount of water in each tray, which allows air to bubble up through the water in each tray, “stripping” the volatile component from the water and transferring it into the air, which is discharged to atmosphere above the roof. This is a multi-stage counter-current process, wherein the cleanest air contacts the cleanest water in the bottom tray for maximum removal efficiency. Once the blowers are shut down, the retained water in the trays drains down into the sump. As this volume of retained water can be significant, the blower is programmed to continue running after the feed pump stops so that the sump level is low enough to provide sufficient capacity to accept the volume of water retained in the trays, as well as to provide additional treatment to the retained water on the air stripper trays.

The major components of the air stripper system are listed below.

- Four perforated stainless steel trays with cleanout ports
- Integral collection sump (185 gallon) with liquid level sight tube
- Two dual direct drive blowers rated for up to 900 cfrn
- Sump liquid level sensors
- Pressure gauge switch

The air stripper blowers are operated drawing 100% outside air. Removal efficiencies during winter have been observed to remain sufficiently high in winter that use of tempered air (combination of outside air and indoor heated air) has not been required to date, and should be avoided if possible to minimize building heating costs.

Common operating problems associated with the air stripping unit include solids build-up, scaling, and/or biological growth. While proper use of the sequestering agent (see Section 2.3) will minimize solids build-up and scaling, occasional change out and cleaning of the plates is required to maintain optimum performance, and should be completed every one to two years, or when the influent air pressure increases above the manufacturer's recommended level (18 in. water). Two sets of plates are maintained at the site for ease of change out, and to minimize system down time during this process. Plate cleaning procedures and other general maintenance requirements are identified in the shallow tray air stripper manufacturer's operation and maintenance manual, and in the SOP presented in Appendix A.7.

2.8 DISCHARGE PUMPS

The discharge pumps are be used to transport the treated groundwater from the stripper discharge sump to sanitary sewer outfall 001 (pump station at the Fire Training Grounds). The discharge pumps are designed to operate in a batch mode, controlled by high and low indicators in the stripper sump. A flowmeter (FE007) and totalizer were installed in the discharge line to monitor the flow from the discharge pumps.

Under normal operations, level sensors in the stripper sump relay signals to turn the discharge pumps on and off, and pump operation is controlled automatically. At the completion of each stripper operating cycle, a discharge pump will be operated until low level is reached in the stripper sump, thus ensuring that no overflow will occur at the end of the stripper cycle, when water held in each plate drains to the bottom sump after the stripper blowers are turned off. Only one pump operates at a time, and the pumps alternate usage by day. High level in the outfall 001 (Fire Training Grounds) pump station will cause shutdown of the discharge pumps to prevent a potential overflow of the pump station.

The characteristics of the air stripper feed pumps are provided below.

Design Capacity (gpm)	80
Design Total Dynamic Head (ft)	40
Speed (rpm)	3450
Pump Suction (inches)	1-1/2" FPT
Pump Discharge (inches)	1-1/4" MPT
Motor Horsepower (HP)	1-1/2
Motor Voltage	460V / 3Ø / 60Hz
Motor Type	TEFC

Refer to the discharge pump manufacturer's operation and maintenance manual for a detailed description of pump maintenance requirements. General pump maintenance requirements are identified in the SOP presented in Appendix A.6.

2.9 INSTRUMENTATION AND CONTROLS

The groundwater collection and treatment system instrumentation package provides automated systems operation and monitoring of the complete system. Basic operation of the groundwater collection and treatment system components is described in sections 2.1 through 2.8 of this manual. The system interface panel provides direct interfacing with the programmable logic controller (PLC) for on-off-auto control of all equipment, display of equipment operations status, current water levels and flowrates, daily totalized flowrates for the past two weeks, equipment run times, and both current and historically logged system alarms. As such, the system interface panel provides a central location for monitoring and control of the full groundwater collection and treatment system, and includes a web server for remote monitoring of the system from any internet-enabled computer or smart phone. Associated instrumentation that is monitored by the PLC and interface panel includes submersible pressure and ultrasonic level transmitters, magnetic flow transmitters, level sensors, pressure sensors, pump and blower auxiliary motor contact switches, room temperature transmitter, etc.

The system is designed for fully automated operation, requiring minimal operator attention for routine monitoring, operation and maintenance activities. A Process Control Summary is provided in Table 2-1 to describe the detailed controls and instrumentation/process interlocks that the PLC program uses to start and stop each piece of equipment when all equipment is placed in “auto” mode from the interface panel. When trouble-shooting any equipment item that is not operating as anticipated, Table 2-1 should be referred to for a detailed listing of pre-requisites that the PLC requires prior to operating the equipment.

There are a total of 14 primary system alarms that will cause the shutdown of one or more equipment items in the groundwater collection and treatment system. Table 2-2 provides a detailed listing of the potential causes for each system alarm, and indicates whether or not each alarm is self-resetting (certain alarms can only be reset by the operator.

Copies of the detailed HMI Interface and PLC programming are provided in Appendix K. The systems control and instrumentation requires no routine preventive maintenance. Refer to the instrumentation manufacturer's operations and maintenance manuals for instrumentation-specific trouble-shooting and maintenance instructions.

TABLE 2-1
PROCESS CONTROL SUMMARY

Equipment	Operation
Groundwater Pumps	Pumps P-1 and P-2 alternate by day when both are in auto Pump starts in auto when all of the following conditions are met: • trench water level is above "on" setpoint (user-set at PLC panel) • feed tank level is 7.5 feet or less • feed tank high level float switch is down • floor sump high-high level float switch is down • groundwater pump failure alarm is off (see alarms summary) • TGA pump station alarm is off (see alarms summary) • 24V power failure alarm is off (see alarms summary) • it has been at least 10 minutes since pump was last running in hand or auto (press alarm reset to bypass timer) Pump stops in auto when any one of the following conditions are met: • trench water level is at or below "off" setpoint (user-set at PLC panel) • feed tank level is above 7.5 feet • feed tank high level float switch is up • floor sump high-high level float switch is up • groundwater pump failure alarm is on (see alarms summary) • TGA pump station alarm is on (see alarms summary) • 24V power failure alarm is on (see alarms summary)
Feed Pumps	Pumps P-1 and P-2 alternate by day when both are in auto Pump starts in auto when all of the following conditions are met: • feed tank level is above 4.0 feet (or feed tank high level float switch is up) • stripper sump high-high level float switch is down • air stripper blower is running (in auto or hand from PLC panel) • feed pump failure alarm is off (see alarms summary) • TGA pump station alarm is off (see alarms summary) • 24V power failure alarm is off (see alarms summary) Pump stops in auto when any one of the following conditions are met: • feed tank level is below 2.0 feet (unless high level float switch is up) • stripper sump high-high level float switch is up • air stripper blower is not running (in auto or hand from PLC panel) • feed pump failure alarm is on (see alarms summary) • TGA pump station alarm is on (see alarms summary) • 24V power failure alarm is on (see alarms summary)

Discharge Pumps	Pumps P-1 and P-2 alternate by day when both are in auto Pump starts in auto when all of the following conditions are met: • stripper sump high level float switch is up (or low level float switch is up when feed pumps stop pumping) • stripper sump high-high level float switch is down • discharge pump failure alarm is off (see alarms summary) • TGA pump station alarm is off (see alarms summary) • 24V power failure alarm is off (see alarms summary) Pump stops in auto when any one of the following conditions are met: • stripper sump low level float switch is down • stripper sump high-high level float switch is up • discharge pump failure alarm is on (see alarms summary) • TGA pump station alarm is on (see alarms summary) • 24V power failure alarm is on (see alarms summary)
Floor Sump Pumps	Pumps P-1 and P-2 alternate by day when both are in auto Pump starts in auto when all of the following conditions are met: • floor sump high level float switch is up • feed tank high level float switch is down • floor sump pump failure alarm is off (see alarms summary) • TGA pump station alarm is off (see alarms summary) • 24V power failure alarm is off (see alarms summary) • it has been at least 10 minutes since pump was last running in hand or auto (press alarm reset to bypass timer) Pump stops in auto when any one of the following conditions are met: • floor sump low level float switch is down • feed tank high level float switch is up • floor sump pump failure alarm is on (see alarms summary) • TGA pump station alarm is on (see alarms summary) • 24V power failure alarm is on (see alarms summary)

Blowers	Blowers B-1 and B-2 alternate by day when both are in auto* (*Note that both are not currently run in auto at same time due to resulting water leakage at seal of non-operating blower if both are connected to stripper at same time) Blower starts in auto when all of the following conditions are met: • one or more feed pumps are trying to run in auto (feed pump will not start in auto until blower starts) • blower failure alarm is off (see alarms summary) • TGA pump station alarm is off (see alarms summary) • 24V power failure alarm is off (see alarms summary • it has been at least 10 minutes since blower was last running in hand or auto (press alarm reset to bypass timer) Blower stops in auto when any one of the following conditions are met: • feed pumps are off and stripper sump low level float switch is down for at least 6 minutes • blower failure alarm is on (see alarms summary) • TGA pump station alarm is on (see alarms summary) • 24V power failure alarm is on (see alarms summary)

TABLE 2-2
ALARMS SUMMARY

Alarm	Description
Feed Tank High Level	Alarm is turned on if: • feed tank level is at 8.0 feet or higher for at least 30 seconds; or • feed tank high level float switch is up; or • feed tank high level float switch fails or contact is broken (fail-safe, normally closed switch) Alarm is self-resetting (will turn off when above conditions are no longer met)
Air Stripper Sump High Level	Alarm is turned on if: • stripper sump high-high level float switch is up for at least 12 minutes; or • stripper sump high-high level float switch fails or contact is broken for at least 12 minutes (fail-safe, normally closed switch) Alarm is self-resetting (will turn off when above conditions are no longer met)
Floor Sump High Level	Alarm is turned on if: • floor sump high-high level float switch is up for at least 10 seconds Alarm is self-resetting (will turn off when above conditions are no longer met)
Groundwater Pump Failure	Alarm is turned on if: • PLC tries to run pump in hand or auto, but does not get a signal back from the starter auxiliary run contact that the pump is operating (contact must be broken for at least 5 seconds for alarm to be triggered) Alarm reset must be pressed at the PLC panel to turn the alarm off (does not self-reset)
Feed Pump Failure	Alarm is turned on if: • PLC tries to run pump in hand or auto, but does not get a signal back from the starter auxiliary run contact that the pump is operating (contact must be broken for at least 5 seconds for alarm to be triggered) Alarm reset must be pressed at the PLC panel to turn the alarm off (does not self-reset)
Discharge Pump Failure	Alarm is turned on if: • PLC tries to run pump in hand or auto, but does not get a signal back from the starter auxiliary run contact that the pump is operating (contact must be broken for at least 5 seconds for alarm to be triggered) Alarm reset must be pressed at the PLC panel to turn the alarm off (does not self-reset)

Floor Sump Pump Failure	Alarm is turned on if: • PLC tries to run pump in hand or auto, but does not get a signal back from the starter auxiliary run contact that the pump is operating (contact must be broken for at least 5 seconds for alarm to be triggered) Alarm reset must be pressed at the PLC panel to turn the alarm off (does not self-reset)
Blower Failure	Alarm is turned on if: • stripper low pressure switch is not on while blower is running (switch must be off for at least 10 seconds for alarm to be triggered); or • stripper low pressure switch fails, or contact wiring is broken while blower is running (contact must be lost for at least 10 seconds for alarm to be triggered); or • PLC tries to run blower in hand or auto, but does not get a signal back from the starter auxiliary run contact that the blower is operating (contact must be broken for at least 10 seconds for alarm to be triggered) Alarm reset must be pressed at the PLC panel to turn the alarm off (does not self-reset)
24V Power Supply Failure	Alarm is turned on if: • 24VDC power supply inside the PLC panel ceases to provide control power for at least 0.5 seconds Alarm reset must be pressed at the PLC panel to turn the alarm off (does not self-reset)
Influent Flow Meter Failure	Alarm is turned on if: • analog input signal at PLC is broken, or signal deviates outside of the expected 4-20 mA range Alarm is self-resetting (will turn off when above conditions are no longer met)
Effluent Flow Meter Failure	Alarm is turned on if: • analog input signal at PLC is broken, or signal deviates outside of the expected 4-20 mA range Alarm is self-resetting (will turn off when above conditions are no longer met)
Feed Tank Level Instrumentation Failure	Alarm is turned on if: • analog input signal at PLC is broken, or signal deviates outside of the expected 4-20 mA range Alarm is self-resetting (will turn off when above conditions are no longer met)

Groundwater Trench Level Instrument Failure	Alarm is turned on if: • analog input signal at PLC is broken, or signal deviates outside of the expected 4-20 mA range Alarm is self-resetting (will turn off when above conditions are no longer met)
TGA Pump Station High Level	Alarm is turned on if: • TGA pump station float switch is up for at least 10 seconds; or • RF signal or instrumentation fails for at least 10 seconds. Alarm is self-resetting (will turn off when above conditions are no longer met) Alarm may be over-ridden from PLC control panel (user settings) if desired when alarm is verified due to instrumentation failure, and not high level conditions

2.10 BUILDING SUMP PUMPS

The building sump pumps are used to pump building and equipment washdown, drainage from equipment and piping during maintenance, and any spills or leaks to the influent feed tank for processing through the treatment system prior to discharge.

Under normal operations, level sensors in the floor collection sump relay signals to turn the sump pumps on and off, and pump operation is controlled automatically. Only one pump operates at a time, and the pumps alternate usage by day. High level in the feed tank will prevent the sump pumps from operating to prevent a potential overflow of the feed tank.

The characteristics of the submersible floor sump pumps are provided below.

Design Capacity (gpm)	95
Design Total Dynamic Head (ft)	18
Speed (rpm)	1550
Pump Discharge (inches)	2" MPT
Motor Horsepower (HP)	3/4
Motor Voltage	115V / 1Ø / 60Hz

Refer to the discharge pump manufacturer's operation and maintenance manual for a detailed description of pump maintenance requirements. General pump maintenance requirements are identified in the SOP presented in Appendix A.6.

3.0 COLLECTION AND TREATMENT SYSTEM MONITORING

Monitoring of the groundwater collection and treatment system will be conducted throughout the operational life of the system to: demonstrate compliance with regulatory requirements associated with operation of the system (i.e., air emissions and sewer use permit limitations); assist in the ongoing evaluation of the effectiveness of the system in remediating the overburden groundwater in the SDA; and to determine the degree and frequency of routine maintenance needs. A suggested log form for recording pertinent groundwater collection and treatment system operating data is presented as Appendix B. The log form should be modified as needed based on current system conditions and monitoring needs, and completed logs should be maintained in the treatment building.

Groundwater collection and treatment system and associated Site monitoring will consist of:

- recording daily discharge flowrates (as calculated by the PLC based upon monitoring of the discharge flowmeter);
- recording monitoring well and piezometer water levels on a quarterly basis (see Section 3.4);
- monthly collection and analysis of aqueous samples at various locations within the treatment process train (see Section 3.3); and
- semi-annual collection and analysis of groundwater monitoring well samples

Table 3-1 presents a summary of treatment system and monitoring well sampling requirements.

3.1 AIR EMISSIONS PERMIT

The air stripper discharges approximately 900 cfrn of air containing volatile organic compounds (VOCs) stripped from the groundwater. Thus, the air stripper is an air emission point source. Because the Rochester Fire Academy groundwater remediation is conducted under a Consent Order (B8-02-5-87-09), the air stripper is exempt from formal permitting requirements; however, a New York State Department of Environmental Conservation (NYSDEC) Permit to Construct/Certificate to Operate (PC/CO) a Process, Exhaust, or Ventilation System was completed to convey the pertinent treatment process emissions information. This permit was submitted to the NYSDEC Division of Air Resources (DAR) for review and approval. A copy of the PC/CO application and the approval letter are provided as Appendix C. A discussion of the substantive requirements of the PC/CO is presented below.

TABLE 3-1
ROCHESTER FIRE TRAINING ACADEMY

SUMMARY OF ROUTINE GROUNDWATER TREATMENT SYSTEM AND MONITORING WELL SAMPLING

Location	Purpose	Sample Type	Sample Frequency	Parameters
GWTS Influent[1]	GWTS performance monitoring/estimate air emission rates	Grab	Quarterly	VOCs (EPA 624), Pesticides (EPA 608)
Air Stripper Effluent	GWTS performance monitoring/estimate air emission rates	Grab	Quarterly	VOCs
GWTS Effluent	GWTS performance monitoring/discharge compliance monitoring	Grab	Monthly	Purgeable Halocarbons, Purgeable Aromatics, pH, flow rate
		Composite	Quarterly	Metals[2], Pesticides, Diethyl Phthalate, Bis(2-ethylhexyl) phthalate, 4-Methylphenol (p cresol)
MW-6I, 7S, 7I, 8I, 9D, 10I, 11I, 15S	Monitor groundwater quality	Grab[3]	Semi-Annually	VOCs (601/602), MTBE

Notes:
(1) Collected prior to bag filter unit.
(2) Metals (totals) include: arsenic, cadmium, chromium, copper, lead, nickel, selenium and zinc.
(3) Follow procedures in Appendix E. Also measure water level in each well and collection trench piezometers.

The VOC loadings to the atmosphere presented in the PC/CO application were considered acceptable by the NYSDEC and are presented in Table 3-2. Therefore, VOC loadings from the air stripper to the atmosphere must remain below these loadings at all times.

In general, VOC loadings will be calculated by means of a groundwater VOC mass balance around the air stripper. Grab samples of air stripper influent and effluent groundwater are collected and analyzed for organic compounds using EPA methods 601 and 602. The daily total discharge flow rate is then used to calculate the VOC loading to atmosphere for each organic contaminant detected in the air stripper influent groundwater using the following formula:

$$M_i \text{ (lbs/hr)} = [C_{in(i)} (\mu g/l) - C_{out(i)} (\mu g/l)] \times Q \text{ (gal/min)} \times 60 \text{ (min/hr)} \times 3.785 \text{ (L/gal)} \times 2.205 \times 10^{-9} \text{(lb/}\mu g)$$

$$= [C_{in(i)} (\mu g/l) - C_{out(i)} (\mu g/l)] \times Q \text{ (gal/min)} \times 5.007 \times 10^{-7} \text{ (min L lbs/hr gal } \mu g)$$

where: M_i = Mass of compound I emitted to the atmosphere per hour
$C_{in(i)}$ = Air stripper influent concentration of compound i
$C_{out(i)}$ = Air stripper effluent concentration of compound i
Q = GWTS effluent flow rate

Note: The variables must be in the units noted in the formula (i.e. $C_{in(i)}$ and $C_{out(i)}$ must be in µg/l, and Q must be in gal/min). Conversion of units may be necessary.

VOC loadings to the atmosphere will be calculated on a quarterly basis. The VOC loading calculated using the average daily total discharge flow rate represents the daily average VOC loading, while the VOC loading calculated using the maximum daily flow rate represents the maximum daily VOC loading. The mass loadings for each compound detected in the air stripper influent will be compared to the values presented in Table 3-2. Neither the average nor the maximum daily VOC loading (on an hourly basis) should exceed the hourly emission rate potential (ERP) listed on Table 3-2. Records of the VOC loading results will be maintained at the groundwater treatment facility. The NYSDEC should be notified if emissions limits are exceeded. Reports of exceedances should be forwarded by the City of Rochester to:

Project Manager
NYSDEC Site Number 8-28-015
New York` State Department of Environmental Conservation
50 Wolf Road
Albany, NY 12233
(518) 457-7878

TABLE 3-2
ROCHESTER FIRE TRAINING ACADEMY

ACCEPTABLE VOLATILE ORGANIC COMPOUND LOADINGS

Contaminant	Hourly ERP[1] Emissions (lbs/hr)	Hourly Actual Emissions (lbs/hr)	Annual Emissions (lbs/yr)
Acetone	0.032	0.012	105.00
Chloroform	<0.001	<0.001	0.50
Benzene	<0.001	<0.001	0.60
1,1,1-Trichloroethane	0.158	0.059	519.00
Chloroethane	0.002	0.001	4.90
Vinyl Chloride	0.004	0.002	14.50
Methylene Chloride	0.012	0.004	38.10
Bromodichloromethane	<0.001	<0.001	0.60
1,1-Dichloroethane	0.020	0.008	65.70
1,1-Dichloroethene	0.002	0.001	7.90
2-Butanone	0.003	0.001	9.90
Trichloroethylene	0.019	0.007	61.80
Ethylbenzene	0.007	0.003	22.30
1,2-Cichloroethane	0.001	<0.001	3.00
4-Methyl-2-Pentanone	0.003	0.001	10.50
Toluene	0.018	0.007	59.80
Chlorobenzene	<0.001	<0.001	0.50
Tetrachloroethylene	0.002	0.001	5.80
1,2-Dichloroethene	0.600	0.225	1970.00
Xylene	0.046	0.017	151.00

Note: (1) ERP = Emission Rate Potential (highest possible emission rate).

3.2 SEWER USE DISCHARGE PERMIT

An industrial sewer use permit (Permit No. 705) was issued by the Monroe County Pure Water District to the City of Rochester Fire Academy for discharge of treated groundwater from the groundwater treatment system to the sanitary sewer. The Rochester Fire Academy is located in Monroe County Pure Waters District No. 8535. A copy of the original sewer use permit application, the original permit, and the most recent permit renewal issued August 18, 1995 are provided in Appendix D.

The groundwater treatment system operator(s) should be thoroughly familiar with all requirements of the Rochester Fire Academy Sewer Use Permit (see Appendix D). Routine monitoring and reporting requirements under the current industrial sewer use permit are summarized below. It should be noted that the industrial sewer permit requirements are subject to change, and any changes to the sewer use permit must be complied with and will supercede the requirements listed below.

a. *Self Monitoring and Reporting:* Self monitoring and reporting of the treatment system effluent quality to confirm compliance shall be conducted by monthly and quarterly sampling, as indicated below. Sampling will be conducted in a manner such that the collected samples will be representative of normal treatment process operation and expected pollutant discharges to the sanitary sewer. Analytical results shall be submitted with a cover letter to:

   Monroe County Pure Waters
   Industrial Waste Section
   Iola Campus, Building 5
   350 East Henrietta Road
   Rochester, NY 14620

   If any parameter exceeds the applicable permit limits, the Monroe County Pure Waters District Industrial Waste Section must be notified at 585-753-7600 (option 4) within 24 hours of receipt of the analytical results. If there is no discharge for a given month, then a letter must be submitted stating so.

b. *Quarterly Composite Sampling Protocol:* Sampling and analysis shall be performed in accordance with the techniques prescribed in 40 CRF Part 136 and amendments thereto. A 24-hour timed composite sample shall be collected from the treated effluent and analyzed for the following parameters, and shall meet the corresponding concentration limits:

Parameter	Limit (ppm)
Arsenic	0.5
Cadmium	1.0
Chromium	3.0
Copper	3.0
Lead	1.0
Nickel	3.0
Selenium	2.0
Zinc	5.0
Pesticides	*
Diethyl Phthalate	*
Bis(2-ethylhexyl) phthalate	*
4-Methylphenol (p cresol)	Monitor Only

Note: all parameters are analyzed for total concentration.

* Components of TTO subject to 2.13 mg/l cumulative limit (see monthly grab sampling TTO limit).

c. *Monthly Grab Sampling Protocol*: Sampling and analysis shall be performed in accordance with the techniques prescribed in 40 CRF Part 136 and amendments thereto. A grab sample, collected from the treatment system effluent, shall be analyzed for the following parameters, and shall meet the corresponding concentration limits:

Parameter	Limit
pH	5.0-12.0
Acetone	Monitor Only
Methyl Ethyl Ketone (2-Butanone)	Monitor Only
Methyl Isobutyl Ketone (4-methyl-2-pentanone)	Monitor Only
Total Toxic Organics (TTO)	2.13 ppm

Notes:
BDL = Below detection limit.
TTO = The summation of Purgeable Halocarbons,and Purgeable Aromatics, plus (when monitored quarterly): pesticides, diethyl phthalate and bis(2-ethylhexyl)phthalate .

d. All groundwater must be treated regardless of the influent concentrations.

e. Quarterly flow summaries shall be submitted, in a timely manner, for billing purposes to the Monroe County Pure Waters District at the following address:

Monroe County Pure Waters
Industrial Waste Section
Iola Campus, Building 5
350 East Henrietta Road
Rochester, NY 14620

f. Proper chain-of-custody procedures and documentation will be used for transfer of the samples to a New York State Department of Health ELAP-certified laboratory for analysis in compliance with applicable holding times, preservatives, and container specifications for analysis of the treatment system effluent in accordance with current Monroe County Pure Waters Districts discharge permit requirements.

3.3 TREATMENT SYSTEM PERFORMANCE MONITORING

Following removal of activated carbon from the treatment system years ago, the sole remaining treatment component of the system that requires performance monitoring is the air stripper. Performance of the air stripper is monitored as described in Section 3.1 of this manual, and testing to monitor and assess the performance of the air stripper is as summarized in Table 3-1.

3.4 GROUNDWATER MONITORING

Upgradient and downgradient wells will be sampled from each of the monitored areas (SDA, TGA, and NDA) on a semi-annual basis during the post-remediation period. The groundwater monitoring wells to be sampled are located on Figure 3, and include the following:

South Disposal Area
Upgradient Wells: 9D
Downgradient Wells: 7S, 7I

Training Grounds Area
Upgradient Wells: 6I
Downgradient Wells: 8I, 15S

North Disposal Area
Upgradient Wells: 10I
Downgradient Wells: 11I

Sampling upgradient monitoring wells 6, 9, and 10 establish background groundwater quality in the TGA, SDA, and NDA, respectively. The remaining wells will be sampled to monitor the downgradient water quality in each of these three areas. In addition, groundwater elevation data will be recorded at monitoring wells as well as within the groundwater collection trench.

Based on the results of previous investigations at the Site, and long-term identification of primary parameters of potential concern, as well as for continuity of prior well testing, groundwater samples from both the upgradient and downgradient monitoring wells identified above will continue to be analyzed semi-annually for VOCs (EPA 601/602) and MTBE, as summarized in Table 3-1.

Groundwater sampling will be performed using disposable polyethylene hailers. Monitoring well sampling will be conducted in accordance with the following procedure:

- Unlock and carefully remove well cover to avoid any foreign material falling into the well.

- Slowly lower a water level indicator probe into the well and record the static water level (in feet below the top of the well riser). Next, lower the probe to the bottom of the well, record the bottom depth, and calculate the standing well volume.

- Purge the well by removing three (3) to five (5) well volumes from rapidly recharging wells, and at least one well volume (or to dryness) from slowly recharging wells. Procedures to be followed for well purging are presented as Appendix E.l.

- Transfer purge water to the head of the groundwater treatment system for treatment prior to discharge.

- Collect water samples following the procedure presented as Appendix E.2. In general, sample collection should be completed within 24 hours after well purging.

- Record all the pertinent information indicated on the field data sheet in Appendix E.2. All sample information should also be recorded in a bound field notebook.

- Label sample bottles and ship to the analytical laboratory under chain of custody command in accordance with Appendices E.3 and E.4, respectively.

- Replace the well cover and lock. Decontaminate water level probe and field instruments with laboratory-grade soap and analyte-free water prior to sampling the next well.

Proper chain-of-custody procedures and documentation will be used for transfer of the samples to a New York State Department of Health ELAP-certified laboratory for analysis in compliance with applicable holding times, preservatives, and container specifications.

The results of the downgradient groundwater monitoring will be compared to historical analytical results for each location as well as Class GA Groundwater Quality Standards and upgradient sample results. Based on this comparison, a determination will be made as to the effectiveness and integrity of the remedial measures, including the hydraulic and treatment efficiency of the groundwater collection and treatment system in the SDA.

4.0 TREATMENT BUILDING

4.1 STRUCTURE AND COMPONENTS

The treatment building provides an environmentally controlled enclosure for process equipment and office facilities for one operator. The treatment building is a clear-span, rigid-frame, premanufactured metal building with an overhead door for equipment removal. The interior concrete floor is sloped to a centrally-located drainage trench and treated with a chemical floor hardener. A sump with a 1,500-gallon capacity is provided within the drainage trench. Equipment pads are provided to support the bag filters, pumps, and feed and discharge tanks.

The structure includes a concrete masonry unit office, an overhead door, a drainage trench with grating, a sump pit, equipment pads, and a bag filter platform.

Maintenance of the building will depend on periodic inspection of the integrity of the structure. In general, the structure is designed to be free of routine maintenance such as painting, roof replacement, etc. Concrete areas should be periodically checked for cracks or other indications of structural failure. Patching of the concrete may be required for small cracks. Areas with larger separations in the concrete may need to be replaced. The drainage trench and sump pit should be periodically inspected for obstructions in the path of flow. Any obstructions should be removed. The enclosure walls should be checked for bowing due to excessive loads on the walls. If the walls are bowing, additional support must be provided to the piece of equipment causing the excessive load. In addition, a small amount of lithium grease should be periodically applied to the overhead door track.

4.2 UTILITIES

Operation and maintenance of the SDA groundwater treatment system requires potable water, sewer, natural gas, electric and cellular data service. General details and locations of these service lines are described below.

- **Potable Water:** The 4-inch diameter ductile iron potable water main servicing the TGA has been extended to the SDA. At the treatment building, the water main is reduced to a 2-inch copper line. Maintenance on the water main should not be required.

- **Sewer:** A 3-inch diameter ductile iron sewer force main, which serves as a conduit for discharge of treated groundwater to the sanitary sewer, extends from the SDA groundwater treatment system to the effluent manhole south of the existing classroom building. The force main may need to be flushed periodically to minimize solids buildup.

- **Natural Gas:** The gas piping in the TGA has been abandoned in place and the gas meter relocated to the lawn area northwest of its former location in the TGA. A 2-inch diameter gas main has been extended from the metering point to the SDA along the SDA access road. Maintenance on the gas piping should not be required.

- **Electric:** The power panels and service transformer at the pump house have been upgraded to provide power to the treatment facility as well as any future requirements in the TGA. The existing pump house services the SDA via underground conduit to the groundwater treatment system.

- **Cellular Data:** Cellular data service in the treatment building control room provides internet and remote monitoring service for plant operations and alarms. A cellular antenna on the northwest corner of the building provides an amplified signal to the cellular data modem.

5.0 COVER SYSTEM INSPECTION AND MAINTENANCE

Remedial activities undertaken in the North Disposal Area, South Disposal Area and Training Grounds Area involved placement of final cover systems upon completion of the work. The cover systems installed in each area are as follows:

North Disposal Area - Soil/Synthetic cover consisting of a 40 mil HDPE liner, 24 inches of barrier soil and 6 inches of topsoil

South Disposal Area - Soil cover consisting of 6-inches of topsoil

Training Grounds Area - Asphalt cover (base and surface courses) and concrete

A summary of the inspection and maintenance/repair programs to be followed for the cover systems is presented below. These programs will be followed for a post-remedial period of at least 30 years. Following the 30-year period, the City and NYSDEC will assess the need for further site maintenance.

5.1 COVER SYSTEM INSPECTION

The City of Rochester is responsible for routine inspection of the cover materials and supporting infrastructure in the North Disposal Area, Training Grounds Area, and South Disposal Area. The covers/infrastructure in each of these areas will be inspected on an annual basis throughout the post-remedial period, and will be examined for:

- Integrity of cover, including:
  - erosion or settling of cap materials
  - cracking/breaches in covers
  - slope loss
  - pooling or ponding of surface water
  - loss of vegetative cover (excluding the Training Grounds Area)
  - presence of undesirable plant or animal species

- Integrity of remaining groundwater monitoring wells

An inspection checklist for visual inspection of the cover systems in provided in Appendix F. The results of the annual inspection, including any maintenance actions planned or taken, will be summarized in the Periodic Review Report that is submitted to NYSDEC on an annual basis (see Section 8.0).

5.2 COVER SYSTEM MAINTENANCE AND REPAIR

Maintenance of the cover systems will be coordinated by the City of Rochester as necessary over the post-remedial care period. Any signs of erosion, settling, cracking, or other site damage or maintenance problems detected during routine site inspections will be corrected as soon as practical. Routine maintenance of the cover systems and infrastructure will include mowing and/or care of the vegetative covers of the North Disposal Area and South Disposal Area (i.e., within the fence line) frequently enough to prevent growth hindrance or smothering due to excessive clippings, and flushing sediments from the storm sewer and grating as necessary to prevent clogging. Mowing of the area outside the South Disposal Area fence line adjacent to the Genesee Valley Park Area will also be performed.

In general, most cover system repairs will be made following the same procedures and using the same materials as for the original construction. Minor asphalt cover cracks or holes will be repaired with asphalt sealant and/or surface course asphalt and a hand tamper. Minor soil cover material repairs will consist of replacement of lost/eroded soils with clean topsoil followed by the addition of starter fertilizer and appropriate seeding, as necessary. If minor repairs to the HDPE liner are necessary, the liner surrounding the breach will be exposed, broomed and washed. The defective area will then be cut out, and the edges around the remaining section will be roughened to remove oxidized material. A round patch will be cut from remaining HDPE used in the original construction or from newly purchased material manufactured from the same or similar resins, and will extend a minimum of 6 inches around the defect. All seams used in the repairing procedure will be approved extrusion welded seams subjected to the same test procedures required in the original construction specification. Topsoil and barrier protection soils removed for the purpose of exposing the defective liner will be replaced per the construction specifications.

If major cover system or infrastructure repairs are required, the repair procedure will be discussed with NYSDEC's Division of Hazardous Waste Remediation in Albany, NY prior to implementation. In addition, if any other construction or physical alterations to the North Disposal Area, South Disposal Area, Training Grounds Area, or Genesee Valley Park Area (in the immediate vicinity of the site) are required and would constitute a substantial change in site use as identified in 6NYCRR Part 375-1.6, NYSDEC's Division of Hazardous Waste Remediation will be contacted for review and approval of the proposed changes. Appendix I presents a soil management plan for the training grounds area, which presents guidelines for health and safety protection and soil characterization, handling and disposal in the event that excavation is required in this active area of the site.

6.0 STORM WATER COLLECTION SYSTEM

The capacity of the existing Rochester Fire Academy storm water collection system was upgraded to handle increased storm water runoff at the time of the construction of the TGA and NDA caps. The current drainage system is designed to accommodate storm water flows from a 25-year storm event in the Fire Academy Entrance Area, TGA, PFR, and NDA. The storm water collection system consists of the following specific components:

- Storm sewer through the TGA:
  - Drainage structure #1
  - 15" diameter pipe
  - Drainage structure #2
  - 21" diameter pipe
  - Drainage structure #3
  - 27" diameter pipe
  - Headwall structure with check valve

- Storm sewer from the PFR:
  - 12" diameter pipe
  - Headwall structure with check valve

- NDA run-off drainage swales #1 and #2

- NDA run-on drainage swale

The City of Rochester is responsible for routine inspection of the drainage systems and supporting infrastructure in the North Disposal Area, Training Grounds Area, and South Disposal Area. The drainage systems in each of these areas will be inspected on an annual basis throughout the post-remedial period, and will be examined for integrity, general condition and functionality, including:

- sediment build-up
- cracking or breaching of storm water pipe or concrete channels
- clogging of drainage grates and/or outfall flapper valve
- pooling or ponding of surface water
- erosion of earthen channels

An inspection checklist for visual inspection of the drainage systems in provided in Appendix F. The results of the annual inspection, including any maintenance actions planned or taken, will be summarized in the Periodic Review Report that is submitted to NYSDEC on an annual basis (see Section 8.0).

Routine maintenance of the storm water collection system may include flushing sediments from the storm sewer and grating as necessary to prevent clogging.

7.0 FACILITY ACCESS SYSTEM

The facility access system consists of on-site paved and gravel roads, fences, and gates. The purpose of the system is to provide access for inspection and maintenance activities, while preventing public access. The facility access system consists of the following specific components:

- Access Roads
  - 24' wide site access road
  - 12' wide paved access road to SDA treatment
  - building 12' wide gravel access road through PFR area
  - asphalt ramp from TOA to bicycle path

- Chain Link Fences
  - perimeter fence
  - fence separating four areas on-site

- Gates
  - 24' wide sliding, locking gate for site
  - access 16' wide sliding gate for treatment plant access
  - 12' wide sliding gate for PFR access
  - 16' wide double swing, locking gate for TOA access from the asphalt ramp
  - 16' wide double swing gate between TOA and NDA

Visual inspection of the facility access system should focus on the condition of the roads, fences, and gates, and the ability of these items to provide adequate access and security to the area. The results of an annual inspection, including any maintenance actions planned or taken, will be summarized in the Periodic Review Report that is submitted to NYSDEC on an annual basis (see Section 8.0).

Recommended maintenance actions for the facility access system are provided in Table 7-1.

TABLE 7-1
ROCHESTER FIRE TRAINING ACADEMY

FACILITY ACCESS SYSTEM MAINTENANCE

Inspection Item	Problem Noted	Action Required	Preventative Maintenance
1. Access Roads i. gravel	a. Pot holes/washout	Fill and compact holes with crushed gravel or stone.	Annual inspection
	b. Inadequate drainage	Regrade road surface and place grade crushed gravel or stone over area of concern.	
ii. paved	a. Cracks/open surfaces	Fill cracks or open surfaces with asphalt sealer.	
	b. Potholes	Fill potholes with asphalt patch.	
2. Access Gates	a. Hinges, locks, or gate worn or damaged	Replace with galvanized equipment	Annual inspection and lubrication
3. Fences	a. Damage to fence posts, rails, braces, or chain link fabric	Replace with galvanized equipment.	Annual inspection
	b. Excessive tree/brush growth around fencing	Remove trees and brush from immediate vicinity	

8.0 REPORTING AND RECORDKEEPING

Operations and maintenance records must be updated by the City of Rochester and maintained on-site. Daily operating logs should be posted in the treatment area and archived in on-site files after 6 months. Maintenance records and records of incidental activities should also be maintained on-site, with environmental records (e.g., hazardous waste transportation manifests) maintained for the duration required by the appropriate agencies. Laboratory records and reports to State and local agencies should be maintained in an area accessible to all authorized personnel. As well, records of all information resulting from any monitoring activities must be maintained for a minimum of ten years. These records shall be available for inspection and copying by state and local regulatory agencies. Incidents at the site will be documented and maintained on-site.

Reporting requirements include monthly and annual monitoring reports to Monroe County Department of Pure Waters as described in Section 3.2, and an annual Periodic Review Report that is typically submitted to NYSDEC in February or March covering the previous calendar year. The Periodic Review Report will include:

- Inspection forms and operator logs completed during the reporting period
- Analytical data summaries and laboratory reports for groundwater and treatment system process sampling during the reporting period
- Historical data trending and evaluation of current data in comparison
- Performance and operating summaries for the groundwater treatment system, including total flow treated, total contaminants removed, number of days operational, and treatment system effectiveness
- Air emissions estimates
- Monitoring plan compliance evaluation
- Identification of any perceived monitoring plan deficiencies
- IC/EC compliance report, including summary of findings from inspections described herein (see Sections 5.0 through 7.0) and any recommended corrective measures
- Evaluation of remedy performance, effectiveness and protectiveness
- Conclusions and recommendations for system/site/remedy improvements
- Signed certification statements

In addition to the recordkeeping and reporting requirements listed above, the sewer use permit copy, equipment lists, engineering and electrical drawings, standard operating procedure details, operator's log form, manufacturer's literature, HMI and PLC programming printouts, and the like should be continuously updated as needed to reflect current operating conditions and requirements, and to maintain this manual in a useful and functional condition. This is necessary to avoid this document from becoming obsolete, and of limited usefulness, as had occurred in the past. While minor changes such as these may be made to keep this document relevant, it is important to note that no significant changes to the primary groundwater collection and treatment process, or to the associated sampling, testing and monitoring plans, may be made without NYSDEC approval.

9.0 HEALTH AND SAFETY PLAN

An example of a full Health and Safety Plan for the Rochester Fire Academy site originally prepared by Malcom Pirnie is provided in Appendix G. This section addresses some site-specific hazards which, at the time of this post-closure monitoring plan development, may potentially be encountered while performing the post-closure maintenance and monitoring tasks described herein. General Health and Safety guidelines for these non-intrusive activities are described below. Malcolm Pirnie does not accept responsibility for the Health and Safety of any individuals other than their own employees. Site representatives, contractors, or any other persons or corporate entities performing work at the site shall be required to provide their own site-specific HASP covering their employees and subcontractors. Appendix G contains an example of a full HASP should intrusive activities be required.

9.1 HAZARD EVALUATION

Based on the results of previous site investigations, potential hazards have been identified for each work task involved. These hazards are listed in Table 9-1. The principal points of exposure would be through direct contact with contaminated fill/soils and groundwater, through the inhalation of contaminated particles or vapors. Since work will be performed during summer/winter time periods, the potential exists for heat/cold stress to impact workers especially those wearing protective equipment and clothing.

TABLE 9-1
ROCHESTER FIRE TRAINING ACADEMY

PROJECT TASKS WITH POTENTIAL HAZARDS

Project Task	Potential Hazards
I. Sample groundwater.	Exposure to contaminants: dermal, oral and inhalation. Physical hazards.
2. Conduct site inspections and maintenance.	Exposure to contaminants: dermal, oral, and inhalation. Physical hazards.
3. Conduct groundwater level monitoring.	Exposure to contaminants: inhalation. Phvsical hazards.

Although no work can be considered completely risk-free, logical and reasonable precautions will be implemented to provide an adequate level of protection for workers. The integration of medical evaluations, worker training relative to chemical hazards, safe work practices, proper personal protection, environmental monitoring, work zones and site control, appropriate decontamination procedures and contingency planning into the project approach will minimize the chance of unnecessary exposures and physical injuries.

Field reconnaissance activities may present the following physical hazards:

- The potential for heat/cold stress to employees during the summer/winter months (see Section 9.4).
- The potential for slip-and-fall injuries due to rough, uneven terrain.
- The potential for injury if a landfill gas or waste fire is experienced.

The primary routes of chemical hazard exposure to the contaminants found on the site (see Appendix G) are through inhalation of dusts and by direct contact.

9.2 SAFE WORK PRACTICES

All employees shall obey the following safety rules during on-site work activities:

- Eating, drinking, chewing gum or tobacco, smoking, or any practice which increases the probability of hand-to-mouth transfer of contaminated material is strictly prohibited.
- The hands and face must be thoroughly washed upon leaving the work area and prior to engaging in any activity indicated above.
- Contact with surfaces/materials either suspected or known to be contaminated will be avoided to minimize the potential for transfer to personnel, cross contamination and need for decontamination.
- Medicine and alcohol can potentiate the effects of exposure to toxic chemicals. Due to possible contraindications, use of prescribed drugs should be reviewed with the Pirnie occupational physician. Alcoholic beverage and illegal drug intake are strictly forbidden during site work activities.
- All personnel shall be familiar with standard operating safety procedures and additional instructions contained in the Health and Safety Plan.
- All employees have the obligation to correct or report unsafe work conditions.

9.3 PERSONAL PROTECTION EQUIPMENT

Personnel must wear personal protective equipment (PPE) when work activities involve known or suspected atmospheric contamination or when direct contact with dermally active substances may occur. Chemical-resistant clothing will be used to protect the skin from contact with skin-destructive and skin-absorbable chemicals. All PPE shall be maintained and stored as specified by the manufacturer. Good personal hygiene and safe work practices, as identified in Section 9.2, are also necessary to limit or prevent the ingestion of potentially harmful substances.

Personal protection equipment has been designated for each project task where potential hazards exist. The designated PPE for each task is listed in Table 9-2. The Site Health and Safety Coordinator will monitor the use of PPE during extreme temperature conditions.

TABLE 9-2
ROCHESTER FIRE TRAINING ACADEMY
PPE FOR EACH PROJECT TASK WITH AN IDENTIFIED HAZARD

1.	Sample groundwater (Level D respiratory, Level C dermal): • Tyvek Suit • Chemical protective gloves (latex) • Rubber boots (pull-on) and safety shoes • Safety glasses
2.	Conduct site inspection and non-intrusive maintenance (Level D): • Coveralls (or work clothes) • Rubber boots (pull-on) and safety shoes • Safety glasses • For intrusive maintenance, upgrade to Level C dermal.
3.	Groundwater level monitoring (Level D respiratory, Level C dermal): • Tyvek Suit • Chemical protective gloves (latex) • Rubber boots (pull-on) and safety shoes • Safety glasses

9.4 HEAT/COLD STRESS MONITORING

Since site inspections, maintenance, and monitoring activities will be scheduled for both the summer and winter months, measures will be taken to minimize heat/cold stress to employees. The Site Health and Safety Coordinator or his/her designee will be responsible for monitoring employees for symptoms of heat/cold stress.

Personal protective equipment may place an employee at risk of developing heat stress, probably one of the most common (and potentially serious) illnesses encountered at sites requiring PPE. The potential for heat stress is dependent on a number of factors, including environmental conditions, clothing, workload, physical conditioning and age. Personal protective equipment may severely reduce the body's normal ability to maintain equilibrium (via evaporation, convection and radiation), and by its bulk and weight increases energy expenditure.

The signs and symptoms of heat stress are as follows:

- Heat rash may result from continuous exposure to heat or humid air.
- Heat cramps are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include:
    - muscle spasms
    - pain in the hands, feet and abdomen

- Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:
    - pale, cool, moist skin
    - heavy sweating
    - dizziness
    - nausea
    - fainting

- Heat stroke is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Competent medical help must be obtained. Signs and symptoms are:
    - red, hot, usually dry skin
    - lack of or reduced perspiration
    - nausea
    - dizziness and confusion
    - strong, rapid pulse
    - coma

The monitoring of personnel wearing protective clothing should commence when the ambient temperature is 70 degrees Fahrenheit or above. For monitoring the body's recuperative ability to excess heat, one or more of the following techniques should be used as a screening mechanism.

- Heart rate may be measured by the radial pulse for 30 seconds as early as possible in the resting period. The rate at the beginning of the rest period should not exceed 110 beats per minute. Ifthe rate is higher, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest period stays the same. If the pulse rate is 100 beats per minute at the beginning of the next rest period, the following work cycle should be further shortened by 33%.

- Body temperature may be measured orally with a clinical thermometer as early as possible in the resting period. Oral temperature at the beginning of the rest period should not exceed 99.6 degrees Fahrenheit. Ifit does, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest period stays the same. However, if the oral temperature exceeds 99.6 degrees Fahrenheit at the beginning of the next period, the following work cycle may be further shortened by 33%. Oral temperature should be measured again at the end of the rest period to make sure that it has dropped below 99.6 degrees Fahrenheit. No Malcolm Pirnie employee will be permitted to continue wearing semipermeable or impermeable garments when his/her oral temperature exceeds 100.6° Fahrenheit.

Exposure to cold conditions may result in frostbite or hypothermia, each of which progresses in stages as shown below.

- Frostbite occurs when body tissue (usually on the extremities) begins to freeze. The three states of frostbite are:

  1) Frostnip - This is the first stage of the freezing process. It is characterized by a whitened area of skin, along with a slight burning or painful sensation. Treatment consists of removing the victim from the cold conditions, removal of boots and gloves, soaking the injured part in warm water (102-108 °F) and drinking a warm beverage.

  2) Superficial Frostbite - This is the second stage of the freezing process. It is characterized by a whitish-grey area of tissue which will be firm to the touch but will yield little pain. Treatment is identical to that for frostnip.

  3) Deep Frostbite - In this final stage of the freezing process the affected tissue will be cold, numb and hard, and will yield little to no pain. Treatment is identical to that for frostnip.

- Hypothermia occurs when the body loses heat faster than it can produce it. The stages of hypothermia (which may not be clearly defined or visible at first) are the following:

  1) Shivering
  2) Apathy (a change to a disagreeable mood)
  3) Unconsciousness
  4) Bodily freezing
  5) Death (if untreated)

  Treatment of hypothermia is given below:

  - Remove the victim from the cold environment and remove wet or frozen clothing. (Do this carefully as frostbite may have started.)

  - Perform active re-warming with hot liquids for drinking (Note: do not give the victim any liquid containing alcohol or caffeine in this case) and a warm water bath (102-108°F)

  - Perform passive re-warming with a blanket or jacket wrapped around the victim.

In any potential cold stress situation, it is the responsibility of the Site Health and Safety Officer to encourage the following:

- Workers should dress warmly, with more layers of thin clothing as opposed to one thick layer.

- Personnel should remain active and keep moving.

- Personnel should be allowed to take shelter in a heated area, as necessary.

- Personnel should drink warm liquids (no caffeine or alcohol if frostbite has set in).

9.5 EMERGENCY RESPONSE PLAN

Emergency medical treatment can be obtained at the Strong Memorial Hospital in Rochester. This information shall be posted in the on-site treatment building and in the field vehicle. It is the Site Safety Officer's responsibility to ensure that the information sheet is posted.

Emergency Telephone Numbers:

Fire, Ambulance, Police	911
Strong Memorial Hospital	(585) 275-2100

Directions to Hospital:

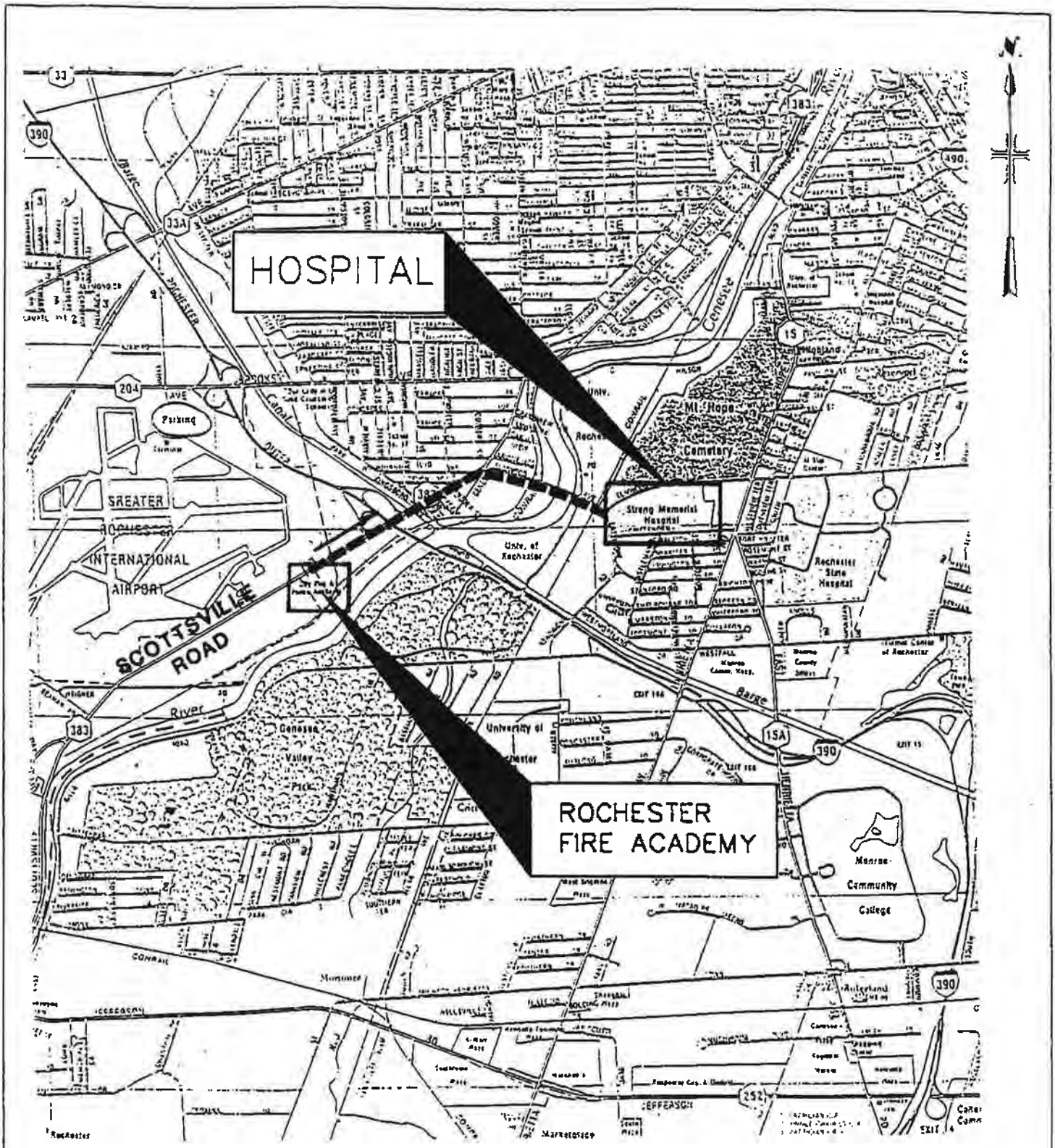
The following directions describe the best route to Strong Memorial Hospital from the Rochester Fire Academy (refer to hospital route map on following page). The route to the hospital will take about five minutes.

1. From the site, tum right onto Scottsville Road and proceed to Elmwood Avenue.

2. Turn right onto Elmwood Avenue; proceed on Elmwood over the Genesee River to Lattimore Road.

3. Turn right onto Lattimore Road and proceed one block to Crittenden Blvd.

4. Turn left onto Crittenden Blvd. and follow signs to the Strong Memorial Hospital Emergency Room located on the left side of the road.



MALCOLM PIRNIE

CITY OF ROCHESTER
ROCHESTER FIRE ACADEMY
HOSPITAL ROUTE

10.0 EMERGENCY/CONTINGENCY PLANS

10.1 FIRE/EXPLOSION

In case of fire within the capped portion of the NDA, the fire department will be dispatched to the scene. Emergency numbers should be listed in the Health and Safety Plan (HASP) and updated annually. The fire department must be prepared with appropriate equipment to adequately handle anticipated emergencies at the Site.

In the event of a fire, only authorized personnel will be allowed at the Site. Details, including the source and cause of the fire, will be maintained at the fire department. The contaminated soils in the NDA are capped with several layers, these being: minimum 6-inch layer of sand; 40 mil HDPE synthetic membrane; geocomposite drainage layer; 24-inch barrier protection layer; and 6-inch seeded topsoil layer. Refer to the Record Drawing (Sheet G-11) for a detailed illustration of the cover layers. In all likelihood, due to the nature of the cap, the greatest potential for fire would be a grass fire without the threat of releases of contamination. If contaminated soils are exposed during a fire or during firefighting operations, appropriate air monitoring and personal protective equipment will be implemented until any damage to the cap is repaired and the risk of exposure no longer exists. Dermal protection will be required during fire-fighting activities.

10.2 PERSONAL INJURY

The security features of the Site should control access by unauthorized individuals. If an accident does occur, the following procedure will be followed:

Injury when person is not incapacitated. Authorized personnel who receive injuries that do not incapacitate them, such as minor bums, punctures, and sprains, will be given first aid at the site only when necessary. The victim will then be taken to the hospital emergency room for examination and treatment. The phone number and directions to the hospital should be included in of the HASP.

Unauthorized persons who receive injuries that are not incapacitating *should not* be given first aid at the Site unless absolutely necessary for the wellbeing of the victim. If possible, obtain all personal information about the victim for purposes of completing accident forms. Instruct individual to go to his doctor for examination and required treatment. Inform police.

Serious Injury. First aid will be rendered only by individuals who have had first aid training. Give only that first aid which is necessary to prevent further harm to the accident victim. Seriously injured victims should not be moved unless they are in danger because of their location.

It is imperative to obtain personal information about the accident victims in order to complete accident forms. If the person is not authorized to be on the Site, inform the police. An ambulance should be called to transport the victim to the hospital. Contact numbers for ambulance services should be listed in the HASP.

Procedures After an Accident: If assistance is needed, the fire department will respond to a non-emergency, on-site accident. All witnesses to the accident will be interviewed. Once the facts surrounding the accident have been compiled, probable cause will be determined and an accident report will be completed. After a thorough investigation and determination of the causes, corrective measures will be implemented to prevent similar accidents in the future. Corrective measures may include, but are not limited to, instruction to authorized personnel, additional safety precautions, and elimination or repair of unsafe conditions.

10.3 SEVERE WEATHER CONDITIONS

The NDA cover system has been designed for adequate drainage and control of normal rain conditions. During severe weather conditions (e.g., heavy rainstorms), the integrity of the constructed cap and surrounding terrain may deteriorate in localized areas due to erosion. After the occurrence of a severe storm, an inspection of the capped area will be conducted to check for erosion of the cover, and adjacent areas that could eventually affect the cover. In the event that excessive erosion has resulted, actions will be taken to repair and return the damaged area to its proper state.

11.0 LIST OF MANUFACTURERS AND SUPPLIERS

Select manufacturer's literature is provided in Appendix J. Shop drawings, record drawings, and vendor O&M Manuals are on- site in the groundwater treatment building. Table 11-1 lists the primary components of the groundwater treatment system with the manufacturer's name and model information. Table 11-1 and Appendix J should be maintained and updated as equipment and instrumentation is replaced or upgraded.

TABLE 11-1
ROCHESTER FIRE TRAINING ACADEMY

EQUIPMENT SUMMARY

Item #	Manufacturer Number	Manufacturer Name & Description	Vendor Name and Phone Number
Sequestering Agent Feed System:			
5.	A971-257	LMI, Polyphosphate Pumps	Pertech, Inc. 716-691-5450
8.	PRV025-PVC	Griffco, Pressure Relief Valves	Pertech, Inc. 716-691-5450
9.	BPV025-PVC	Griffco, Back Pressure Valves	Pertech, Inc. 716-691-5450
Bag Filter:			
13.	UF8-l 802F-A2CE	Trumpler Clancy, Inc., Bag Filter	Trumpler Clancy, Inc. 315-488-3200
14.	UF81802DIS	Trumpler Clancy, Filter Displacers	Trumpler Clancy, Inc. 315-488-3200
Sump System:			
11.	SRM4MIC	F.E.Myers, Submersible Sump Pumps	Fluid Kinetics, Inc. 716-662-7900
18.	TFD-PE1500	Remedial System, Inc., Feed Tank	Remedial System, Inc. 508-543-1512
Air Stripper:			
6.	TE-7K-MD	March Manufacturing, Feed Pumps	Pertech, Inc. 716-691-5450
19.	RTS-50-4	Remedial System, Inc., Low Profile Shallow Tray Air Stripper	Remedial System, Inc. 508-543-1512
20.	1950-10-2F	Dwyer Pressure Switch	(various)
21.	PB-15A	Cincinnati Blower	Remedial System, Inc. 508-543-1512

TABLE 11-1
ROCHESTER FIRE TRAINING ACADEMY

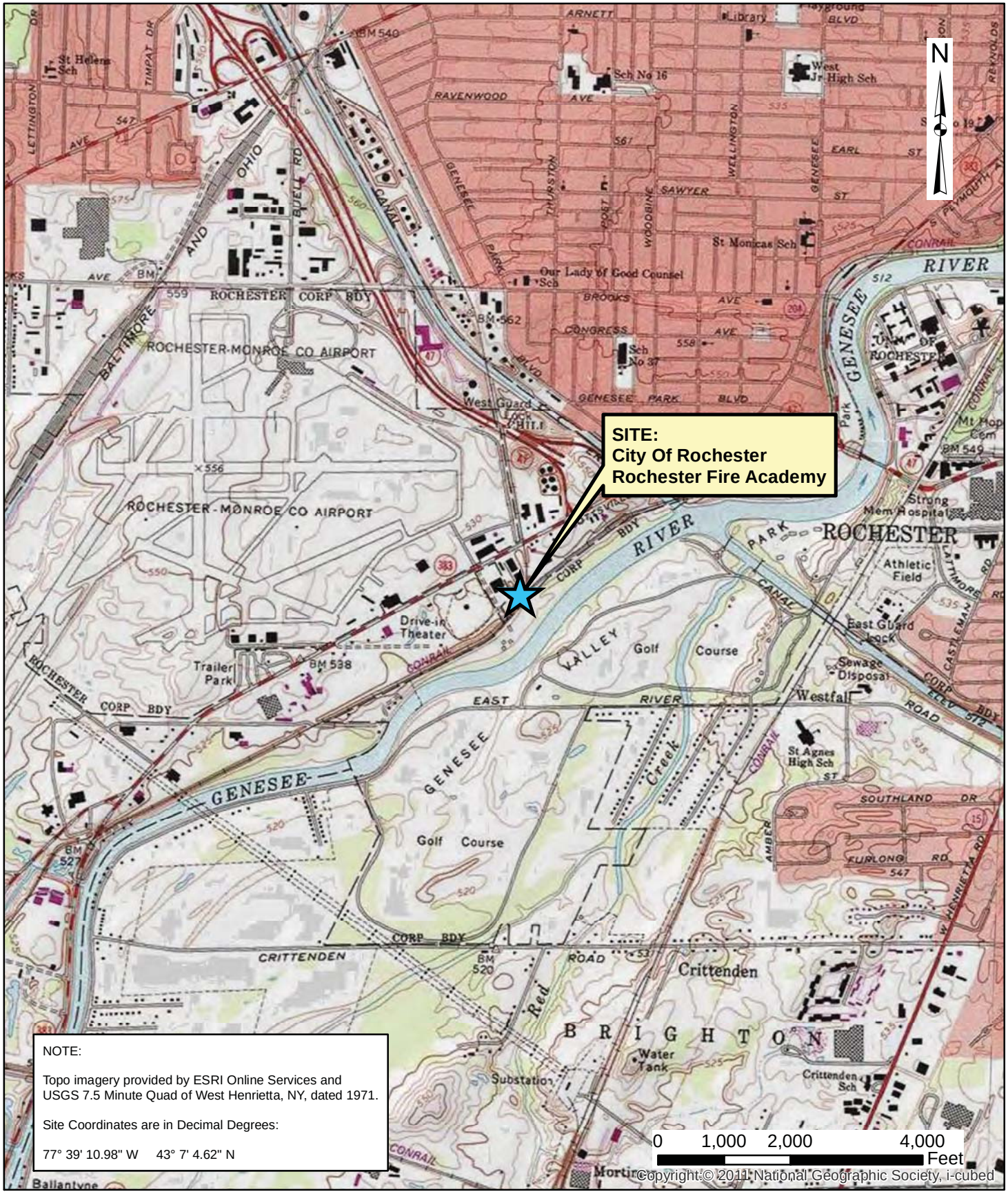
MANUFACTURER'S LITERATURE

		Manufacturer Name & Description	Vendor Name and Phone Number	
Discharge System:				
7.	2BF21534	Goulds Pumps, Discharge Pumps	Estabrook Corp.	1-800-959-9160
17.	TDS-PEl 500	Remedial System, Discharge Tank	Remedial System, Inc.	508-543-1512
Instrumentation:				
3.	HydroRanger I	Milltronics, Ultrasonic Level Transmitters	Cyclops Process Equipment	315-638-8121
10.	SENTRY III CTPl OlOH	Griffco, Pulsation Dampner	Pertech, Inc.	716-691-5450
12.	IMT20-SA 1OFGZ	Foxboro, Magnetic Flow Transmitter	Wicker Technologies	716-377-2740
	8302-SABA-TST-GFNA	Foxboro, Magnetic Flow Tube	Wicker Technologies	716-377-2740
15.	P5045-G	Winters, Pressure Gauges	Winters	716-833-3416
Miscellaneous:				
I.	K l50UVCM	Kitz, A-Port Control Valve	R.M. Newell	716-632-0662
2.	CE4ATAH	Automax, Actuator	RM. Newell	716-632-0662
4.	N/A	CSK Technical, Skid	CSK Technical	1-800-833-2613
16.	#70	Winters, Diaphragm Seal	Winters	716-833-3416

TABLE 11-1
ROCHESTER FIRE TRAINING ACADEMY

MANUFACTURER'S LITERATURE

Item #	Manufacturer Number	Manufacturer Name & Description	Vendor Name and Phone Number
Electrical:			
22.	EA7-T6C	HMI Interface Panel	Automation Direct 800-633-0405
23.	SLC5/30	Allen-Bradley, PLC	Wehle Electric 716-854-3270
24.	Airlink GX400	Sierra Wireless Cellular Data Modem	(online supplier)



NOTE:

Topo imagery provided by ESRI Online Services and USGS 7.5 Minute Quad of West Henrietta, NY, dated 1971.

Site Coordinates are in Decimal Degrees:

77° 39' 10.98" W 43° 7' 4.62" N

Date: 10-16-2013 Drawn By: RJM Scale: AS NOTED	**DAY ENVIRONMENTAL, INC.** Environmental Consultants Rochester, New York 14606 New York, New York 10170	Project Title: CITY OF ROCHESTER ROCHESTER FIRE ACADEMY ROCHESTER, NEW YORK GROUNDWATER TREATMENT SYSTEM RENOVATION Drawing Title: Project Locus Map	Project No. 4839C-13 FIGURE 1

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Last Date Saved: 16 Oct 2013

Figure 2
Rochester Fire Academy
Site Map

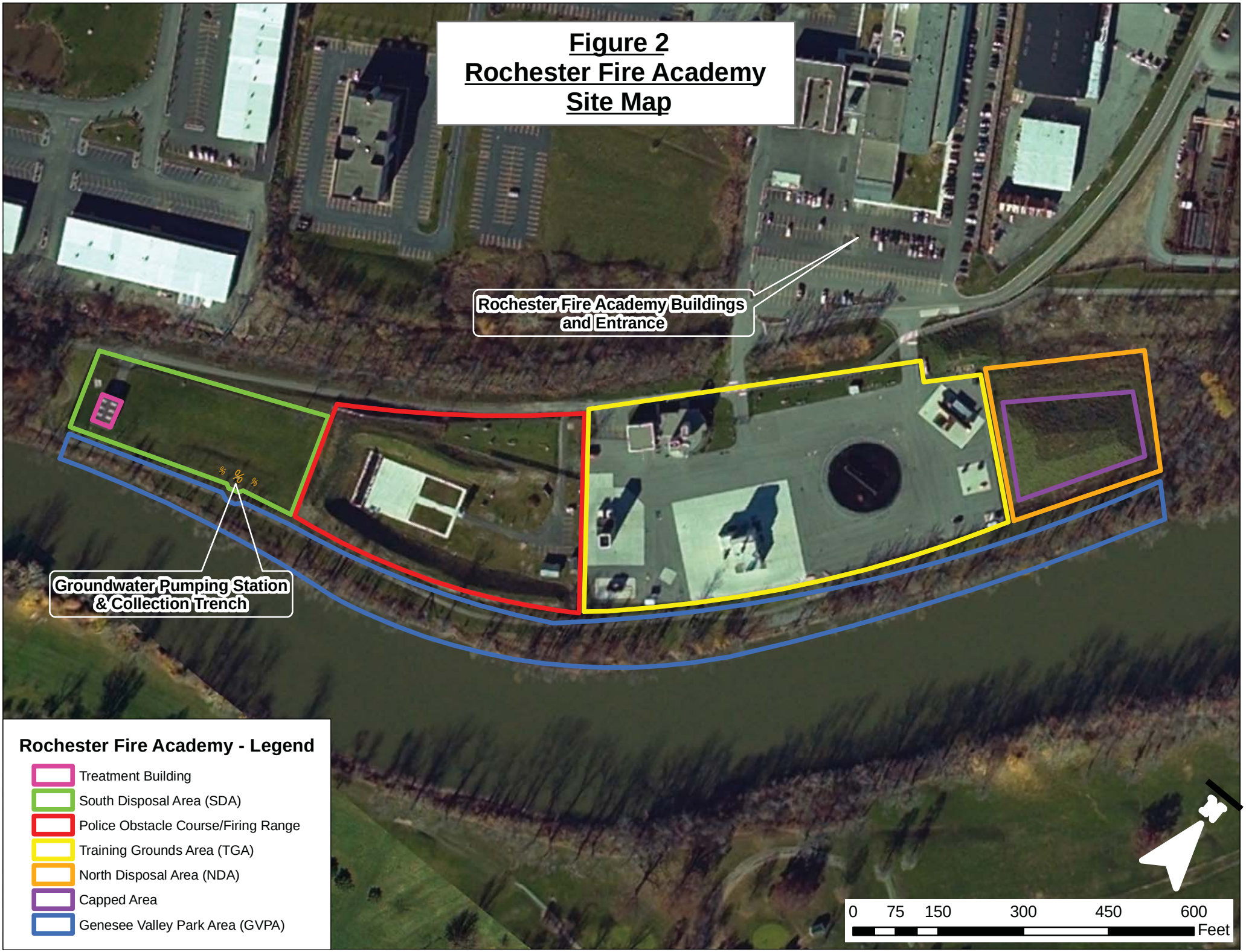
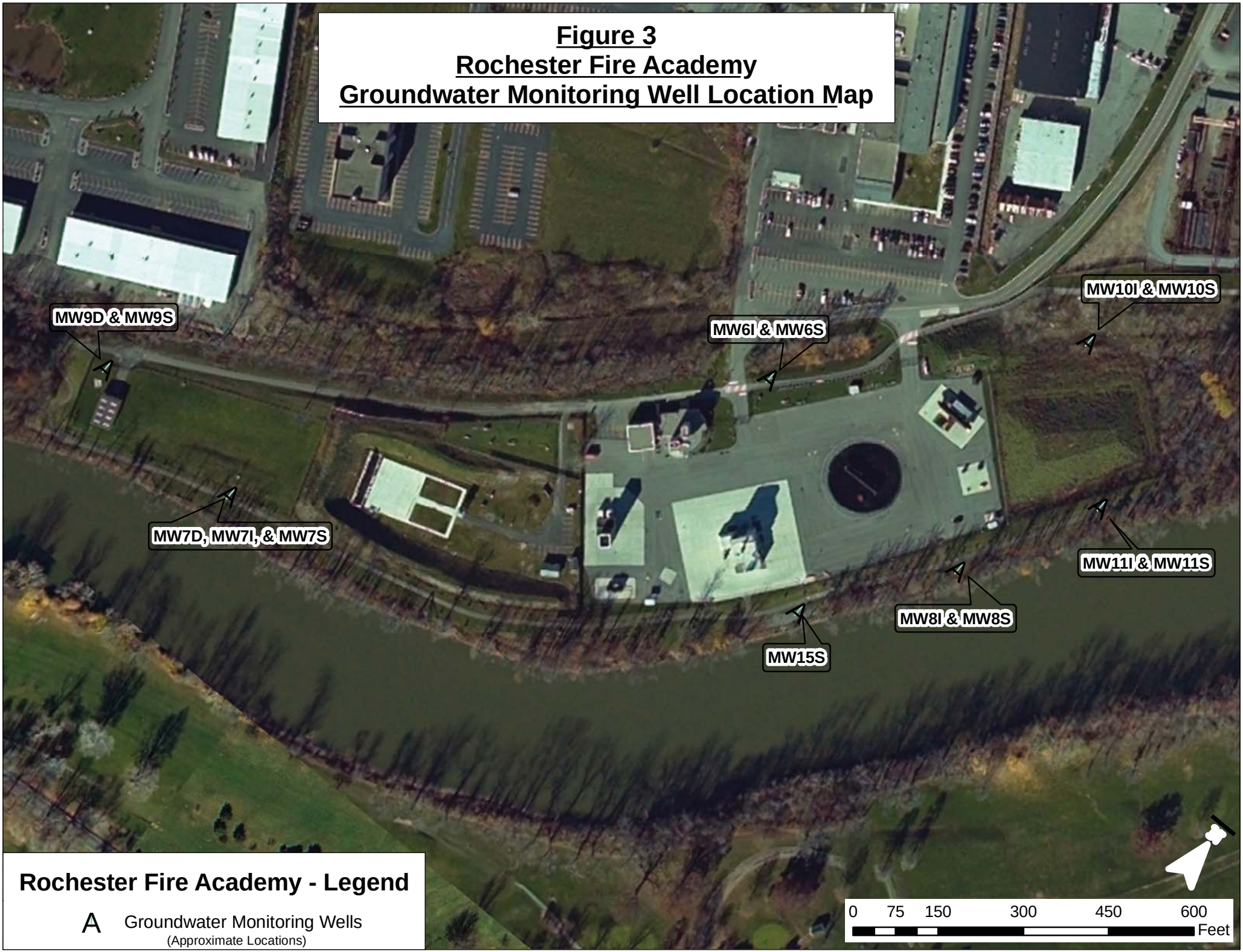
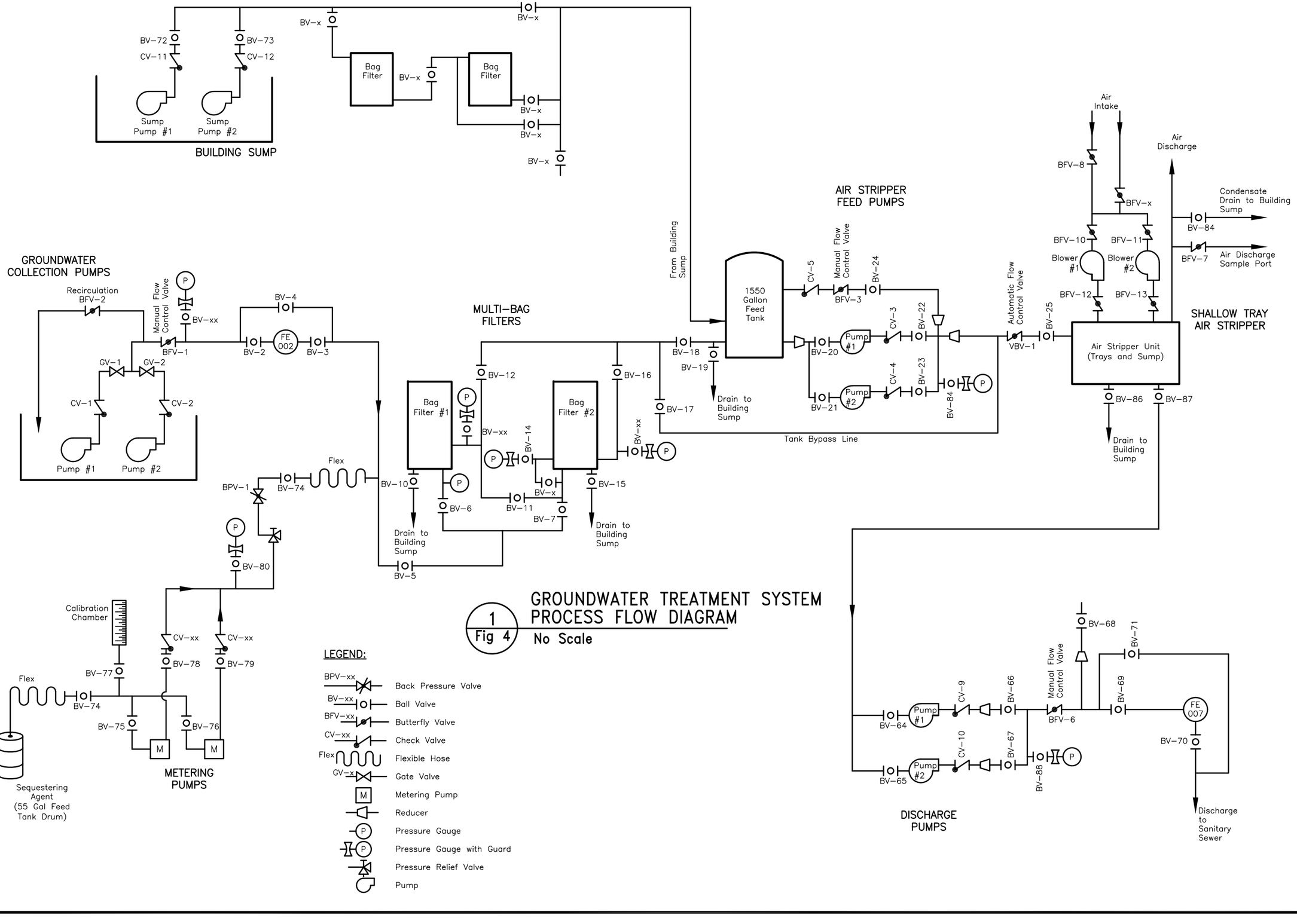


Figure 3
Rochester Fire Academy
Groundwater Monitoring Well Location Map



Rochester Fire Academy - Legend

A Groundwater Monitoring Wells
(Approximate Locations)



1 Fig 4

GROUNDWATER TREATMENT SYSTEM PROCESS FLOW DIAGRAM

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ANSI B
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DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	SCALE	DATE ISSUED
BFK	Tww	BFK	BFK	As Noted	12-30-2016

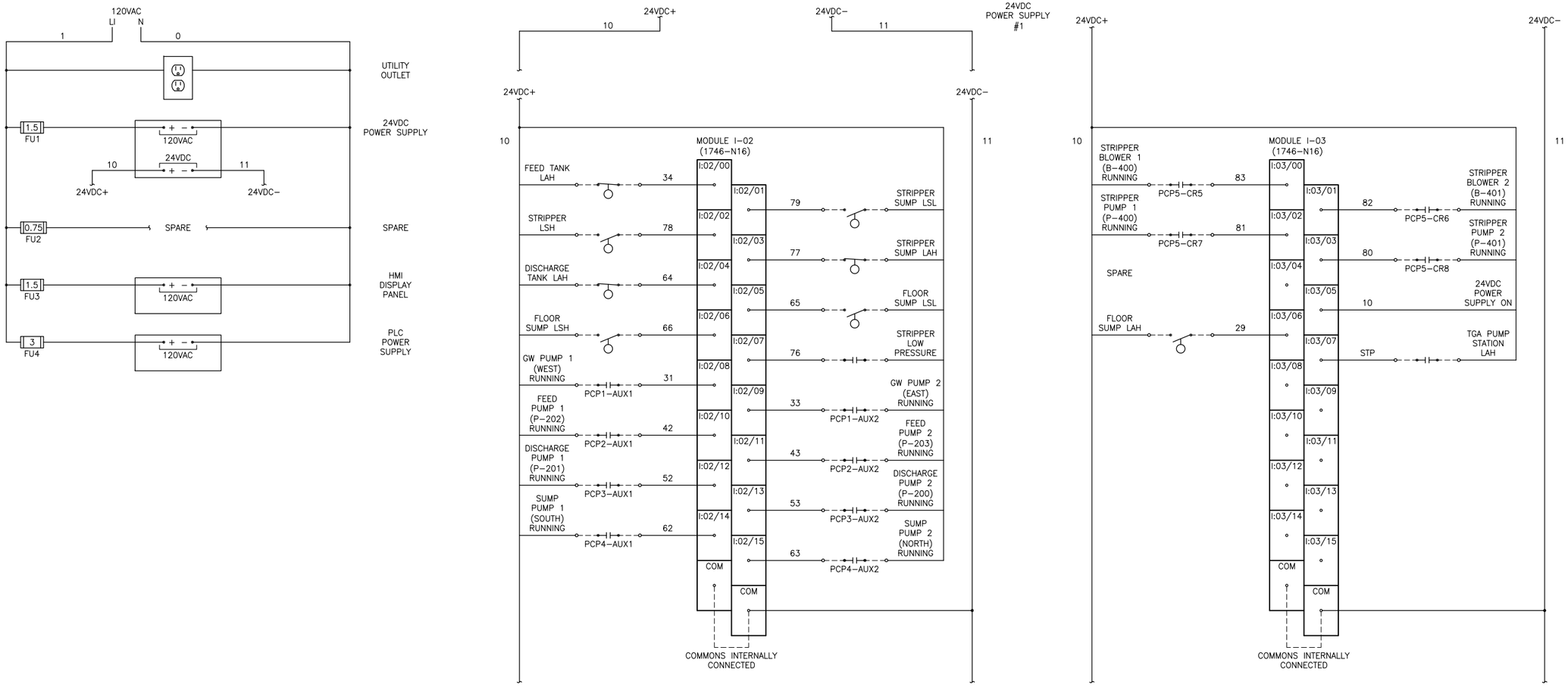
DAY ENVIRONMENTAL, INC.
ENVIRONMENTAL CONSULTANTS
ROCHESTER, NEW YORK 14606
NEW YORK, NEW YORK 10170

PROJECT TITLE
City of Rochester
Rochester Fire Academy
Rochester, NY
Groundwater Treatment System

DRAWING TITLE
Groundwater Treatment System
Process Flow Diagram

PROJECT No.
4839C-13

DWG No.
Figure 4



1/1 ELECTRICAL ONE−LINE DIAGRAM
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5			
4	8-18-14	RJM	
3	3-31-14	RJM	REVISED PER BFK REVIEW COMMENTS
2			REVISED PER BFK REVIEW COMMENTS
1			

PROJECT MANAGER	BFK
DATE	9-2013
DRAWN BY	RJM
DATE DRAWN	9-30-2013
CHECKED BY	BFK
DATE	10-4-2013
APPROVED BY	BFK
DATE	10-7-2013
SCALE	No Scale
DATE PLOTTED	10-7-2013

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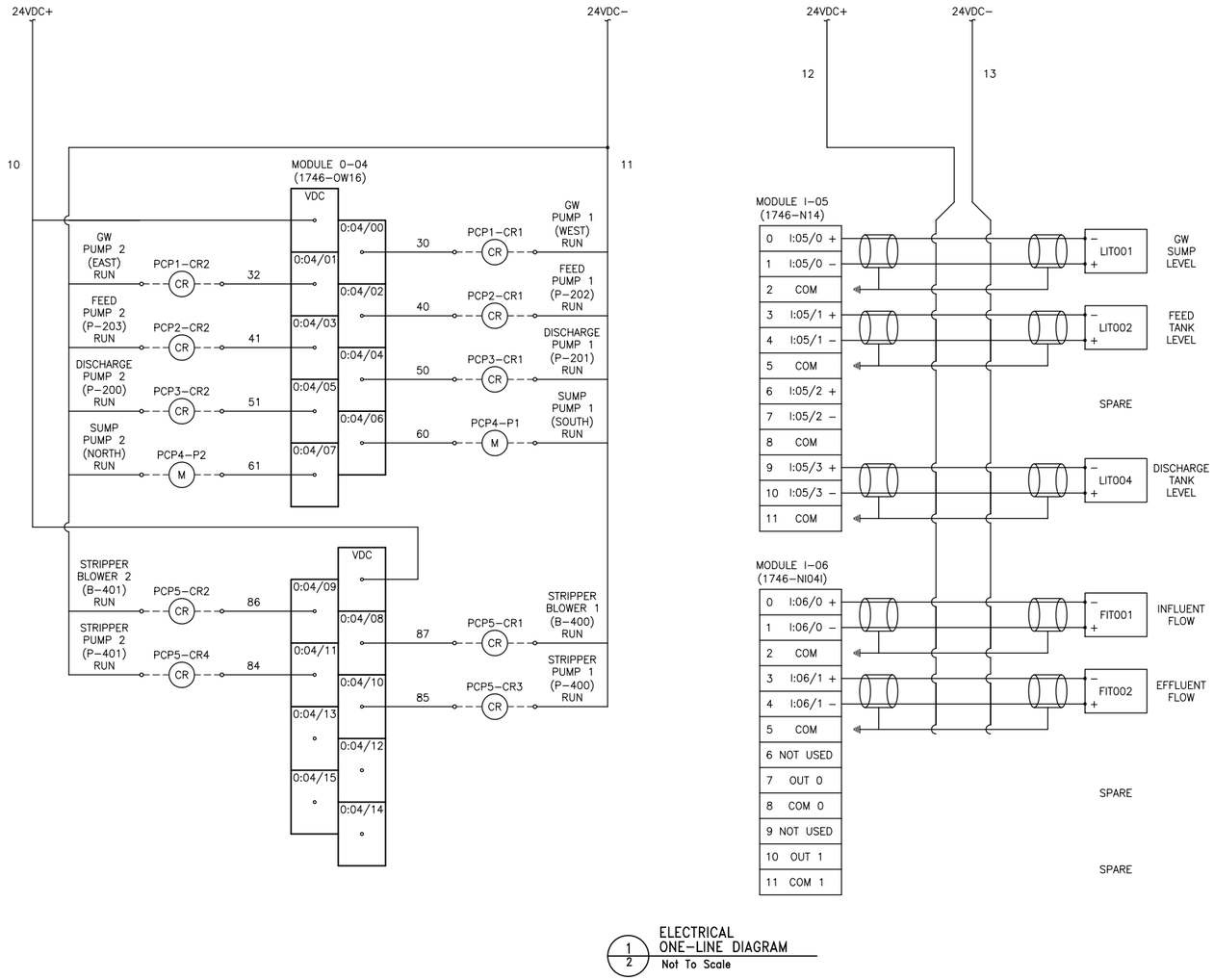
PROJECT TITLE
CITY OF ROCHESTER
ROCHESTER FIRE ACADEMY
ROCHESTER, NEW YORK
GROUNDWATER TREATMENT SYSTEM

DRAWING TITLE
ELECTRICAL ONE-LINE DIAGRAM

PROJECT NO.
4839C-13

FIGURE NO.
Figure 5



1/2 ELECTRICAL ONE−LINE DIAGRAM

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CHECKED BY	DATE
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APPROVED BY	DATE
BFK	10-7-2013
SCALE	DATE PLOTTED
No Scale	10-7-2013

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3	8-18-14	RJM
2	3-31-14	RJM
1	REVISED PER BFK REVIEW COMMENTS	
	REVISED PER BFK REVIEW COMMENTS	
	REVISIONS	

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ENVIRONMENTAL CONSULTANTS
ROCHESTER, NEW YORK 14606
NEW YORK, NEW YORK 10170

PROJECT TITLE
CITY OF ROCHESTER
ROCHESTER FIRE ACADEMY
ROCHESTER, NEW YORK
GROUNDWATER TREATMENT SYSTEM

DRAWING TITLE
ELECTRICAL ONE-LINE DIAGRAM

PROJECT NO.
4839C-13

FIGURE NO.
Figure 6

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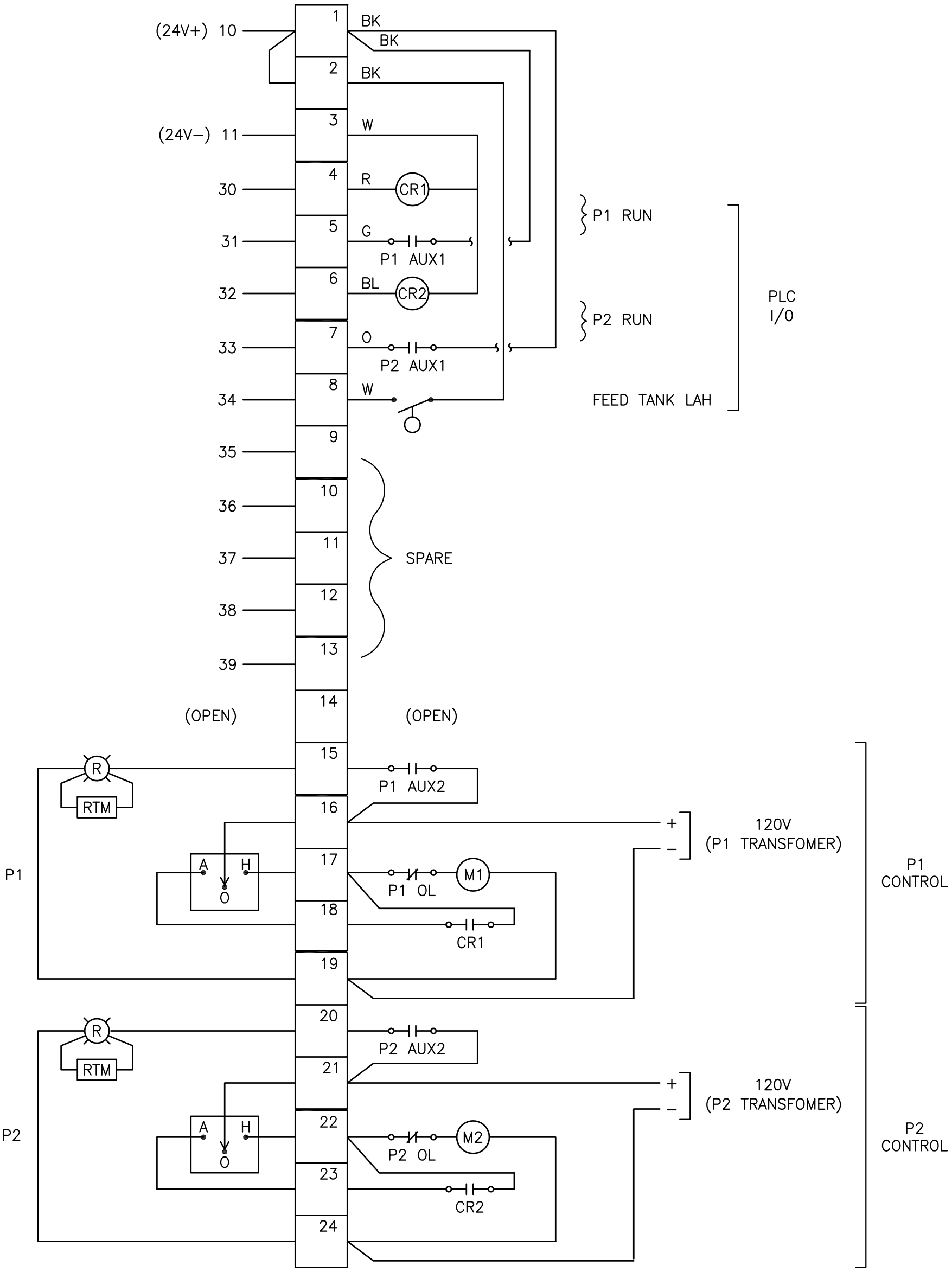
PCP-1
CONTROL WIRING DIAGRAM



PROJECT NO. 4839C-13	PROJECT TITLE: CITY OF ROCHESTER ROCHESTER FIRE ACADEMY ROCHESTER, NEW YORK GROUNDWATER TREATMENT SYSTEM	day DAY ENVIRONMENTAL, INC. ENVIRONMENTAL CONSULTANTS ROCHESTER, NEW YORK 14606 NEW YORK, NEW YORK 10170	PROJECT MANAGER: BFK — DATE: 7-2014 DRAWN BY: RJM — DATE DRAWN: 7-25-2014 SCALE: NOT TO SCALE — DATE ISSUED: 8-18-2014
Figure 7	DRAWING TITLE: PCP-1 CONTROL WIRING DIAGRAM		

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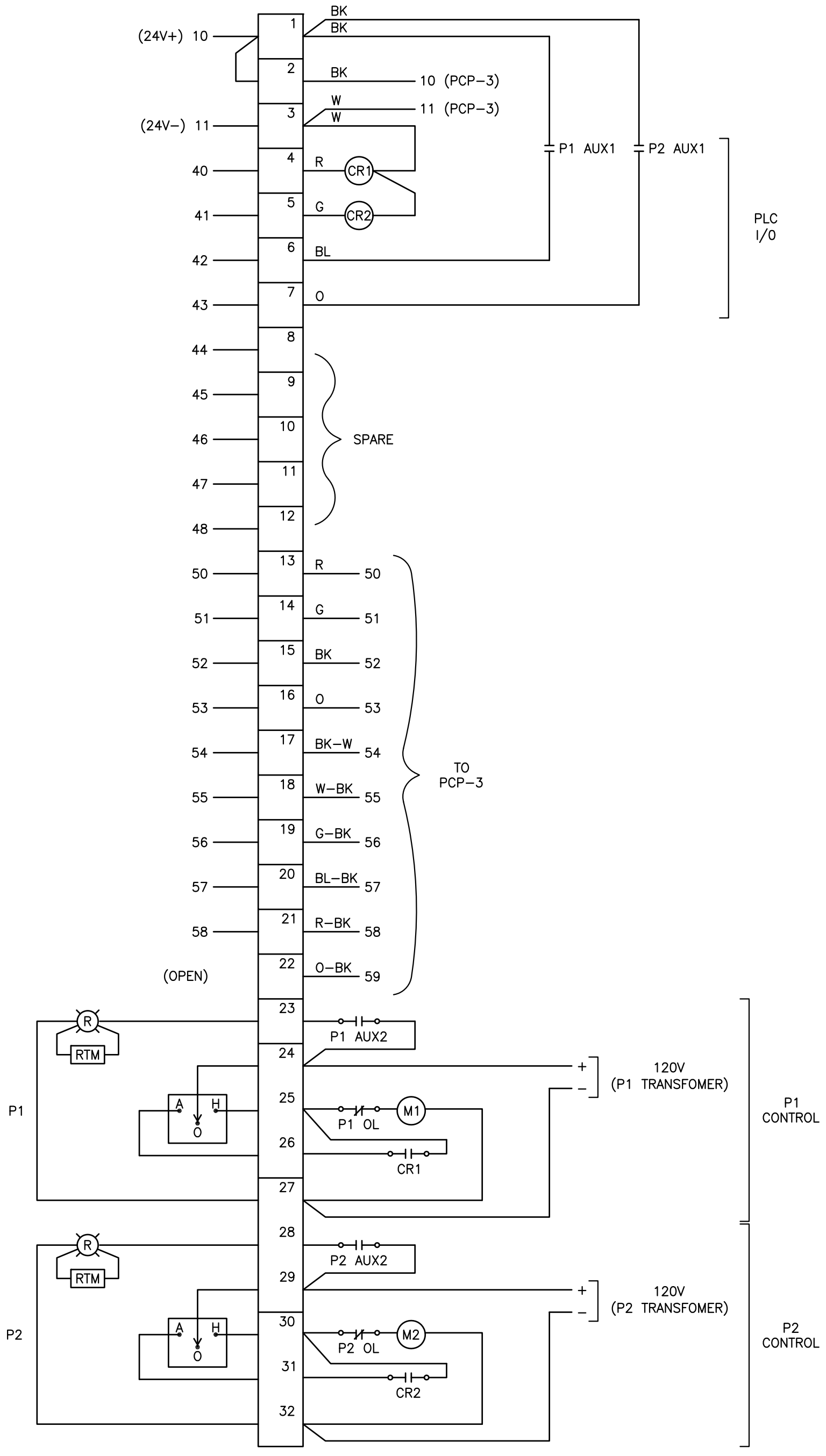
PCP-2
CONTROL WIRING DIAGRAM



PROJECT NO. 4839C-13 **Figure 8**	PROJECT TITLE **CITY OF ROCHESTER** **ROCHESTER FIRE ACADEMY** **ROCHESTER, NEW YORK** **GROUNDWATER TREATMENT SYSTEM** DRAWING TITLE **PCP-2 CONTROL WIRING DIAGRAM**	day DAY ENVIRONMENTAL, INC. ENVIRONMENTAL CONSULTANTS ROCHESTER, NEW YORK 14606 NEW YORK, NEW YORK 10170	PROJECT MANAGER: **BFK** — DATE: **7-2014** DRAWN BY: **RJM** — DATE DRAWN: **7-25-2014** SCALE: **NOT TO SCALE** — DATE ISSUED: **8-18-2014**

Time Plotted: Friday, December 30, 2016 10:47:24 AM
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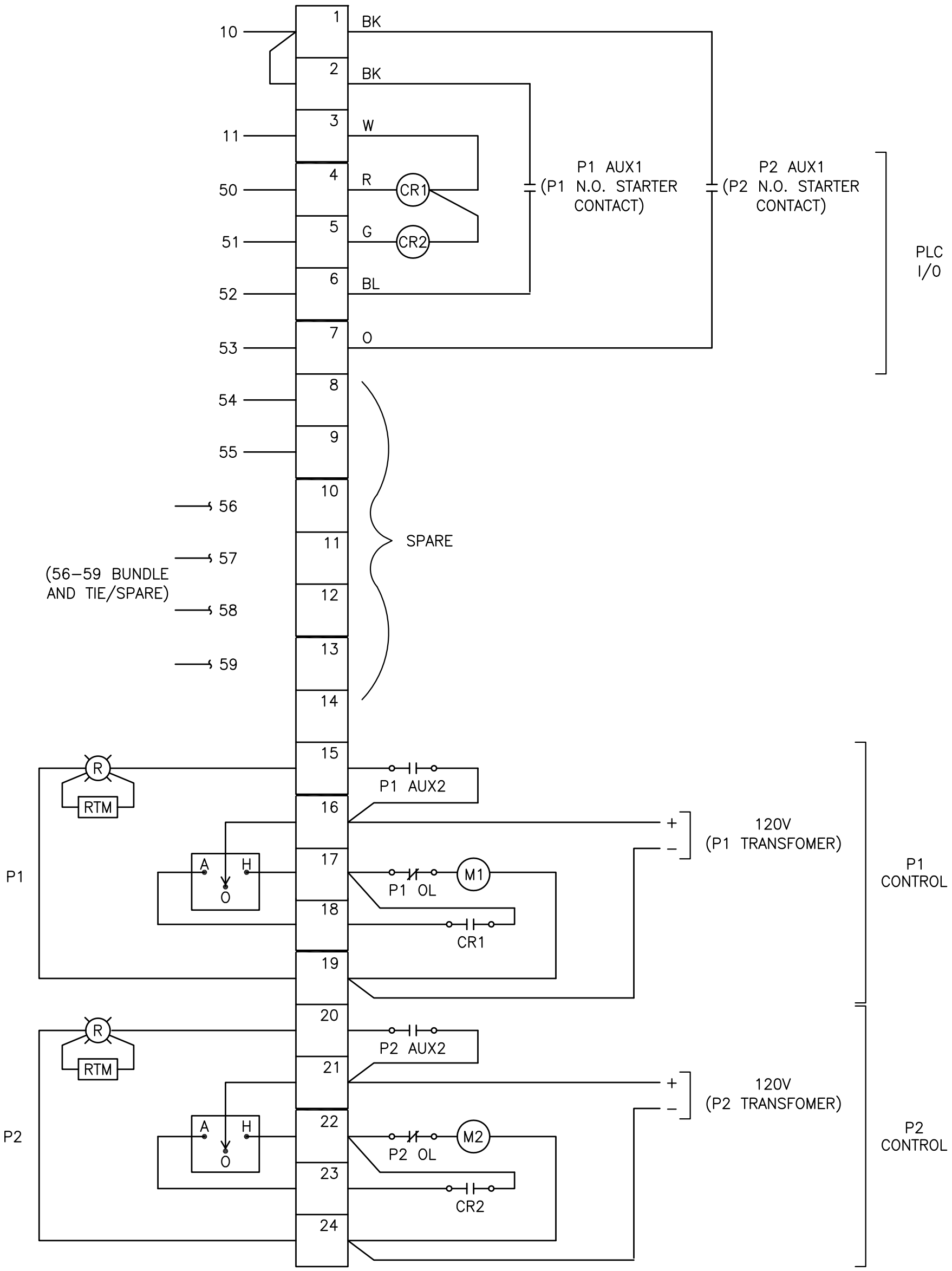
PCP-3
CONTROL WIRING DIAGRAM



PROJECT NO. 4839C-13 **Figure 9**	PROJECT TITLE **CITY OF ROCHESTER** **ROCHESTER FIRE ACADEMY** **ROCHESTER, NEW YORK** **GROUNDWATER TREATMENT SYSTEM** DRAWING TITLE **PCP-3 CONTROL WIRING DIAGRAM**	day DAY ENVIRONMENTAL, INC. ENVIRONMENTAL CONSULTANTS ROCHESTER, NEW YORK 14606 NEW YORK, NEW YORK 10170	PROJECT MANAGER: **BFK** — DATE: **7-2014** DRAWN BY: **RJM** — DATE DRAWN: **7-25-2014** SCALE: **NOT TO SCALE** — DATE ISSUED: **8-18-2014**

Time Plotted: Friday, December 30, 2016 10:46:35 AM
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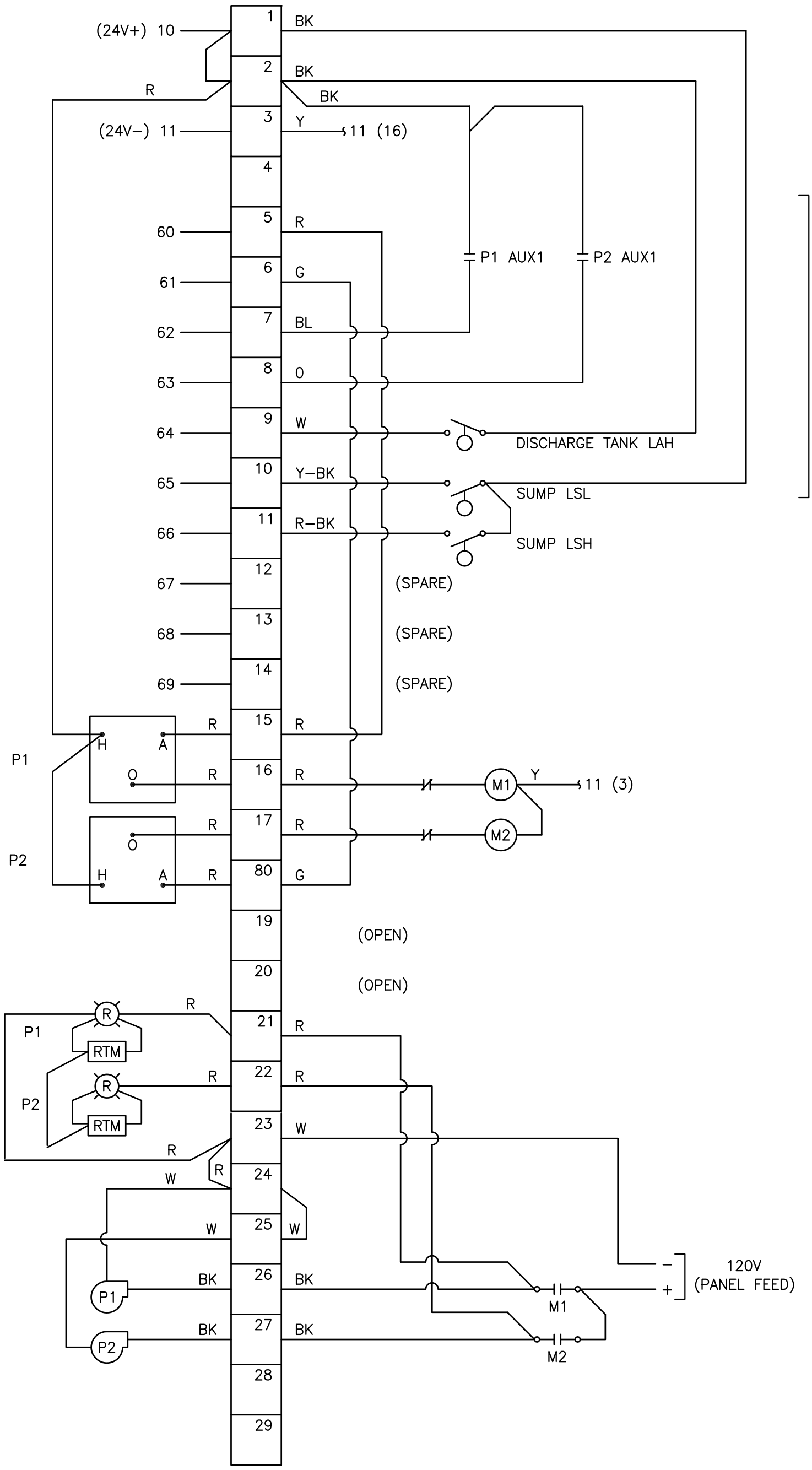
PCP-4
CONTROL WIRING DIAGRAM



PROJECT NO. 4839C-13	PROJECT TITLE: CITY OF ROCHESTER ROCHESTER FIRE ACADEMY ROCHESTER, NEW YORK GROUNDWATER TREATMENT SYSTEM	day DAY ENVIRONMENTAL, INC. ENVIRONMENTAL CONSULTANTS ROCHESTER, NEW YORK 14606 NEW YORK, NEW YORK 10170	PROJECT MANAGER: BFK — DATE: 7-2014 DRAWN BY: RJM — DATE DRAWN: 7-25-2014 SCALE: NOT TO SCALE — DATE ISSUED: 8-18-2014
Figure 10	DRAWING TITLE: PCP-4 CONTROL WIRING DIAGRAM		

Time Plotted: Friday, December 30, 2016 10:45:38 AM
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Ref2:
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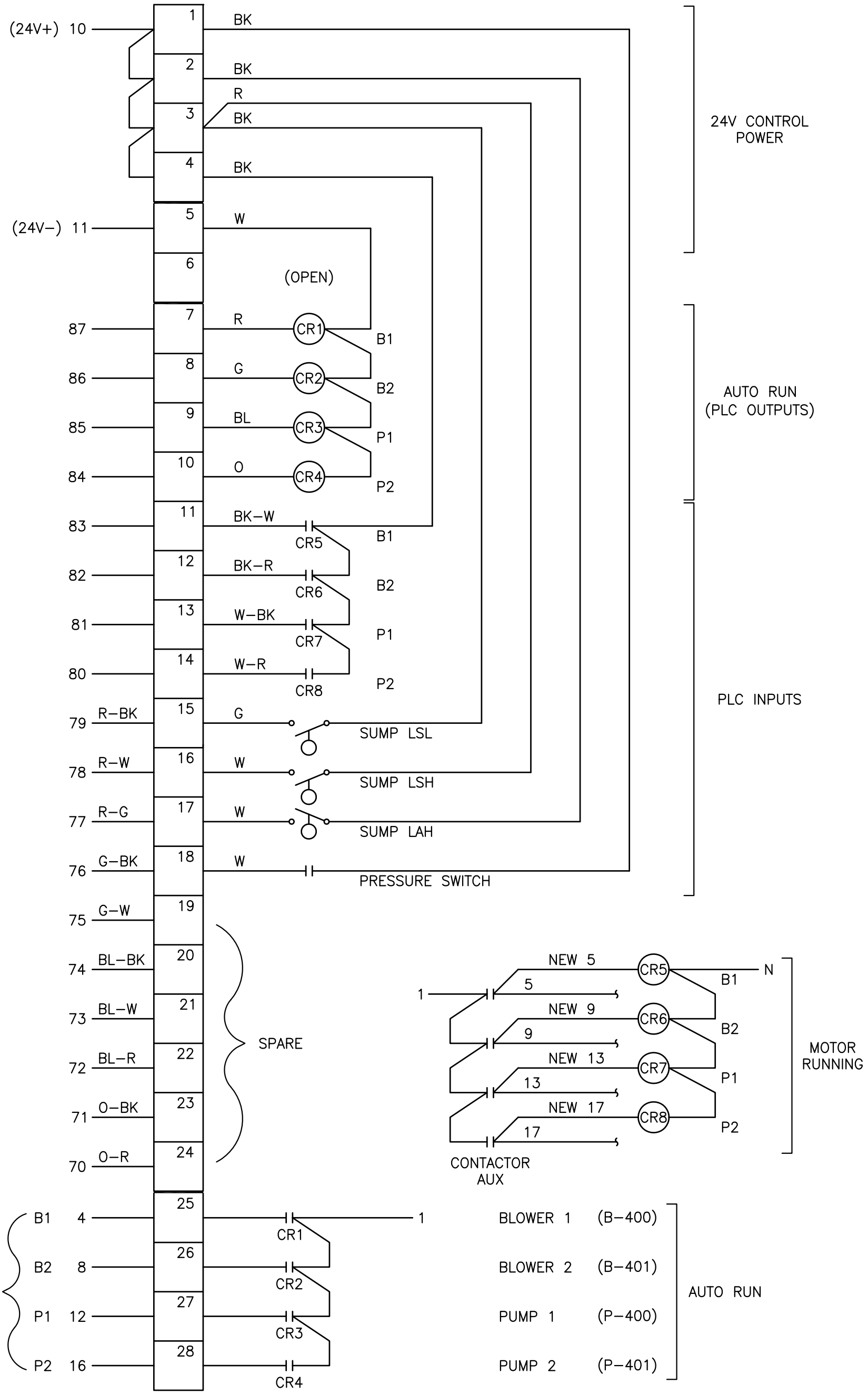
PCP-5
CONTROL WIRING DIAGRAM



PROJECT NO. 4839C-13	PROJECT TITLE: CITY OF ROCHESTER ROCHESTER FIRE ACADEMY ROCHESTER, NEW YORK GROUNDWATER TREATMENT SYSTEM	day DAY ENVIRONMENTAL, INC. ENVIRONMENTAL CONSULTANTS ROCHESTER, NEW YORK 14606 NEW YORK, NEW YORK 10170	PROJECT MANAGER: BFK — DATE: 7-2014 DRAWN BY: RJM — DATE DRAWN: 7-25-2014 SCALE: NOT TO SCALE — DATE ISSUED: 8-18-2014
Figure 11	DRAWING TITLE: PCP-5 CONTROL WIRING DIAGRAM		

APPENDIX A

GROUNDWATER COLLECTION AND TREATMENT SYSTEM STANDARD OPERATING PROCEDURES (SOPs)

APPENDIX A.1

Rochester Fire Academy
Operations and Maintenance Manual

Standard Operating Procedure for
Groundwater Collection and Treatment System
Start-up and Shut-Down

The following steps present standard procedures for start-up and shut-down of the groundwater collection and treatment system at the Rochester Fire Academy that should be employed if maintenance activities or unforeseen conditions (e.g., mechanical failure) result in or require extended shut-down of the system.

START-UP PROCEDURE

1. Verify all required mechanical connections are in-place and orientation of manually-operated valves will allow flow transfer from the collection trench through the bag filters, feed tank, and air stripper prior to discharge to the sanitary sewer.

2. Toggle through process control set-points on the PLC interface panel to verify that user set-points have not been lost from memory or altered, and that all equipment is in “off” mode at the PLC. Also be sure that any alarms have been manually reset.

3. Verify that bag filters are in-place and vessel lids are closed. Place all pump and blower HOA switches in "auto" mode at the pump control panels, then place the groundwater collection trench pumps in “auto” mode at the PLC interface control panel. Slightly open sample tap on groundwater feed line to release any trapped air, then close.

4. Place, in succession, the following equipment in "auto" mode at the PLC control panel: air stripper primary blower; air stripper discharge pumps; air stripper feed pumps; and building sump pumps.

5. Place sequestering agent feed pumps in automatic mode. Verify that the sequestering agent feed rate is appropriate based on the recommended dosages presented in this manual or based on the results of subsequent water quality testing on the collected groundwater.

6. Monitor treatment system operation to verify that all processes are functioning appropriately.

7. If system was shut-down for greater than 48-hours, periodically monitor system flowrates and groundwater elevation in trench to verify groundwater drawdown across the collection trench.

SHUT-DOWN PROCEDURE

1. Turn collection pump HOA switches to "off" position (at PLC interface panel and at pump control panel).

2. Place sequestering agent metering pumps in "off" mode.

3. Allow feed tank to reach low-level, automatically shutting down the air stripper feed pumps. Allow stripper blower and discharge pumps to run until they automatically shut off to ensure complete treatment and removal of water in the stripper.

4. Place blowers, stripper feed pumps and discharge pumps in "off" mode at PLC interface panel and at pump control panel.

5. Leave building sump pumps in "auto" mode unless sump pump maintenance will be required.

APPENDIX A.2

Rochester Fire Academy
Operations and Maintenance Manual

Standard Operating Procedure for Groundwater Collection Trench and Pumps

Description: Groundwater Collection System

Model: SRM4MIC (submersible pumps)

Manufacturer: F.E. Meyers (pumps, lift station)
1101 Myers Parkway
Ashland, Ohio 44805-1969
Phone: (419) 289-1144 Fax: (419) 289-6658

Vendor: Fluid Kinetics, Inc.
251 Thorn Avenue
Orchard Park, NY 14127
(716) 662-7900 Fax: (716) 662-7982

Start-up (initial):

1. Verify that collection trench lines are unplugged and free of obstructions. Verify all mechanical connections, and ensure that valves in treatment building are positioned to allow flow through bag filters into process feed tank.

2. Open valves on collection trench drain lines. Close recirculation line valve.

3. Set pump on/off levels via groundwater treatment system PLC interface.

4. Turn feed pump HOA switches to "auto" mode at PLC and at pump control panels (by feed tank).

5. Slowly open sample tap on influent feed line in treatment building to release any air.

6. Monitor level in collection trench piezometers and sump routinely to ensure that automatic shut-down level is not beneath top of collection trench sand bedding elevation.

Start-up (normal):

1. Ensure that valves in treatment building are positioned to allow flow from groundwater collection pumps through bag filters into process feed tank.

2. Turn feed pump HOA switches to "auto" mode at PLC interface panel and at pump control panels (by feed tank).

3. The pumps will start automatically, and will cycle on/off as necessary based on groundwater trench and feed tank level.

4. Adjust recirculation line butterfly valve as desired to avoid pump short-cycling (i.e., pumps energizing more than 30 times per hour) and maintain desired groundwater elevation drawdown. Open recirculation line valve to reduce net discharge rate from pump station. Close recirculation valve to increase net discharge rate.

Shut-down:

1. Tum collection pump HOA switches to “off“ position.

Maintenance:

1. Routine maintenance of the collection trench, pump station and submersible collection pumps is not required. Monitor groundwater elevation in the collection trench at the PLC interface panel to ensure drawdown to desired elevation.

Troubleshooting:

1. Refer to manufacturer's operation and maintenance manual for trouble-shooting procedures and additional operational information for collection pumps. Be aware that collection pump automatic operation will be halted if the treatment system process feed tank reaches pre-set high level.

2. Shut-down levels for collection pumps must be established to ensure collection trench sand bedding is always submerged. If surficial oxidation or clogging of perforated PVC drain lines occurs, (as evidenced by inability to maintain desired elevation in collection trench piezometers when pumps are operating properly) high-pressure cleaning as is commercially available for clogged sewer lines may be beneficial in loosening scale and unclogging the line. Oxidized sand bedding may require excavation and replacement.

APPENDIX A.3

Rochester Fire Academy
Operations and Maintenance Manual

Standard Operating Procedure for
Sequestering Agent Feed System
Start-Up/Shut-Down and Maintenance

Description: Sequestering Agent Feed System
Model: A971-257

Manufacturer: LMI
Liquid Metronics Division
8 Post Office Square
Acton, MA 01720
Phone: 508-263-9800

Vendor: Pertech, Inc.
586 North French Road, Suite 6
Buffalo, NY 14228
(716) 691-5450 Fax: (716) 691-5470

Start-up (initial):

1. Verify all mechanical connections on suction and discharge side of pumps have been made and valving is correctly positioned to allow unobstructed flow from sequestering agent feed drum to process influent line.

2. Set back pressure relief valve at 50 psi; set pressure relief valve at 75 psi.

3. Turn power on at panel on pump face and set mode to "manual." Adjust stroke rate to 50%.

4. Once air had been purged from suction and discharge lines, fill calibration tube with sequestering agent. Arrange valving to draw from calibration tube, and re-start pump. Adjust stroke rate to deliver maximum desired flow (i.e., 15.1 ml/min. per Section 2.3.1.5) at process flow rate of 40 gpm, with decrease in sequestering agent dosing rate proportional to decrease in process flow (see attached flow chart).

5. Leave pump set in automatic (i.e., external) mode.

Start-up (normal):

1. Under normal conditions, pump rate will automatically adjust based on influent flow rate. Tum power on or off at panel as desired.

Shut-down:

1. Turn power off at front panel. If pump will be shut down for an extended period (i.e., greater than one week), route suction line into clean water and manually operate pump so as to purge lines and pump head of sequestering agent.

Maintenance:

1. Replace Liquifram® seal rings, valve balls and the Injection Check Valve spring annually (see manufacturer's 0 & M Manual for information on ordering replacement parts).

2. Depressurize, drain and disconnect discharge line prior to replacements. Flush head assembly with neutralizing solution. Then pump air until pump head purged of neutralizing solution.

3. While pump is running, set stroke knob to zero and tum pump off.

4. Replace all parts. Take care not to scratch the Teflon face of new Liquifram®.

5. Start the pump and tum stroke knob to 90%. With pump running, screw new Liquifram® clockwise until center buckles inward. Stop the pump. Position and/or adjust Liquifram®.

6. After one week of operation, recheck screws and tighten if necessary.

Refer to manufacturer's operation and maintenance manual for additional operational information.

APPENDIX A.4

Rochester Fire Academy
Operations and Maintenance Manual

Standard Operating Procedure for Multiple Bag Filters

Description: Multiple Bag Filter Unit and Filter Displacers

Model: UF8-l 802F-A2CE (filter unit) UF81802DIS (displacers)

Manufacturer: Trumpler Clancy, Inc.
726 State Blvd, Syracuse, NY 13209
Phone: (315) 488-3200 Fax: (315) 488-3565

Vendor: Same as Above

Start-up (initial):

1. Complete and verify all mechanical connections. Make sure groundwater collection pumps are turned off at the control panel.
2. Install re-usable envelope seals on each of eight (8) oil-absorbing, 25-micron bags
3. Open lid on primary (lead) vessel and install eight (8) wire mesh filter baskets in the vessel openings. Install bags inside baskets such that envelope seals rest on outer perimeter of vessel openings.
4. Install liquid displacers inside each bag.
5. Close and seal vessel lid.
6. Repeat steps 1 through 5 for secondary (lag) vessel, using 10-micron woven nylon bags.
7. Ensure valving is arranged to direct flow in series from primary vessel through secondary vessel.
8. Start groundwater collection pumps.

Start-up (normal):

1. Follow same procedure as for initial start-up. If non-aqueous phase liquids are not present following the initial start-up period, 10 micron woven bags may be used and a single vessel may be placed in operation with the second vessel in standby mode.

Shut-down:

1. Turn off groundwater collection pumps at the control panel.
2. Remove vessel lids and open drain valves.
3. Remove liquid displacers and bags. Examine and clean baskets, if required.
4. Remove envelope seals from bags for re-use. Dispose of bags in accordance with applicable State and Federal Regulations.

Maintenance:

1. Monitor pressure differential across bag housing daily. Replace bags when differential pressure exceeds 10 PSI. Note that pressure build-up rate may not be linear, and pressure may build-up quickly as the filter capacity decreases.
2. Lubricate swing-davit on vessel lids semi-annually.

Refer to manufacturer's operation and maintenance manual for trouble-shooting procedures and additional operational information.

APPENDIX A.5

Rochester Fire Academy
Operations and Maintenance Manual

Standard Operating Procedure for Feed Tank

Description:	Groundwater Feed Tank
Model:	TFD-PE1500 (feed tank)
Manufacturer:	Remedial System, Inc. 56 Leonard Street, Foxboro, MA 02035-2829 Phone: (508) 543-1512 Fax: (508) 543-7485
Vendor:	Same as above
Start-up (initial):	N/A
Start-up (normal):	N/A
Shut-down:	N/A
Maintenance:	Note: No routine maintenance of the feed tank should be required. Solids buildup should be minimal, as what few solids may come in from the groundwater collection trench are removed in the bag filters. Additionally, carbon filters are no longer present that could be sensitive to even small solids loadings. As such, it is anticipated that no shutdown, claning and/or maintenance of the feed tank will be required.

APPENDIX A.6

Rochester Fire Academy
Operations and Maintenance Manual

Standard Operating Procedure for Air Stripper Feed Pumps

Description:	Feed Pumps
Model:	TE-7K-MD
Manufacturer:	March Manufacturing
Vendor:	Pertech, Inc. 586 North French Road, Suite #6, Buffalo, NY 14228 Phone: (716) 691-5450 Fax: (716) 691-5470

Start-up (initial):	1.	Verify all mechanical connections, and ensure that valves on inlet and discharge lines are positioned to allow flow from the feed tank to the air stripper.
	2.	Ensure air stripper blower is operating
	3.	Place feed pump HOA switches in "auto" position. Pumps will cycle automatically based on feed tank and stripper sump level.
Start-up (normal):	1.	Same as initial start-up procedure.
Shut-down:	1.	Turn feed pump HOA switches to "off" position.
Maintenance:	1.	Routine maintenance of these mag-drive pumps is not required.

Refer to manufacturer's operation and installation manual for trouble-shooting procedures and additional operational information for feed pumps.

APPENDIX A.7

Rochester Fire Academy
Operations and Maintenance Manual

Standard Operating Procedure for Low Profile Air Stripper

Description: Low Profile Shallow Tray Air Stripper

Stripper Model: RTS-50-4

Manufacturer: Remedial Systems, Inc.
56 Leonard Street, Foxboro MA 02035-2829
Phone: (508) 543-1512 Fax: (508) 543-7485

Vendor: Same as Above

Start-up (initial):

1. Complete and verify all mechanical and electrical connections.

2. Tum the power on at the system control panel (located alongside the stripper).

3. Close the valve on the inlet water line.

4. Check that all the control functions are properly indicated.

5. Start the primary system blower by turning the HOA switch on the stripper control panel to "hand" (manual).

6. Verify that the feed tank is sufficiently full, and manually start one of the stripper feed pumps. Open the valve on the influent water line slowly until the desired water flow rate is reached.

7. Run the system for 1-2 minutes then turn the inlet water off. After 1 minute, turn off the blower. This procedure will ensure that the down-tube in the sump is immersed in water, creating a seal against air escaping up the down tube. The system is now ready for continuous process operation.

8. Repeat steps 3 through 7 whenever the stripper sump is drained.

Maintenance:

1. On a quarterly basis, shut down blower and feed pumps and open PVC boots on stripper tray and sump ports. Examine each tray (top and bottom) for build-up of calcite scale (precipitated calcium oxide) or sludge.

2. Loose sludges (e.g., biological) may be cleaned by inserting the washer wand from a pressure sprayer directly into the ports.

3. If holes in the trays are becoming clogged with scale, disassemble for cleaning through the following procedure:
   - A. Disconnect the process influent pipe
   - B. Unsnap tray connector clips
   - C. Lift each tray from the unit one at a time (requires two persons)
   - D. Replace the trays with clean spare set, re-start stripper.

4. Cleaning of heavy scale is best accomplished by tapping tray bottoms with a rubber mallet to loosen the scale, followed by high-pressure washing. Light scale can be cleaned by spraying a fine mist of dilute hydrochloric acid (<30%) across the tray bottoms with subsequent pressure washing. Contact of acid on bare steel and gaskets should be avoided.

Refer to manufacturer's operation and maintenance manual for trouble-shooting procedures and additional operational information.

APPENDIX A.8

Rochester Fire Academy
Operations and Maintenance Manual

Standard Operating Procedure for Discharge Pumps

Description:	Discharge Pumps
Model:	2BF21534
Manufacturer:	Goulds Pumps, Inc. P.O. Box 330, Seneca Falls, NY 13148 Phone: (315) 568-2811
Vendor:	Estabrook Corp. 660 Front Street, Berea, Ohio 44017 Phone: 1-800-959-9161 Fax: 1-800-959-2234

Start-up (initial):

1. Verify all mechanical connections, and ensure that valves on inlet and discharge lines are positioned to allow flow from the discharge tank to the sanitary sewer.
2. Place discharge pump HOA switches in "auto" position at control panel (by discharge pumps) and at PLC interface panel. Pumps will cycle automatically based on stripper sump level.

Start-up (normal):

1. Same as initial start-up procedure.

Shut-down:

1. Turn discharge pump HOA switches to "off" position.

Maintenance:

1. Routine maintenance of these pumps is not required.

Refer to manufacturer's operation and installation manual for trouble-shooting procedures and additional operational information for discharge pumps.

APPENDIX B

OPERATOR
LOG FORM

ROCHESTER FIRE TRAINING ACADEMY
GROUNDWATER TREATMENT OPERATORS LOG

WEEK OF: _____

Daily Log Info:

Date:	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Daily Discharge (gal)							
Total Flow Year-To-Date (gal)							
Alarms							

Weekly Log Info:

Site Check Date	
NDA Grounds Check	
TGA Grounds Check	
SDA Grounds Check	
SDA Plant Check	

Flow Rate In, GPM (P1 or P2)	
Flow Rate Out, GPM (P1 or P2)	
Bag Filter PSI (In/Out)	
Sequestering Agent Level, in.	
GW Trench Pump Setpoints (On/Off)	

Site Notes: _____

APPENDIX C

GROUNDWATER TREATMENT SYSTEM
PC/CO APPLICATION AND LETTER OF APPROVAL

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
50 Wolf Road, Albany, New York 12233

MAR 2 1 1995

Mr. Mark D. Gregor
Department of Environmental Services
City of Rochester
30 Church Street, Room 300B
Rochester, New York 14614-1278

Dear Mr. Gregor:

Re: Site No. 8-28-015
Rochester Fire Academy
Rochester, Monroe County

The Department's Technology Section has completed review of the City of Rochester's (COR) application for approval of groundwater treatment system exhaust as submitted with its February 17, 1995 transmittal letter. The calculated discharges for the air stripper unit as provided in the enclosed application are acceptable.

Please call me at (518) 457-7878 if you have any questions.

Sincerely,

Amarinderjit S. Nagi, P.E.
Project Manager
Western Field Services Section
Bureau of Construction Services
Division of Hazardous Waste Remediation

cc: M. J. Peachey - NYSDEC Region 8
T. Marriot (w/enc.)
J. Harrington (w/enc.)
R. Cozzy

City of Rochester

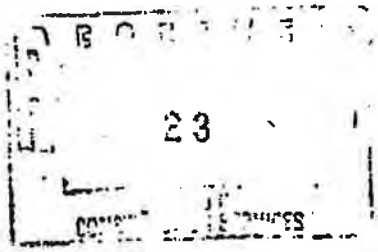
FAX (716) 428-6010
TDD/Voice 232-3260

Department of
Environmental Services

Office of the Commissioner
Division of Environmental Quality
30 Church Street, Rm. 300B
Rochester, New York 14614-1278
Tel.#: (716) 428-6011

February 17, 1995

Robert Cozzy
New York State Department of Environmental Conservation
Bureau of Central Remedial Action
50 Wolf Road
Albany, New York 12233



Re: Rochester Fire Academy, NYSDEC Site No. 828015
Application for Approval of Groundwater Treatment System Process Exhaust

Dear Mr. Cozzy:

The City of Rochester has received bids for the remediation of the Rochester Fire Academy site, located at 1190 Scottsville Road in the City of Rochester, New York. The site remediation will incorporate a groundwater treatment system to remove volatile organics (VOC) from collected groundwater, which will be accomplished through the use of a low profile air stripper. The groundwater treatment system design has been approved by the NYSDEC Division of Hazardous Waste Remediation. Construction of the groundwater treatment system is tentatively scheduled to begin in summer, 1995 with start-up on or about September 1, 1995. Although the project is being performed under Consent Order (B8-02-5-87-09 dated June 21, 1989) and, hence, is exempt from permitting requirements, the enclosed permit to construct/certificate to operate (PC/CO) application has been completed to convey the pertinent treatment process emissions information to the Division of Air Resources for review and approval. A description of the key assumptions behind the emissions loading calculations as well as a summary of the monitoring to be performed by the City of Rochester to verify the loadings are presented below.

Emissions Loading Calculations

The VOC emissions rates indicated in Section F of the PC/CO application are dependent on the performance of the groundwater collection system. Upon start-up, the process is expected to operate continuously at a rate of less than 40 gallons per minute (i.e., the design capacity of the treatment system). Within 3-4 months, it is expected that the collection and treatment rate will approach steady-state conditions of approximately 15 gallons per minute. Maximum contaminant concentrations, based on the highest concentrations detected during previous groundwater sampling events at the facility, were used to calculate emissions loadings for both the 40 gpm and 15 gpm flow rate scenarios.

The Emission Rate Potential (ERP) identified on the PC/CO application assumes a groundwater flow rate of 40 gpm and 100% transfer of the contamination to the air by the stripper. The actual emission rate presented on the application assumes 100% transfer of the contamination to the air by the stripper at a groundwater flow rate of 15 gpm.

Emissions Monitoring

VOC loadings to the atmosphere will be checked on a daily basis for the first three (3) days of treatment system start-up or longer until compliance with Division of Air Resources emissions limits is demonstrated. The emissions loadings will be calculated by means of a mass balance around the air stripper. Samples of the stripper influent and effluent groundwater will be collected and analyzed on each of three consecutive days in according with USEPA Methods 601 and 602, with 24-hour turnaround on the analytical results. The daily total and maximum groundwater flow rates will also be recorded. The difference in aqueous concentrations multiplied by the groundwater flow rates will provide the maximum and average VOC emission rates to the atmosphere, which will be compared to the emissions limits issued by the Department. If emissions limits are not met, corrective actions will be taken. The Department will be notified of all emissions monitoring results.

After the start-up period, the mass balance described above will be performed on a quarterly basis by the City of Rochester. The City will maintain records of the mass balance calculations and will notify NYSDEC if emissions limits are exceeded.

If you have any questions, please contact me at (716)428-5978.

Sincerely,

Mark D. Gregor
Environmental Specialist

jaf

xc: Amarinderjit Nagi,NYSDEC
Ford Ritz,MPI
Jim Raleigh,MPI
Jim Dinardo
Bill Kiselycznyk

CALCULATIONS

The process will incorporate an air stripper to remove volatile organic compounds from groundwater. Mass loadings to the atmosphere reported in Section F of the Permit to Construct are based on a material balance around the stripper. An example calculation is presented below for 1,1-dichloroethene. The attached spreadsheets (Tables 1 and 2) present the actual and potential emmission rates, respectively, for all contaminants.

Material Balance:

Mass transfer to the atmosphere = concentration transferred from groundwater to air x groundwater flow rate = (stripper influent concentration - stripper effluent concentration) x flow rate.

Airstripper Influent Groundwater Concentration (mg/l):

Influent concentrations are conservatively assumed to be the highest concentration of the contaminant ever detected in all groundwater samples collected from the aquifer.

For 1,1-dichloroethene, influent concentration = 0.12 mg/l

Airstripper Effluent Groundwater Concentration (mg/l):

Effluent concentrations are conservatively assumed to be 0 (100% stripped to the atmosphere) for all contaminants.

For 1,1-dichloroethene, effluent concentration = 0 mg/l

Groundwater Flow Rate (gallons per minute):

Maximum stripper design operating capacity (start-up only) = 40 gpm
Anticipated average flow rate at steady-state = 15 gpm.

Mass Transfer to Air:

For 1,1-dichloroethene, ERP =

(0.12 mg/l - 0 mg/l) x 40 gal/min x 3.785 L/gal x 2.205 lb/1x10^{6}mg x 60 min/hr = 0.0024 lbs/hr

Actual Emissions =

(0.12 mg/l - 0 mg/l) x 15 gal/min x 3.785 L/gal x 2.205 lb/1x10^{6}mg x 60 min/hr = 0.0009 lbs/hr

TABLE 1

ROCHESTER FIRE ACADEMY - SOUTH DISPOSAL AREA

GROUNDWATER AIR STRIPPER

CALCULATION OF ACTUAL EMISSIONS RATE

AT A STEADY-STATE GROUNDWATER PRODUCTION RATE OF 15 gpm

CONTAMINANT	INFLUENT WATER CONC. (mg/l)	EFFLUENT WATER CONC. (mg/l)	NET (mg/l)	MAX WATER FLOW RATE (GPM)	MASS TRANSFER TO AIR (mg/min)	BLOWER CAP. (cfm)	STACK AIR CONC. (mg/cu m)	VOC LOADING TO AIR (lhs/hr)
1,1-Dichloroethene	0.12	0	0.12	15	6.82	900	0.27	0.0009
1,1-Dichloroethane	1	0	1	15	56.82	900	2.23	0.0075
1,2-Dichloroethene	30	0	30	15	1704.55	900	66.86	0.2255
Chloroform	0.008	0	0.008	15	0.45	900	0.02	0.0001
1,2-Dichloroethane	0.046	0	0.046	15	2.61	900	0.10	0.0003
Vinyl Chloride	0.22	0	0.22	15	12.50	900	0.49	0.0017
Acetone	1.6	0	1.6	15	90.91	900	3.57	0.0120
Methylene Chloride	0.58	0	0.58	15	32.95	900	1.29	0.0044
2-Butanone	0.15	0	0.15	15	8.52	900	0.33	0.0011
1,1,1-Trichloroethane	7.9	0	7.9	15	448.86	900	17.61	0.0594
Bromodichloromethane	0.009	0	0.009	15	0.51	900	0.02	0.0001
Trichloroethene	0.94	0	0.94	15	53.41	900	2.09	0.0071
Benzene	0.009	0	0.009	15	0.51	900	0.02	0.0001
4-methyl-2-pentanone	0.16	0	0.16	15	9.09	900	0.36	0.0012
Tetrachloroethene	0.088	0	0.088	15	5.00	900	0.20	0.0007
Toluene	0.91	0	0.91	15	51.70	900	2.03	0.0068
Chlorobenzene	0.008	0	0.008	15	0.45	900	0.02	0.0001
Ethylbenzene	0.34	0	0.34	15	19.32	900	0.76	0.0026
Total Xylenes	2.3	0	2.3	15	130.68	900	5.13	0.0173
Chloroethane	0.075	0	0.075	15	4.26	900	0.17	0.0006

TABLE 2

ROCHESTER FIRE ACADEMY – SOUTH DISPOSAL AREA

GROUNDWATER AIR STRIPPER

CALCULATION OF MAXIMUM POTENTIAL EMISSIONS RATE

AT A START-UP GROUNDWATER PRODUCTION RATE OF 40 gpm

CONTAMINANT	INFLUENT WATER CONC. (mg/l)	EFFLUENT WATER CONC. (mg/l)	NET (mg/l)	MAX WATER FLOW RATE (GPM)	MASS TRANSFER TO AIR (mg/min)	BLOWER CAP. (cfm)	STACK AIR CONC. (mg/cu m)	VOC LOADING TO AIR (lbs/hr)
1,1-Dichloroethene	0.12	0	0.12	40	18.18	900	0.71	0.0024
1,1-Dichloroethane	1	0	1	40	151.52	900	5.94	0.0200
1,2-Dichloroethene	30	0	30	40	4545.45	900	178.28	0.6013
Chloroform	0.008	0	0.008	40	1.21	900	0.05	0.0002
1,2-Dichloroethane	0.046	0	0.046	40	6.97	900	0.27	0.0009
Vinyl Chloride	0.22	0	0.22	40	33.33	900	1.31	0.0044
Acetone	1.6	0	1.6	40	242.42	900	9.51	0.0321
Methylene Chloride	0.58	0	0.58	40	87.88	900	3.45	0.0116
2-Butanone	0.15	0	0.15	40	22.73	900	0.89	0.0030
1,1,1-Trichloroethane	7.9	0	7.9	40	1196.97	900	46.95	0.1583
Bromodichloromethane	0.009	0	0.009	40	1.36	900	0.05	0.0002
Trichloroethene	0.94	0	0.94	40	142.42	900	5.59	0.0188
Benzene	0.009	0	0.009	40	1.36	900	0.05	0.0002
4-methyl-2-pentanone	0.16	0	0.16	40	24.24	900	0.95	0.0032
Tetrachloroethene	0.088	0	0.088	40	13.33	900	0.52	0.0018
Toluene	0.91	0	0.91	40	137.88	900	5.41	0.0182
Chlorobenzene	0.008	0	0.008	40	1.21	900	0.05	0.0002
Ethylbenzene	0.34	0	0.34	40	51.52	900	2.02	0.0068
Total Xylenes	2.3	0	2.3	40	348.48	900	13.67	0.0461
Chloroethane	0.075	0	0.075	40	11.36	900	0.45	0.0015

CONTAMINANT IMPACT SUMMARY OF AIR GUIDE 1 ANALYSIS

CAS NUMBER	EMISSIONS #/HOUR	EMISSIONS #/YEAR	ANNUAL EMISSIONS #/HOUR	SUMMATION OF SHORT-TERM IMPACTS, MAXIMUM (Cav,Pt,Area) ug/m3	SUMMATION OF CAVITY IMPACTS ACTUAL ANNUAL ug/m3	SUMMATION OF POINT or AREA SOURCE IMPACTS POTENTIAL ANNUAL ug/m3	ACTUAL ANNUAL ug/m3
000067641	0.032000	284.0000	0.032420	6.407278	0.000000	0.186804	0.189430
000071556	0.157000	1378.0000	0.157306	31.435709	0.000000	0.916504	0.919232
000075343	0.020000	177.4000	0.020251	4.004549	0.000000	0.116752	0.118340
000075354	0.003000	21.3000	0.002432	0.600682	0.000000	0.017513	0.014209
SUMMARY TOTALS	0.212000	1860.7001	0.212409	42.448215	0.000000	1.237575	1.241230

CONTAMINANT ASSESSMENT SUMMARY OF AIR GUIDE 1 ANALYSIS

CAS NUMBER	AGC ug/m3	SGC ug/m3	SUMMATION OF SHORT-TERM IMPACTS, MAXIMUM (Cav,Pt,Area) % OF SGC	SUMMATION OF CAVITY IMPACTS ACTUAL ANNUAL % OF AGC	SUMMATION OF POINT or AREA SOURCE IMPACTS POTENTIAL ANNUAL % OF AGC	SUMMATION OF POINT or AREA SOURCE IMPACTS ACTUAL ANNUAL % OF AGC
000067641	14000.000000000	0.0000	0.0000	0.0000	0.0013	0.0014
000071556	500.000000000	0.0000	0.0000	0.0000	0.1833	0.1839
000075343	500.000000000	0.0000	0.0000	0.0000	0.0234	0.0237
000075354	500.000000000	0.0000	0.0000	0.0000	0.0035	0.0026
SUMMARY TOTALS			0.0000	0.0000	0.2115	0.2117

Form: 0691 (Epson LQ 1070+)

LOCATION | FACILITY | EMISSION POINT

A ADD
C CHANGE
D DELETE

READ INSTRUCTIONS CONTAINED IN FORM 75-11-12 BEFORE ANSWERING ANY QUESTION

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

COPIES
WHITE - ORIGINAL -
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WHITE - REGIONAL OFFICE
WHITE - FIELD REP
YELLOW - APPLICANT

PROCESS, EXHAUST OR VENTILATION SYSTEM

APPLICATION FOR PERMIT TO CONSTRUCT OR CERTIFICATE TO OPERATE

1. NAME OF OWNER / FIRM	9. NAME OF AUTHORIZED AGENT	10. TELEPHONE	12. FACILITY NAME (IF DIFFERENT FROM OWNER / FIRM)
City of Rochester	Malcolm Pirnie, Inc.	(716) 828-1300	Rochester Fire Academy
2. NUMBER AND STREET ADDRESS	**11. NUMBER AND STREET ADDRESS**		**12a. FACILITY LOCATION (NUMBER AND STREET ADDRESS)**
City Hall - 30 Church Street	P.O. Box 1938		1190 Scottsville Rd.
3. CITY - TOWN - VILLAGE / **4. STATE** / **5. ZIP**	**13. CITY - TOWN - VILLAGE** / **14. STATE** / **15. ZIP**		**12b. CITY - TOWN - VILLAGE** / **12c. ZIP**
Rochester / NY / 14614	Buffalo / NY / 14219		Rochester / 14624

6. OWNER CLASSIFICATION	16. NAME OF P.E. OR ARCHITECT PREPARING APPLICATION	16. N.Y.S. P.E. OR ARCHITECT LICENSE NO.	17. TELEPHONE	12d. BUILDING NAME OR NUMBER	12e. FLOOR NAME OR NUMBER
A. ☐ COMMERCIAL B. ☐ UTILITY F. ☒ MUNICIPAL H. ☐ RESIDENTIAL I. ☐ INDUSTRIAL M. ☐ FEDERAL O. ☐ EDUC. INST. J. ☐ OTHER	Paul H. Werthman	57626	(716) 828-1300	GW Treatment	1

7. NAME & TITLE OF OWNER'S REPRESENTATIVE	8. TELEPHONE	18. SIGNATURE OF OWNER'S REPRESENTATIVE OR AGENT WHEN APPLYING FOR A PERMIT TO CONSTRUCT	12f. START UP DATE	12g. DRAWING NUMBERS OF PLANS SUBMITTED	27. PERMIT TO CONSTRUCT	28. CERTIFICATE TO OPERATE
Mr. Mark Gregor Sr. Environmental Specialist	(716) 428-6976		07 / 25 MO / YR	G-2, M-2, M-3, A-2	A. ☒ NEW SOURCE B. ☐ MODIFICATION	A. ☐ NEW SOURCE C. ☐ EXISTING SOURCE B. ☐ MODIFICATION

19. EMISSION POINT ID.	20. GROUND ELEVATION (FT.)	21. HEIGHT ABOVE STRUCTURE (FT.)	22. STACK HEIGHT (FT.)	23. INSIDE DIMENSIONS (IN.)	24. EXIT TEMP. (°F)	25. EXIT VELOCITY (FT./SEC.)	26. EXIT FLOW RATE (ACFM)	27. SOURCE CODE	28. HRS / DAY	29. DAYS / YR	45. % OF OPERATION BY SEASON: Winter	Spring	Summer	Fall
0 0 0 0 1	526.0	23.0	38.0	10	50	26.2	900		24	365	25	25	25	25

41. DESCRIBE PROCESS OR UNIT

1. Air stripping for removal of volatile organics from groundwater.
2.
3.
4.
5.
6.
7.
8.

42. EMISSION CONTROL EQUIPMENT I.D.	43. CONTROL TYPE	MANUFACTURER'S NAME AND MODEL NUMBER	DISPOSAL METHOD	DATE INSTALLED - MONTH / YEAR	USEFUL LIFE
42. N/A	43. 99	44. None	46.	48. /	47.
48.	49.	50.	51.	52. /	53.

Page 1 of 4

CALCULATIONS

See Attached

CONTAMINANT NAME	CAS NUMBER	EMISSIONS ACTUAL	UNIT	HOW DET.	PERMISSIBLE	% CONTROL EFFIC CY	HOURLY EMISSIONS (LBS/HR) ERP	ACTUAL	ANNUAL EMISSIONS (LBS/YR) ACTUAL	*DF	PERMISSIBLE
54. Acetone	55. 000067-64-1	53. 12.000	56. 2	57. 8	58.	59. 0.000	60. 0.032 (0.030)	61. 0.012	62. 1.05	63. 2	64.
65. Chloroform	66. 000067-66-3	64. 0.100	65. 2	66. 8	67.	68. 0.000	69. 0.000	70. 0.000	71. 5.9 8.00	72. -1	73.
74. Benzene	75. 000071-43-2	73. 0.100	74. 2	75. 8	76.	77. 0.000	78. 0.000	79. 0.000	80. 6.0 8.00	81. -1	82.
83. 111-Trichloroethane	84. 000071-55-6	82. 50.300	83. 2	84. 8	85.	86. 0.000	87. 0.158 (0.158)	88. 0.059 (0.059)	89. 5.19 8.16	90. 2	91.
92. Chloroethane	93. 000075-00-3	91. 0.800	92. 2	93. 8	94.	95. 0.000	96. 0.002	97. 0.001	98. 4.90 (4.90)	99. 0	100.
101. Vinyl Chloride	102. 000075-01-4	100. 1.700	101. 2	102. 8	103.	104. 0.000	105. 0.004	106. 0.002	107. 1.48	108. 1	109.

SOLID FUEL TYPE	SOLID FUEL TONS / YR	% S	LIQUID FUEL TYPE	LIQUID FUEL THOUSANDS OF GALS / YR	% S	GAS TYPE	GAS THOUSANDS OF CF/YR	BTU/CF
144.	145.	146.	147.	148.		150.	151.	152.

APPLICABLE RULE	APPLICABLE RULE
153.	154.

[illegible] completion of construction and the statements noted below are [illegible] the application for this permit.

IF PROCESS, EXHAUST OR VENTILATION SYSTEM HAS BEEN CONSTRUCTED AND WILL BE OPERATED IN ACCORDANCE WITH STATED SPECIFICATIONS AND IN CONFORMANCE WITH ALL PROVISIONS OF EXISTING REGULATIONS

155. SIGNATURE OF AUTHORIZED REPRESENTATIVE OR AGENT | DATE

[illegible] RECEIVED THIS DATE AND REVIEWED FOR ISSUANCE

Form: 0911 (Spcon LG 10784)

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

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WHITE - FIELD REP
YELLOW - APPLICANT

LOCATION | FACILITY | EMISSION POINT

ADD / CHANGE / DELETE

READ INSTRUCTIONS CONTAINED IN FORM 78-11-12 BEFORE ANSWERING ANY QUESTION

PROCESS, EXHAUST OR VENTILATION SYSTEM

APPLICATION FOR PERMIT TO CONSTRUCT OR CERTIFICATE TO OPERATE

SECTION A

1. NAME OF OWNER / FIRM: City of Rochester
8. NAME OF AUTHORIZED AGENT:
9. TELEPHONE:
10. FACILITY NAME (IF DIFFERENT FROM OWNER / FIRM): Rochester Fire Academy
2. NUMBER AND STREET ADDRESS: City Hall - 30 Church Street
11. NUMBER AND STREET ADDRESS:
10a. FACILITY LOCATION (NUMBER AND STREET ADDRESS): 1190 Scottsville Rd.
3. CITY - TOWN - VILLAGE: Rochester | 4. STATE: NY | 5. ZIP: 14614
12. CITY - TOWN - VILLAGE | 13. STATE | 14. ZIP
10b. CITY - TOWN - VILLAGE: Rochester | 10c. ZIP: 14624
6. OWNER CLASSIFICATION: A. ☐ COMMERCIAL B. ☐ UTILITY E. ☐ STATE F. ☒ MUNICIPAL H. ☐ HOSPITAL I. ☐ RESIDENTIAL C. ☐ INDUSTRIAL D. ☐ FEDERAL G. ☐ EDUC. INST. J. ☐ OTHER
15. NAME OF P.E. OR ARCHITECT PREPARING APPLICATION
16. N.Y.S. P.E. OR ARCHITECT LICENSE NO.
17. TELEPHONE
10d. BUILDING NAME OR NUMBER: GW Treatment
10e. FLOOR NAME OR NUMBER: 1
7. NAME & TITLE OF OWNER'S REPRESENTATIVE: Mr. Mark Gregor, Sr. Environmental Specialist
E. TELEPHONE: (716) 428-5870
18. SIGNATURE OF OWNER'S REPRESENTATIVE OR AGENT WHEN APPLYING FOR A PERMIT TO CONSTRUCT
22. START OF DATE: 07 / 86 (MO / YR)
23. DRAWING NUMBERS OF PLANS SUBMITTED: G-2, M-2, M-3, A-2
27. PERMIT TO CONSTRUCT: A. ☒ NEW SOURCE B. ☐ MODIFICATION
28. CERTIFICATE TO OPERATE: A. ☐ NEW SOURCE B. ☐ MODIFICATION C. ☐ EXISTING SOURCE

SECTION B

24. EMISSION POINT NO.	25. GROUND ELEVATION (FT.)	26. HEIGHT ABOVE STRUCTURES (FT.)	27. STACK HEIGHT (FT.)	28. INSIDE DIMENSIONS (IN.)	29. EXIT TEMP (°F)	30. EXIT VELOCITY (FT/SEC.)	31. EXIT FLOW RATE (ACFM)
0 0 0 0 1							

32. SOURCE CODE	33. HRS / DAY	34. DAYS / YR	35. % OF OPERATION BY SEASON: Winter	Spring	Summer	Fall

SECTION C

36. DESCRIBE PROCESS OR UNIT:
1. | 2. | 3. | 4. | 5. | 6. | 7. | 8.

SECTION D

41. EMISSION CONTROL EQUIPMENT I.D.	42. CONTROL TYPE	43. MANUFACTURER'S NAME AND MODEL NUMBER	44. DISPOSAL METHOD	45. DATE INSTALLED - MONTH / YEAR	47. USEFUL LIFE
48.	49.	50.	51.	52. /	53.

Page 2 of 4

SECTION E

CALCULATIONS

See Page 1

SECTION F

CONTAMINANT NAME	CAS NUMBER	54. INPUT OR PRODUCTION	55. UNIT	56. DRY RATING	57. EMISSIONS ACTUAL	58. UNIT	59. HOURS PER DAY	60. PERMISSIBLE	61. % CONTROL EFFICIENCY	62. HOURLY EMISSIONS (LBS/HR) SIP	ACTUAL	63. ANNUAL EMISSIONS (LBS/YR) ACTUAL	64.	PERMISSIBLE
Methylene Chloride	000075-09-2				4.400	2	8		0.000	0.012	0.004	3.81	5	
Bromodichloromethane	000075-27-4				0.100	2	8		0.000	0.000	0.000	6.00	-1	
1,1-Dichloroethane	000075-34-3				7.300	2	8		0.000	0.020	0.008	6.57	1	
1,1-Dichloroethene	000075-35-4				0.900	2	8		0.000	0.002	0.001	7.90	0	
2-Butanone	000078-93-3				1.100	2	8		0.000	0.003	0.001	9.90	0	
Trichloroethylene	000079-01-6				7.100	2	8		0.000	0.019	0.007	6.16	1	

SECTION G

SOLID FUEL TONS / YR	% S	LIQUID FUEL THOUSANDS OF GALLONS/YR TYPE	% S	GAS THOUSANDS OF CU/YR TYPE	BTU/CF	APPLICABLE RULE	APPLICABLE RULE

Upon completion of construction sign the statement below and forward to the appropriate field representative

THE PROCESS, EXHAUST OR VENTILATION SYSTEM HAS BEEN CONSTRUCTED AND WILL BE OPERATED IN ACCORDANCE WITH STATED [illegible] IN CONFORMANCE WITH ALL PROVISIONS OF EXISTING REGULATIONS

SIGNATURE OF AUTHORIZED REPRESENTATIVE OR AGENT | DATE

Form 88-01 (Eposn LQ 1075+)

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

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YELLOW - APPLICANT

ID LOCATION FACILITY EMISSION POINT

A ADD
C CHANGE
D DELETE

READ INSTRUCTIONS CONTAINED IN FORM 75-11-12 BEFORE ANSWERING ANY QUESTION

PROCESS, EXHAUST OR VENTILATION SYSTEM

APPLICATION FOR PERMIT TO CONSTRUCT OR CERTIFICATE TO OPERATE

SECTION A

1. NAME OF OWNER / FIRM: City of Rochester
8. NAME OF AUTHORIZED AGENT
10. TELEPHONE
19. FACILITY NAME (IF DIFFERENT FROM OWNER / FIRM): Rochester Fire Academy
2. NUMBER AND STREET ADDRESS: City Hall - 30 Church Street
11. NUMBER AND STREET ADDRESS
20. FACILITY LOCATION (NUMBER AND STREET ADDRESS): 1190 Scottsville Rd.
3. CITY - TOWN - VILLAGE: Rochester
4. STATE: NY
5. ZIP: 14614
12. CITY - TOWN - VILLAGE
13. STATE
14. ZIP
21. CITY - TOWN - VILLAGE: Rochester
22. ZIP: 14624
6. OWNER CLASSIFICATION: A. COMMERCIAL C. UTILITY F. [X] MUNICIPAL I. RESIDENTIAL; B. INDUSTRIAL D. FEDERAL G. SOLID WST. J. OTHER; H. HOSPITAL
16. NAME OF P.E. OR ARCHITECT PREPARING APPLICATION
18. N.Y.S. P.E. OR ARCHITECT LICENSE NO.
17. TELEPHONE
23. BUILDING NAME OR NUMBER: GW Treatment
24. FLOOR NAME OR NUMBER: 1
25. START UP DATE: 07 (MO) / 95 (YR)
26. DRAWING NUMBERS OF PLANS SUBMITTED: G-2, M-2, M-3, A-2
7. NAME & TITLE OF OWNER'S REPRESENTATIVE: Mr. Mark Gregor, Sr. Environmental Specialist
9. TELEPHONE: (716) 4[illegible]-5878
15. SIGNATURE OF OWNER'S REPRESENTATIVE OR AGENT WHEN APPLYING FOR A PERMIT TO CONSTRUCT
27. PERMIT TO CONSTRUCT: A. [X] NEW SOURCE; B. [ ] MODIFICATION
28. CERTIFICATE TO OPERATE: A. [ ] NEW SOURCE C. [ ] EXISTING SOURCE; B. [ ] MODIFICATION

SECTION B

29. EMISSION POINT ID.	30. GROUND ELEVATION (FT.)	31. HEIGHT ABOVE STRUCTURES (FT.)	32. [illegible]	33. INSIDE DIAMETER (ins.)	34. EXIT TEMP. (°F)	35. EXIT VELOCITY (FT./SEC.)	36. EXIT FLOW RATE (ACFM)	37. SOURCE CODE	38. HRS / DAY	39. DAYS / YR	40. % OPERATION BY SEASON (Winter / Spring / Summer / Fall)
00001											

SECTION C

41. DESCRIBE PROCESS OR UNIT
1. 2. 3. 4. 5. 6. 7. 8.

42. EMISSION CONTROL EQUIPMENT I.D.	43. CONTROL TYPE	44. MANUFACTURER'S NAME AND MODEL NUMBER	45. DISPOSAL METHOD	46. DATE INSTALLED - MONTH / YEAR	47. USEFUL LIFE
42.	43.	44.	45.	46. /	47.
48.	49.	50.	51.	52. /	53.

SECTION E

CALCULATIONS
See Page 1

SECTION F

CONTAMINANT NAME	CAS NUMBER	INPUT OR PRODUCTION	UNIT	SW. RATING	EMISSIONS ACTUAL	UNIT	HOW OFT.	PERMISSIBLE	% CONTROL EFFICIENCY	HOURLY EMISSIONS (LBS/HR) ERP	HOURLY EMISSIONS (LBS/HR) ACTUAL	ANNUAL EMISSIONS (LBS/YR) ACTUAL	ANNUAL EMISSIONS (LBS/YR) 10*	ANNUAL EMISSIONS (LBS/YR) PERMISSIB
54. Ethylbenzene	56. 000100-41-4				58. 2.500	2	8		0.000	0.007	0.003	2.21 / 2.23	1	
69. 1,2-Dichloroethane	70. 000107-06-2				74. 0.300	2	8		0.000	0.001	0.000	3.00 / 3.00	0	
84. 4-Methyl-2-Pentanone	85. 000108-10-1				89. 1.200	2	8		0.000	0.003	0.001	1.05 / 1.05	1	
99. Toluene	100. 000108-88-3				104. 6.800	2	8		0.000	0.018 / 0.018	0.007 / 0.007	5.98 / 5.98	1	
114. Chlorobenzene	115. 000108-90-7				119. 0.100	2	8		0.000	0.000	0.000	5.00 / 5.00	-1	
129. Tetrachloroethylene	130. 000127-18-4				134. 0.700	2	8		0.000	0.002	0.001	5.80 / 5.80	0	

SECTION G

SOLID FUEL TYPE	SOLID FUEL TONS / YR	% S	LIQUID FUEL TYPE	LIQUID FUEL THOUSANDS OF GALLONS/YR	% S	GAS TYPE	GAS THOUSANDS OF CU/YR	BTU/CF	APPLICABLE RULE	APPLICABLE RULE
144.	145.	146.	147.	148.	149.	150.	151.	152.	153.	154.

Upon completion of construction sign the statement noted below and forward to the appropriate field representative

THE PROCESS, EXHAUST OR VENTILATION SYSTEM HAS BEEN CONSTRUCTED AND WILL BE OPERATED IN ACCORDANCE WITH STATED SPECIFICATIONS AND IN CONFORMANCE WITH ALL PROVISIONS OF EXISTING REGULATIONS

156. SIGNATURE OF AUTHORIZED REPRESENTATIVE OR AGENT

DATE

Form: 08/91 (Epson LQ 1070+)

LOCATION | FACILITY | EMISSION POINT

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

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PINK - REGIONAL OFFICE
WHITE - [illegible]
YELLOW - APPLICANT

A ADD
C CHANGE
D DELETE

READ INSTRUCTIONS CONTAINED IN FORM 78-11-12 BEFORE ANSWERING ANY QUESTION

PROCESS, EXHAUST OR VENTILATION SYSTEM

APPLICATION FOR PERMIT TO CONSTRUCT OR CERTIFICATE TO OPERATE

SECTION A

1. NAME OF OWNER / FIRM: City of Rochester
2. NUMBER AND STREET ADDRESS: City Hall - 30 Church Street
3. CITY - TOWN - VILLAGE: Rochester
4. STATE: NY
5. ZIP: 14614
6. OWNER CLASSIFICATION: A. COMMERCIAL B. INDUSTRIAL C. UTILITY D. FEDERAL E. STATE F. MUNICIPAL G. EDUC. INST. H. HOSPITAL I. RESIDENTIAL J. OTHER — F
7. NAME & TITLE OF OWNER'S REPRESENTATIVE: Mr Mark Gregor / Sr. Environmental Specialist
8. TELEPHONE: (716) 428-6978
9. NAME OF AUTHORIZED AGENT
10. TELEPHONE
11. NUMBER AND STREET ADDRESS
12. CITY - TOWN - VILLAGE
13. STATE
14. ZIP
15. NAME OF P.E. OR ARCHITECT PREPARING APPLICATION
16. N.Y.S. P.E. OR ARCHITECT LICENSE NO.
17. TELEPHONE
18. SIGNATURE OF OWNER'S REPRESENTATIVE OR AGENT WHEN APPLYING FOR A PERMIT TO CONSTRUCT
19. FACILITY NAME (IF DIFFERENT FROM OWNER / FIRM): Rochester Fire Academy
20. FACILITY LOCATION (NUMBER AND STREET ADDRESS): 1190 Scottsville Rd.
21. CITY - TOWN - VILLAGE: Rochester
22. ZIP: 14624
23. BUILDING NAME OR NUMBER: GW Treatment
24. FLOOR NAME OR NUMBER: 1
25. START-UP DATE: 07 / 95 (MO / YR)
26. DRAWING NUMBERS OF PLANS SUBMITTED: G-2, M-2, M-3, A-2
27. PERMIT TO CONSTRUCT: A. [X] NEW SOURCE B. [ ] MODIFICATION
28. CERTIFICATE TO OPERATE: A. [ ] NEW SOURCE B. [ ] MODIFICATION C. [ ] EXISTING SOURCE

SECTION B

29. EMISSION POINT ID.	30. GROUND ELEVATION (FT.)	31. HEIGHT ABOVE STRUCTURES (FT.)	32. STACK HEIGHT (FT.)	33. INSIDE DIMENSIONS (IN.)	34. EXIT TEMP. (°F)	35. EXIT VELOCITY (FT./SEC.)	36. EXIT FLOW RATE (ACFM)	37. SOURCE CODE	38. HRS / DAY	39. DAYS / YR	40. % OPERATION BY SEASON (Winter / Spring / Summer / Fall)
0 0 0 0 1											

41. DESCRIBE PROCESS OR UNIT

SECTION C

42. EMISSION CONTROL EQUIPMENT I.D.	43. CONTROL TYPE	44. MANUFACTURER'S NAME AND MODEL NUMBER	45. DISPOSAL METHOD	46. DATE INSTALLED MONTH / YEAR	47. USEFUL LIFE
48.	49.	50.	51.	52. /	53.
54.	55.	56.	57.	58. /	59.

Page 4 of 4

SECTION D

CALCULATIONS
See Page 1

SECTION E

60. CONTAMINANT NAME	61. CAS NUMBER	62. INPUT OR PRODUCTION	63. UNIT	64. SW RATING	65. EMISSIONS ACTUAL	66. UNIT	67. HOW DET.	68. PERMISSIBLE	69. % CONTROL EFFICIENCY	70. HOURLY EMISSIONS (LBS/HR) ERP	71. HOURLY EMISSIONS (LBS/HR) ACTUAL	72. ANNUAL EMISSIONS (LBS/YR) ACTUAL	73. ANNUAL EMISSIONS (LBS/YR) PERMISSIBLE
1,2-Dichloroethane	000540-59-0				0.225	T	E		0.000	0.600	0.225	1.97	3
Xylene	001330-20-7				17.200	P	E		0.000	0.046	0.017	1.51	2
					0.000				0.000	0.000	0.000	0.00	
					0.000				0.000	0.000	0.000	0.00	
					0.000				0.000	0.000	0.000	0.00	
					0.000				0.000	0.000	0.000	0.00	

74. SOLID FUEL TONS / YR	% S	76. LIQUID FUEL TYPE	THOUSANDS OF GALLONS/YR	% S	79. GAS TYPE	THOUSANDS OF CF/YR	STU/CF

82. APPLICABLE RULE	83. APPLICABLE RULE

I certify that I am familiar with the information contained in and submitted with this application, and that based on my inquiry of those individuals responsible for obtaining the information, the information is true, accurate and complete. I certify that the facility described in this application will be constructed and will be operated in accordance with stated [illegible] and in accordance with all limitations of [illegible]

84. SIGNATURE OF AUTHORIZED REPRESENTATIVE OR AGENT | DATE

APPENDIX D

SEWER USE PERMIT

Department of **Environmental Services**
Monroe County, New York

Maggie Brooks
County Executive

Michael J. Garland, P.E.
Director

09/24/2013

Dennis M. Peck
City of Rochester
Department of Environmental Services
City Hall Room 300B, 30 Church St
Rochester, NY 14614

Revised
Reissued 11/13
- May did not change date

Re: Rochester Fire Academy
Sewer Use Permit #705 Renewal

Dear Mr. Peck:

As we discussed on the phone, I have changed the permit enclosure for the Rochester Fire Academy to reflect that the analyte 4-methylphenol has been changed from monthly to quarterly monitoring to be consistent with the other SVOCs. The updated Permit Enclosure should replace the previous version in your records and the old copy should be removed and discarded. I apologize for the oversight and any inconvenience it may have caused.

If you have any questions, please call me at (585) 753-7686.

Sincerely yours,

Michael Burkett
Industrial Waste Assistant

F. Drew Smith – Environmental & Regulatory Compliance Manager
Monroe County Department of Environmental Services
145 Paul Road, Bldg. 1, Rochester, New York 14624 - 585-753-7600, option 4, fax 585-324-1213
www.monroecounty.gov/des-industrialwaste.php

COUNTY OF MONROE
SEWER USE PERMIT ENCLOSURE

City of Rochester - Fire Academy
1190 Scottsville Road
Rochester, N.Y. 14624

PERMIT NUMBER: 705
DISTRICT NUMBER: 8571

TYPE OF BUSINESS: Groundwater Remediation
SIC CODE: N/A
SAMPLE POINT: IWC-705.1 - Pretreatment Effluent Sample Port

REQUIRED MONITORING & EFFLUENT LIMITS

SAMPLE POINT: IWC-705.1 - Pretreatment Effluent Sample Port

SELF-MONITORING FREQUENCY: **MONTHLY**

SAMPLING PROTOCOL: Sampling and analysis shall be performed in accordance with the techniques prescribed in 40CFR part 136 and amendments thereto. A grab sample, collected from the above noted sample point shall be analyzed for the following:

Purgeable Halocarbons
Purgeable Aromatics
pH
Acetone (monitor only)
2-Butanone (MEK) (monitor only)
4-Methyl-2-pentanone (MIBK) (monitor only)

DISCHARGE LIMITATIONS: The summation of purgeable aromatics, and purgeable halocarbons, greater than 10 µg/l shall not exceed 2.13 mg/l. The pH shall be within 5.0-12.0 su.

REQUIRED MONITORING & EFFLUENT LIMITS (CONTINUED)

SAMPLE POINT: IWC-705.1 - Pretreatment Effluent Sample Port

SELF-MONITORING FREQUENCY: **QUARTERLY**

SAMPLING PROTOCOL: Sampling and analysis shall be performed in accordance with the techniques prescribed in 40CFR part 136 and amendments thereto. A grab sample collected from the above noted sample point, shall be analyzed for the following parameters:

	Monroe County Sewer Use Limits
Arsenic (T)	0.5 mg/l
Cadmium (T)	1.0 mg/l
Chromium (T)	3.0 mg/l
Copper (T)	3.0 mg/l
Lead (T)	1.0 mg/l
Nickel (T)	3.0 mg/l
Selenium (T)	2.0 mg/l
Zinc (T)	5.0 mg/l
*Pesticides	
*Diethyl phthalate	
*Bis (2-ehtylhexyl) phthalate	
4 Methylphenol (p cresol) (monitor only)	

*The summation of all analysis in this group shall not exceed 2.13 mg/l. When these analytes are run at the same time as the Monthly analysis of the purgeable halocarbons and purgeable aromatics, the summation of analytes in all of these groups with detection levels equal to or greater than 10 µg/l shall not exceed 2.13 mg/l.

SPECIAL CONDITIONS:

1. All groundwater must be treated regardless of the influent concentrations.

2. Quarterly flow summaries shall be submitted for billing purposes. It is imperative these summaries are submitted in a timely manner.

3. If there is no discharge for a given month, then a letter must be submitted stating so.

TERMS AND CONDITIONS

GENERAL REQUIREMENTS:

A. The permittee agrees to accept and abide by all provisions of the Sewer Use Law of Monroe County(MCSUL) and of all pertinent rules or regulations now in force or shall be adopted in the future.

B.1 In addition to the parameters/limits outlined, the total facility discharge shall meet all other concentration values as described in Article II, Section 10e of the Monroe County Pure Waters Districts, Rules and Regulations-Sewer Use Law of the County of Monroe.

B.2 Included in Article II, Section 10e, is the definition of "Normal Sewage". "Normal Sewage" may be discharged to the sewer system in excess of the concentrations outlined in the Joint Rules and Regulations, however, the facility will be subject to the imposition of a sewer surcharge and possible self monitoring requirements as a result. Surcharging procedures are outlined in Article X of the MCSUL.

B.3 Regulatory sampling for analytes not specified under "required monitoring" shall be conducted by the Industrial Waste Section at a minimum frequency of once every three (3) years.

C. This permit is not assignable or transferable. The permit is issued to a specific user and location.

D. Per Article VIII, Section 8.11 of the MCSUL, a violation by the permittee of the permit conditions may be cause for revocation or suspension of the permit after a Hearing by the Administrative Board, or if the violation is found to be within the emergency powers of the Director under Sections 4.5 or 5.5. The revocation is immediate upon receipt of notice to the Industrial User, however a Hearing shall be held as soon as possible.

E. As provided under Article VIII, Section 8.1, the Director and his duly authorized representatives shall gain entry on to private lands by permission or duly issued warrant for the purpose of inspection, observation, measurement sampling and testing in accordance with the provisions of this law and its implementing Rules and Regulations. The Director or his representatives shall not have authority to inquire into any processes used in any industrial operation beyond that information having a direct bearing on the kind and source of discharge to the sewers or the on-site facilities for waste treatment. While performing the necessary work on private lands, referred to above, the Director or his duly authorized representative shall observe all safety rules applicable to the premises as established by the owner and/or occupant.

SPECIAL CONDITION:

A. All required monitoring shall be analyzed by a New York State Department of Health certified laboratory. All sampling and analysis must be performed in accordance with Title 40 Code of Federal Regulations Part 136.

B. The pH range for this permit is 5.0 – 12.0 su. This range is specifically permitted by the Director as allowed under Article IV, Section 4.2 of the Monroe County Sewer Use Law. PH must be analyzed immediately.

C. The summation of all Total Toxic Organics(TTO) Compounds as defined in the Code of Federal Regulations (40 CFR part 433.11(e)) with detection levels above 10 ug/l shall not exceed 2.13 mg/l as imposed by the Director under Article IV, Section 4.3 of the Monroe County Sewer Use Law unless Federal limits are more stringent under which the Federal limits will apply.

D. Petroleum Oil and Grease shall not exceed 100 mg/l as imposed by the Director under Article IV, Section 4.3 of the Monroe County Sewer Use Law.

E. Discharges containing Phenolic compounds shall not exceed 2.13 mg/l as imposed by the Director under Article IV, Section 4.3 of the Monroe County Sewer Use Law unless otherwise specified in the permit. These limits are applicable unless Federal limits are more stringent under which Federal limits will apply.

SURCHARGE CONCENTRATIONS:

Concentration and/or characteristics of normal sewage:
"Normal Sewage" shall mean sewage, industrial wastes or other wastes, which when analyzed, show concentration values with the following characteristics based on daily maximum limits:

a. B. O. D.	300 mg/l
b. Total Suspended Solids	300 mg/l
c. Total Phosphorus, as P	10 mg/l

Annual average concentrations above normal sewage are subject to surcharge as defined in Article X of the sewer use law.

DISCHARGE LIMITATIONS (SEWER USE LIMITS)

Permissible concentrations of toxic substances and/or substances the Department wishes to control:
The concentration in sewage of any of the following toxic substances and/or substances the Department wishes to control shall not exceed the concentration limits specified when discharged into the County Sewer System; metal pollutants are expressed as <u>total</u> metals in mg/l (ppm): the following pollutant limits are based on daily maximum values:

a. Antimony (Sb)	1.0 mg/l
b. Arsenic (As)	0.5 mg/l
c. Barium (Ba)	2.0 mg/l
d. Beryllium (Be)	5.0 mg/l
e. Cadmium (Cd)	1.0 mg/l
f. Chromium (Cr)	3.0 mg/l
g. Copper (Cu)	3.0 mg/l
h. Cyanide (CN)	1.0 mg/l
i. Iron (Fe)	5.0 mg/l
j. Lead (Pb)	1.0 mg/l
k. Manganese (Mn)	5.0 mg/l
l. Mercury (Hg)	0.05 mg/l
m. Nickel (Ni)	3.0 mg/l
n. Selenium (Se)	2.0 mg/l
o. Silver (Ag)	2.0 mg/l
p. Thallium (Tl)	1.0 mg/l
q. Zinc (Zn)	5.0 mg/l

REPORTING REQUIREMENTS:

A. Per the requirements of 40 CFR, Part 403.5, Significant Industrial Users must submit Periodic Reports on Continued Compliance to the Control Authority on a biannual (2/yr) basis. Deadline dates of submission for these reports will be August 15 and February 15, respectively.

B. Discharge monitoring reports shall be submitted to the Control Authority upon receipt from the permittee's testing laboratory.

C. Any Industrial User subject to the reporting requirements of the General Pretreatment Regulations shall maintain records of all information resulting from any monitoring activities required by 403.12 for a minimum of three (3) years. These records shall be available for inspection and copying by the Control Authority. This period of retention shall be extended during the course of any unresolved litigation regarding the discharge of pollutants by the Industrial User or the operation of the POTW Pretreatment Program or when requested by the Director or the Regional Administrator.

NOTIFICATION REQUIREMENTS:

A. Pursuant to Article VIII, Section 8.4K, the permittee shall notify the Department within 24 hours of becoming aware that discharge monitoring is in violation of any permit limit. This notification shall be directed to the Industrial Waste Section at 585-753-7600 Option 4. The User shall also repeat sampling and analysis for the analyte in non-compliance and submit the results of the repeat analysis to Monroe County within 30 days after becoming aware of the violation.

B. Notify the Director in writing when considering a revision to the plant sewer system or any change in industrial waste discharges to the public sewers. The later encompasses either an increase or decrease in average daily volume or strength of waste or new wastes.

C. Notify the Director immediately of any accident, negligence, breakdown of pretreatment equipment or other occurrence that occasions discharge to the public sewer of any waste or process waters not covered by this permit.

SLUG CONTROL

An Industrial User shall be required to report any/all slug discharges to the Monroe County sewer system by calling 585-753-7600 option 4. For the purpose of this permit enclosure, a slug discharge shall be identified as any discharge of a non-routine, episodic nature, including but not limited to an accidental spill or a non-customary batch discharge. Following a review process, the Control Authority (Monroe County) shall determine the applicability of a facility slug control plan. If the Control Authority decides that a slug control plan is needed, the plan shall contain, at a minimum, the following elements:

1. Description of discharge practices, including non-routine batch discharges.
2. Description of stored chemicals.
3. Procedures for immediately notifying the Control Authority of slug discharges, including any discharge that would violate a prohibition under 40 CFR 403.5 (b), with procedures for follow up written notification within five (5) days.
4. If necessary, procedures to prevent adverse impact from accidental spills, including, but not limited to, inspection and maintenance of storage areas, handling and transfer of materials, loading and unloading operations, control of plant site run-off, worker training, building of containment structures or equipment, measures for containing toxic organic pollutants (including solvents) and/or measures and equipment for emergency purposes.

SNC DEFINITION:

In accordance with 40 CFR 403.8 (f) (vii), an Industrial User is in significant noncompliance (SNC) if its violations meet one or more of the following criteria:

A. Chronic violations of wastewater discharge limits – defined as those which 66% or more of all the measurements taken during a six-month period exceed (by any magnitude) the daily maximum limit or the average limit for the same pollutant parameter. This criteria does NOT apply to the following Monroe County surchargeable parameters: Biochemical Oxygen Demand, Total Suspended Solids, Chlorine Demand and Total Phosphorus (ref. Article X – Monroe County Sewer Use Law).

B. Technical review criteria (TRC) violations – defined as those in which 33% or more of all the measurements for each pollutant parameter taken during a six month period equal or exceed the product of the daily maximum limit or the average limit times the applicable TRC. This criteria does NOT apply to the following Monroe County surchargeable parameters: Biochemical Oxygen Demand, Total Suspended Solids, Chlorine Demand and Total Phosphorus (ref. Article X – Monroe County Sewer Use Law).

C. Any other violation of a pretreatment effluent limit (daily maximum or longer-term average) that the Control Authority determines has caused, alone or in combination with other discharges, interference or pass-through (including endangering the health or POTW personnel or the general public).

D. Any discharge of a pollutant that has caused imminent endangerment to human health, welfare or the environment or has resulted in the POTW's exercise of its emergency authority under paragraph (t)(1)(vi)(8) of 40 CFR part 403 to prevent such a discharge.

E. Failure to meet, within 90 days after the scheduled date, a compliance schedule milestone contained in a local control mechanism or enforcement order, for starting construction, completing construction or attaining final compliance.

F. Failure to provide, within 30 days after the due date, required reports such as BMRs, 90 day compliance reports, period reports on continued compliance.

G. Failure to accurately report noncompliance.

H. Any other violation or group of violations that the Control Authority determines will adversely affect the operation and implementation of the local Pretreatment Program.

PENALTIES

Should the facility be considered in Significant Non-Compliance (SNC), based on the above mentioned criteria, the minimum enforcement response by Monroe County will be the publication of the company name in the Gannett Rochester newspaper. The company will be published as an Industrial User in Significant Non-Compliance (SNC). Fines and criminal penalties may follow this publication (ref. Article XII – Monroe County Sewer Use Law).

Nothing in this permit shall be construed to relieve the permittees from civil/criminal penalties for noncompliance under Article XII, Section 12.1(D) of the Sewer Use Law of the County of Monroe. Article XII, Section 12.1(D) provides that any person who violates a permit condition is subject to a civil penalty not to exceed $10,000 for any one case and an additional penalty not to exceed $10,000 for each day of continued violation.

APPENDIX E

STANDARD OPERATING PROCEDURES
AND FIELD DATA SHEETS
FOR MONITORING WELL SAMPLING

INTRODUCTION

This standard operating procedure (SOP) document was prepared in general accordance with Section 2.4 of the New York State Department of Environmental Conservation (NYSDEC) Technical Guidance for Site Investigation and Remediation DER-10 dated May 2010. This SOP document provides procedures to be used during site and groundwater sampling associated with remedial site operations at the Rochester Fire Academy, to ensure that data of a known and acceptable precision and accuracy are generated.

QA/QC protocols and procedures have been developed and are described below. The objective of the QA/QC protocol and procedures is to ensure that the information, data, and decisions associated with this project are technically sound and properly documented. The QA/QC protocol and procedures also pertain to the collection, evaluation, and review of activities and data that are part of this project.

Miscellaneous Field Monitoring Equipment

Field monitoring equipment to be used during site and groundwater monitoring activities may include, as necessary:

- An electronic static water level indicator;
- An oil/water interface meter, and;
- Water quality meter(s) that measure pH, specific conductivity, temperature, dissolved oxygen, oxygen-reduction potential, and/or turbidity.

Any meters used during site monitoring activities will be calibrated, operated, and maintained in accordance with the manufacturer's recommendations.

Collection of Groundwater Samples from Monitoring Wells (Non-Low Flow Procedure)

Static water level measurements will be obtained from each well using an electronic static water level indicator. The sample collector will also look for light non-aqueous phase liquid (LNAPL) by using visual observations.

Groundwater in each well to be sampled will then be purged by removing three well casings of water, or to dryness. The purging at each well will be completed using new dedicated disposable bailers and twine and/or new dedicated disposable polyethylene tubing attached to an aboveground electric or gas pump. Each well will be allowed to recharge to within 90% of its original static water level, and then a grab sample will be collected using a dedicated disposable bailer and twine. As needed, specific conductivity, dissolved oxygen, pH, oxidation-reduction potential, temperature, and/or turbidity may be measured on a portion of each groundwater sample using a calibrated water quality meter.

The procedures and equipment used during the purging and groundwater sampling, and the field measurement data obtained, will be documented in the field and recorded on Monitoring Well Sampling Logs.

Equipment Decontamination Procedures

In order to reduce the potential for cross-contamination of samples collected during this project, the following procedures will be implemented to ensure that the data collected (primarily the laboratory data) is acceptable.

It is anticipated that most of the materials used to assist in obtaining samples will be disposable one-time use materials (e.g., sampling containers, bailers, rope, pump tubing, latex gloves, etc.). However, when equipment must be re-used (e.g., static water level indicator), it will be decontaminated by washing in tap water, followed by washing in mixture of tap water and Alconox-type soap, then double rinsing with deionized or distilled water, and drying by air or with clean paper towel.

Sample Handling And Custody Requirements

During sampling activities, personnel will wear disposable latex or nitrile gloves. Between collection of samples, personnel performing the sampling will discard used latex gloves and put on new gloves to preclude cross-contamination between samples. As few personnel as possible will handle samples or be in charge of their custody prior to shipment to the analytical laboratory.

New laboratory-grade sample containers will be used to collect samples. Sufficient volume (i.e., as specified by the analytical laboratory) will be collected to ensure that the laboratory has adequate sample volume to perform the specified analyses. Samples with zero headspace will be collected when VOC analysis is going to be performed. Samples will be kept on ice in a cooler for shipment to the analytical laboratory.

Samples will be preserved as specified by the analytical laboratory for the type of parameters and matrices being tested. The required amount of preservatives will be added by the analytical laboratory to the sample containers prior to delivery to the Site.

Chain-Of-Custody

Samples that are collected for subsequent testing as part of this project will be handled using chain-of-custody control. Chain-of-custody documentation will accompany samples from their inception to their analysis, and copies of chain-of-custody documentation will be included with the laboratory's report. The chain-of-custody will include the date and time the sample was collected, the sample identity and sampling location, the requested analysis, and any request for accelerated turnaround time.

Sample Labels

Sample labels for field samples and QC samples with adhesive backing will be placed on sample containers in order to identify the sample. Sample information will be clearly written on the sample labels using waterproof ink. Sufficient sample information will be provided on the label to allow for cross-reference with the field sampling records or sample logbook.

The following information should be provided on each sample label:

Date and time of collection;
Sample identification;
Intended analyses; and
Preservation required/utilized.

Transportation of Samples

Samples will be handled, packaged and shipped in accordance with applicable regulations, and in a manner that does not diminish their quality or integrity. Samples will be delivered to the laboratory no later than 48 hours from the day of collection.

Record Keeping And Data Management

Activities will be documented on monitoring well sampling logs. Information that will be recorded in the logs may include, as applicable:

- Dates and time work is performed;
- Details on work being performed;
- Details on field equipment being used;
- Field evidence of contamination such as staining, odors, degree of saturation, etc.
- Field meter measurements collected during monitoring activities;
- Sampling locations and static water level depths;
- Monitoring well purge volumes and details;
- Personnel and equipment on-site;
- Weather conditions; and
- Other pertinent information as warranted.

A typical monitoring well sampling log is attached for use as needed.

MONITORING WELL SAMPLING LOG

WELL MW -

SECTION 1 - SITE INFORMATION

SITE LOCATION: _____ **DATE :**_____

_____ **SAMPLE COLLECTOR:** _____

WEATHER CONDITIONS: _____ **PID IN WELL** (PPM, if measured): _____ **LNAPL** ____ **DNAPL** ____

SECTION 2 - PURGE INFORMATION

DEPTH OF WELL [FT]: _____ (MEASURED FROM TOP OF CASING - T.O.C.)

STATIC WATER LEVEL (SWL) [FT]: _____ (MEASURED FROM T.O.C.)

T.O.C. TO GROUND SURFACE [FT]:_____

THICKNESS OF WATER COLUMN [FT]: _____ (DEPTH OF WELL - SWL)

CALCULATED VOL. OF H_2O PER WELL CASING [GAL]: _____ **CASING DIA.:** _____

CALCULATIONS:

CASING DIA. (FT)	WELL CONSTANT(GAL/FT)
¾" (0.0625)	0.023
1" (0.0833)	0.041
1¼" (0.1041)	0.063
2" (0.1667)	0.1632
3" (0.250)	0.380
4" (0.3333)	0.6528
4½" (0.375)	0.826
6" (0.5000)	1.4688
8" (0.666)	2.611

CALCULATIONS

VOL. OF H_2O IN CASING = DEPTH OF WATER COLUMN X WELL CONSTANT

CALCULATED PURGE VOLUME [GAL]: _____ (3 TIMES CASING VOLUME)

ACTUAL VOLUME PURGED [GAL]: _____

PURGE METHOD: _____ **PURGE START:** _____ **END:**_____

SECTION 3 - SAMPLE IDENTIFICATION AND TEST PARAMETERS

SAMPLE ID #	DATE / TIME	SAMPLING METHOD	ANALYTICAL SCAN(S)

SECTION 4 - WATER QUALITY DATA (as needed)

SWL (FT)	TEMP (°C)	pH	CONDUCTIVITY (S/m)	TURBIDITY (NTU)	DO (mg/L)	ORP (mV)	VISUAL

N/M = Not Measured
ND = Not Detected

APPENDIX F

SITE INSPECTION CHECKLISTS

ROCHESTER FIRE ACADEMY

COVER SYSTEM INSPECTION CHECKLIST

Date: _____

Inspected By: _____

VISUAL EVALUATION ITEMS	CONDITION (Check)				Remarks
	Acceptable	Not Acceptable	Present	Not Present	
1. North Disposal Area					
a. Vegetative Cover Integrity	_____	_____			
b. Erosion			_____	_____	
c. Settling			_____	_____	
d. Slope Loss			_____	_____	
e. Pooling / ponding			_____	_____	
f. Undesirable species			_____	_____	
2. South Disposal Area					
a. Vegetative Cover Integrity	_____	_____			
b. Erosion			_____	_____	
c. Settling			_____	_____	
d. Slope Loss			_____	_____	
e. Pooling / ponding			_____	_____	
f. Undesirable species			_____	_____	
3. Training Grounds Area					
a. Surface Coarse Integrity	_____	_____			
b. Cracking			_____	_____	
c. Potholes			_____	_____	
d. Pooling / ponding			_____	_____	
e. Undesirable species			_____	_____	
4. Other Comments / Problems:					

ROCHESTER FIRE ACADEMY

STORM WATER COLLECTION SYSTEM INSPECTION CHECKLIST

Date: _____

Inspected By: _____

VISUAL EVALUATION ITEMS	CONDITION (Check)		Remarks
	Present	Not Present	
1. Drainage Channels			
a. Sediment build-up	_____	_____	
b. Pooling/ponding	_____	_____	
c. Severe cracking	_____	_____	
d. Erosion	_____	_____	
e. Slope loss	_____	_____	
2. Storm Sewers / Grates			
a. Sediment build-up	_____	_____	
b. Pooling / ponding	_____	_____	
c. Broken pipe	_____	_____	
d. Slope loss	_____	_____	
e. Grate clogging	_____	_____	
3. Drainage Structures #1, #2, #3			
a. Flapper valve functioning	_____	_____	
b. Broken / cracked pipe	_____	_____	
c. Cracked headwall structure	_____	_____	
Other Comments / Problems:			

APPENDIX G

HEALTH AND SAFETY PLAN

MALCOLM PIRNIE

APPENDIX G

OPERATIONS AND MAINTENANCE PLAN FOR ROCHESTER FIRE TRAINING ACADEMY

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MALCOLM PIRNIE

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MALCOLM PIRNIE

APPENDIX G

1.0 HEALTH AND SAFETY PLAN

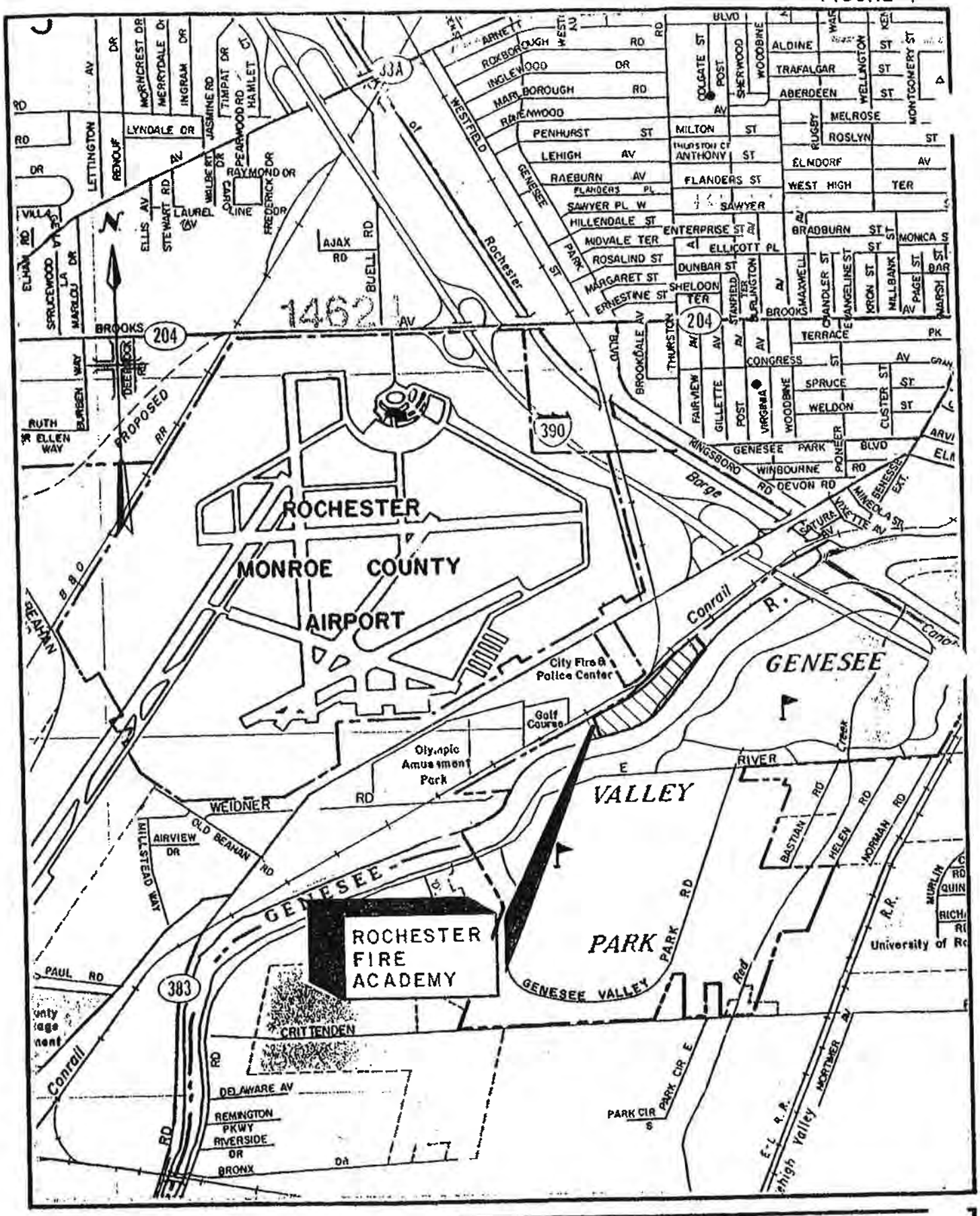
This Health and Safety Plan (HASP) has been prepared for informational purposes only. It addresses those site-specific hazards which may potentially be encountered while performing the operation and maintenance (O & M) tasks described herein. Malcolm Pirnie does not accept responsibility for the Health and Safety of any individuals other than their own employees. Site representatives, contractors, or any other persons performing work at the site shall be required to provide their own site-specific HASP covering their employees and subcontractors.

1.1 SITE LOCATION AND BACKGROUND

The Rochester Fire Training Academy (the Fire Academy) site is a 21-acre tract of land that has been used since 1954 as a training facility by the City of Rochester Fire and Police Departments. The Site is located on the west bank of the Genesee River at 1190 Scottsville Road in the City of Rochester, Monroe County, New York (Figure 1-1). Prior to 1954, the area was undeveloped park land. During the period from approximately 1954 through 1980, the Fire Academy accepted flammable liquids from local industries and other sources for training activities. No records were kept on materials accepted by the Fire Department for burning practices.

The Site consists of four distinct areas: the North Disposal Area (NDA); the South Disposal Area (SDA); the Training Grounds Area (TGA); and the Police Obstacle Course and Firing Range (PFR). Three of these areas have been involved with chemical use and disposal; the NDA, TGA, and SDA; which are 3.0, 5.4, and 0.8 acres in size, respectively. On-site personnel indicated that solvents, paint thinners and other organic chemicals in addition to metallic residue sludge-like materials were burned and/or disposed at the TGA, NDA, and SDA. The PFR and two adjacent off-site areas, the Genesee Valley Park Area (GVP) and the Genesee Valley Canal Area, are not believed to have been associated with

FIGURE 1



MALCOLM PIRNIE

ROCHESTER FIRE ACADEMY

SITE LOCATION MAP

CITY OF ROCHESTER, NEW YORK

historical dumping of potentially hazardous wastes. However, portions of the GVP soils have been affected by overland transport of contaminants from other areas of the site.

1.2 PURPOSE

The purpose of this HASP is to provide guidelines and establish procedures for the protection of approved personnel performing the following tasks at the site:

- Site inspections and maintenance.
- Groundwater, leachate/groundwater discharge, and sediment sampling.
- Landfill gas monitoring.
- Groundwater level monitoring.

All on-site personnel will be required to be familiar with the procedures and requirements of this HASP.

Contractors whose work will be performed on-site, or who otherwise could be exposed to health and safety hazards, will be advised of all known hazards through distribution of site-specific information. Contractors shall be solely responsible for the health and safety of their employees and shall comply with all applicable laws and regulations. All contractors and subcontractors are responsible for: (1) developing their own HASP including a written Hazard Communication Program (HCP) and any other written hazard specific programs required by Federal, State, and local laws; (2) providing their own personal protection equipment (PPE); (3) providing documentation that their employees have been trained in accordance with applicable Federal, State, and local laws; (4) providing evidence of medical surveillance and medical approvals for their employees; and (5) designating their own site safety officer.

1.3 PROJECT ORGANIZATION AND KEY PERSONNEL

The Malcolm Pirnie Project Manager, the Health and Safety Officer and the Site Health and Safety Coordinator (or his/her designee) identified below will determine and enforce compliance.

MALCOLM PIRNIE

- PROJECT MANAGER

Name:	Anne Marie C. McManus	
Telephone:	Office:	(716) 667-6611
	Home:	(716) 667-3081

- CORPORATE HEALTH AND SAFETY MANAGER

Name:	MarK McGowan, CIH	
Telephone:	Office:	(914) 694-2100
	Home:	(203) 350-2186

- SITE HEALTH AND SAFETY OFFICER

Name:	Judy Vangalio	
Telephone:	Office:	(716) 667-6650
	Home:	(716) 662-5404

- SITE HEALTH AND SAFETY COORDINATOR

Name:	Fordyce J. Ritz	
Telephone:	Office:	(716) 248-5161
	Home:	(716) 352-6294

The following roles have been identified for Malcolm Pirnie project personnel:

Project Manager - The Project Manager has full responsibility for implementing and executing an effective program of employee protection and accident prevention. He/She may delegate authority to expedite and facilitate any application of the program.

Health and Safety Manager - The Health and Safety Manager serves as the administrator of the corporation's health and safety program. He/She is responsible for ensuring that field personnel are properly trained, that they have obtained medical clearance to wear respiratory protection (per 29 CFR Part 1910.134(b)(10)), and that they are properly trained in the selection, use and maintenance of PPE, including qualitative respirator fit testing.

The Health and Safety Manager will also serve as scientific advisor for the duration of the project, providing guidance on data interpretation and the determination of appropriate levels of worker protection.

Site Health and Safety Officer - The Site Health and Safety Officer is knowledgeable in safety and worker protection techniques as they relate to the project. Responsibilities include the development of the specific provisions of this HASP, including the level of personnel protection to be employed, identification of emergency procedures, and personnel/equipment decontamination procedures. This individual will provide technical assistance to project management on problems relating to industrial hygiene and work site safety.

Any health and safety briefings required during the course of the project will be conducted by the Site Health and Safety Officer. Examples of briefings might include accident prevention, respirator refresher courses or current issues. The frequency of safety briefings will be based upon the potential hazards specific to the designated work tasks and any new information relative to such hazards which are discovered during the project.

Site Health and Safety Coordinator - The Site Health and Safety Coordinator or his/her designee will be responsible for enforcement of this HASP for employees at the site and for monitoring the personal exposures of employees to hazardous substances contained in air, soil or water. This will consist of spot checking workplace air sampling performed by the Subcontractor such as organic vapor monitoring and the documentation of such data. The Site Health and Safety Coordinator or his/her designee will communicate directly with the Site Health and Safety Officer on a regular basis to advise him/her of monitoring results and any unexpected conditions found at the site. As data are received and evaluated, the Site Health and Safety Officer will adapt this HASP to fit the current employee protection needs at the site. All affected employees and the Subcontractor's designated Site Health and Safety Officer (if any) will be informed of the air sampling results.

When unsafe work conditions are identified, the Site Health and Safety Coordinator or his/her designee is authorized to order his/her personnel to stop work. Resolution of all on-site health and safety problems will be coordinated through the Project Manager with assistance from the Health and Safety Manager and Site Health and Safety Officer as well as the Subcontractor's designated Health and Safety personnel.

1.4 HAZARD EVALUATION

1.4.1 Summary of Projected Risks

Based on the results of previous site investigations, potential hazards have been identified for each work task involved. These hazards are listed in Table 1-1. The principal points of exposure would be through direct contact with contaminated fill/soils and groundwater, through the inhalation of contaminated particles or vapors. Since work will be performed during summer/winter time periods, the potential exists for heat/cold stress to impact workers especially those wearing protective equipment and clothing.

Although no work can be considered completely risk-free, logical and reasonable precautions will be implemented to provide an adequate level of protection for workers. The integration of medical evaluations, worker training relative to chemical hazards, safe work practices, proper personal protection, environmental monitoring, work zones and site control, appropriate decontamination procedures and contingency planning into the project approach will minimize the chance of unnecessary exposures and physical injuries.

1.4.2 Physical Hazards

Field reconnaissance activities may present the following physical hazards:

- The potential for heat/cold stress to employees during the summer/winter months (see Section 9.10).
- The potential for slip-and-fall injuries due to rough, uneven terrain.
- The potential for injury if a landfill gas or waste fire is experienced.

1.4.3 Chemical Hazards

Previous field investigations have provided information concerning the types of contaminants which are likely to be encountered during operation and maintenance activities. Table 1-2 identifies contaminants determined present during previous field investigations at the site. Potential contaminants include volatile organics, lead, cadmium, and PCBs. Table 1-3 lists toxicity and exposure data for the "contaminants of concern"

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APPENDIX G
TABLE 1-1

ROCHESTER FIRE TRAINING ACADEMY

PROJECT TASKS WITH POTENTIAL HAZARDS

Project Task	Potential Hazards
1. Sample groundwater.	Exposure to contaminants: dermal, oral and inhalation. Physical hazards.
2. Conduct site inspections and maintenance.	Exposure to contaminants: dermal, oral, and inhalation. Physical hazards.
3. Groundwater level monitoring.	Exposure to contaminants: inhalation. Physical hazards.

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APPENDIX G
TABLE 1-2

ROCHESTER FIRE TRAINING ACADEMY

POTENTIAL CONTAMINANTS[1]

Parameter	SDA Max. Overburden Groundwater Concentration	Max. Soil Concentration			
		NDA	SDA	TGA	GVP
Inorganics: (ppm)					
Cadmium	ND	20	151	12	328
Lead	0.06	7860	4880	4380	964
Organics: (ppm)					
Total Volatile Organics [2]	45.9	<10	6,310	596	1.3
Chloroethane	0.075		0.2		
Chloroform	0.008		3.2		
1,1-dichloroethane	1.0		108		
1,2-dichloroethane	0.046		26		
1,1-dichloroethene	0.12		11.5		
Total 1,2-dichloroethene	30		291		
Tetrachloroethene	0.088		617		
1,1,1-trichloroethane	7.9		900		
Trichloroethene	0.94		2,572		
Vinyl chloride	0.22		3		
Acetone	1.6		182		
2-butanone (MEK)	0.15		2.7		
4-methyl-2-pentanone (MIBK)	0.16		96.0		
Benzene	0.009		ND		
Chlorobenzene	0.008		ND		
Ethylbenzene	0.34		74	26	
Toluene	0.91		802	350	
Total xylenes	2.3		491	210	
Methylene chloride			22		
1,2,4-Trimethyl Benzene			99		
Others			<10	<10	
Total Semi-Volatile Organics	0.159	7.4	90	1,357	5.6
PAHS		2.7	<1	409	<1
Phthalates		3.7	88	946	2.1
Others		<1	<1	1.6	2.5
Total PCBs	0.005	10	330	85	14

Notes:

(1) This is a list of maximum concentrations detected during field investigation at the site for soil and groundwater likely to be contacted during the remedial construction work.
NDA = North Disposal SDA = South Disposal
TGA = Training Grounds GVP = Genesee Valley Park

(2) Only trace concentrations of volatile organics have been detected in the NDA and GVP. Elevated concentrations of VOCs have been detected in the TGA soil as well as in the soil and groundwater in the SDA, therefore individual maximum VOC concentrations are presented for these media.

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APPENDIX G
TABLE 1-3

ROCHESTER FIRE TRAINING ACADEMY

TOXICITY AND EXPOSURE DATA

Contaminant of Concern	Inhalation Hazard		Dermal Hazard	LD_{50} mg/kg	Fire/ Explosion Hazard
	TWA (ppm)	TLV (ppm)			
Acetone	1,000	750	Low	9,750	high/mod
Benzene	10	10	High	3,800	high/mod
Chlorobenzene	75	75	—	—	—
Chloroethane	1,000	1,000	Mod	—	mod/mod
Chloroform	2	10	Mod	—	slight/slight
1,1-dichloroethane	100	200	Mod	1,120	—/—
1,2-dichloroethane	100	200	Mod	1,120	—/—
Ethylbenzene	100	100	Low	3500	high/—
Methylene Chloride	500	50	Mod		—
Methyl ethyl ketone	—	200	Mod	3,400	high/mod
Methyl isobutyl ketone	—	50	—	—	—/—
1,1,1-trichloroethane	350	350	Mod	10,300	slight/slight
1,2,4-trimethylbenzene	25	25	Mod-Low		mod/slight
Trichloroethene	100	50	High	4,920	slight
Toluene	200	100	Low	5,000	slight/mod
Vinyl Chloride	1	5	High	500	high/high
Xylenes	100	100	—	5,000	high/mod
PCBs	1 ug/m^3	*	High	—	slight/—
PAHs	*	*	Mod-High	—	—
Phthalates	*	*	Low	—	—
Lead	0.05 mg/m^3 total dust/ particulate	0.15 mg/m^3 total dust/ particulate			
Cadmium	0.005 mg/m^3 total dust/ particulate	0.01 mg/m^3 total dust/ particulate			

Notes:

* = TWA and TLV not applicable to these general classes of compounds.

TWA = Time Weighted Average established by OSHA, equals the maximum exposure concentration allowable for 8 hours per day @ 40 hours per week.

TLV = Threshold Limit Value established by ACGIH, equals the maximum exposure concentration allowable for 8 hours per day @ 40 hours per week.

identified in Table 1-2. Brief descriptions of the toxicology of some of these materials and related health and safety guidance and criteria are provided below.

- **Acetone** is a colorless liquid having a characteristic odor. In high concentrations, acetone vapors can irritate the eyes and skin. However, acetone has a very low skin toxicity rating. Prolonged inhalation of vapors may lead to headache or narcotic effects. Acetone is flammable, and explosion may occur if the vapors are exposed to flame.

- **1,1-Dichloroethane** may be moderately toxic via oral or skin absorption routes. Upon heating to decomposition, toxic fumes of chlorine will be emitted.

- **1,2-Dichloroethene** is a colorless, volatile liquid which is highly toxic via oral or inhalation routes. 1,1-Dichloroethene is a carcinogen and can explode spontaneously. Violent reactions can occur when this substance is exposed to oxidizing materials.

- **Ethyl Benzene** is a colorless, aromatic liquid which can irritate the eyes, skin and mucous membranes at a concentration of 0.1% in air. Exposure to higher concentrations may cause dizziness and a sense of constriction of the chest. Ethyl benzene is flammable, and can react vigorously with oxidizing materials.

- **Methyl Isobutyl Ketone (MIBK)** is a colorless liquid with a characteristic sweet, sharp odor. MIBK is a skin and eye irritant and has a narcotic effect upon exposure to high concentrations. MIBK poses a moderate explosion hazard when exposed to heat or flame.

- **Tetrachloroethene** is a colorless liquid having a chloroform-like odor. Tetrachloroethene may be toxic via inhalation routes, prolonged or repeated contact with the skin, or when ingested by mouth exposures to concentrations above 200 ppm can cause irritation and burning of the eyes, nose, and throat. There may be vomiting, nausea, drowsiness, an attitude of irresponsibility and even an appearance resembling alcoholic intoxication. This material acts as an anesthetic through the inhalation of excessive amounts within a short time. Tetrachloroethene can cause dermatitis, particularly after repeated or prolonged skin contact.

- **1,1,1-Trichloroethane** is moderately toxic by ingestion and intraperitoneal routes, is a moderate skin and severe eye irritant, narcotic in high concentrations. 1,1,1-TCA causes a proarrythmic activity which sensitizes the heart to epinephrine-induced arrhythmias. This sometimes will cause a

cardiac arrest particularly when this material is massively inhaled as in drug abuse for euphoria.

- **Trichloroethylene (TCE)** is a common industrial solvent used primarily in dry cleaning and metal degreasing. Trichloroethylene exposure at levels of 200 ppm has been associated with mild behavioral and psychomotor effects, including vertigo, fatigue and headache. TCE is a suspected human carcinogen. The principal routes of potential personnel exposure to TCE are through inhalation of volatized TCE and direct skin contact.

- **Toluene**is an organic liquid derived from coal tar. Exposure to toluene may cause narcotic effects (impairment of coordination and reaction time) loss of appetite, headache, nausea, and eye irritations. Generally, acute poisoning due to exposures to high concentrations are rare, and individuals recover easily when removed from the exposure.

- **Vinyl chloride** is a synthetic chlorinated organic chemical used in the manufacture of polyvinyl chloride (PVC). Its presence in site-specific circumstances may be attributable to breakdown of the halogenated aliphatic hydrocarbons TCE and 1,2-trans-dichloroethene to vinyl chloride. In high concentrations, vinyl chloride may cause reversible narcosis similar to alcohol intoxication. Skin contact with undiluted vinyl chloride results in frostbite by rapid evaporation and subsequent freezing. It is unlikely that these acute effects would be observed at the concentrations and site-specific exposure scenarios expected. Chronic exposure to vinyl chloride through inhalation has been associated with liver toxicity, fatty deposition in particular. Vinyl chloride is considered to be a suspect carcinogen.

Polychlorinated biphenyl compounds (PCBs) as a class, are moderately toxic substances which may cause changes to exposed tissue, but rarely cause permanent injury or death. However, some compounds are suspected to be carcinogenic to humans via oral exposures. Routes of entry to the body include ingestion and dermal contact. The main physical responses to PCB exposure include chloracne and liver atrophy. The ACGIH threshold limit value and the OSHA time weighted average concentration standard for some compounds is as low as 500 ug/m^3.

Cadmium compounds are highly toxic when ingested; however, associated irritating and emetic reactions can be so violent that little cadmium is absorbed and fatalities are very rare. The inhalation of cadmium fumes or dusts primarily affects the respiratory tract and liver, leading to cough, headache, constriction of the chest and shortness of breath. Cadmium may also be carcinogenic when inhaled.

Lead compounds are cumulative. The major routes of lead absorption are the gastrointestinal tract and the respiratory system. Small amounts of lead may also be absorbed from intact or abraded skin when applied in high concentration. The four major target systems consist of the central nervous system, the peripheral nerves, the kidney, and the blood-forming system.

- **Xylenes** are clear, colorless liquids which irritate the eyes at approximately 200 ppm. When exposed to heat or flame, these compounds may ignite or cause explosion. Upon heating to decomposition, acrid smoke and fumes may be emitted.

The use of proper respiratory protection (Section 1.8) and implementation of air monitoring (Section 1.9) will minimize the potential for exposure to airborne contamination. Further, exposure to contaminants through dermal and other routes will also be minimized through the use of protective clothing (Section 1.8) and safe work practices (Section 1.7).

1.5 MEDICAL SURVEILLANCE

Medical monitoring, including initial employment, annual and employment termination examinations, will be provided to employees whose work may result in potential chemical exposure or present unusual physical demands. Medical evaluations will be performed by an occupational physician. The medical evaluations will be conducted according to the Corporate Medical Monitoring Program and include an evaluation of the workers' ability to use respirator protective equipment (as per 29 CFR 1910). The examination will include:

- Occupational history.
- Medical history.
- Medical review.
- Medical surveillance examination with emphasis on organ systems potentially affected by toxic substances identified in the work environment.
- Medical certification of physical requirements (sight, hearing, musculoskeletal, cardiovascular) for safe job performance.

- Laboratory testing to include a complete blood count, white cell differential count, serum multiphasic screening and urinalysis.

The purposes of the medical evaluation are to: (1) determine fitness for duty on hazardous waste sites (such an evaluation is based upon the employee's occupational and medical history, a comprehensive physical examination and an evaluation of the ability to work while wearing protective equipment); and (2) establish baseline medical data.

Supplemental examinations may be performed whenever there is an actual or suspected excessive exposure to chemical contaminants or upon experience of exposure symptoms, or following injuries or temperature stresses.

In conformance with OSHA regulations, medical records will be maintained and preserved for a period of 30 years following termination of employment. Employees have access to the results of medical testing and to full medical records and analyses.

1.6 EMPLOYEE TRAINING PROGRAM

All employees who may be exposed to hazardous substances, health hazards, or safety hazards shall be adequately trained prior to engaging in any on-site work activities. At a minimum, such training shall include an initial 40-hour Hazardous Waste Site Worker Protection Course, an 8-hour Annual Refresher Course subsequent to the initial 40-hour training, and 3 days of actual field experience under the direct supervision of a trained, experienced supervisor (i.e., the Health and Safety Coordinator or his/her designee). This training shall be conducted by a qualified instructor and shall be specifically designed to meet the requirements of OSHA Standard 29 CFR 1910.120(e)(2). At a minimum, the initial 40-hour training course will include the following:

TOPICS

- OSHA/SARA/EPA/RCRA/HCS Requirements
- Decontamination of Personnel & Equipment
- Fire, Explosion & Accident Prevention
- Respiratory Protection Selection & Use
- Waste Site Safety
- Hazard Recognition
- Medical Surveillance
- Cold & Heat Stress

- Preparation of Health & Safety Plans
- Emergency Preparedness & Escape
- Protective Clothing Use & Selection
- Air Monitoring & Surveillance
- Work Practices to Minimize Risk
- Site Entry & Set-Up
- Permissible Exposure Limits
- Site Control & Work Zones
- Chemical & Physical Hazards
- Confined Space Entry

WORKSHOPS/EXERCISES

- Self-Contained Breathing Apparatus
- Air Monitoring Equipment Workshop
- Air Purifying Respirator Workshop
- Decontamination
- Qualitative/Quantitative Fit Test
- Level A/B Field Exercise
- Level B/C Field Exercise
- Air Tank Refilling Workshop

Records and certifications received from the course instructor documenting each employee's successful completion of the training identified above will be maintained on file in both local and corporate headquarters offices. Subcontractor(s) will be required to provide similar documentation of training for all their personnel who will be involved in on-site work activities.

Any employee who has not received adequate training and has been so certified shall be prohibited from engaging in on-site work activities that may involve exposure to hazardous substances, health hazards or safety hazards.

Periodic health and safety briefings will be conducted by the Site Health and Safety Officer for his/her employees on an as-needed basis. Problems relative to respiratory protection, inclement weather, heat/cold stress or the interpretation of newly-available environmental monitoring data are examples of topics which might be covered during these briefings.

1.7 SAFE WORK PRACTICES

All employees shall obey the following safety rules during on-site work activities conducted within the exclusion and support zones:

- Eating, drinking, chewing gum or tobacco, smoking, or any practice which increases the probability of hand-to-mouth transfer of contaminated material is strictly prohibited.

- The hands and face must be thoroughly washed upon leaving the work area and prior to engaging in any activity indicated above.

- Any required respiratory protective equipment and clothing **must** be worn by all personnel going on-site. Excessive facial hair (i.e., beards, long mustaches or sideburns), which interferes with the satisfactory respirator-to-face seal is prohibited.

- Contact with surfaces/materials either suspected or known to be contaminated will be avoided to minimize the potential for transfer to personnel, cross-contamination and need for decontamination.

- Medicine and alcohol can potentiate the effects of exposure to toxic chemicals. Due to possible contraindications, use of prescribed drugs should be reviewed with the Pirnie occupational physician. Alcoholic beverage and illegal drug intake are strictly forbidden during site work activities.

- All personnel shall be familiar with standard operating safety procedures and additional instructions contained in this Health and Safety Plan.

- On-site personnel shall use the "buddy" system. No one may work alone, i.e., out of earshot or visual contact with other workers in the exclusion zone.

- Personnel and equipment in the contaminated area shall be minimized, consistent with effective site operations.

- All employees have the obligation to correct or report unsafe work conditions.

- Use of contact lenses on-site will not be permitted. Spectacle kits for insertion into full-face respirators will be provided for employees as required.

1.8 PERSONAL PROTECTION EQUIPMENT

Personnel must wear personal protective equipment (PPE) when work activities involve known or suspected atmospheric contamination; when vapors, gases, or particulates may be generated; or when direct contact with dermally active substances may occur. Full-face respirators will be used to protect the lungs, the gastro-intestinal tract and the eyes

against air toxicants. Chemical-resistant clothing will be used to protect the skin from contact with skin-destructive and skin-absorbable chemicals. All PPE shall be maintained and stored as specified by the manufacturer. Good personal hygiene and safe work practices, as identified in Section 1.7, are also necessary to limit or prevent the ingestion of potentially harmful substances.

Personal protection equipment has been designated for each project task where potential hazards exist. The designated PPE for each task is listed in Table 1-4. The Site Health and Safety Coordinator will monitor the use of PPE during extreme temperature conditions.

1.9 ENVIRONMENTAL MONITORING

1.9.1 General On-Site Monitoring

Modifications to the level of protection established for employees for each task will be based upon measurements of the contaminants present in the work environment. Tasks and activities proposed for this site along with the estimated potential of exposure to contaminants known to be present in the groundwater and soil at each well location will be used to determine the minimum required levels of personal protection and is described in Section 9.8. Based upon the existing data base, the release of organic vapors may occur during the construction phase of the project. Ambient breathing zone concentrations may, at times, exceed the permissible exposure limits (PEL) established by OSHA for the individual compounds (see Table 1-3). Respiratory and dermal protection may be modified (upgraded or downgraded) based upon real-time field monitoring data.

Contaminated soil and groundwater are most likely to be encountered during liner repair and monitoring activities. The air monitoring program will monitor volatile contaminants as well as the presence of respirable dust when soil is physically disturbed. Real time monitoring, with a combustible gas meter and total organic vapor analyzer (HNu), will be performed by the Health and Safety Coordinator on a periodic basis during all sampling and field reconnaissance surveys. The level of respiratory and dermal protection in use will be based upon an evaluation of general air monitoring data.

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APPENDIX G

TABLE 1-4

ROCHESTER FIRE TRAINING ACADEMY

PPE FOR EACH PROJECT TASK WITH AN IDENTIFIED HAZARD

1.	Sample groundwater (Level D respiratory, Level C dermal): ▪ Tyvek Suit ▪ Chemical protective gloves (latex) ▪ Rubber boots (pull-on) and safety shoes ▪ Safety glasses
2.	Conduct site inspection and non-intrusive maintenance (Level D): ▪ Coveralls (or work clothes) ▪ Rubber boots (pull-on) and safety shoes ▪ Safety glasses ▪ For Intrusive Maintenance, upgrade to Level C Dermal
3.	Groundwater level monitoring (Level D respiratory, Level C dermal): ▪ Tyvek Suit ▪ Chemical protective gloves (latex) ▪ Rubber boots (pull-on) and safety shoes ▪ Safety glasses

Monitoring instruments will be protected from surface contamination during use to allow for easy decontamination. When not in use, the monitoring instruments will be placed on plastic sheeting to avoid surface contact. Additional monitoring instruments may be required if the situations or conditions change.

Any grab samples which are collected as part of an addended scope of work will be surveyed with the HNu, or similar equipment as each sample is retrieved. These values will be recorded with the respective sample number and will assist in the determination of the adequacy of employee protective equipment.

1.9.2 On-Site Monitoring Action Levels

The HNu or other appropriate instrument(s) will be used to monitor organic vapor concentrations as specified in this plan. Methane gas will be monitored during cover system repairs or other activities requiring significant cap disruption with the "combustible gas" option on an explosimeter/tritector or other appropriate instrument(s). In addition, fugitive dust/particulate concentrations will be monitored during cover system repairs or substantially intrusive activities using a real-time particulate monitor. Readings obtained in the breathing zone may be interpreted (with regard to other site conditions) as follows for on-site personnel:

- Total atmospheric concentrations of unidentified vapors or gases ranging from 0 to background on the HNu - Continue Operations Under Level D.
- Total atmospheric concentrations of unidentified vapors or gases yielding sustained readings above background to 5 ppm on the HNu (vapors not suspected of containing high levels of chemicals toxic to the skin) - Continue Operations Under Level C.
- Total atmospheric concentrations of unidentified vapors or gases yielding sustained readings of 5 to 50 ppm above background on the HNu - continue operations under Level B, re-evaluate and alter activities (if possible) to achieve lower vapor concentrations.
- Total atmospheric concentrations of unidentified vapors or gases above 50 ppm on the HNu - discontinue engineering operations and exit the work zone immediately.

The explosimeter will be used to monitor levels of both combustible gases and oxygen during site activities. Action levels based on the instrument readings shall be as follows:

- Less than 10% LEL - Continue engineering operations with caution.
- 10-25% LEL - Continuous monitoring with extreme caution, determine source/cause of elevated reading.
- Greater than 25% LEL - Explosion hazard, evaluate source and leave the Work Zone.
- Less than 19.5% oxygen - leave Work Zone immediately.
- 19.5-25% oxygen - Continue engineering operations with caution.
- Greater than 25% oxygen - Fire hazard potential, leave Work Zone immediately.

The particulate monitor will be used to monitor respirable dust concentrations during all intrusive activities for the purpose of settling these actions, the air contaminant is considered to be 100 percent lead (Pb). Action levels based on the instrument readings shall be as follows:

- Less than 150 ug/m^3 - Continue field operations.
- Greater than 150 ug/m^3- Don dust/particulate mask or equivalent. Initiate engineering controls (viz. wetting of excavated soils or tools at discretion of Site Health and Safety Officer).

Readings with the explosimeter, particulate monitor, and organic vapor analyzer will be recorded and documented in the Health and Safety logbook. All instruments will be calibrated before use and the procedure will be documented in the Health and Safety logbook.

1.9.3 Community Monitoring Action Levels

In addition to the action levels prescribed in Section 1.9.2 for Malcolm Pirnie personnel on-site, the following criteria shall be adhered to for the protection of the nearby community.

Vinyl Chloride and Chloroform

- If the ambient air concentration of organic vapors exceeds 1 ppm above background at the perimeter of the exclusion zone, contaminant-specific monitoring for vinyl chloride and chloroform will be performed using either a draeger tube or a field GC. If neither vinyl chloride nor chloroform are detected at the perimeter of the exclusion zone, monitoring for total organic vapors will continue as discussed below. If vinyl chloride or chloroform are detected at the perimeter of the exclusion zone, total organic vapor monitoring will be conducted 200 feet downwind of the work area or half the distance to the nearest residential or commercial structure whichever is less. If the concentration of total organic vapors exceeds 1 ppm at this location and vinyl chloride or chloroform are detected, work activities will be halted and monitoring for vinyl chloride and chloroform will be conducted within 20 feet of the perimeter of the nearest residential or commercial structure. If either vinyl chloride or chloroform are detected in the 20-foot zone, the major vapor emission response plan will be implemented.

Total Organic Vapors

- If the ambient air concentration of organic vapors exceeds 10 ppm above background at the perimeter of the exclusion zone, work activities will be halted and monitoring continued. If the organic vapor decreases below 10 ppm over background, work activities can resume. If the organic vapor levels are greater than 10 ppm over background, but less than 25 ppm at the perimeter of the exclusion zone, activities can resume, provided that the organic vapor level 200 feet downwind of the work area or half the distance to the nearest residence or commercial structure, whichever is less, is below 10 ppm over background. If the organic vapor level is above 25 ppm at the perimeter of the exclusion zone, the Contractor's Health and Safety Officer must notify Malcolm Pirnie's Site Health and Safety Coordinator and shutdown work activities. When work shutdown occurs, downwind air monitoring, as directed by the Contractor's Health and Safety Officer, will be implemented per the Contractor's HASP to ensure that vapor emissions do not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission Section (see below). The Contractor's Health and Safety Officer will determine when re-entry of the exclusion zone is possible.

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Major Vapor Emission (Total Organic Vapors)

- If any organic levels greater than 10 ppm over background are identified 200 feet downwind from the work area or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted.

- If, following the cessation of the work activities or as the result of an emergency, organic levels persist above 10 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the work area, then the air quality must be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20-foot zone).

- If efforts to abate the emission source are unsuccessful and if the following levels persist for more than 30 minutes in the 20-foot zone, then the Major Vapor Emission Response Plan shall automatically be placed into effect:

  - if organic vapor levels are approaching 10 ppm above background.

- However, the Major Vapor Emission Response Plan shall be immediately placed into effect if organic vapor levels are greater than 10 ppm above background.

Major Vapor Emission Response Plan:

Upon activation, the following activities will be undertaken:

1. The local police authorities will immediately be contacted by the Safety Officer and advised of the situation; and

2. Frequent air monitoring will be conducted at 30-minute intervals within the 20-foot zone.

The following personnel are to be notified in the listed sequence in the event that a Major Vapor Emission Plan is activated:

Responsible Person	Contact	Contact Location/Phone
Site Health and Safety Coordinator	Police	911
Site Health and Safety Coordinator	NYSDEC Representative Region 8 - Avon (if no DEC representative on-site)	(716) 226-2466
Site Health and Safety Coordinator	NYSDOH Representative Rochester Field Office	(716) 423-8071

Additional emergency numbers as listed in Section 1.13 (Emergency Response Plan).

Explosive Vapors

- Sustained atmospheric concentration of greater than 10% LEL in the work area - Increase monitoring frequency for combustible gases at the downwind portion of the site perimeter to at least every 30 minutes.

- Sustained atmospheric concentrations of greater than 10% LEL at the downwind site perimeter - Contact local Fire Department.

Airborne Particles

- Sustained atmospheric concentrations of greater than 150 ug/m^3 in the work area - Increase monitoring frequency for particulates at the downwind portion of the site to at least every 30 minutes.

- Sustained atmospheric concentrations of 150 ug/m^3 or greater at the downwind site perimeter - Stop work and evaluate situation.

Pertinent emergency response information including the telephone number of the Fire Department are included in Section 1.13 (Emergency Response Plan).

1.10 HEAT/COLD STRESS MONITORING

Since site inspections, maintenance, and monitoring activities will be scheduled for both the summer and winter months, measures will be taken to minimize heat/cold stress to employees. The Site Health and Safety Coordinator or his/her designee will be responsible for monitoring employees for symptoms of heat/cold stress.

1.10.1 Heat Stress Monitoring

Personal protective equipment may place an employee at risk of developing heat stress, probably one of the most common (and potentially serious) illnesses encountered at sites requiring PPE. The potential for heat stress is dependent on a number of factors, including environmental conditions, clothing, workload, physical conditioning and age. Personal protective equipment may severely reduce the body's normal ability to maintain equilibrium (via evaporation, convection and radiation), and by its bulk and weight increases energy expenditure.

The signs and symptoms of heat stress are as follows:

- Heat rash may result from continuous exposure to heat or humid air.
- Heat cramps are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include:
  - muscle spasms
  - pain in the hands, feet and abdomen
- Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:
  - pale, cool, moist skin
  - heavy sweating
  - dizziness
  - nausea
  - fainting
- Heat stroke is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Competent medical help must be obtained. Signs and symptoms are:
  - red, hot, usually dry skin
  - lack of or reduced perspiration
  - nausea
  - dizziness and confusion
  - strong, rapid pulse
  - coma

The monitoring of personnel wearing protective clothing should commence when the ambient temperature is 70 degrees Fahrenheit or above. For monitoring the body's recuperative ability to excess heat, one or more of the following techniques should be used as a screening mechanism.

- Heart rate may be measured by the radial pulse for 30 seconds as early as possible in the resting period. The rate at the beginning of the rest period should not exceed 110 beats per minute. If the rate is higher, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest period stays the same. If the pulse rate is 100 beats per minute at the beginning of the next rest period, the following work cycle should be further shortened by 33%.

- Body temperature may be measured orally with a clinical thermometer as early as possible in the resting period. Oral temperature at the beginning of the rest period should not exceed 99.6 degrees Fahrenheit. If it does, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest period stays the same. However, if the oral temperature exceeds 99.6 degrees Fahrenheit at the beginning of the next period, the following work cycle may be further shortened by 33%. Oral temperature should be measured again at the end of the rest period to make sure that it has dropped below 99.6 degrees Fahrenheit. No Malcolm Pirnie employee will be permitted to continue wearing semipermeable or impermeable garments when his/her oral temperature exceeds 100.6° Fahrenheit.

1.10.2 Cold Stress Monitoring

Exposure to cold conditions may result in frostbite or hypothermia, each of which progresses in stages as shown below.

- **Frostbite** occurs when body tissue (usually on the extremities) begins to freeze. The three states of frostbite are:

  1) **Frostnip** - This is the first stage of the freezing process. It is characterized by a whitened area of skin, along with a slight burning or painful sensation. Treatment consists of removing the victim from the cold conditions, removal of boots and gloves, soaking the injured part in warm water (102-108°F) and drinking a warm beverage.

  2) **Superficial Frostbite** - This is the second stage of the freezing process. It is characterized by a whitish-grey area of tissue which will be firm to the touch but will yield little pain. Treatment is identical to that for frostnip.

3) **Deep Frostbite** - In this final stage of the freezing process the affected tissue will be cold, numb and hard, and will yield little to no pain. Treatment is identical to that for frostnip.

- **Hypothermia** occurs when the body loses heat faster than it can produce it. The stages of hypothermia (which may not be clearly defined or visible at first) are the following:

1) Shivering
2) Apathy (a change to a disagreeable mood)
3) Unconsciousness
4) Bodily freezing
5) Death (if untreated)

Treatment of hypothermia is given below:

- Remove the victim from the cold environment and remove wet or frozen clothing. (Do this carefully as frostbite may have started.)

- Perform active re-warming with hot liquids for drinking (Note: do **not** give the victim any liquid containing alcohol or caffeine in this case) and a warm water bath (102-108°F)

- Perform passive re-warming with a blanket or jacket wrapped around the victim.

In any potential cold stress situation, it is the responsibility of the Site Health and Safety Officer to encourage the following:

- Workers should dress warmly, with more layers of thin clothing as opposed to one thick layer.

- Personnel should remain active and keep moving.

- Personnel should be allowed to take shelter in a heated area, as necessary.

- Personnel should drink warm liquids (no caffeine or alcohol if frostbite has set in).

1.11 WORK ZONES AND SITE CONTROL

Work zones around the areas designated for site inspection and maintenance, sample collection, and landfill gas monitoring will be established by the Health and Safety Coordinator on a daily basis and communicated to all employees and other site users. It shall be the Site Health and Safety Coordinator's responsibility to ensure that all site workers are aware of the work zone boundaries and to enforce proper procedures in each area. The zones will include:

- **Exclusion Zone ("Hot Zone")** - the area where contaminated materials may be exposed, excavated or handled and all areas where contaminated equipment or personnel may travel. The zone will be delineated by flagging tape. All personnel entering the Exclusion Zone must wear the appropriate PPE.

- **Contamination Reduction Zone** - the zone where decontamination of personnel and equipment takes place. Any potentially contaminated clothing, equipment and samples must remain in the Contamination Reduction Zone until decontaminated.

- **Support Zone** - the part of the site which is considered non-contaminated or "clean". Support equipment will be located in this zone, and personnel may wear normal work clothes within this zone.

Access of non-essential personnel to the Exclusion and Contamination Reduction Zones will be strictly controlled by the Health and Safety Coordinator. Only personnel who are essential to the completion of the task will be allowed access to these areas and only if they are wearing appropriate PPE. Entrance of all personnel must be approved by the Site Health and Safety Coordinator.

A log containing the names of workers and their level of protection will be maintained on-site.

The zone boundaries may be changed by the Site Health and Safety Coordinator as environmental conditions warrant, and to respond to the necessary changes in work locations on-site.

1.12 FIRE PREVENTION AND PROTECTION

Recommended practices and standards of the National Fire Protection Association (NFPA) and other applicable regulations will be followed in the development and application of Project Fire Protection Programs. When required by regulatory (DEC) authorities, the project management will prepare and submit a Fire Protection Plan for the approval of the contracting officers, authorized representative or other designated official. Essential considerations for the Fire Protection Plan will include:

- Proper site preparation and safe storage of combustible and flammable materials.
- Availability of coordination with private and public fire authorities.
- Adequate job-site fire protection and inspections for fire prevention.
- Adequate indoctrination and training of employees.

1.12.1 Equipment and Requirements

- Fire extinguishers will be provided by the Subcontractor(s).
- Fire extinguishers will be inspected, serviced, and maintained in accordance with the manufacturer's instructions. As a minimum, all extinguishers shall be checked monthly and weighed semi-annually, and recharged if necessary.
- Immediately after each use, fire extinguishers will be either recharged or replaced.

1.12.2 Flammable and Combustible Substances

- All storage, handling or use of flammable and combustible substances will be under the supervision of qualified persons.
- All tanks, containers and pumping equipment, whether portable or stationary, which are used for the storage and handling of flammable and combustible liquids, will meet the recommendations of the NFPA.
- If the LEL exceeds 10% for any compound, fans will be used to dissipate volatile/combustible gases and to minimize the explosion hazard during drilling/ excavation activities. In addition, % O_2/explosive gas monitoring will be conducted throughout the drilling/excavation operations.

1.13 EMERGENCY RESPONSE PLAN

Emergency medical treatment can be obtained at the Strong Memorial Hospital in Rochester. This information shall be posted in the on-site treatment building and in the field vehicle. It is the Site Safety Officer's responsibility to ensure that the information sheet is posted.

Emergency Telephone Numbers:

Fire, Ambulance, Police	911
Strong Memorial Hospital	(716) 275-2100

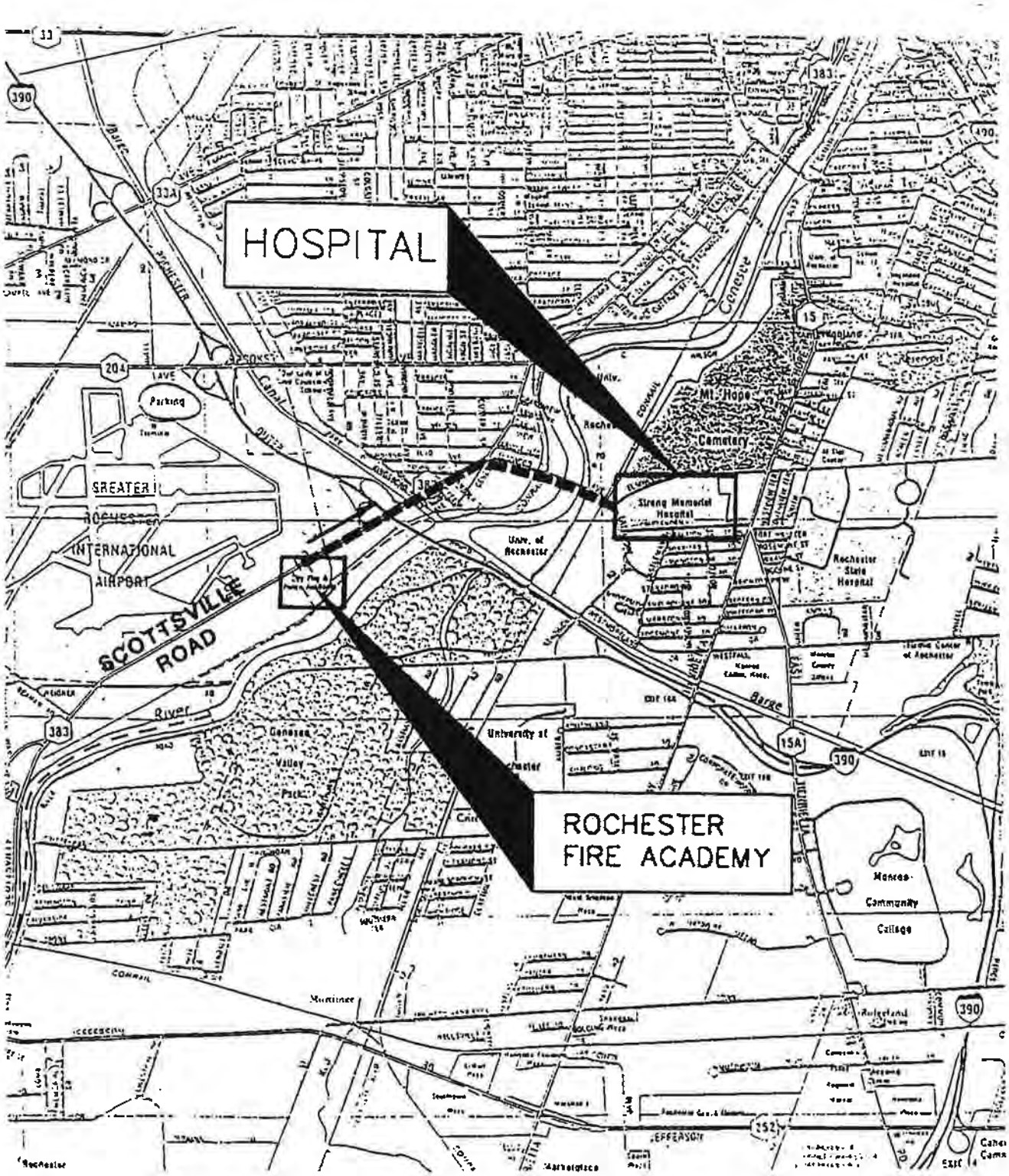
Directions to Hospital:

The following directions describe the best route to Strong Memorial Hospital from the Rochester Fire Academy (refer to Figure 1-2). The route to the hospital will take about five minutes.

1. From the site, turn right onto Scottsville Road and proceed to Elmwood Avenue.
2. Turn right onto Elmwood Avenue; proceed on Elmwood over the Genesee River to Lattimore Road.
3. Turn right onto Lattimore Road and proceed one block to Crittenden Blvd.
4. Turn left onto Crittenden Blvd. and follow signs to the Strong Memorial Hospital Emergency Room located on the left side of the road.

1.14 HAZARD COMMUNICATION STANDARD

In order to comply with the OSHA Hazard Communication Standard (29 CFR 1910.1200), the Contractor and other site representatives must implement a Hazard Communica-



MALCOLM PIRNIE

CITY OF ROCHESTER
ROCHESTER FIRE ACADEMY
HOSPITAL ROUTE

tion Program (HCP). The program must be designed to provide employees with information on hazardous chemicals to which they may be exposed. Information is provided to employees through employee training, container labeling of all chemicals used, Material Safety Data Sheets (MSDS), and access to the written HCP. The only chemicals which should be introduced to the site are those used for sample preservation and decontamination (e.g., nitric acid, sulfuric acid and Alconox™). The MSDS's for these chemicals must be maintained at the site and provided for review by all field personnel.

APPENDIX H

LIST OF DOCUMENTS MAINTAINED AT GROUNDWATER TREATMENT BUILDING OFFICE

LIST OF DOCUMENTS MAINTAINED AT
GROUNDWATER TREATMENT BUILDING OFFICE

- Empire Soils Investigations, 1981
- Engineering Investigations at Inactive Hazardous Waste Site in the State of New York, Phase I Investigation, Rochester Fire Academy, Recra Research, Inc., 1983.
- Engineer Investigations at Inactive Hazardous Waste sites in the State of New York, Phase 11 Investigation, Rochester Fire Academy, Recra Research, Inc., 1985.
- Remedial Investigation for the Rochester Fire Academy Site-Results of Preliminary Surveys, Malcolm Pirnie, Inc., February 1990.
- Remedial Investigation Report for the Rochester Fire Academy Site, Malcolm Pirnie, Inc., May 1991.
- Interim Remedial Measures (IRM) Phase 11Design Concept Report, Malcolm Pirnie, Inc., February 1992.
- Supplemental Remedial Investigation Report for the Rochester Fire Academy Site, Malcolm Pirnie, Inc., May 1992.
- Feasibility Study for the Rochester Fire Academy Site, Malcolm Pirnie, Inc., February 1993.
- Record of Decision, Rochester Fire Academy, Monroe County, New York, Site Number 828015, New York State Department of Environmental Conservation, March 1993.
- Draft Technical Report for Adjacent Property Owners, Malcolm Pirnie, Inc., April 1993.
- Subsurface Exploration and Geotechnical Engineering Report for Proposed Smokehouse and Pre-Engineered Treatment Plant Structures at Rochester Fire Academy Project, Rochester, New York, Buffalo Drilling Company, Inc., May 27, 1993.
- Closure Report, Interim Remedial Measures, Rochester Fire Academy Site, Malcolm Pirnie, Inc., July 1993.
- Drill Yard Remediation Plan, City of Rochester, New York, Fire Training Facility, Cowan and Cricenti Engineering Associates, Inc., August 1993.
- Remedial Design Engineering Report, Rochester Fire Training Academy, Rochester, New York, November 1993.

- Project Manual, Fire Training Academy Remedial Construction, Malcolm Pirnie, Inc., December 1994.

- Fire Training Academy Remedial Construction Drawings and Record Drawings, Malcolm Pirnie, Inc., December 1994.

- Construction Monitoring Report for Fire Training Academy Remedial Construction, Malcolm Pirnie, Inc., November 1997.

- Rochester Fire Academy Groundwater Treatment System Operations and Mainte- nance Manual. CSR Technical, Inc., May 1996.

- Manufacturer's literature for individual groundwater collection, treatment, control and remote monitoring equipment, 1996-1997.

- Record Drawings for Rochester Fire Academy Remedial Construction (to be submitted by Thermocor Kimmons).

APPENDIX I

TRAINING GROUNDS AREA
SOIL MANAGEMENT PLAN

City of Rochester

FAX (716) 428-6010
TDD/Voice 232-3260

Department of Environmental Services

Office of the Commissioner
Division of Environmental Quality
30 Church Street, Rm 300B
Rochester, New York 14614-1278
Tel#: (716) 428-6011

January 30, 1998
Suzanne Wheatcraft
Clough, Harbour & Associates
13 South Fitzhugh Street
Rochester, New York 14614-1497

Re: ARFF/PSTF Soils Management Plan

Dear Ms. Wheatcraft:

Attached please find our proposed soils management plan for future excavation work in the training ground at the existing Rochester Police and Fire Training Academy site. We prepared the plan with the assistance of Malcolm Pirnie Inc., the remedial project designer, and the plan is consistent with the draft Site Operations and Maintenance Plan. I have included the language from the City-County draft lease agreement regarding Monroe County's responsibilities for meeting the obligations of the O&M Plan and Record of Decision. We also have developed this plan from the perspective of the waste generator and site owner. As a result, we have based the process of waste determination and management of normal practices by the City.

If you have any questions about the plan or its implementation please give me a call at 428-5978. Thank you for your patience and cooperation.

Sincerely,

Mark D. Gregor
Manager, Division of Environmental Quality

G:\ENVQUAL\MARK\ARFFCONT.LET
enc.
c A.Klumpp
J.Brennan
E.Tomasso
F.Ritz/MPI
A.Nagi/NYSDEC

7. Enclosed is the City's proposed language for Article XX, third ¶, p. 20:

> Furthermore, pursuant to letters dated February 21, 1997 and April 9, 1997 between City and County, the County agrees to undertake, at its expense, a DEC required capping system for fire training grounds in accordance with Site Record of Decision and the Consent Order, Index No. B8-0205-87-09; the County is also responsible for operating and maintaining the facility consistent with the Site Record of Decision and the New York State approved Operations and Maintenance Manual for the Site. The County agrees to defend, indemnify and hold the City and MCC harmless against any and all liability, loss, damage, claim, suit, expense, fine, fee, penalty or cost of any kind, including attorney fees and consultant fees which the City or MCC may directly or indirectly incur, suffer or be required to pay as a result of the remediation work, undertaken by the County.

Aircraft Rescue and Firefighting/Public Safety Training Facility Project
Training Grounds Soils Management Plan

January 31, 1998

I. PURPOSE

Monroe County is constructing the Aircraft Rescue and Firefighting/Public Safety Training Facility (ARFF/PSTF) located at the Rochester Fire and Police Training Academy. This site recently underwent remediation by the City of Rochester under consent order with the New York State Department of Environmental Conservation (NYSDEC). A major element of the remediation was to remove soil contaminated with various hazardous wastes, including PCB's, fuel/solvent and lead and cadmium contaminated soil. The purpose of this soils management plan is to describe the steps which must be taken to characterize any soil excavated from the fire training grounds below the elevation where the previous remediation was completed and to manage any soil generated which is classified as a non-hazardous special waste or a hazardous waste. It is expected that soil excavated during the project below an elevation of 519 ft msl may still have contaminants present and could be classified either as a special waste or as a hazardous waste.

NYSDEC regulations regarding management of hazardous and non-hazardous special waste are contained in 6 NYCRR Parts 371, 372 and 6 NYCRR Part 360. Proper management requires that care be taken in planning, monitoring and testing excavated soil to properly characterize the soil and ensure proper disposition of the soil. This document provides guidance for the characterization and proper disposal of soils excavated from an elevation below 519 ft msl at the ARFF/PSTF construction site.

II. CITY OF ROCHESTER CONTACTS

Mark Gregor, City of Rochester, Manager, Division of Environmental Quality (428-5978) will provide technical assistance and consultation to Monroe County on issues of soil management and is the designated contact for communications with NYSDEC representatives.

Anne Klumpp, City of Rochester, Environmental Compliance Coordinator (428-7474), will coordinate waste transportation and disposal. Ms. Klumpp will assist Monroe County in securing waste profile acceptance from the disposal facility(ies) and will sign all waste profiles and hazardous waste manifests. She will be available to answer questions on waste transportation and disposal issues.

III. SOIL CHARACTERIZATION

A. Waste Types

It is anticipated that soils excavated from elevations below 519 ft msl may fall into one of three categories of waste:

1. Soil with no chemical constituents above NYSDEC cleanup levels

2. Contaminated soil containing levels of compounds above the NYSDEC cleanup levels, but which is classified as a non-hazardous special waste

3. Contaminated soil exhibiting characteristics which classify it as a hazardous waste

B. Sampling and Analysis

To determine which category these soils fall into, the Contractor must obtain one (1) representative sample per 100 yd^3 of soil excavated from below a level of 519 ft msl. Each sample must be analyzed by the contractor for the following:

- NYSDEC Record of Decision cleanup level list, limits are
    - Volatile organic compounds (VOC) by EPA method 8260 (ROD cleanup level = 10 ppm total VOCs),
    - PCBs by EPA method 8080 (ROD cleanup level =10 ppm total PCBs),
    - Total lead (ROD cleanup level = 250 ppm total lead) and
    - Total cadmium (ROD cleanup level = 10 ppm total cadmium).
- Guidance Values set forth in NYSDEC STARS #1 Policy (EPA methods 8020/8021, 8270)
- Hazardous Waste Characteristic of Toxicity, using the toxicity characteristic leaching procedure (TCLP) for EPA waste codes D004 - D043
- Polychlorinated biphenyls (PCBs) by EPA method 8080

C. Waste Determination Criteria

Soil which fails the TCLP for any of the hazardous waste characteristics of toxicity or contains greater than 50 ppm of PCBs will be classified as a hazardous waste.

Soil which is not characterized as a hazardous waste due to toxicity or PCBs, but which exceed any of the NYSDEC ROD cleanup levels or Stars #1 guidance values will be classified as non-hazardous special waste.

Since many disposal facilities require testing in addition to those listed above, it is recommended to the contractor that the following test also be performed by the contractor on each sample at the time of waste characterization:

- ignitability
- corrosivity
- reactivity
- paint filter test
- percent solids

IV. SOIL MANAGEMENT AND DISPOSAL

A. Soil Meeting all NYSDEC Cleanup Levels

Soils characterized as not exceeding any site cleanup levels or hazardous waste characteristic regulatory levels may be managed as typical construction and demolition debris. Such soils may be re-used on-site or disposed of at an off-site location that can legally accept C&D material. The contractor shall be responsible for selecting off-site disposal of soils meeting all cleanup levels.

B. Non-Hazardous Special Waste

The Contractor shall manage all non-hazardous special waste generated during the project must be managed in accordance with 6 NYCRR Part 360 regulations. Excavated special waste which will be staged on-site prior to off-site shipment must be placed on and covered with 6mm poly sheeting to prevent migration of contaminants. The material must be disposed of at an approved RCRA Subtitle D and 6 NYCRR Part 360 permitted facility such as the Monroe County Mill Seat Landfill.

The City of Rochester will be listed as the generator of the waste on all profiles and shipping papers and a City representative will sign all profiles and shipping papers.

C. Management of Hazardous Waste

The Contractor shall store all hazardous waste generated at the site will be stored in compliance with applicable federal and state hazardous waste management regulations. Hazardous waste stored at the site prior to shipment must be staged on and covered with 6 mm poly sheeting to prevent migration of hazardous waste.

Hazardous waste may be accumulated on site for as period not exceeding 90 days. The waste must be manifested and shipped to a treatment storage and disposal facility (TSDF) before the 90 day accumulation time is up. All hazardous waste will be shipped to CWM on a New York State Hazardous Waste Manifest. Manifests will be reviewed and signed by Anne Klumpp or Mark Gregor. The transporter utilized to transport hazardous waste must be a fully licensed and permitted hazardous waste transporter. A list of possible waste transporters can be supplied by the City to Monroe for this project.

Note to Contractor:
During the remediation project which took place recently at the Fire Academy, hazardous waste soil was shipped to CWM Chemical Services in Model City, New York. Copies of the profiles for these waste streams are attached to this plan. CWM has indicated hat the information from the existing profiles can be transferred to new profiles without waiting for a new approval to be obtained to facilitate shipment of any hazardous waste generated during the ARFF/PSTF project.

Waste generated during the remediation project at the Fire Academy met the land disposal restriction treatment standard for the hazardous waste characterization associated with the waste. Should initial laboratory analysis show that the hazardous waste does not meet the treatment standard for land disposal of hazardous waste, an alternative TSDF must be utilized for disposal. The City can assist the County in locating an alternative facility and in profiling the waste into the facility.

V. SITE MONITORING

During Training Grounds excavation work at the site below 519 ft msl, the contractor must provide a health and safety officer on site to monitor the work. The work must be performed in accordance with a Health and Safety Plan approved by the City prior to commencement of work. All site workers performing excavation below 519 ft msl must have received and is current in OSHA 1910.120 Hazardous Waste Operations and Emergency Response training.

VI. SUMMARY OF RESPONSIBILITIES

The Contractor shall:

1. Notify the City of its proposed schedule for performing work involving excavation below 519 ft msl at the site.
2. Sample soil excavated at or below 519 ft msl in increments of every 100 yd^3.
3. Perform the analytical testing outlined in this guidance document on waste

excavated at of below 519 ft msl.

4. Stage excavated soil in accordance with this plan
5. Submit proposed disposal facilities and transporters for non-hazardous special waste and hazardous waste to the City for approval prior to any shipment of waste from the site.
6. Have a trained Health and Safety Officer and trained OSHA 1910.120 workers at the site during excavation work.
7. Contract and schedule shipments directly with the disposal facility and transporters for waste removal.
8. Notify the City 24 hours in advance of planned shipments off-site so that a City representative can be present to sign manifests, shipping papers, land disposal restriction forms and other generator paperwork.
8. Prepare necessary profiles, manifests, bills of lading, and any associated paperwork necessary for waste approval and removal and provide completed unsigned original paperwork to the City for approval and signature.

The City of Rochester will:

1. Review and give final approval for waste transporters and disposal facilities submitted for consideration by the contractor within two (2) working days of receipt of proposed transporters and disposal facilities.
2. As the generator, within two (2) working days after receipt of test data, interpret analytical results from the soil samples to determine if the soil should be characterized as non-hazardous special waste or hazardous waste.
3. Sign all waste profiles, manifests, bills of lading and any associated paperwork necessary for waste approval and removal.
4. Be available to answer questions on waste issues related to waste approval and removal from the site.

G:\ENVQUAL\ARFFCONT.WPD

GENERATOR'S WASTE PROFILE SHEET

* PLEASE PRINT IN INK OR TYPE

Service Agreement on File? ☒YES ☐NO
☒Hazardous ☐Non-Hazardous ☐TSCA

Profile Number: WMI CF 7308
Renewal Date: / /

A. Waste Generator Information

1. Generator Name: City of Rochester
2. SIC Code:
3. Facility Street Address: 1190 Scottsville Road
4. Phone: ( )
5. Facility City: Rochester, NY
6. State/Province: NY
7. Zip/Postal Code: 14624
8. Generator USEPA/Federal ID #: NYD980535116
9. County: Monroe
10. State/Province ID #:
11. Customer Name: Thermoflex Kimmins
12. Customer Phone: (716) 328-6170
13. Customer Contact: Ralph Argen
14. Customer Fax: 716/328-6183
15. Billing Address: 1190 Scottsville Road, Rochester NY 14624 ☐Same as above

B. Waste Stream Information

1. Description
   a. Name of Waste: lead, Cadmium Soil
   b. Process Generating Waste: Site Remediation

Generator mailing address:
30 Church Street
Room 300B
Rochester, NY 14614

c. Color	d. Strong odor (describe):	e. Physical state @ 70°F	f. Layers	g. Free liquid range
Black/Brown	NO	☒Solid ☐Liquid ☐Gas ☐Sludge ☐Other	☒Single Layer ☐Multi-layer	0 to %
				h. pH: Range N/A to %

i. Liquid Flash Point: ☐<73°F ☐73-99°F ☐100-139°F ☐140-199°F ☐≥ 200°F ☒Not applicable

j. Chemical Composition (List all constituents (including halogenated organics, dioxins, and UHC's) present in any concentration and submit representative analysis):

Constituents	Concentration Range	Constituents	Concentration Range
100% Soil	99-100		
lead, cadmium	0-1%		

TOTAL COMPOSITION MUST EQUAL OR EXCEED 100%

k. ☐Oxidizer ☐Pyrophoric ☐Explosive ☐Radioactive ☐Carcinogen ☐Infectious ☐Shock Sensitive ☐Water Reactive

l. Does the waste represented by this profile contain any of the carcinogens which require OSHA notification? (list in Section B.1.j)..... ☐YES ☒NO

m. Does the waste represented by this profile contain dioxins? (list in Section B.1.j)..... ☐YES ☒NO

n. Does the waste represented by this profile contain asbestos?..... ☐YES ☒NO
If yes..... ☐friable ☐non-friable

o. Does the waste represented by this profile contain benzene?..... ☐YES ☒NO
If yes, concentration _____ ppm
Is the waste subject to the benzene waste operations NESHAP?..... ☐YES ☒NO

p. Is the waste subject to RCRA Subpart CC controls?..... ☐YES ☒NO
If yes, volatile organic concentration _____ ppmw

q. Does the waste contain any Class I or Class II ozone-depleting substances?..... ☐YES ☒NO

r. Does the waste contain debris? (list in Section B.1.j)..... ☐YES ☒NO

2. Quantity of Waste
Estimated Annual Volume 1600 ☒Tons ☒Yards ☐Drums ☐Other (specify) _____

3. Shipping Information
   a. Packaging:
   ☒Bulk Solid; Type/Size: Dump ☐Bulk Liquid; Type/Size: _____
   ☐Drum: Type; Size: _____ ☐Other: _____
   b. Shipping Frequency: Units 1600 Per: ☐Month ☐Quarter ☐Year ☒One time ☐Other
   c. Is this a U.S. Department of Transportation (USDOT) Hazardous Material? (If no, skip d, e, and f)..... ☒YES ☐NO

Form WMI-8153

GENERATOR'S WASTE PROFILE SHEET

PLEASE PRINT IN INK OR TYPE

d. Reportable Quantity (lbs.; kgs.): 100# e. Hazard Class/ID #: 9

f. USDOT Shipping Name: RQ Hazardous Waste Solid, n.o.s NA 3077 PG III (D008, D

g. Personal Protective Equipment Requirements:

h. Transporter/Transfer Station:

C. Generator's Certification (Please check appropriate responses, sign, and date below.)

1. Is this a USEPA hazardous waste (40 CFR Part 261)? If the answer is no, skip to 2. ☒YES ☐NO
   a. If yes, identify ALL USEPA listed and characteristic waste code numbers (D, F, K, P, U) D008, D006
   b. If a characteristic hazardous waste, do underlying hazardous constituents (UHCs) apply? (If yes, list in Section B.1.j) ☐YES ☒NO
   c. Does this waste contain debris? (If yes, list size and type in Chemical Composition - B.1.) ☐YES ☒NO

2. Is this a state hazardous waste? ☐YES ☒NO
   Identify ALL state hazardous waste codes

3. Is the waste from a CERCLA (40 CFR 300, Appendix B) or state mandated clean-up? ☒YES ☐NO
   If yes, attach Record of Decision (ROD), 104/106 or 122 order or court order that governs site clean-up activity. For state mandated clean-up, provide relevant documentation.

4. Does the waste represented by this waste profile sheet contain radioactive material, or is disposal regulated by the Nuclear Regulatory Commission? ☐YES ☒NO

5. Does the waste represented by this waste profile sheet contain concentrations of Polychlorinated Biphenyls (PCBs) regulated by 40 CFR 761? (If yes, list in Chemical Composition - B.1.j) ☐YES ☒NO
   a. If yes, were the PCBs imported into the U.S.? ☐YES ☐NO

6. Do the waste profile sheet and all attachments contain true and accurate descriptions of the waste material, and has all relevant information within the possession of the Generator regarding known or suspected hazards pertaining to the waste been disclosed to the Contractor? ☒YES ☐NO

7. Will all changes which occur in the character of the waste be identified by the Generator and disclosed to the Contractor prior to providing the waste to the Contractor? ☒YES ☐NO

☐Check here if a Certificate of Destruction or Disposal is required.

Any sample submitted is representative as defined in 40 CFR 261 - Appendix I or by using an equivalent method. I authorize WMI to obtain a sample from any waste shipment for purposes of recertification. If this certification is made by a broker, the undersigned signs as authorized agent of the generator and has confirmed the information contained in this Profile Sheet from information provided by the generator and additional information as it has determined to be reasonably necessary. If approved for management, Contractor has all the necessary permits and licenses for the waste that has been characterized and identified by this approved profile.

Certification Signature: Title: Env. Compliance Coordina

Name (Type or Print): Annie E. Spaulding Company Name: City of Rochester Date: 9/18/12

☐Check if additional information is attached. Indicate the number of attached pages

D. WMI Management's Decision — FOR WMI USE ONLY

1. Management Method ☐Landfill ☐Non-hazardous Solidification ☐Bioremediation ☐Incineration ☐Hazardous Stabilization ☐Other (Specify)
2. Proposed Ultimate Management Facility:
3. Precautions, Special Handling Procedures, or Limitation on Approval:

4. Waste Form 5. Source 6. System Type

Special Waste Decision ☐Approved ☐Disapproved

Salesperson's Signature: Date:

Division Approval Signature (Optional): Date:

Special Waste Approvals Person Signature: Date:

Form WMI-4153

95032

Chemical Waste Management, Inc.

Date Printed: 07/31/97

GENERATOR'S WASTE PROFILE SHEET

Profile #
MWI 95032

(X) Check here if this is a Recertification LOCATION OF ORIGINAL MIDWEST REGIONAL LAB BR9516

GENERAL INFORMATION

1. Generator Name: ROCHESTER POLICE & FIRE DEPTS
   Generator EPA ID: NYD980333116
2. Generator Address: 1190 SCOTTSVILLE RD BLDG 1.11
   Billing Address: (_) Same THERMOCOR KIMMINS
   250 3RD ST
   PO BOX 120
   ROCHESTER NY 14624-5174
   NIAGARA FALLS NY 14303-8020
3. Technical Contact/Phone: MARK GROGAN 716/428-5978
4. Alternate Contact/Phone: MARK SPRINGING 716/428-7676
   Billing Contact/Phone: ~~ROBERT ANDREWS~~ Ralph Avgen 716/282-7252

PROPERTIES AND COMPOSITION

5. Process Generating Waste: SITE REMEDIATION
6. Waste Name: SOIL CONTAMINATED WITH PCBS
7A. Is this a USEPA Hazardous Waste (40 CFR Part 261)? Yes (_) No (X)
B. Identify All USEPA listed and characteristic waste code Numbers (D,F,K,P,U):
   State Waste Codes: NONE
8. Physical State @ 70F: A. Solid(X) Liquid(_) Both(_) Gas(_) B. Single Layer (X) Multilayer (_) C. Pump liq. range __ to __%
9A. pH: Range _____ or Not applicable (X) B. Strong Odor (_):describe
10. Liquid Flash Point: < 73F (_) 73-90F (_) 100-139F (_) 140-199F (_) >= 200F (_) N.A. (X) Closed Cup (X) Open Cup (_)
11. CHEMICAL COMPOSITION: List All Constituents (incl. halogenated organics) present in any concentration and forward analysis

Constituents	Range		unit	Description
SOIL		to	100 %	
		to		
		to		
		to		
		to		
		to		
TOTAL COMPOSITION (MUST EQUAL OR EXCEED 100%):			100.000000	

12. OTHER: PCBs If yes, concentration _____ ppm, TCDs regulated by 40 CFR 761 (_). Pyrophoric (_) Explosive (_)
Radioactive (_) Benzene if yes, concentration _____ ppm. Reactive (_) Shock Sensitive (_) Oxidizer (_)
Carcinogen (_) Infectious (_) Other
13. If waste subject to the land ban & meets treatment standards, check here: _ & supply analytical results where applicable.
000000

SHIPPING INFORMATION

14. PACKAGING: Bulk Solid (X) Bulk Liquid (_) Drum (_) Type/Size: OTHER Other END DUMPS
15. ANTICIPATED ANNUAL VOLUME: 2640 Units: TONS Shipping Frequency: DAY

SAMPLING INFORMATION

Sample Tracking Number:
16a. Sample source (drum, lagoon, pond, tank, vat, etc.):
Date Sampled: Sampler's name/company:
16b. Generator's Agent Supervising Sampling: 17. (_) No sample required (See instructions.)

GENERATOR'S CERTIFICATION

I hereby certify that all information submitted in this and all attached documents contains true and accurate descriptions of this waste. Any sample submitted is representative as defined in 40 CFR 261 - Appendix I or by using an equivalent method. All relevant information regarding known or suspected hazards in the possession of the generator has been disclosed. I authorize CWM to obtain a sample from any waste shipment for purposes of recertification.

Signature Anne Spaulding Env. Compliance Coord 8/1/97
Name and Title Date

Date Printed 07/31/97

Any Other HAZARDOUS CONSTITUENTS Contained in the Waste Concerning Any of the following

ORGANICS	TCLP Information Check only ONE for each constituent				TCLP Data	TCA or TOTAL
	Less Than	Regulated Level	Equal or More	Waste No.	TCLP Analytical Test Results Use units: ppm or mg/l	Use units: ppm, mg/l or %
Benzene	X	0.5 mg/l		D018		
Carbon Tetrachloride	X	0.5 mg/l		D019		
Chlordane	X	0.03 mg/l		D020		
Chlorobenzene	X	100.0 mg/l		D021		
Chloroform	X	6.0 mg/l		D022		
m-Cresol	X	200 mg/l		D024		
o-Cresol	X	200.0 mg/l		D023		
p-Cresol	X	200.0 mg/l		D025		
Cresol	X	200.0 mg/l		D026		
2,4-D	X	10.0 mg/l		D016		
1,4 Dichlorobenzene	X	7.5 mg/l		D027		
1,2-Dichloroethane	X	0.5 mg/l		D028		
1,1-Dichloroethylene	X	0.7 mg/l		D029		
2,4-Dinitrotoluene	X	0.13 mg/l		D030		
Endrin	X	.02 mg/l		D012		
Heptachlor, & Hydroxide	X	0.008 mg/l		D031		
Hexachloro-1,3 Butadiene	X	0.5 mg/l		D033		
Hexachlorobenzene	X	0.13 mg/l		D032		
Hexachloroethane	X	3.0 mg/l		D034		
Lindane	X	0.4 mg/l		D013		
Methoxychlor	X	10.0 mg/l		D014		
Methyl Ethyl Ketone	X	200.0 mg/l		D035		
Nitrobenzene	X	2.0 mg/l		D036		
Pentachlorophenol	X	100.0 mg/l		D037		
Pyridine	X	5.0 mg/l		D038		
Tetrachloroethylene	X	0.7 mg/l		D039		
Toxaphene	X	0.5 mg/l		D015		
2,4,5-TP Silvex	X	1.0 mg/l		D017		
Trichloroethylene	X	0.5 mg/l		D040		
2,4,5-Trichlorophenol	X	400.0 mg/l		D041		
2,4,6-Trichlorophenol	X	2.0 mg/l		D042		
Vinyl Chloride	X	0.2 mg/l		D043		

APPENDIX J

MANUFACTURER'S LITERATURE

FLOWSERVE

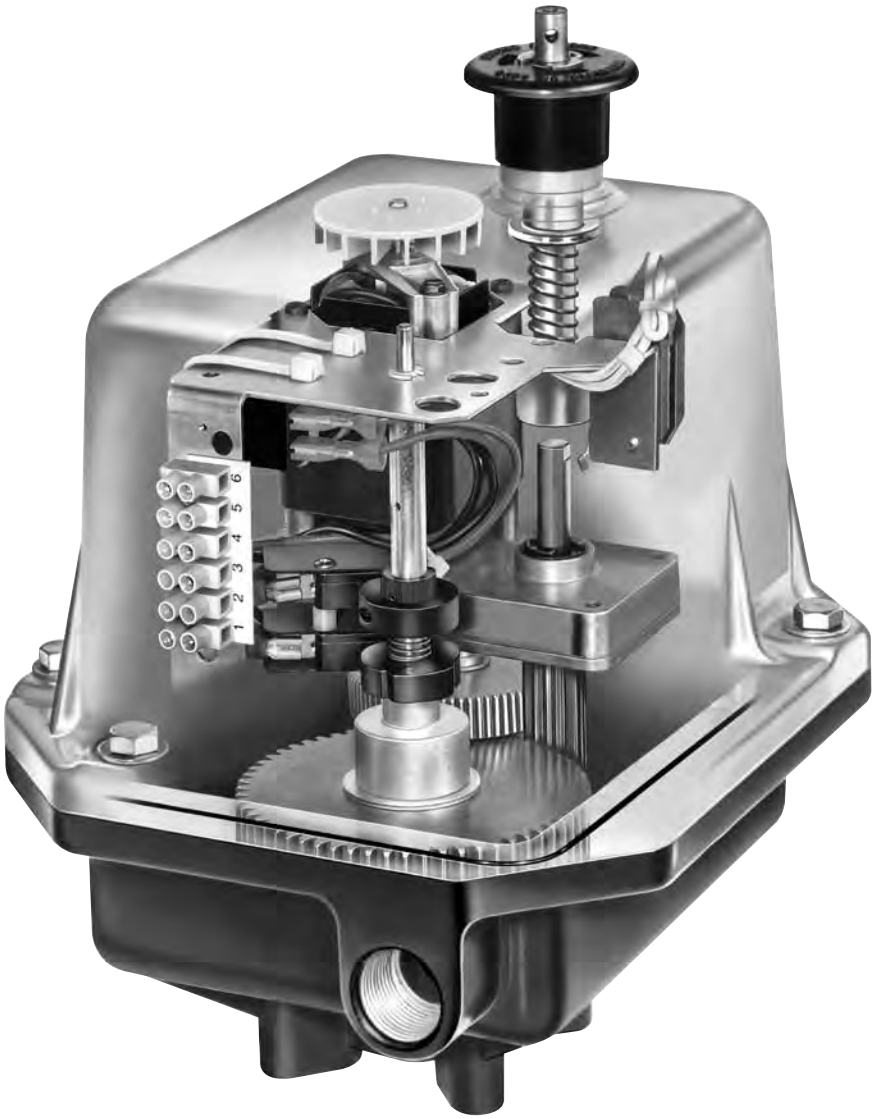
USER INSTRUCTIONS

Automax CENTURA™ CE Series

Electric Rotary Valve Actuator

FCD AXENIM0037-01 – 10/05 (Replaces AUTO-37)

Installation
Operation
Maintenance



Experience In Motion

Introduction

The Centura electric actuator is a rotary valve actuator with output torques from 250 to 1,500 in-lbs. It has been designed for NEMA 4, 4X, 7, 9 and can come with a 4-20 mA card for modulating service.

Storage

For short and long term storage refer to short and long term storage conditions CE Actuator.

Maintenance

Centura Series actuators contain a permanently lubricated, precision cut, heat treated gear train for long, reliable cycle life. There is no need to change gear train grease; however, should it become necessary to refill, use a multi-purpose grease such as DuBois MPG-2.

Permanent split capacitor gearmotors have been equipped with thermal protectors. After many operations, especially in warm environments, the motor will heat up. To guard the motor against overheating, the thermal cut-out blocks power to the motor and maintains this state until the motor's temperature drops to a satisfactory level. This thermal protection means that the actuator will not move when overheated. Consideration must be given to the duty cycle requirements of the actuator.

When replacing the cover, the machined joints must be clean and clear of any obstructions. The integrity of the explosion-proof rating depends on the care of these joints.

Installation

1. This section of the instruction sheet applies to the on-off units. For instructions on Modulating units, please see the ESP3 Electronic Servo Positioner Instructions.
2. Manually open and close valve to ensure freeness of operation.

   ⚠ **CAUTION:** To prevent ignition of hazardous atmospheres, keep unit tight while circuits are alive. Disconnect supply circuit before opening.

3. Be sure valve and Automax actuator rotate in the same direction and are in the same position (i.e., valve closed, actuator closed). If not sure, electrically operate the actuator to determine its operating range, taking note of any explosion safety requirement. The electric actuators are factory set for 90 degree operation.

   ⚠ **CAUTION:** Use heavy duty brake option 'K' for rubber lined butterfly valves & dampers or applications that may back drive the unit.

4. Mount Automax actuator to valve with Automax provided mounting hardware to ensure proper alignment. Use mounting hardware that has 1½ times bolt length engagement. (Do not use the manual override to align actuator shaft to valve shaft, as this could drive the actuator out of its operating range).

   NOTE: Some valves have manual stops; remove if appropriate or set actuator to operate within those travel stops).

5. Care should be taken to align valve stem properly with Automax actuator output shaft (misalignment will cause premature failure of assembly).
6. To connect power to terminal strip of actuator, remove the cover and locate the terminal wiring schematic inside the cover.
7. Connect power to terminal strip according to schematic diagram (power should be fused with a 5 amp slow-blow fuse). The actuator should be wired and grounded in accordance with Local and National Electrical Codes.

   ⚠ **CAUTION:** Consult factory when wiring multiple actuators in series or parallel. Serious damage may result. User must isolate unused winding.

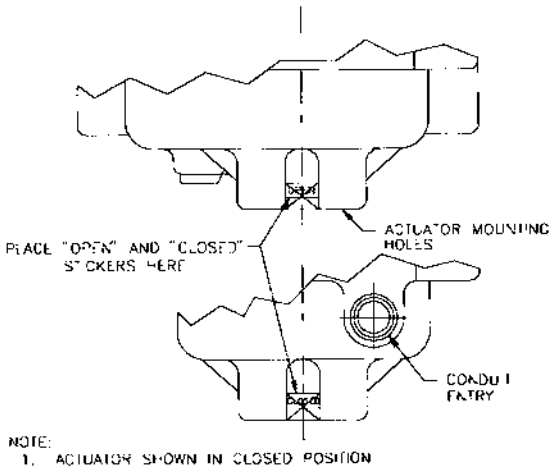
8. Before replacing cover, actuate valve and check to see if it opens and closes to preferred positions. If valve does not perform correctly, adjust cams to set actuator travel properly.
9. Drive actuator to desired open position. The cams are adjusted in two ways. Simply depress the splined "Quick-Set" cam against the spring and rotate to desired location. Or, for very precise applications, turn the screw inside the cam to move the tip into the leaf of the micro switch.
10. To adjust closed position, repeat step 9 with actuator in desired closed position.
11. Operate the unit several times and recheck position. If unit is still out of adjustment, reset the cams by following steps 9 and 10.
12. Installation in hazardous areas requires that the electrical leads be sealed within 18 inches of the enclosure in accordance with Local and National Electrical Codes.
13. Open conduit entries must be closed up after installation is complete using a close-up plug engaging at least five full threads and approved for use in hazardous locations.

14. 60Hz actuator motors may be run on 50 Hz supply. However, the cycle time increases by 1.2 times and the duty cycle decreases by a factor of approximately 25%. The rated torque does not change.

Manual Override

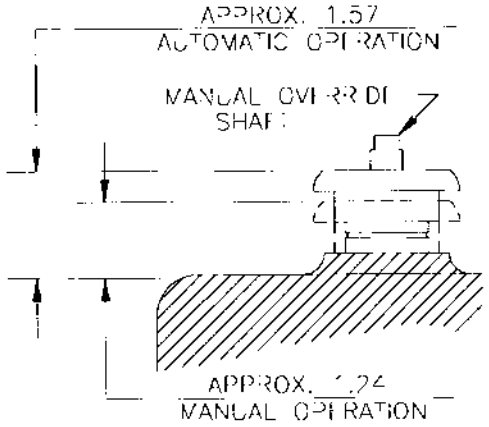
The principle of the design is such that when the manual override shaft is in the up position, the shaft is disconnected from the drive train. When the shaft is in the down position it does two things. One, the shaft trips a switch to disconnect the power to the motor and two, it releases the brake. By releasing the brake the motor can back drive along with the output. For 90 degree operation, the 250 in-lbs unit requires 1.6; the 700 in-lbs unit requires 3.1; the 1000 in-lbs unit requires 4.2; and 1500 in-lbs unit requires 6.3.

⚠ **CAUTION:** Turn manual override shaft slowly. DO NOT jerk.



Manual Operation

1. The actuator cover should be securely attached.
2. Depress hub toward actuator cover.
3. Rotate the manual override shaft slowly; do not force.
4. The motor is now electrically disconnected.
5. Turn the manual override shaft clockwise for clockwise output.
6. Do not rotate actuator past full clockwise or counter-clockwise position.



Automatic Operation

1. Pull hub away from the actuator cover.
2. The motor is now electrically connected and ready for automatic operation.
3. The manual override shaft will freewheel.

Position Indication Stickers

Attached to the inside of the cover is a set of stickers with the words “CLOSED” and “OPEN”. These stickers are to be attached to the outside of the actuator near the base between the mounting feet. The stickers have an orange triangle on them, such that when properly attached to the actuator, they will line up with the triangle on the output shaft. A sticker can be placed on either side of the unit to produce a visual indication of the opened and closed position of the actuator.

Common Parts Related to All Actuators

No.	Item	Material	P/N	Qty
1	Painted Cover	Cast Aluminum	106100	1
2	5/16-24UNF HHCS/Shank	Stainless Steel	103233	8
3	5/16 Type A Washer	Stainless Steel	103715	8
4	½" Sleeve Bearing	Sintered Bronze	105590	1
5	Molded Oil Seal	Nitrile	105585	1
6	Manual Override Hub	Black 141 Lexan	105567	1
7	7/16 I.D. Klipring	Stainless Steel	106174	1
8	Handwheel (Optional)	Black Plastic	105974	1
9	Manual Override Shaft	Steel/Plated	105591	1
10	Brake Trip Washer	Aluminum	107065	1
11	Manual Override Coupler	Steel/Plated	106129	1
	Manual Override Spring	Spring Steel	105593	1
	1/16 Dia. Roll Pin	Spring Steel	103621	1
12	O-Ring, Base	N674-70 Nitrile	105584	1
13	CE1/CE2 Machined Base	Cast Aluminum	106098	1
	CE4/CE7 Machined Base	Cast Aluminum	106099	1
	CE5 Machined Base	Cast Aluminum	107503	1
14	⅜" Needle Bearing	Steel/Plated	105582	1
15	⅜" Sleeve Bearing	Sintered Bronze	105581	4
16	O-Ring, Output Shaft	N674-70 Nitrile	105583	1
17	1½" Sleeve Bearing	Sintered Bronze	409944	1
18	CE1/CE2 Motor Plate	Cast Aluminum	106080	1
	CE4/CE7 Motor Plate	Cast Aluminum	106081	1
	CE5 Motor Plate	Cast Aluminum	107504	1
19	⅝" Sleeve Bearing	Sintered Bronze	105694	1
20	8-32 UNC Ground Screw	Steel/Plated	103627	1
21	#8 Cup Washer	Brass	105626	1
22	8-32 UNC x ⅝" Hex Screw	Steel/Plated	105577	5
23	8-32 UNC x ⅝" Phillips Hd.	Steel/Plated	105576	1
24	Actuator Bracket	Steel/Plated	108099	1
27	M.O. Cut-off Switch	Plastic/Steel	105769	1
28	Switch Insulator Gasket	Vulcanized Fiber	103675	5
29	4-40 UNC x ⅝" Phillips Hd.S	Steel/Plated	106146	2
30	4-40 UNC x 1¼" Phillips Hd.	Steel/Plated	100159	2
31	3/16" Higher Spacer	Nylon	105679	2
32	15 Amp Switch	Plastic/Steel	107765	2
33	3/16" Pop-in Bearing	Plastic	105851	1
34	Camshaft	Steel/Plated	107005	1
35	Large 4-Deg. Spline Shaft	Plastic	103571	1
	1/16" Dia. Roll Pin	Spring Steel	103621	1
36	Small 4-Deg. Spline Shaft	Plastic	103572	1
	1/16" Dia. Roll Pin	Spring Steel	103621	1
37	Switch Spring	Spring Steel	103714	1
38	Hi-Ramp Cam	Plastic	107322	2

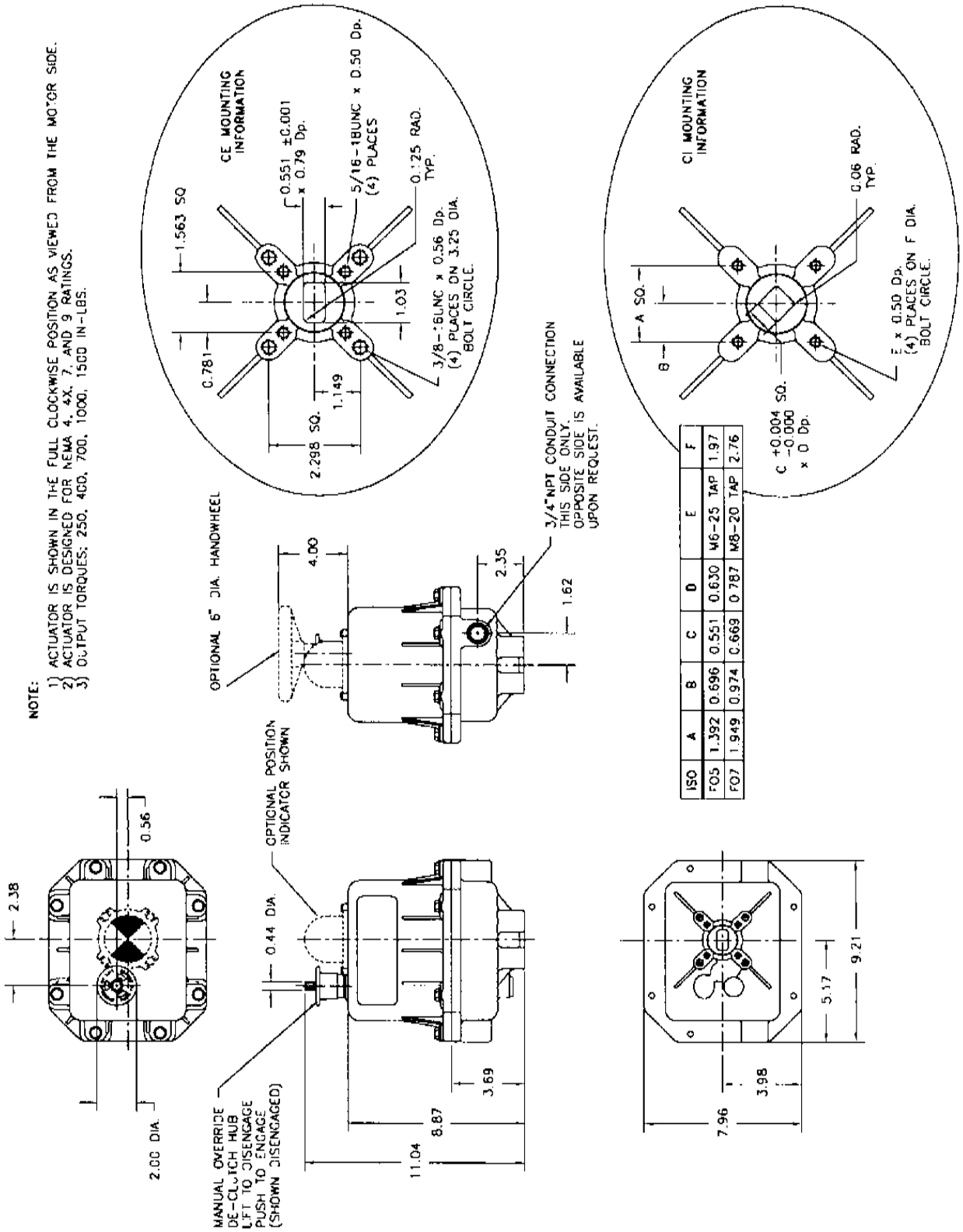
Continued on Page 5

Common Parts Related to All Actuators (continued from Page 4)

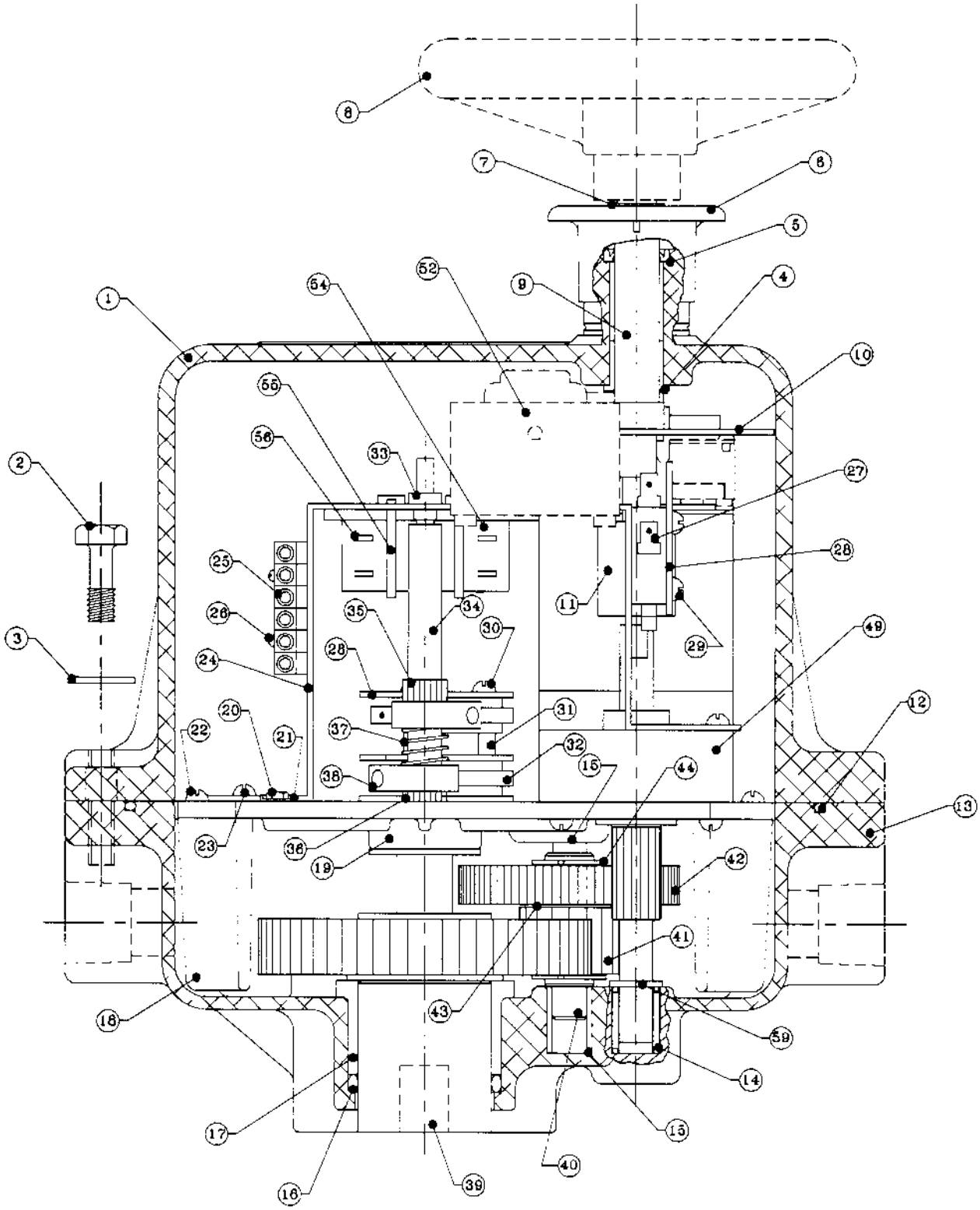
No.	Item	Material	P/N	Qty
39	CE2/CE4 Output Shaft Ass'y	Steel	106096	1
	CE5 Ouput Shaft Ass'y	Steel	107700	1
	CE1/CE7 Output Shaft Ass'y	Steel	106097	1
40	CE1/2/5/& 7 Offset Shaft	Steel 86L20	104864	1
	⅛ x ⅛ x 1.19" Long Key	Steel	105589	1
41	CE1 Offset Pinion	Steel -Heat Treated	104893	1
	CE2 Offset Pinion	Steel -Heat Treated	104887	1
	CE4 Offset Pinion	Steel -Heat Treated	104889	1
	CE7 Offset Pinion	Steel -Heat Treated	104891	1
	CE5 Offset Pinion	Steel -Heat Treated	107169	1
42	CE1/CE7 Offset Gear	Steel -Heat Treated	104890	1
	CE2 Offset Gear	Steel -Heat Treated	104885	1
	CE4 Offset Gear	Steel -Heat Treated	104884	1
	CE5 Offset Gear	Steel -Heat Treated	107168	1
43	1.00 O.D.x 0.031 Spacer	Steel	105587	1
44	9/16" I.D. Snap Ring	Spring Steel	100678	2
58	Nameplate	Stainless Steel	105578	1
	Ty-Rap Cable Tie	Plastic	101066	2
	3/32" Dia. Drive Pins	Stainless Steel	105454	2
	Cam Adjustment Sticker	Mylar	105757	1
	Manual Override Sticker	Mylar	105756	1
	Automax Logo Sticker	Mylar	105862	2
	Position Indication Sticker	Mylar	106187	1
	¾" NPT Conduit Plug	Plastic	103685	1
	Open/Close Stickers	Mylar	106186	1
59	Press Fit Washer	Steel	107178	1
60	Plug	Steel/Plated	107126	2

Additional Parts Specific To 115 VAC Actuators CE2, CE4, CE7, CE1, CE5

No.	Item	Material	P/N	Qty
49	115 VAC PSC Motor Int.	Steel/Copper	105675	1
	16 Fin Impeller Fan	Plastic	105703	1
	10-32 UNC x 3/16" SHCS	Steel/Plated	105599	2
54	Capacitor	Plastic Encapsulated	106619	1
55	Wire Tie	Plastic	106243	2
56	Quick Connect	Plastic/Steel	106761	4
25	6 Position Terminal Strip	Plastic/Steel	103997	1
	2 Screw Marker Strip	Plastic	103996	1
26	3-48 UNC x ½" Pan Head	Steel/Plated	104837	2
	115 VAC Wire Harness	Copper/Plastic	106111	1
	115 VAC Schematic Sticker	Gloss Paper	815169	1



ISO	A	B	C	D	E	F
F05	1.392	0.696	0.551	0.630	M6-25 TAP	1.97
F07	1.949	0.974	0.669	0.787	M8-20 TAP	2.76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Additional Parts Specific To 115 VAC With ESP Servo Positioner Actuators CE2ATA, CE4ATA, CE7ATA, CE1ATA, CE5ATA

No.	Item	Material	P/N	Qty
49	115 VAC PSC Motor Ext.	Steel/Copper	105676	1
	Fan Hub	Pressed Metal	107939	1
	Fan	Plastic	107940	1
	Compression Spring	Steel	108431	1
	Brake Hinge Ass'y	Steel/Plastic	108600	1
52	Brake Solenoid	Coil	108022	1
	Switch Spring	Steel	103714	1
	Wave Spring	Steel	108198	1
	10-32UNF Set Screw	Stainless Steel	103486	1
	.75 x .459 x .042 Washer	Brass	108361	1
	Klip Ring	Stainless Steel	106174	1
	6-32 x ½ Phil. Screw	Steel	106061	1
	.350 x .118 Lg. Spacer	Bronze	108296	2
	6-32 Hex. Nut	Nylon/Steel	105864	1
	10-32UNF SHCS	Steel	105599	2
	#6 Type A Plain Washer	Steel	100986	3
	Brake Shim	Steel	108199	1
	8-32 x ⅝ Phil. Screw	Steel	105576	3
55	Wire Tie	Plastic	106243	2
56	Quick Connect	Plastic/Steel	106761	4
54	Capacitor	Plastic Encapsulated	106618	1
	#6 x 0.19 lg. Spacer	Aluminum	100839	1
	6-32 UNC x ⅜" Phillips Hd.	Steel/Plated	100881	1
	¼ Turn Standoff	Plastic	105168	2
	ESP3 Servo Positoner	Fiberglass	105005	1
	Potentiometer	Plastic	106195	1
	85- Tooth Gear	Aluminum	107312	1
	85- Tooth Gear	Aluminum	105853	1
26	115 VAC ESP3 Wire Harness	Copper/Plastic	106194	1
	ESP3 Schematic Sticker	Glass Paper	815224	1

Additional Parts Specific To 12 VDC Actuators CE2B, CE4B, CE7B, CE1B, CE5B

No.	Item	Material	P/N	Qty
49	12 VDC Gearmotor	Steel/Copper	106088	1
	Motor Bracket Spacer	Aluminum	106193	2
25	6 Piston Terminal Strip	Plastic/Steel	103997	1
	2 Screw Marker Strip	Plastic	103996	1
26	3-48 UNC x ½" Pan Head	Steel/Plated	104837	2
	12 VDC Wiring Harness	Copper/Plastic	106196	1
	12 VDC Schematic Sticker	Gloss Paper	815176	1

Additional Parts Specific To 24 VDC Actuators CE2C, CE4C, CE7C, CE1C, CE5C

No.	Item	Material	P/N	Qty
49	24 VDC Gearmotor	Steel/Copper	106088	1
	Motor Bracket Spacer	Aluminum	106193	2
25	6 Position Terminal Strip	Plastic/Steel	103997	1
	2 Screw Marker Strip	Plastic	103996	1
26	3-48 UNC x ½" Pan Head	Steel/Plated	104837	2
	24 VDC Wiring Harness	Copper/Plastic	106197	1
	24 VDC Schematic Sticker	Gloss Paper	815176	1

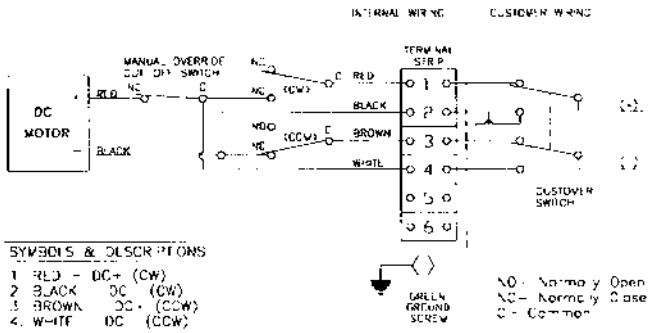
Wiring Diagrams

⚠ **CAUTION:** To prevent ignition of hazardous atmospheres, keep unit tight while circuits are alive. Disconnect supply circuit before opening.

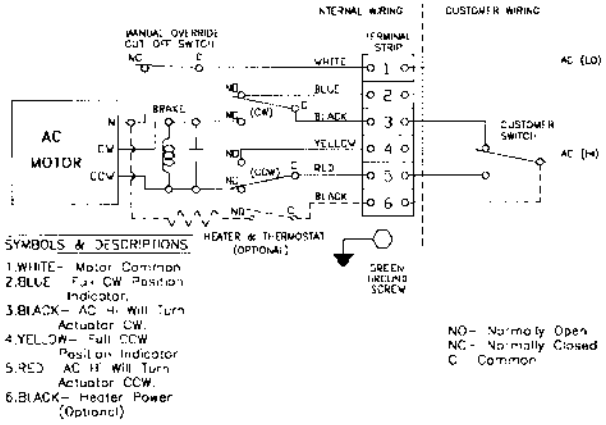
⚠ **CAUTION:** Consult factory when wiring multiple actuators in series or parallel. Serious damage may result.

NOTE: Wiring diagrams show internal wire connections and suggested customer connection for proper use. Switches shown in "customer wiring" are for illustration only and are not supplied with the actuator.

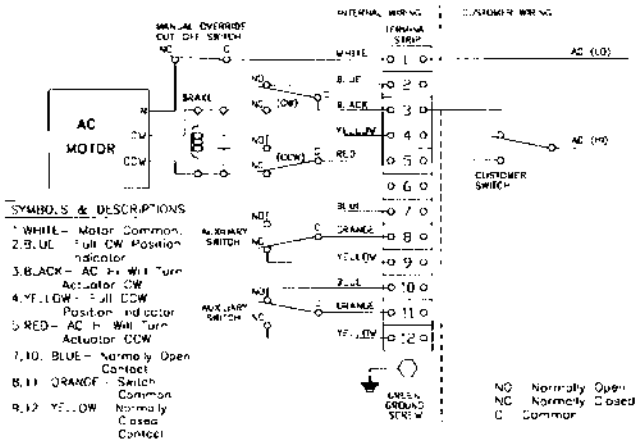
Reversible DC Actuator



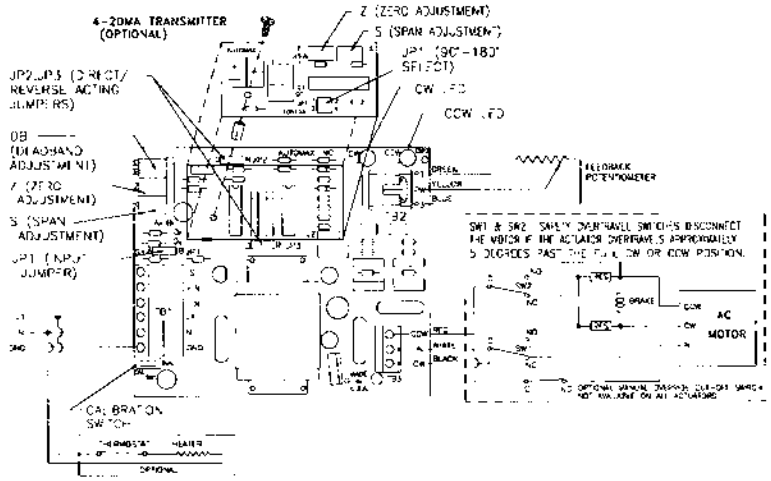
Reversible AC Actuator



Reversible AC Actuator with 2 Extra Switches



Reversible Modulating AC Actuator



Typical Actuator Specifications

Action		Reversible
Range of Adjustability		0° -270°
Supply Voltages	AC:	115 VAC
	+/-10%	230 VAC
	50/60 Hz	24 VAC
	DC:	12 VDC
		24 VDC
Temperature Rating		-40°F (-40°C) to 160°F (70°C)
Enclosure Ratings		Nema 4, 4X, 7, 9 Watertight and Explosion-proof
		Class I Groups C&D, Div. 1&2
		Class II Groups E, F&G, Div. 1&2
Motor Types	AC:	Permanent Split Capacitor, Class B Insulation
	DC:	Brush
AC Motor Thermal Protection		Automatically resetting
Travel and Aux. Switches		SPDT, Form C
		15 amp 125 VAC ½ HP, 10 amp 250 VAC, ½ amp 125 VDC
Conduit Connections		¾-14 NPT
Manual Override		300 In-lbs max input
Corrosion Protection		Chromate conversion undercoat with polyester electrostatic powder top coat
Terminal Strip Hookup		300V, 30 amp, 12-26 AWG
Lubrication		Permanently lubricated
Gear Train		Heat treated alloy steel able to withstand stall torque

Note: The above ratings may change depending on model configurations and options provided. Products may differ as the result of the Company policy of continuous product improvement.

Motor Option	Motor Voltage	Duty Cycle [1,3]	Run Current (Amps)	Locked Rotor (Amps)	Cycle Times in Seconds per 90 Degrees				
					Actuator Model				
					CE2	CE4	CE7	CE1	CE5
Std.	115 AC	25	1.1	1.3	3	5	6	11	18
A	115 AC	Extended: 75	0.5	0.6	6	10	17	24	36
B	12 DC	100	1.6	3.0 [2]	6	9	16	21	32
C	24 DC	100	0.9	2.0 [2]	6	8	15	20	30
D	230 AC	25	0.7	0.8	3	5	6	11	18
F	230 AC	Extended: 75	0.3	0.4	6	10	17	24	36
J	24 AC	100	0.5	0.8	3	5	6	11	18
Torque and Weights									
Torque (In-Lbs)					250	400	700	1000	1500
Torque (N-M)					28	45	79	113	169
Weight (Lbs)					18	18	18	18	20
Weight (Kg)					8	8	8	8	9

Notes:

1. Duty cycle is the limit of "on" time as percentage of total cycle time. For example, the CE2 with standard motor runs 3 seconds to open or close the valve. The motor must remain off for 9 seconds prior to starting the close cycle. DC motors may be operated continuously.

2. Do not lock up DC motors.

3. CE5 duty cycles for AC motors are 20% for standard duty and 70% for extended duty.

4. For 180 degree applications, simply multiply the above cycle times by 2.

Troubleshooting

Problem

There is power to the unit, but it does not respond.

Solution

Check the nameplate to see that the correct voltage has been applied.

Check the wiring to see that it is per the wiring schematic.

Check the limit switches to see if they are in the normal operating range.

Check the manual override. If it is in the down position, the motor is electrically disconnected.

Problem

Power is getting to the motor, but it merely hums.

Solution

Check to see that the proper voltage is applied. Make sure all the connections are tight.

Check to see that the brake coil is pulling the brake pad and hinge away from the fan.

Check to see that CW and CCW power connections are not powered at the same time.

Problem

The actuator performs erratically.

Solution

Check to see that the actuator is not stalling.

Check the ambient temperature rating. The permanent split capacitor units are equipped with thermal cut-outs. Excessive temperatures and cycle frequencies may heat the motor up and the thermal cut-out turns it off.

United States
Flowserve Corporation
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FCD AXENIM0037-01 Printed in USA. (Replaces AUTO-37)

To find your local Flowserve representative:

For more information about Flowserve Corporation, visit www.flowserve.com or call USA 1 800 225 6989

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Part No.: 01218

Installation, Safety, Operation & Maintenance Instructions And Parts List

For Models PB, PBS, SPB, LM and LMF.

Arrangement 4 Blowers

NOTE

READ ENTIRE MANUAL, INCLUDING "SECTION IV. INITIAL UNIT STARTUP" BEFORE ATTEMPTING TO INSTALL AND OPERATE THIS EQUIPMENT.

BLOWER SPECIFICATIONS

BLOWER SERIAL NUMBER: _____ **MFG. DATE:** _____

NOTE: The serial number above is a required reference for any assistance. It is stamped on the blower nameplate.

BLOWER SPECIFICATIONS:

Model: _____ **Arrangement:** _____ **Rotation:** _____ **Discharge:** _____

Nominal Inlet Size: _____ (in Inches) **Wheel Size and Type:** _____

BLOWER PERFORMANCE DATA: (If entered on order)

CFM: _____ **SP:** _____ (Inches of Water Gauge) **Motor BHP:** _____

Density: _____ **Altitude:** _____ (Ft. above S.L.) **Airstream Temperature:** _____**°F.**

Fan RPM: _____ **Maximum Safe Fan RPM:** _____ **DO NOT EXCEED THIS RPM**

MOTOR DATA: (This section is completed only if the motor was supplied by Cincinnati Fan)

HP: _____ **RPM:** _____ **Voltage:** _____ **Phase:**_____

Hz: _____ **Frame Size:** _____ **Enclosure:** _____ **Efficiency:** _____

IF Motor is EXP, Class(es) & Group(s) are:_____

Manufacturers Model Number: _____ **CFV Part Number:** _____

ATTENTION: RECEIVING DEPARTMENT

All Cincinnati Fan products are packaged to minimize any damage during shipment. The freight carrier is responsible for delivering all items in their original condition as received from Cincinnati Fan. The individual receiving this equipment is responsible for inspecting this unit for any obvious or concealed damage. If any damage is found, it should be noted on the bill of lading before the freight is accepted and the receiver must file a claim with the freight carrier.

LONG TERM STORAGE NOTICE

If this blower will NOT be installed and put into operation within 30 days, refer to the "Long Term Storage Instructions" on pages 12 and 13. Failure to follow all applicable long term storage instructions, will void your warranty. This blower should be stored indoors in a clean, dry location.

⚠ DANGER

Hazardous voltage can cause electrical shock and death.

High speed rotating equipment can cause severe personal injury.

Lock out/Tag out to prevent personal injury BEFORE starting ANY service or inspection.

Avoid injury. NEVER operate without ALL required safety guards in place.

Avoid injury. You MUST read and understand all instructions in this manual BEFORE installing.

TABLE OF CONTENTS

I. GENERAL

A. Unpacking:

Be careful not to damage or deform any parts of the blower when removing it from the packaging container. **All the packaging material should be kept in the event the blower needs to be returned.**

Handling:

Handling of the blower should be performed by trained personnel and be consistent with all safe handling practices. Verify that all lifting equipment is in good operating condition and has the proper lifting capacity. The blower should be lifted using well-padded chains, cables or lifting straps with spreader bars. Some blower models have lifting eye locations provided in the blower base. **NEVER lift the blower by an inlet or discharge flange, motor shaft, motor eye bolt, or any other part of the blower assembly that could cause distortion of the blower assembly.**

B. Safety Instructions & Accessories:

1. **Safety Instructions:**
   All installers, operators and maintenance personnel should read AMCA Publication 410-96, **"Recommended Safety Practices for Users and Installers of Industrial and Commercial Fans".** This manual is included with the blower. Additional copies can be requested by writing us at Cincinnati Fan, 7697 Snider Rd., Mason, OH 45040-9135
2. **Sound:**
   Some blowers can generate sound that could be hazardous to personnel. It is the responsibility of the user to measure the sound levels of the blower and/or system, determine the degree of personnel exposure, and comply with all applicable safety laws and requirements to protect personnel from excessive noise.

3. Air Pressure and Suction:

In addition to the normal dangers of rotating machinery, the blower can present additional hazards from the suction or pressure created at the blower inlet or discharge. Suction at the blower inlet can draw materials into the blower where they become high velocity projectiles at the discharge and cause severe personal injury or death. It can also be extremely dangerous to persons in close proximity to the inlet or discharge as the forces involved can overcome the strength of most individuals.

⚠ WARNING

NEVER OPERATE A BLOWER WITH A NON-DUCTED INLET AND/OR DISCHARGE. IF THE BLOWER INLET AND/OR DISCHARGE IS NON-DUCTED, IT IS THE USERS RESPONSIBILITY TO INSTALL AN INLET AND/OR DISCHARGE GUARD.

4. Temperature:

Many blowers, blower components and all motors operate at temperatures that could burn someone if they come in contact with them. If this potential hazard could exist in your installation, steps must be taken by the user to protect anyone from coming in contact with this equipment.

5. Spark Resistance; (Per AMCA Standard 99-0401-86 and ISO 13499)

⚠ DANGER

NO GUARANTEE OF ANY LEVEL OF SPARK RESISTANCE IS IMPLIED BY SPARK RESISTANT CONSTRUCTION. IT HAS BEEN DEMONSTRATED THAT ALUMINUM IMPELLERS RUBBING ON RUSTY STEEL CAN CAUSE HIGH INTENSITY SPARKS. AIR STREAM MATERIAL AND DEBRIS OR OTHER SYSTEM FACTORS CAN ALSO CAUSE SPARKS.

6. Safety Accessories;

Guards:

All moving parts must be guarded to protect personnel. Safety requirements can vary, so the number and types of guards required to meet company, local, state and OSHA regulations must be determined and specified by the actual user or operator of the equipment.

NEVER start any blower without having all required safety guards properly installed. All blowers should be checked on a regular schedule, for missing or damaged guards. If any required guards are found to be missing or defective, the power to the blower should be immediately turned off and locked out in accordance with OSHA regulations. Power to the blower should NOT be tuned back on until the required guards have been repaired or replaced.

This blower can become dangerous due to a potential “windmill” effect, even though all electrical power has been turned off or disconnected. The blower wheel should be **carefully** secured to prevent any rotational turning ***BEFORE*** working on any parts of the blower/motor assembly that could move.

7. Access or Inspection Doors:

⚠ DANGER

NEVER OPEN ANY ACCESS OR INSPECTION DOORS WHILE THE BLOWER IS OPERATING. SERIOUS INJURY OR DEATH COULD RESULT FROM THE AFFECTS OF AIR PRESSURE, AIR SUCTION OR MATERIAL THAT IS BEING CONVEYED. DISCONNECT OR LOCK OUT POWER TO THE BLOWER AND LET THE BLOWER WHEEL COME TO A COMPLETE STOP *BEFORE* OPENING ANY TYPE OF ACCESS OR INSPECTION DOOR.

II. INSTALLATION

A. Vibration:

Before any mounting method is selected, the user should be aware of the effects vibration will have on the blower, motor and other parts. Improper blower installation can cause excessive vibration causing premature wheel and/or motor bearing failure, that is not covered under warranty. Vibration eliminator pads, springs or bases should be properly installed to prevent any blower vibration from transmitting to the foundation, support structure or ducting.

⚠ WARNING

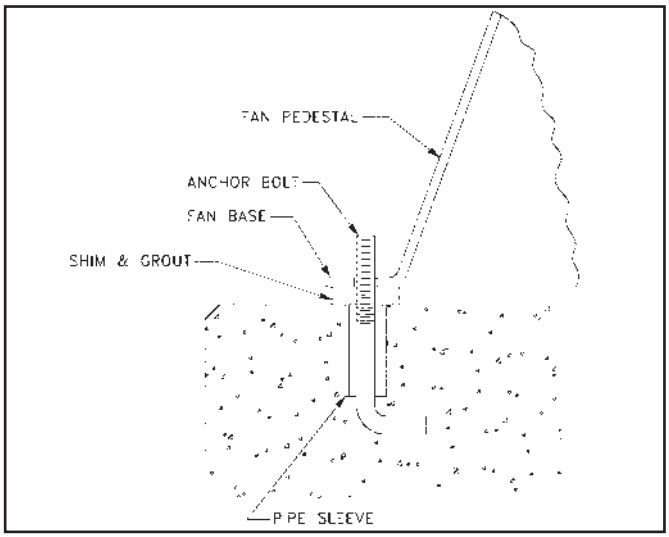
SHUT THE BLOWER DOWN IMMEDIATELY IF THERE IS ANY SUDDEN INCREASE IN VIBRATION.

B. Mounting Methods:

1. Floor Mounted Units;

Centrifugal blowers should be mounted on a flat, level, concrete foundation weighing 2-3 times the weight of the complete blower/motor assembly. It is recommended that the foundation be at least 6 inches larger than the base of the blower. The foundation should include anchor bolts such as shown in **Fig. 1** on page 4. Place the blower over the anchor bolts and shim under each bolt until the blower is level. After shimming, flat washers, lock washers and lock nuts should be tightened at each anchor bolt. Any gaps between the blower base and the foundation should be grouted. If the blower will be sitting on some type of vibration pads or mounts, follow the recommended mounting procedures supplied with the vibration elimination equipment.

Fig. 1



2. Elevated Units;

Improper mounting of elevated blowers can cause vibration problems. The structure that the blower/motor assembly will be mounted on must be strong enough to support at least 3 times the weight of the entire blower/motor assembly. **An insufficient support will cause excessive vibration and lead to premature wheel and/or motor bearing failure**. Bracing of the support structure must be sufficient enough to prevent any side sway. The entire structure should be welded at all connection joints to maintain constant alignment of the platform.

⚠ DANGER

THE IMPROPER DESIGN OF AN ELEVATED PLATFORM STRUCTURE COULD RESULT IN A RESONANT CONDITION, AND CONSEQUENTLY, CAUSE A LIFE THREATENING, CATASTROPHIC, STRUCTURAL FAILURE.

C. Duct Work Connections:

All duct connections to the blower should include flexible connectors between the ducting and the blower inlet and/or discharge. This will eliminate distortion, noise and vibration from transmitting to the duct and building. The connectors should be selected to handle the operating conditions for air volume and pressure that the blower will produce. **All ducting or accessories, added by the user, should be independently supported. DO NOT use the blower/motor assembly to support any additional weight.** Inlet and/or discharge duct elbows should be located a minimum of 2 blower wheel diameters from the blower. Any duct elbows located closer than 2 wheel diameters to the blower inlet or discharge **WILL** reduce the air performance and blower efficiency. Any duct elbows near the blower discharge should be in the **same rotational direction** as the **blower rotation**.

Non-Ducted Blower Inlet:

Any blower with no ducting on the inlet **must** have an inlet guard. The blower should be located so the blower inlet is, at least, 1 wheel diameter away from any wall or bulkhead to eliminate a reduction in air flow.

Non-Ducted Blower Discharge:

Any blower with no ducting on the discharge **must** have a discharge guard.

D. Safety Guards:

Cincinnati Fan offers guards, as optional, to keep your blower in compliance with OSHA safety regulations. These include inlet or discharge guards. Any blowers built with high temperature construction, a “heat slinger guard” is standard. It is the responsibility of the user to make sure this blower meets all local, state and OSHA safety regulations. If you have a specific guard requirement not covered by OSHA, please contact the local Cincinnati Fan sales office for assistance.

E. Dampers and Valves: (Airflow control devices)

If the blower is supplied with any type of air flow control device, it should be closed before initial start-up of the blower to minimize overloading of the motor. Any airflow control device, with bearings, should be maintained in accordance with the manufacturers instructions. Any air flow control device, with an automatic control mechanism, should be adjusted per the manufacturers recommendations.

F. Set Screw and Taper-lock Bushing Torque Values:

All blower wheel set screws are tightened to the proper torque prior to shipment. Some wheels may have taper-lock hubs and split, taper-lock bushings to secure the wheel to the motor shaft.

NOTE: Check all set screw or taper-lock bushing torques. Forces encountered during shipment, handling, rigging and temperature can affect factory settings. For correct torque values, see **Tables 1** and **2** below.

Table 1

SET SCREW TORQUE VALUES		
Diameter & Number of Treads/Inch	**Hex Wrence Size (Across Flats)**	**Required Torque (Inch Pounds)**
1/4-20	1/8"	65
5/16-18	5/32"	165
3/8-16	3/16"	228
7/16-14	7/32"	348
1/2-13	1/4"	504
5/8-11	5/16"	1104

Table 2

TORQUE VALUES FOR TAPER-LOCK BUSHINGS	
Taper-lock Bushing Size	**Required Torque (Inch Pounds)**
H	95
B	192
P	192
Q	350
R	350

⚠ CAUTION

Set screws should NEVER be used more than once. If the set screws are loosened, they MUST be replaced. Use only knurled, cup-point, set screws with a nylon locking patch.

III. ELECTRICAL

A. Disconnect Switches:

All blower motors should have an independent disconnect switch located in close visual proximity to turn off the electrical service to the blower motor. **Disconnects must be locked out in accordance with OSHA "lock out-tag out" procedures any time inspection or maintenance is being performed on the blower and/or motor assembly. The "lock out-tag out" procedure should be performed by a licensed electrician or authorized personnel.** All disconnects should be sized in accordance with the latest NEC codes (National Electric Codes) and any local codes and should be installed only by a licensed electrician. "Slow blow" or "time delay" fuses or breakers should be used since the initial start-up time for the blower motor, although rare, can be up to 10 seconds.

B. Motors:

⚠ DANGER

ALL WIRING CONNECTIONS, INSPECTION AND MAINTENANCE OF ANY MOTOR MUST BE PERFORMED BY A LICENSED ELECTRICIAN IN ACCORDANCE WITH THE MOTOR MANUFACTURERS RECOMMENDATIONS, ALL ELECTRICAL CODES AND OSHA REGULATIONS. FAILURE TO PROPERLY INSTALL, MAKE WIRING CONNECTIONS, INSPECT OR PERFORM ANY MAINTENANCE TO A MOTOR CAN RESULT IN MOTOR FAILURE, PROPERTY DAMAGE, EXPLOSION, ELECTRICAL SHOCK AND DEATH.

1. **DO NOT connect or operate a motor without reading the motor manufacturers instructions supplied with the blower.** The basic principle of motor maintenance is: **KEEP THE MOTOR CLEAN AND DRY.** This requires periodic inspections of the motor. The frequency of the inspections depends on the type of motor, the service and environment it will be subjected to and the motor manufacturers instructions.
2. **Cleaning:** Cleaning should be limited to exterior surfaces only. **Follow motor manufacturers cleaning instructions.**
3. **Lubrication:** Most small motors have sealed bearings that are permanently lubricated for the life of the motor. Some larger motors have grease plugs that should be replaced with grease fittings to perform re-lubrication. These motors, or any motor with grease fittings, should be lubricated in accordance with the motor manufacturers recommendations. Lubrication frequency depends on the motor horsepower, speed and service. **BE SURE** you use compatible grease and **DO NOT** over grease.
4. **Location:** If the motor will be outside and subjected to the weather, it is recommended that a weather cover be installed to keep rain and snow off of the motor. No motors are guaranteed to be "watertight". Be careful to allow enough openings between the motor and the motor cover to let the motor "breath". If the back end of the motor is covered, the cover should be no closer than 3" to the back of the motor for proper ventilation.

5. **Wiring Connections:** All wiring connections should be made for the proper voltage and phase as shown on the motor nameplate. Connections should follow the motor manufacturers recommendations as shown on the wiring schematic. This wiring diagram will be located on the outside of the motor, inside of the motor conduit box or on the motor nameplate. **Reversing some wires might be necessary to get the correct blower rotation.**
6. **Motors with Thermal Overload Protection:** If a motor is equipped with thermal overloads, the thermal overload must be wired per the wiring schematic to be operable. ***There are 3 types of thermal overloads:***
   a. **Automatic:** These will automatically shut the motor down if the internal temperature exceeds the design limits.

⚠ DANGER

MAKE SURE YOU LOCK OUT THE POWER TO THE MOTOR BEFORE INSPECTING ANY MOTOR WITH AUTOMATIC THERMALS. WHEN THE THERMALS COOL DOWN, THEY WILL ALLOW THE MOTOR TO AUTOMATICALLY START UP AGAIN, UNLESS YOU HAVE LOCKED OUT THE POWER TO THE MOTOR.

   b. **Manual:** These motors will have a button on them. If the motor overheats, it will shut down. After you have inspected the motor and eliminated the over heating problem, you will need to "reset" it by pushing the button. **You should still lock out the power BEFORE inspecting the motor.**
   c. **Thermostats:** This type of thermal is a temperature sensing device **ONLY**. If the motor overheats, the thermostats will open or close (depending on the type) and send a **"signal"** to the electrical box. ***THEY WILL NOT TURN THE MOTOR OFF.*** **These are pilot circuit devices that must be connected to the magnetic starter circuit.**

7. **EXPLOSION PROOF Motors:** No motor is explosion proof. Explosion proof (EXP) motors are designed so if there is an explosion **WITHIN** the motor, the explosion will be **CONTAINED INSIDE** the motor and not allowed to get out to the atmosphere. All explosion proof motors must be selected based on the atmosphere and/or the environment the motor will be operating in. Explosion proof motors are designed, rated, and labeled for their operating conditions based on Classes, Groups and "T" Codes. **The Class, Group and "T" Code of an EXP motor MUST be selected based on the atmosphere and/or environmental conditions the motor will be operating in. Consult the NEC (National Electric Code) and the NFPA (National Fire Protection Association) for the proper EXP motor Class, Group and "T" Code required for your specific application and location.**

⚠ DANGER

IF AN EXPLOSION PROOF MOTOR IS USED IN AN AREA CONTAINING VOLITILE LIQUIDS, GASES, FUMES OR DUST FOR WHICH THE MOTOR WAS NOT DESIGNED TO OPERATE IN, AN EXPLOSION AND/OR FIRE CAN OCCUR.

NOTICE:

   a. **All EXP motors have some type of thermal overload as required by UL (Underwriters Laboratories). Refer to all of Section 6 above.**
   b. **All EXP motors are required to have the UL (Underwriters Laboratories) and CSA (Canadian Standards Association) listing numbers on the motor name plate or on a separate plate attached to the motor. The Class, Group and "T" Code the motor is designed for must also be listed.**

8. **Normal Motor Operating Temperatures:**
   Using your hand to test the normal running temperature of a motor can be a very painful experience;
   The normal operating temperature of a fully loaded, open type, electric motor operating in a 70°F. (21° C.) ambient temperature is 174°F. (79° C.)

C. Maximum Blower Speed and Motor Speed Controllers:

If you will be using any type of motor speed controller with this blower, **DO NOT** exceed the **maximum safe blower speed**. Installing and using a speed control device requires special training and certification as required by the speed control manufacturer. See the manufacturers instructions for proper use, installation and wiring connections for the maximum speed settings. It may also be necessary to "block out" some speeds to eliminate a resonant vibration problem. The maximum safe blower speed is shown on the data sheet shipped with the blower. If you have lost the data sheet, contact Cincinnati Fan or our sales office for your area. You must have the serial number from the **blower** name plate for us to determine the maximum safe blower speed. Cincinnati Fan will only extend the motor manufacturers warranty, when used with a speed controlling device, if the motor has the words **"Inverter Duty"** marked on the motor name plate. If the motor does not have **"Inverter Duty"** marked on the motor name plate, and you have a motor failure, you will be required to contact the motor manufacturer for any service or warranty claims.

IV. INITIAL UNIT STARTUP

NOTICE: Failure to complete and document all the following pre-startup and both post-startup checks, listed in sections A (below) and B on page 8, could void all warranties.

A. Pre-Startup & Post-Startup Checks: (Check blocks as each step is completed. Retain this for your records.)

A1. Pre-Startup Checks Completed By: _____ **DATE:** _____

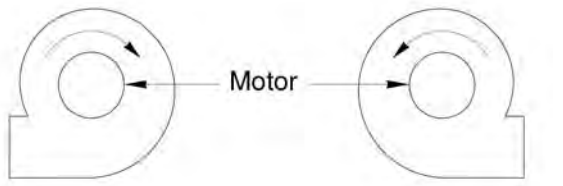
A2. 8 Hour, Post-Startup Checks Completed By: _____ **DATE:** _____

A3. 3 Day, Post-Startup Checks Completed By: _____ **DATE:** _____

MAKE SURE POWER TO THE MOTOR IS LOCKED OUT BEFORE STARTING PRE-STARTUP OR POST-STARTUP CHECKS.

1. ☐☐☐ If possible, *CAREFULLY* spin the blower wheel by hand to ensure it rotates freely and no rubbing or clicking noise is heard.
2. ☐☐☐ Check all blower, foundation and duct work hardware to make sure it is tight.
3. ☐☐☐ Check all blower wheel set screws to make sure they are tight per **Table 1** on page 5.
4. ☐☐☐ If the wheel has a taper-lock bushing, make sure the bolts are tightened per **Table 2** on page 5.
5. ☐☐☐ Make certain there is no foreign material in the blower or duct work that can become a projectile.
6. ☐☐☐ Make sure any inspection doors in the duct work are securely bolted or locked.
7. ☐☐☐ Ensure all electrical power components are properly sized and matched for your electrical system.
8. ☐☐☐ Check that all required guards are properly secured.
9. ☐☐☐ Any dampers should be fully opened and closed to make sure there is no binding or interference.
10. ☐☐☐ If your blower is mounted on an elevated support structure, make sure the structure is welded at all the joint connections and the structure is properly braced to prevent "side sway".
11. ☐☐☐ Close any dampers to minimize load on motor. Especially on blowers with high temperature construction. **Never** subject a "cold" blower to a "hot" gas stream. If the blower will be handling "hot gases" greater than 150°F (65°C) it is imperative that the blower be subjected to a gradual rate of temperature increase, not to exceed 15°F/minute (8°C/minute). The same temperature limits are also important when the blower is experiencing a drop in temperature until the temperature drops down to 150°F (65°C). Only, when the entire blower has reached an equilibrium temperature of 150°F (65°C), or less, should the power be turned off.
12. ☐☐☐ Make sure the power source connections to the blower motor are per the motor manufacturers instructions.
13. ☐☐☐ Make sure the blower wheel is stationary prior to startup. **Starting a blower with a wheel that is rotating backwards can cause wheel damage.**
14. ☐☐☐ Apply power to the blower motor momentarily (i.e. "bump start") to check for proper blower wheel rotation. If the blower is rotating in the wrong direction, reconnect the motor leads per the motor manufacturers wiring schematic. **Blower rotation is determined by viewing the blower from the motor side of the blower, NOT from the inlet side**. After reconnecting the leads, repeat this step. **See Fig. 2 below.**

Fig. 2



Clockwise (CW) Rotation **Counter-Clockwise (CCW) Rotation**

15. ☐☐☐ Apply power to the blower motor and let it come up to full speed. **Turn off the power.** Look and listen for any unusual noise or mechanical abnormality while the blower wheel is still spinning. If any are noticed, lock out the power, wait for the blower wheel to come to a complete stop, locate the cause and correct it.
16. ☐☐☐ Unlock power and start the blower.
17. ☐☐☐ Measure, record and keep the following motor data for future reference and comparison:
(Single phase motors will only have L1 and L2 leads)

Amperage draw on each motor lead: L1 _____ **L2** _____ **L3** _____
(Running amps **SHOULD NOT** exceed the motor nameplate amps for the voltage being operated on)

Voltage coming to motor leads: L1_____ **L2**_____ **L3**_____
(Should be about the same input voltage on all leads)

B. Vibration:

The blower was balanced at the factory to comply with ANSI/AMCA Standard 204-05, Category BV-2. However, rough handling in shipment and/or erection, weak and/or non-rigid foundations, and misalignment may cause a vibration problem after installation. After installation, the vibration levels should be checked by personnel experienced with vibration analysis and vibration analysis equipment.

NOTE:

The blower SHOULD NOT be operated if the vibration velocity of the fan exceeds 0.50 inches per second, filter out, if the blower is rigidly mounted. If the blower is mounted on isolators or on an isolator base, it SHOULD NOT be operated if the vibration velocity of the blower exceeds 0.75 inches per second, filter out.

Vibration readings for direct driven blowers should be taken on the motor at the top, sides and end as per **Fig. 3** below. After you have taken your vibration readings, write them down in the spaces below and keep for future comparison.

⚠ DANGER

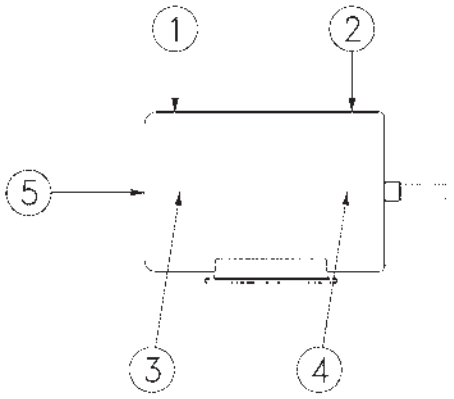
If the blower is going to be conveying material, it is the users responsibility to periodically turn the blower off and lock out the power. The blower wheel should then be checked for material build-up and/or erosion. If material has built up on any parts of the wheel, it MUST be removed and cleaned before it is put back into service. If any parts of the wheel have been eroded, the wheel MUST be replaced. Failure to perform this inspection can cause excessive vibration that will damage the blower and/or motor bearings. When vibration becomes excessive, it will lead to complete blower failure that could cause property damage, severe personal injury and death. The user must determine the frequency of this inspection based on the actual circumstances of their operation, BUT checking the vibration readings should NEVER exceed a 12 month period. For the AMCA/ANSI standard for vibration limits, see Fig. 4 on page 9.

Fig. 3

VIBRATION METER PROBE POSITIONS

For Arrangement 4 Blowers

	1	2	3	4	5
A					
B					
C					

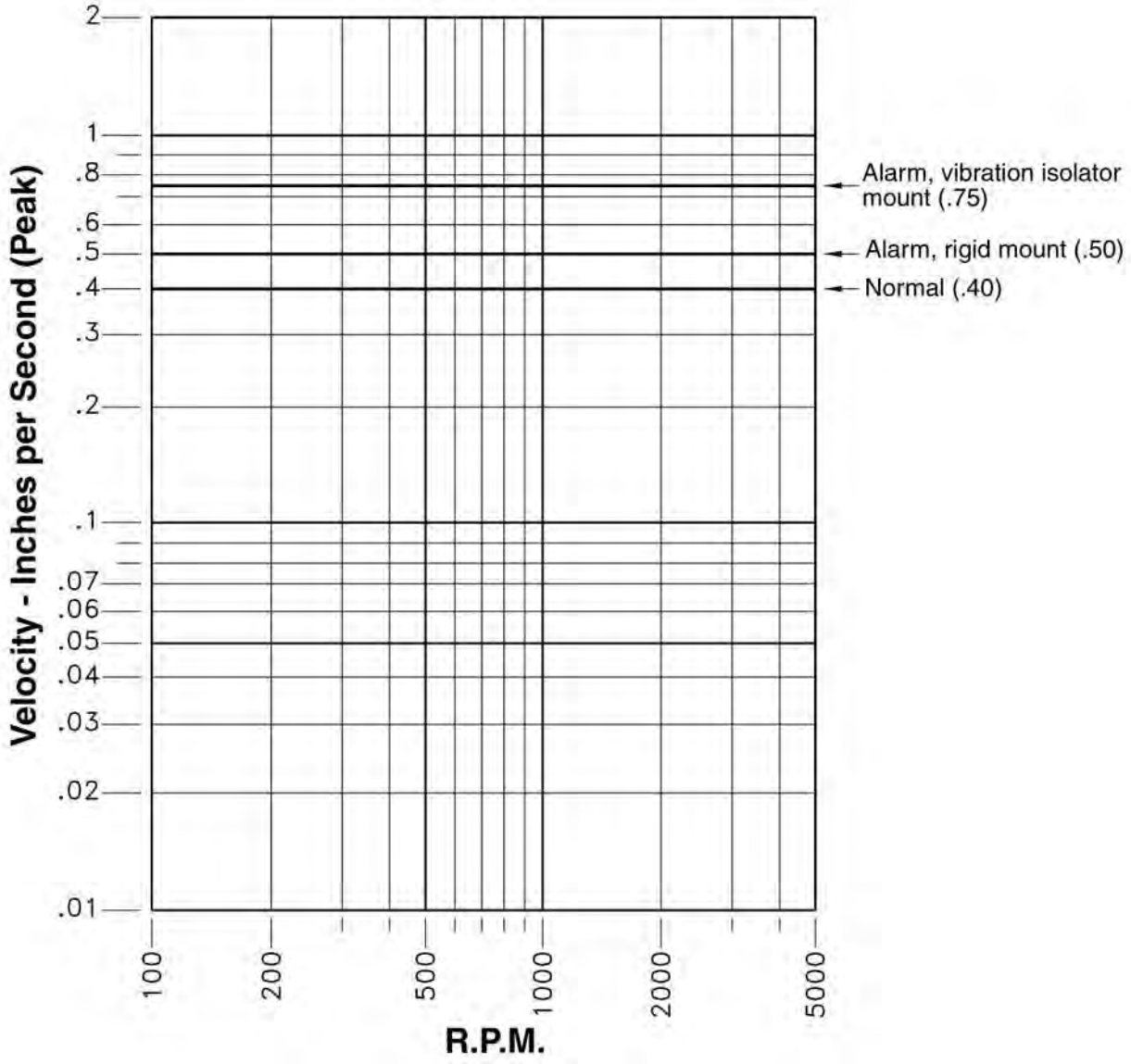


A Pre-Startup ..... Readings taken by: _____ **Date:** _____

B 8 Hour Post-Startup ..... Readings taken by: _____ **Date:** _____

C 3 Day Post-Startup ..... Readings taken by: _____ **Date:** _____

Fig. 4 Vibration Severity Chart



V. ROUTINE INSPECTION & MAINTENANCE

Periodic inspection of all the blower parts is the key to good maintenance and trouble-free operation. The frequency of inspections must be determined by the user and is dependent upon the severity of the application. **BUT,** it should **NEVER** exceed a 12 month period. The user should prepare an inspection and maintenance schedule and make sure it is adhered to.

⚠ WARNING

BEFORE STARTING ANY INSPECTION OR MAINTENANCE, BE SURE BLOWER IS TURNED OFF, POWER IS LOCKED OUT AND THE BLOWER WHEEL HAS BEEN CAREFULLY SECURED TO PREVENT WIND MILLING. IF THE OPERATING CONDITIONS OF THE BLOWER ARE TO BE CHANGED (SPEED, PRESSURE, TEMPERATURE, ETC.) CONSULT CINCINNATI FAN, OR OUR SALES OFFICE FOR YOUR TERRITORY, TO DETERMINE IF THE UNIT WILL OPERATE SAFELY AT THE NEW CONDITIONS.

A. Hardware:

All blower and foundation hardware should be checked to make sure it is tight. Wheel set screws or taper-lock bushings should be tightened to the torque values shown in **Tables 1 and 2** on page 5.

NOTE: If any set screws have come loose, they must be thrown away and replaced. **NEVER** use set screws more than once. **Replace with knurled, cup-point set screws with a nylon locking patch.**

B. Motor Bearing Lubrication:

1. Motor Bearings:

Most smaller motors have sealed bearings that never require re-lubrication for the life of the motor. For any motors with grease fittings, consult the motor manufacturers recommendations with reference to the lubrication frequency and the type of grease that should be used.

DO NOT over grease the motor bearings. Generally, 1-2 shots should be enough. Use a hand operated grease gun at no more than 40 PSI. ***IF POSSIBLE, CAREFULLY*** **lubricate the motor bearings while the motor is running.**

C. Wheel Balance:

All blower wheels are balanced at the factory. It is not uncommon that additional "trim balancing" is required after the blower is assembled. Trim balancing of the blower assembly, in the field, is typically always necessary for all replacement wheels. **After any wheel is installed, the final balance of the entire blower assembly should be checked.** Refer to Section B on page 8 and Fig. 4 on page 9. Air stream material or chemicals can cause abrasion or corrosion of the blower parts. This wear is generally uneven and, over time, will lead to the wheel becoming unbalanced, causing excessive vibration. When that happens, the wheel must be rebalanced or replaced. The other air stream components should also be inspected for wear or structural damage and cleaned or replaced if necessary. **After cleaning any blower wheel, it should be balanced and then "trim balanced" on the motor shaft.**

There are three ways to balance a blower wheel:

1. **Add balancing weights for fabricated aluminum, steel or stainless steel wheels:**
   Balance weights should be rigidly attached to the wheel at a location that will not interfere with the blower housing nor disrupt air flow. They should (if at all possible) be welded to the wheel. When trim balancing the wheel, **on the blower,** be sure to ground the welder **directly** to the blower wheel. Otherwise, the welding current will likely pass through the motor and damage the motor bearings.
2. **Grinding off material for cast aluminum wheels:**
   If you are grinding on the wheel to remove material, be very careful not to grind too much in one area. That could affect the structural integrity of the wheel.
3. **Forward curved wheels, Model LM only (also known as squirrel cage or multivane wheels).**
   These wheels have balancing clips attached to individual blades around the wheel. That is the only proper way to balance this type of wheel.
   NOTE:
   Removing any forward curve wheel from the blower to clean it, requires special attention when reinstalling the wheel back into the blower housing. Make sure you reinstall the wheel so the proper wheel-to-inlet clearance is maintained. Failure to do this will affect the blowers airflow (CFM), static pressure (SP) capabilities and efficiency. Consult Cincinnati Fan or our local sales office for your area for assistance if necessary.

D. Vibration:

As mentioned previously in this manual, excessive vibration can cause premature motor bearing failure that could lead to catastrophic failure of the blower. After performing any routine maintenance, the vibration readings should be taken again. New readings should be taken (maximum every 12 months) and compared to the readings you recorded in **Figure 3**, on page 8, during the initial startup. **If any major differences are present, the cause should be determined and corrected before the blower is put back into operation.**

The most common causes of vibration problems are:

1. Wheel unbalance.
2. Mechanical looseness.
3. Poor blower inlet and/or discharge conditions.
4. Foundation stiffness.

E. Dampers and Valves: (Airflow control devices)

Turn off and lock out power to the blower motor. Any dampers or valves should be periodically inspected to make sure all parts are still operable within their full range and there is no interference with any other damper or blower components. Any bearings or seals should be checked for their proper function. The manufacturers maintenance instructions should be followed.

F. Safety Equipment & Accessories:

It is the users responsibility to make sure that all safety guards required by the company, local, state and OSHA regulations are properly attached and fully functional at all times. If any guards become defective or non-functional at any time, **the power to the blower MUST be turned off and locked out** until complete repairs and/or replacements have been made, installed and inspected by authorized personnel.

Any accessories used in conjunction with the blower should also be inspected to make sure they are functioning within their intended limits and design specifications. The manufacturers maintenance manuals should be referred to for correct maintenance procedures. These accessories include, but are not limited to, the following:

Shaft seals, inspection doors, vibration isolators or vibration bases, air flow or pressure measuring equipment, hoods, controls, special coatings, silencers, expansion joints, valves, flexible connectors and filters.

VI. ORDERING REPLACEMENT PARTS:

Under normal conditions, you should not need any spare or replacement parts for at least 24 months after shipment from Cincinnati Fan. That does not include any wear due to abrasion, corrosion, excessive temperatures, abuse, misuse, accident or any severe conditions the fan was not designed for.

NOTICE:

1. **If this blower is vital to any process that could cost you lost revenue, we strongly recommend that you keep a replacement blower wheel and motor at your location.**

2. **If this blower is vital for the safety of any people and/or animals, we strongly recommend that you keep a complete blower/motor assembly, as originally ordered, at your location.**

To order any parts or complete units, contact us for the name of our sales office for your area. Or you can find them on our website at: **www.cincinnatifan.com**

WE MUST HAVE THE BLOWER SERIAL NUMBER FROM THE BLOWER NAME PLATE TO IDENTIFY PARTS CORRECTLY.

VII. TROUBLESHOOTING

⚠ DANGER

Troubleshooting should only be performed by trained personnel. Any potential electrical problems should only be checked by a licensed electrician. All safety rules, regulations and procedures MUST be followed. Failure to follow proper procedures can cause property damage, severe bodily injury and death.

Potential problems and causes listed below are in no order of importance or priority. The causes are only a list of the most common items to check to correct a problem. If you find the cause of a problem, **DO NOT** assume it is the **ONLY** cause of that problem. Different problems can have the same causes.

PROBLEM	CAUSE
Excessive Vibration	1. Loose mounting bolts, wheel set screws, taper-lock hubs. 2. Worn or corroded blower wheel. 3. Accumulation of foreign material on blower wheel. 4. Bent motor shaft. 5. Worn motor bearings. 6. Motor out of balance. 7. Inadequate structural support. 8. Support structure not sufficiently cross braced. 9. Weak or resonant foundation. 10. Foundation not flat and level.
Airflow (CFM) Too Low	1. Blower wheel turning in wrong direction (**rotation**). 2. Actual system static pressure (**SP**) is higher than expected. 3. Motor speed (**RPM**) too low. 4. Dampers or valves not adjusted properly. 5. Leaks or obstructions in duct work. 6. Filters dirty. 7. Inlet and/or discharge guards are clogged. 8. Duct elbow too close to blower inlet and/or discharge. 9. Improperly designed duct work 10. Blower wheel not properly located relative to the inlet bell (**LM** Model only).
Airflow (CFM) Too High	1. Actual system static pressure (**SP**) is lower than expected. 2. Motor speed (**RPM**) too high. 3. Filter not in place. 4. Dampers or valves not adjusted properly.

PROBLEM	CAUSE
Motor Overheating	**NOTE: A normal motor will operate at 174°F. See B-8 on page 6.** 1. Actual system static pressure **(SP)** is lower than expected. 2. Voltage supplied to motor is too high or too low. 3. Motor speed (**RPM**) too high or defective motor. 4. Air density higher than expected. 5. Motor wired incorrectly or loose wiring connections. 6. Cooling fan cover on back of motor is clogged. (Fan cooled motors only.)
Excessive Noise	1. Wheel rubbing inside of housing. 2. Worn or corroded blower wheel. 3. Accumulation of foreign material on blower wheel. 4. Loose mounting bolts, wheel set screws, or taper-lock hubs. 5. Bent motor shaft. 6. Worn motor bearings. 7. Motor out of balance. 8. Motor bearings need lubrication. 9. Vibration originating elsewhere in system. 10. System resonance or pulsation. 11. Inadequate or faulty design of blower support structure. 12. Blower operating near "stall" condition due to incorrect system design or installation.
Fan Doesn't Operate	1. Motor wired incorrectly. 2. Incorrect voltage supply. 3. Defective fuses or circuit breakers. 4. Power turned off elsewhere. 5. Motor wired incorrectly or loose wiring connections. 6. Defective motor.

VIII. LONG TERM STORAGE INSTRUCTIONS: (Storage exceeding 30 days after receipt of equipment)

NOTE: Failure to adhere to these instructions voids all warranties in their entirety.

1. Storage site selection:
   a. Level, well-drained, firm surface, in clean, dry and warm location. Minimum temperature of 50°F (10°C).
   b. Isolated from possibility of physical damage from construction vehicles, erection equipment, etc.
   c. Accessible for periodical inspection and maintenance.
2. The blower should be supported under each corner of its base to allow it to "breath". Supports (2 x 4's, timbers, or railroad ties) should be placed diagonally under each corner.
3. If the equipment is to be stored for more than three (3) months, the entire blower assembly must be loosely covered with plastic, **but not tightly wrapped**.
4. Storage Maintenance:

   A periodic inspection and maintenance log, by date and action taken, must be developed and maintained for each blower. See example below. Each item must be checked monthly.

EXAMPLE:

Storage / Maintenance Schedule Log

ITEM	ACTION	DATES CHECKED
1	Re-inspect units to insure any protective devices used are functioning properly. Check for scratches in the finish which will allow corrosion or rust to form.	
2	Rotate wheel a minimum of 10 full revolutions to keep the motor bearing grease from separating and drying out. ***This is a critical step.***	

Long Term Storage instructions continued on page 13.

5. General Motor Procedure:

   If the motor is not put into service immediately, the motor must be stored in a clean, dry, warm location. Minimum temperature of 50°F. (10°C,). Several precautionary steps must be performed to avoid motor damage during storage.

   a. Use a “Megger” each month to ensure that integrity of the winding insulation has been maintained. Record the Megger readings. Immediately investigate any significant drop in insulation resistance.
   b. **DO NOT** lubricate the motor bearings during storage. Motor bearings are packed with grease at the factory.
   c. If the storage location is damp or humid, the motor windings **must** be protected from moisture. This can be done by applying power to the motor’s space heaters, (IF AVAILABLE) while the motor is in storage. If the motor does not have space heaters, storing it in a damp or humid location will, very quickly, cause internal corrosion and motor failure which is not warranted.

   ***NOTE*:**
   For specific storage instructions, for the <u>actual</u> motor and any accessory parts that were supplied, refer to the manufacturer’s instructions.

IX. LIMITED WARRANTY:

Cincinnati Fan & Ventilator Company (Seller) warrants products of its own manufacture, against defects of material and workmanship under normal use and service for a period of eighteen (18) months from date of shipment or twelve (12) months from date of installation, whichever occurs first. This warranty does not apply to any of Seller's products or any part thereof which has been subject to extraordinary wear and tear, improper installation, accident, abuse, misuse, overloading, negligence or alteration. This warranty does not cover systems or materials not of Seller's manufacture. On products furnished by Seller, but manufactured by others, such as motors, Seller extends the same warranty as Seller received from the manufacturer thereof. Expenses incurred by Purchaser's in repairing or replacing any defective product will not be allowed except where authorized in writing and signed by an officer of the Seller.

The obligation of the Seller under this warranty shall be limited to repairing or replacing F.O.B. the Seller's plant, or allowing credit at Seller's option. **THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND OF ALL OTHER OBLIGATIONS AND LIABILITIES OF THE SELLER. THE PURCHASER ACKNOWLEDGES THAT NO OTHER REPRESENTATIONS WERE MADE TO PURCHASER OR RELIED UPON BY PURCHASER WITH RESPECT TO THE QUALITY OR FUNCTION OF THE PRODUCTS HEREIN SOLD.**

Removal of the Sellers nameplate or any generic fan nameplate containing the fan serial number voids all warranties, either written or implied. Failure to complete and document all the pre-startup and post startup checks and perform the suggested routine maintenance checks voids all warranties, either written or implied.

LIMITATION OF LIABILITY:

Notice of any claim, including a claim for defect in material or workmanship, must be given to Seller in writing within 30 days after receipt of the equipment or other products. Seller reserves the right to inspect any alleged defect at Purchaser's facility before any claim can be allowed and before adjustment, credit, allowance replacement or return will be authorized. See **RETURNS** below. Seller's liability with respect to such defects will be limited to the replacement, free of charge, of parts returned at Purchaser's expense F.O.B. Seller's plant and found to be defective by the Seller.

IN NO EVENT WILL SELLER BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, WHETHER IN CONTACT, TORT, NEGLIGENCE, STRICT LIABILITY OR OTHERWISE, INCLUDING WITHOUT LIMITATION DAMAGES FOR INJURY TO PERSONS OR PROPERTY, LOST PROFITS OR REVENUE, LOST SALES OR LOSS OF USE OF ANY PRODUCT SOLD HEREUNDER. PURCHASER'S SOLE AND EXCLUSIVE REMEDY AGAINST SELLER WILL BE THE REPLACEMENT OF DEFECTIVE PARTS AS PROVIDED HEREIN OR REFUND OF THE PURCHASE PRICE FOR DEFECTIVE PRODUCTS, AT SELLER'S SOLE OPTION. SELLER'S LIABILITY ON ANY CLAIM, WHETHER IN CONTRACT, TORT, NEGLIGENCE, STRICT LIABILITY OR OTHERWISE, FOR ANY LOSS OR DAMAGE ARISING OUT OF OR IN CONNECTION WITH PURCHASER'S ORDER OR THE PRODUCTS OR EQUIPMENT PURCHASED HEREUNDER, SHALL IN NO CASE EXCEED THE PURCHASE PRICE OF THE EQUIPMENT GIVING RISE TO THE CLAIM.

RESPONSIBILITY:

It is the understanding of the Seller that Purchaser and/or User will use this equipment in conjunction with additional equipment or accessories to comply with all Federal, State and local regulations. The Seller assumes no responsibility for the Purchaser's or Users compliance with any Federal, State and local regulations.

RETURNS:

Cincinnati Fan & Ventilator Company assumes no responsibility for any material returned to our plant without our permission. An **RMA** (Return Material Authorization) number must be obtained and clearly shown on the outside of the carton or crate and on a packing slip. Any items returned must be shipped freight prepaid. Failure to comply will result in refusal of the shipment at our receiving department.

DISCLAIMER

This manual, and all its content herein, is based on all applicable known material at the time this manual was created. **Any parts of this manual are subject to change at any time and without notice.**

If any statements, diagrams and/or instructions contained herein, **for components not manufactured by the Seller,** conflict with instructions in the manufacturer's manual (i.e.: motors, dampers, etc.), the instructions in the manufacturer's manual, for that component take precedent.

Should you want the latest version of this manual, please contact us or our sales office for your area. Or, you can print a current version by going to our website at: **www.cincinnatifan.com**

cincinnati fan

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Phone: (513) 573-0600 Fax: (513) 573-0640
E-Mail: sales@cincinnatifan.com

X. PARTS DRAWING:

PLEASE NOTE

Cincinnati Fan manufactures many models and arrangements with special variations. For that reason, the maintenance manuals contained on our website do not include a parts drawing nor the completed blower or fan specifications on page 1. For the parts drawing of all the standard components and specifications for the specific blower or fan that you have, please contact our local Cincinnati Fan sales office for your area.

You will need to give them the serial number shown on the blower or fan nameplate so they can supply you the correct information.

Click on ***"Contact a Sales Rep"*** on our website for the name and contact information for our local sales office for your area. **www.cincinnatifan.com**

FLOWSERVE

USER INSTRUCTIONS

Durco® BX2001
High-Performance Butterfly Valves

FCD DVENIM0390-03-AQ – 5/16

Experience In Motion

HOW TO SPECIFY BX2001 VALVES

Size Type Body Class Materials Seal Seal Operator Options

□□ - □□□ - □ - □ - □□□□ - □ - □ - □ - □

Valve Size

Selection	Code	Selection	Code
2 in (50 mm)	2	14 in (350 mm)	14
3 in (80 mm)	3	16 in (400 mm)	16
4 in (100 mm)	4	18 in (450 mm)	18
5 in (125 mm)	5	20 in (500 mm)	20
6 in (150 mm)	6	24 in (600 mm)	24
8 in (200 mm)	8	30 in (750 mm)	30
10 in (250 mm)	10	36 in (900 mm)	36
12 in (300 mm)	12		

Type

Selection	Code
Big Max 2001	BX2

Body

Lug	L
Wafer	W

Class

ASME 150 Bidirectional	1
DIN PN10	2
ASME 300 End of Line Lug	9
ASME 150 End of Line Lug	4
DIN PN16	5
DIN PN20	7
ASME 300 Bidirectional	3
DIN PN25	0
DIN PN40	8

Body Material

Selection	Code	Selection	Code
D4*▮	1	DC3	6
DS*▮	8	Ti	7
D4L	L	D2	9
D20	2	DINC	N
DMM	3	CK3M	K
DNI	4	CD4MCu	0
DC2	5		

Disc Material

Selection	Code	Selection	Code
D4*▮	1	DC3	6
D4L	L	Ti	7
D20	2	D2	9
DMM	3	DINC	N
DNI	4	CK3M	K
DC2	5	CD4MCu	0

Shaft Material

Selection	Code	Selection	Code
17-4SS*	1	Ti	7
316SS	S	N50A	R
C20H	2	▲ N50 TriFlex +601°F	T
K Monel 500	3	Ferralium 255	F
Nickel	4	254 SMO	K
Hastelloy B	5		
Hastelloy C276	6		

Bearing Material

Selection	Code	Selection	Code
PTFE/Fiberglass	A	Inconel/PTFE	N
Hastelloy B/PTFE	B	316SS/PTFE ▮	S
C20/PTFE	C	Monel/PTFE	M
Hastelloy C/PTFE	H	Nickel/PTFE	4
Inconel X750, APEX or TriFlex +400°F	I	316 HCP (TriFlex* or APEX +400°F)	T
Titanium/PTFE	L		

Options

Code	Selection
T	TriFlex/Apex to 400°F
H	TriFlex/Apex 401°F to 600°F
R	TriFlex 601°F to 800°F
Y	TriFlex 801°F to 1000°F
B	Single 1/8" NPT Bleed/Inj. Port'
P	Two 1/8" NPT Purge Ports'
L	Bearing Lube (1/8" NPT Port)
C	CL2 Cleaned
O	O2 Cleaned★
S	Special Cleaning★
N	N.A.C.E. Trim (includes R shaft)
J	Steam Jacket
D	Steam Traced Disc
F	Special Fasteners
I	Inconel 718 Bellevilles ●▼
Z	None
X	Special Non-Standard

Operator

Code	Selection
0	Locking Lever 2-8 in
1	Enclosed Gear
2	Pad Lockable Gear
9	Bare Stem

Seal

Code	Selection
V	PFA/Viton Energizer*
R	PFA/Silicone Energizer
M	PFA/Inconel Energizer
Z	Fire Seal PFA/Inconel
N	Inconel TriFlex ◆
S	316/Inconel TriFlex
A	Inconel APEX Class IV
C	Copper/Inconel TriFlex
K	Monel TriFlex
U	UHMWPE (2" - 12")
4	Nickel/Inconel TriFlex

Shaft Seal

Code	Selection
1	Single PTFE Cup & Cone*
2	Double PTFE Cup & Cone
3	Live Loaded Single Cup & Cone**
4	Live Loaded Double Cup & Cone**
7	Triple Seal Single PTFE Cup & Cone (Self-Adjusting)
8	Triple Seal Double PTFE Cup & Cone (Self-Adjusting)
9	Single Grafoil ▮▼
0	Double Grafoil ▼

* = Standard PFA Seal - All other materials considered optional.
** = 17-7 S.S. Belleville Washers included.
★ = Customer specification must be given.
● = For use with Shaft Seals 3 & 4 only (17-7 Bellevilles Standard).
▮ = Standard Fire Sealed.
◆ = Standard TriFlex Seat - All other materials considered optional.
▼ = Grafoil Packing is NOT recommended with Belleville Washers.
▲ = ASTM A479 Xm19 Standard Trilfex +601°F (315°C)
' = Per Packing Gland

INTRODUCTION

The Big Max® BX2001 is a superior quality ASME Class 150 and 300 valve available in standard PFA, fire sealed and two metal seated versions. Offered in 2 in through 36 in sizes and in both wafer and lug body designs, all are available with a wide variety of packing options to meet your routine or most rigid service requirements.

BX2001 effectively contains fugitive process media emissions regulated by the federal Clean Air Act, including chlorine, hydrofluoric acid and anhydrous HCl. This valve is an ideal choice for precise throttling control or on-off service with lighter weight piping systems and less expensive, energy efficient actuators.

Materials Selection Chart	
DS	= ASTM A216 Gr. WCB (CAST STEEL)
DSNI	= NICKEL COATED CAST STEEL
D2	= ASTM A351 Gr. CF8 (304 SS)
D4	= ASTM A351 Gr. CF8M (316 SS)
D20	= ASTM A351 Gr. CN-7M (DURIMET 20)
CK3M	= ASTM A351 Gr. CK-3MCuN (254 SMO)*
DINC	= ASTM A494 Gr. CY-40 (INCONEL 600)**
DMM	= ASTM A494 Gr. M35-1 (MONEL 400)**
DNI	= ASTM A494 Gr. CA-100 (NICKEL 200)
DC2	= ASTM A494 Gr. N-7M (CHLORIMET 2)
DC3	= ASTM A494 Gr. CW-6M (CHLORIMET 3)
D44	= ASTM A351 Gr. CF8M with controlled ferrite
D4L	= ASTM A351 Gr. CF3M

*Registered trademark of Avesta AB
**Registered trademark of International Nickel Co. Inc.

PRESSURE-CONTAINING FASTENERS

Material Selection

Selecting the proper fastener material is the ultimate responsibility of the customer because the supplier does not typically know in what service the valves will be used or what elements may be present in the environment. Flowserve normally supplies B7 (carbon steel) for ductile cast iron and carbon steel valves. For stainless steel and high alloy valves, B8 (stainless steel) fasteners are supplied as standard. All fasteners used must have a minimum yield strength of 40,000 PSI, a minimum elongation of 12% and be compatible with the process fluid. Determining compatibility to the process fluid goes beyond a material being resistant to general corrosion because the more important consideration is a material's resistance to stress corrosion cracking. Depending on the service, it may make sense to use B7 fasteners on high alloy valves. One such service would be marine environments because of stainless steel's susceptibility to stress corrosion cracking in chloride environments. Another key aspect of fasteners is frequent visual inspection. Because of the common practice of using steel fasteners rather than stainless steel to avoid chloride stress corrosion cracking, visual inspection is recommended to monitor the general corrosion of these fasteners. If jacketing or insulation is used on a valve, it must be periodically removed for visual inspection of the fasteners. If you wish assistance in determining the proper fasteners to use, please refer to the "Fasteners" chart (next page), or contact the Flowserve Material Engineering Group at (937) 226-4475.

Design & Type

Flowserve valve design standards adopt ASME B18.2.1 (1981) as the standard for fastener type and design. This national standard requires that finished hex "head" cap screws be used when the head of the fastener is turned. A finished hex "head" cap screw and a heavy hex cap screw have a bearing surface under the head to minimize frictional resistance during tightening. They also comply to qualified body dimensions and fully formed head dimensions. Cookeville Flow Control Division's policy is to use finished hex "head" and heavy hex "head" cap screws for all pressure retaining fasteners. This includes top caps, packing adjusters, bottom caps, body halves or other pressure retaining components. Compliance is made with ASME B18.2.2 (1987), *Square and Hex Nuts*, when studs and heavy hex nuts are required. Additional information on these items may be obtained from Flowserve Corporation, Cookeville Flow Control Division, Cookeville, Tennessee.

PRESSURE CONTAINING FASTENERS (continued)

FASTENERS

TABLE 1

Cap Screws-Studs
HHCS - Finished Heavy Hex Head Cap Screw HCS - Finished Hex Head Cap Screw SCS - Socket Head Cap Screw STUD - Stud Dimensions per ASME B18.2.1 Alloy identification stamp required on each piece. Certification required. Alloy Specification (40 KSI Minimum Yield Strength, 12% Min. El.)
ASTM Material Specifications
B840 - 316 Stainless Steel per ASTM A193, Grade B8M2 or Grade B8M3, 40 KSI Min. Yield Strength, 12% Min. El. B7 - Chromium - Molybdenum Alloy Steel per ASTM A193, Grade B7 B7M - Chromium - Molybdenum Alloy Steel per ASTM A193, Grade B7M, 100% hardness tested B7MT - Chromium - Molybdenum Alloy Steel per ASTM A193, Grade B7M, 100% hardness tested, PTFE coated, DuPont SP11C, type B - Color blue or green B8M - 316 Stainless Steel per ASTM A193, Grade B8M, Class 1, 40 KSI Min. Yield Strength, 12% Min. El. B8C2 - 304 Stainless Steel per ASTM A193, Grade B8, Class 2 C20 - Carpenter C20, CB-3 (UNS N08020), ASTM B473, 40 KSI Min. Yield Strength, 12% Min. El. HC - Hastelloy C276 (UNS N10276), ASTM B574 I625 - Inconel 625 (UNS N006625), ASTM B446 I825 - Incoloy 825 (UNS N08825), ASTM B425, 40 KSI Min. Yield Strength, 12% Min. El. IN - Inconel 600 (UNS N0660), ASTM B166, 40 KSI Min. Yield Strength, 12% Min. El. M - Monel (UNS N04400), ASTM B164, Class A or B, 40 KSI Min. Yield Strength, 12% Min. El. HB - Hastelloy B (UNS 10665), ASTM B335 I718 - Incoloy 718, AMS 5596B MKH - Monel K-500, Cold drawn and aged hardened, QQN-286 and ASTM F468 L7 - Chromium-Molybdenum Alloy Steel per ASTM A320, Grade L7 L7M - Chromium-Molybdenum Alloy Steel per ASTM A320, Grade L7M, 100% hardness tested L7T - Chromium-Molybdenum Alloy Steel per ASTM A320, Grade L7, PTFE coated, DuPont SP11C, Type B - Color blue or green L7MT - Chromium-Molybdenum Alloy Steel per ASTM A320, Grade L7M, 100% hardness tested, Teflon coated, DuPont SP11C, Type B - Color blue or green N - Nickel per ASTM B160 (UNS N0220), 40 KSI Min. Yield Strength, 12% Min. El. B7YC - Chromium-Molybdenum Steel per A193, Grade B-7, Yellow Zinc Dichromate Plated

TABLE 2

Nuts
HN - Finished Heavy Hex Nut XN - Finished Hex Nut HXN - Regular Heavy Hex Nut Dimensions per ASME B18.2.2 Alloy identification stamp is required on each piece. Certification required.
ASTM Material Specifications
8 - 304 Stainless Steel per ASTM A194, Grade 8 8M - 316 Stainless Steel per ASTM A194, Grade 8M 2H - ASTM A194, Grade 2H 2HM - ASTM A194, Grade 2HM 7M - ASTM A194, Grade 7M, 100% hardness tested 7MT - ASTM A194, Grade 7M, 100% hardness tested, PTFE coated, DuPont SP11C, Type B - Color blue or green M - Monel (UNS N04400), ASTM B164, Class A or B, or QQN-281, Class B HB - Hastelloy B (UNS N10665), ASTM B335 HC - Hastelloy C276 (UNS N10276), ASTM B574 I625 - Inconel 625 (UNS N06625), ASTM B446 I718 - Incoloy 718, AMS 5596B I825 - Incoloy 825 (UNS N08825), ASTM B425 L7 - Chromium-Molybdenum Alloy Steel per ASTM A194, Grade 7 L7M - Chromium-Molybdenum Alloy Steel per ASTM A194, Grade 7M, 235 BHN Max, ASTM A320, Section 9 MKH - Monel K-500, Cold drawn and aged hardened, QQN-286 and ASTM F467 8F - 303 Stainless Steel per ASTM A194, Grade 8F 2HYC - ASTM A194, Grade 2H, Yellow Zinc Dichromate Plated

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SECTION I

SAFETY PRECAUTIONS

To avoid possible injury to personnel or damage to valve parts, WARNING and CAUTION notes must be strictly adhered to. Modifying this product, substituting nonfactory parts, or using maintenance procedures other than outlined could drastically affect performance, be hazardous to personnel and equipment, and may void existing warranties.

1. **WARNING:** Standard industry safety practices must be adhered to when working on this, or any other, process control product. Specifically, personal protective and lifting devices must be used as warranted.
2. Always completely remove the valve from service before attempting any maintenance on the valve.
3. Depressurize and bleed the line on both sides of the valve before removing the valve.
4. Check nameplate before installation to ensure that the valve is not installed in systems where service conditions exceed those for which the valve was designed.
5. Install or remove the valve with the disc in the closed position.

SECTION I

SAFETY PRECAUTIONS (continued)

IMPORTANT NOTES ABOUT YOUR WARRANTY AND SAFETY

Replacement Parts

The use of parts and components other than those supplied by **Flowserve Corporation** could severely restrict the operation and performance of this valve. Unauthorized modifications or substitution of components can lead to valve **failure** due to corrosion and/or **premature failure** of the substituted parts.

Selection, Installation, Operation and Maintenance

Flowserve Corporation has established industry leadership in the design and manufacture of its products. When properly selected, each product is designed to perform its intended function safely during its useful service life. However, it is necessary that Flowserve's customers be fully aware of their responsibilities when using these products.

Each Flowserve product may be used in numerous applications under a wide variety of industrial service conditions. Although Flowserve can, and often does, provide general guidelines, it is obviously not possible to provide application specific data and warnings for all conceivable applications. The purchaser/end user must therefore assume the ultimate responsibility for the proper selection, installation, operation and maintenance of the products. Read the appropriate IOM before installing, operating or repairing any valve. The purchaser/end user should train its employees and/or contractors in the safe use of the Flowserve products in connection with the purchaser's manufacturing processes.

Flowserve will continue to provide its customers with the best possible products and service available. We do not recommend substituting surplus or remanufactured valves over new Flowserve valves or those repaired in an authorized service center. Should you have any questions about these provisions or about Flowserve products in general, please contact your local Flowserve representative, who will be happy to help.

Paying close attention to safety is always extremely important. However, there are often situations that require special attention. These situations are indicated throughout this book by the following symbols:

⚠DANGER

DANGER – Immediate hazards which WILL result in severe personal injury or death.

⚠WARNING

WARNING – Hazards or unsafe practices which COULD result in severe personal injury or death.

⚠CAUTION

CAUTION – Hazards or unsafe practices which COULD result in minor personal injury or product or property damage.

NOTE: **ALWAYS COORDINATE REPAIR ACTIVITY WITH OPERATIONS PERSONNEL, AND FOLLOW ALL PLANT SAFETY REQUIREMENTS AND OSHA REGULATIONS.**

SECTION II

INSTALLATION (Please refer to and follow all recommendations of MSS SP-92)

1. Check valve nameplate before installation to ensure that the valve's pressure rating and materials of construction are compatible with the intended service conditions. If lug style, check for end of line service tag.
2. Inspect adjoining pipelines and remove any material that could damage the seat. Check clearance of the disc projection into the pipeline shown in **TABLE B** and **FIGURE 1**.
3. Check actuator stops before valve is installed and the line is pressurized. Make certain position indicator reads "shut" and the disc position is in agreement.
4. The valve must be installed with the disc in the closed position and centered on the seat.
5. The valve must be properly aligned and centered between the pipe flanges.
6. The BX2001 is designed for bi-directional shut off when installed between metallic ANSI B16.5 flanges. Flow direction should agree with the flow arrow on the body to assure lower opening torque and longer service life. With non-metallic flanges, the BX2L4 series valve should be used.
7. The use of rubber or other similar "soft" gaskets is NOT recommended, and should be avoided.
8. When standard lug style valves are installed for end-of-line (dead-end) service, the retainer ring must be supported by a mating pipe flange. For true end-of-line service with retainer ring unsupported, a BX2L4 series valve must be used.
9. When BX2L4 valves are used, torque down retainer ring fasteners to 120 in-lb in a criss-cross manner.

⚠CAUTION

BX2L4 end of line valves are derated to 150 PSI maximum when installed without a mating flange supporting the retainer ring.

10. When BX2L4 valves are used, check for compatibility before using API 601 spiral wound metallic gaskets.
11. Flange fasteners should be tightened and torqued in a sequential criss-cross pattern as recommended by the MSS SP-92 standard.
12. For recommended fastener sizes see the tables at the end of this publication on page 34 and 35.

FIGURE 1
Mating Flange
Clearance Dimensions

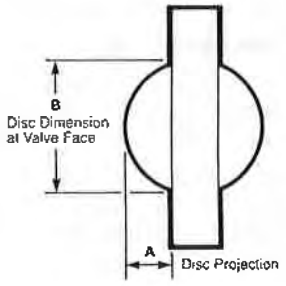


TABLE B – Disc Projection

Size	in (mm)	2 (50)	3 (80)	4 (100)	5 (125)	6 (150)	8 (200)	10 (250)	12 (300)	14 (350)	16 (400)	18 (450)	20 (500)	24 (600)	30 (750)	36 (900)
ASME Class 150	A in	3/8	11/16	1 1/8	1 1/2	2 1/16	2 5/8	3 5/8	4 1/2	5	5 25/32	6 3/8	7 3/32	8 5/16	11	13 41/64
	(mm)	(10)	(17)	(29)	(38)	(52)	(67)	(92)	(114)	(127)	(147)	(162)	(180)	(211)	(279)	(346)
	B in	1 1/4	2 7/16	3 5/8	4 1/2	5 9/16	7	9 5/16	11 3/8	12 45/64	14 45/64	16 9/16	18 15/32	22 23/32	28 3/8	34 3/8
	(mm)	(32)	(62)	(92)	(114)	(141)	(178)	(237)	(289)	(323)	(373)	(420)	(469)	(561)	(721)	(873)
ASME Class 300	A in	3/8	11/16	1 1/8	—	2 1/16	2 5/8	3 5/8	4 1/2	4 1/8	4 51/64	5 3/8	6 1/4	—	—	—
	(mm)	(10)	(17)	(29)		(52)	(67)	(92)	(114)	(105)	(121)	(137)	(159)			
	B in	1 1/4	2 7/16	3 5/8	—	5 9/16	7	9 5/16	10 3/4	12 7/32	14 3/32	15 7/8	17 1/4	—	—	—
	(mm)	(32)	(62)	(92)		(141)	(178)	(237)	(273)	(310)	(358)	(402)	(438)			

SECTION III

VALVE REMOVAL

⚠DANGER

DANGER – Immediate hazards which WILL result in severe personal injury or death.

1. Refer to Safety Precautions Instructions on page 5 of this manual.
2. Open the valve and bleed the line.
3. Close the valve.
4. Remove the valve from the line.

SECTION IV

SEAT REPLACEMENT

DISASSEMBLY

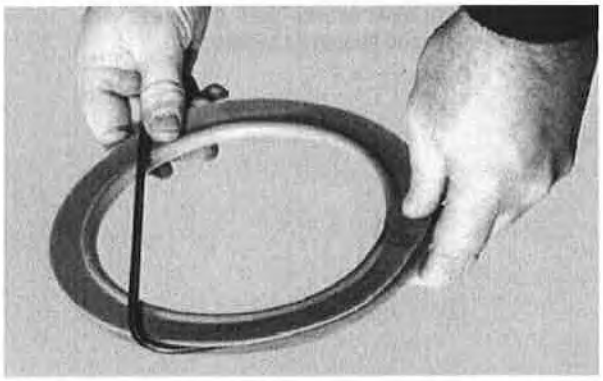
1. For repairs that require seat replacement only, it is not necessary to remove manual operators.
2. Place the valve seat side up on a work table.
3. For valves that have retainer ring fasteners, remove the fasteners and lift the retainer ring and seat package out of the valve body.
4. For metal seated valves that use a wire retainer locking ring, cut the wire where it is attached to the valve body. Use pliers to pull the wire while also rotating the retainer ring until the wire is pulled free. Lift the retainer ring and seat out of the valve body.
5. For soft seated valves that use an O-ring retainer locking ring, insert the flat blade of a screwdriver into the gap between the back of the retainer ring and the valve body. Twist the blade to pry the retainer ring out of the valve body, then remove the seat package.

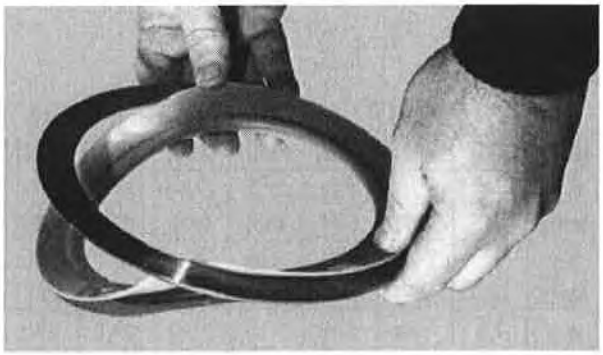
CLEAN UP AND PREPARATION

1. Remove the PFA seat and seat energizer from the seat ring. Remove any gasket material from the seat ring and clean thoroughly.
2. Remove any seat gasket material from the retainer ring and the seat pocket of the valve body. Clean all surfaces thoroughly. Discard retainer ring fasteners, wire or O-ring retainer lock rings.
3. Carefully clean and inspect the sealing surface of the valve disc. Small scratches, scale or minor corrosion can be removed by polishing using 600 grit or finer emery paper. DO NOT SAND OR BEAD BLAST DISC.
4. Metal seated valves use hard surface plating on the valve disc to improve seal life. If the plating is damaged, scratched or heavily worn, the disc should be replaced.
5. Under no circumstances should worn, corroded or scratched valve discs be repaired by welding or re-machining.

PFA SEAT PACKAGE PRE-ASSEMBLY

1. Spread open the seat and insert the seat energizer into the seat. Press the energizer firmly into the inside of the seat.
2. Spread open the seat again and slip it over the seat ring, working it around the circumference of the ring until the seat ring is totally encapsulated by the seat.



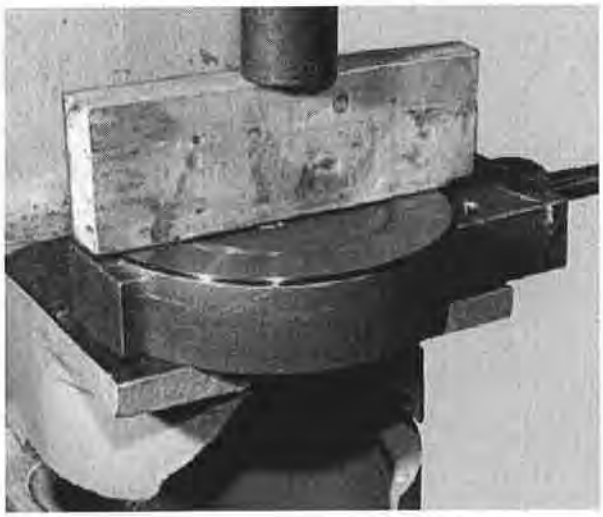


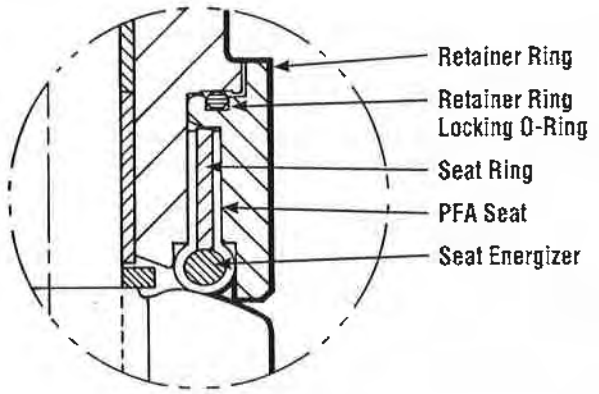
SECTION IV

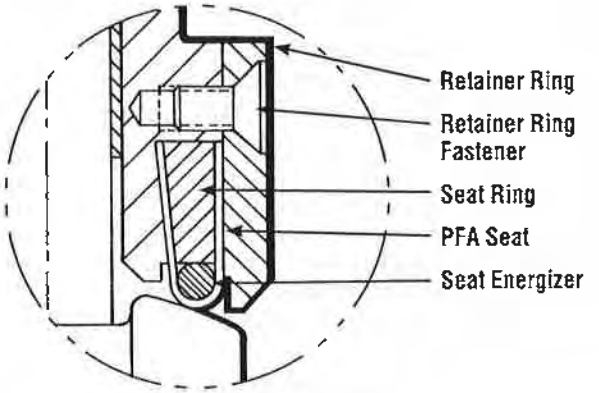
SEAT REPLACEMENT (continued)

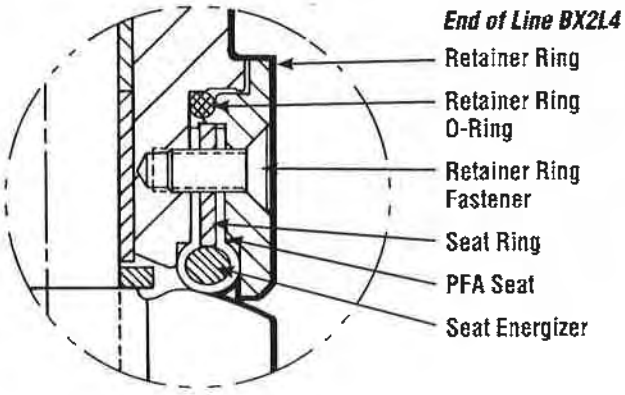
SEAT PACKAGE INSTALLATION – STANDARD VALVE

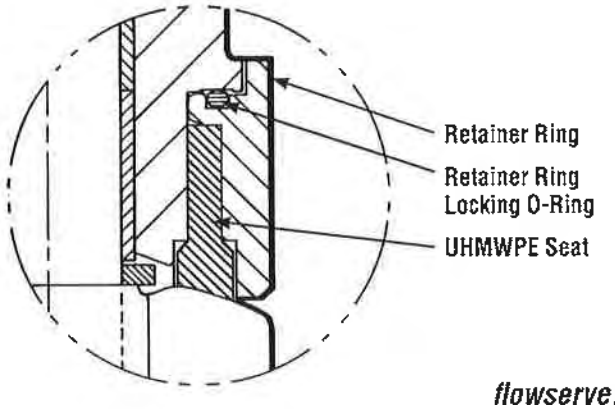
1. Make certain the valve disc is fully closed and place the seat package in the valve body seat pocket. For valves with seat rings with an angled face, place the angled face side of the seat down against the seat pocket in the valve body.
2. For valves that use retainer ring fasteners, place the retainer ring on the valve body and line up the fastener holes. Using a press or "C" clamps, firmly press the retainer ring onto the valve body to compress the seat package. Insert and tighten the fasteners in a criss-cross pattern to 180 in-lbs (20 Nm). **Note:** For end-of-line BX2L4 lug valves, tighten fasteners to 120 in-lbs (14 Nm).
3. For valves that use an O-ring retainer locking ring, place the new O-ring into the outside groove of the retainer ring. Apply a light coat of lubricant on the O-ring and place the retainer ring on the body. Using a press or "C" clamps, firmly press the retainer ring into the valve body.









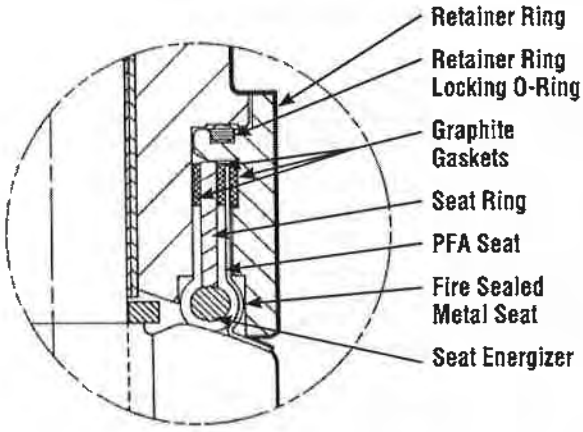


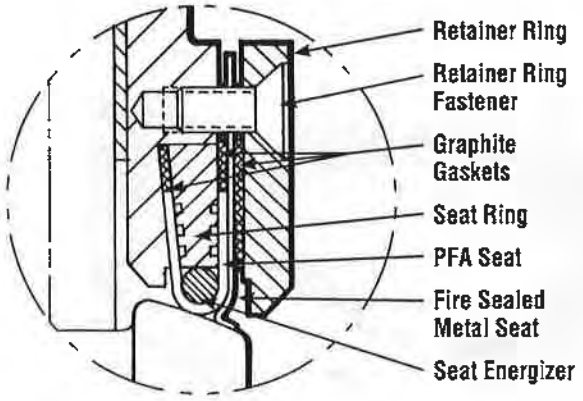
SECTION IV

SEAT REPLACEMENT (continued)

SEAT PACKAGE INSTALLATION – FIRE SEALED VALVE

1. Make certain the valve disc is fully closed and place one of the 3 graphite gaskets into the seat pocket of the valve body. **Note:** If the repair kit contains one wide and 2 narrow gaskets, use the narrow gaskets first and use the wide gaskets for Step 5.
2. Place the seat package in the valve body seat pocket. For valves with seat rings with an angled face, place the angled face side of the seat down against the seat pocket in the valve body.
3. Place a second graphite gasket on the top of the seat package, making certain it is centered so that it fits around the outside diameter of the PFA seat.
4. Place the fire sealed metal seat on the package, orientated so that the inside metal lip is facing away from the valve disc. Make certain that the inside lip is centered to the valve disc.
5. Some styles of retainer rings have a machined groove for this gasket. For these styles, use a small amount of adhesive and glue the gasket into the groove of the retainer ring. For styles without the machined gasket groove, place the third graphite gasket on top of the fire sealed metal seat, making certain that it is centered to the diameter of the seat.
6. For valves that use retainer ring fasteners, place the retainer ring on the valve body and line up the fastener holes. Using a press or "C" clamps, firmly press the retainer ring onto the valve body to compress the seat package. Insert and tighten the fasteners in a criss-cross pattern to 180 in-lbs (20 Nm).
7. For valves that use an O-ring retainer locking ring, place the new O-ring into the outside groove of the retainer ring. Apply a light coat of lubricant on the O-ring and place the retainer ring on the body. Using a press or "C" clamps, firmly press the retainer ring into the valve body.



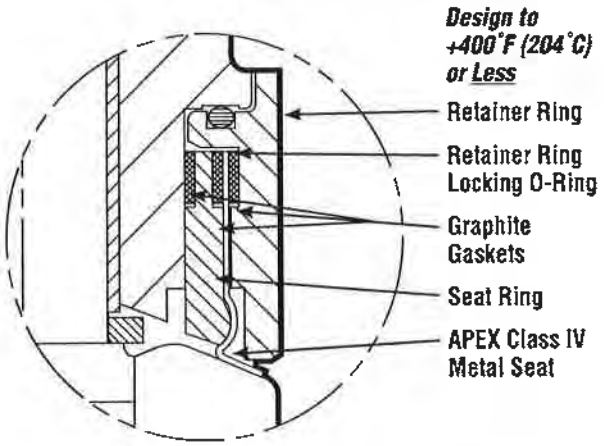


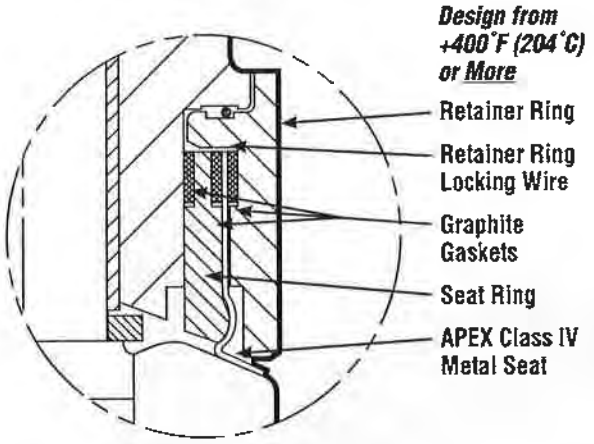
SECTION IV

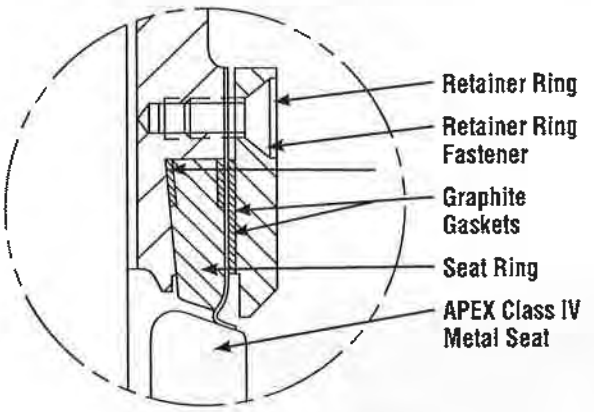
SEAT REPLACEMENT (continued)

SEAT PACKAGE INSTALLATION – APEX CLASS IV METAL SEATED VALVE

1. Make certain the valve disc is fully closed and place one of the 3 graphite gaskets into the seat pocket of the valve body. **Note:** If the repair kit contains one wide and 2 narrow gaskets, use the narrow gaskets first and use the wide gaskets for Step 5.
2. Place the seat ring in the valve body seat pocket. For valves with seat rings with an angled face, place the angled face side of the seat down against the seat pocket in the valve body.
3. Place a second graphite gasket on the top of the seat package, making certain it is centered so that it fits into the groove around the outside diameter of the seat ring.
4. Place the APEX metal seat on the seat package, orientated so that the inside metal lip is facing away from the valve disc. Make certain that the inside lip is centered to the valve disc.
5. Some styles of retainer rings have a machined groove for this gasket. For these styles, use a small amount of adhesive and glue the gasket into the groove of the retainer ring. For styles without the machined gasket groove, place the third graphite gasket on top of the APEX metal seat, making certain that it is centered to the diameter of the seat.
6. For valves that use retainer ring fasteners, place the retainer ring on the valve body and line up the fastener holes. Using a press or "C" clamps, firmly press the retainer ring onto the valve body to compress the seat package. Insert and tighten the fasteners in a criss-cross pattern to 180 in-lbs (20 Nm).
7. For valves that use an O-ring retainer locking ring, place the new O-ring into the outside groove of the retainer ring. Apply a light coat of lubricant on the O-ring and place the retainer ring on the body. Using a press or "C" clamps, firmly press the retainer ring into the valve body.
8. For valves that use a wire retainer locking ring, place the retainer ring into the valve body seat pocket. Thread the wire through the slot in the valve body and rotate the retainer ring to pull the wire through the valve body until both ends of the wire extend through the slot. Bend each end of the wire back to lock the wire in place. Trim off extra wire length and tack weld each to the valve body.





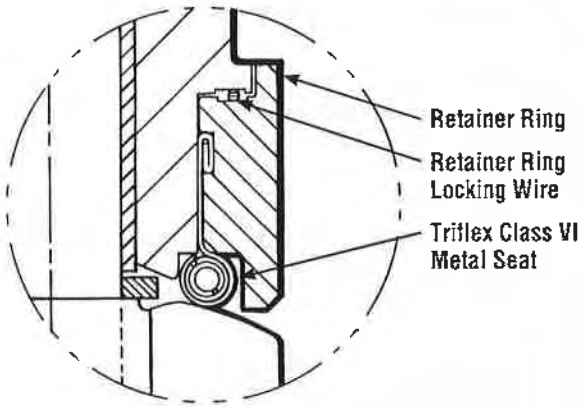


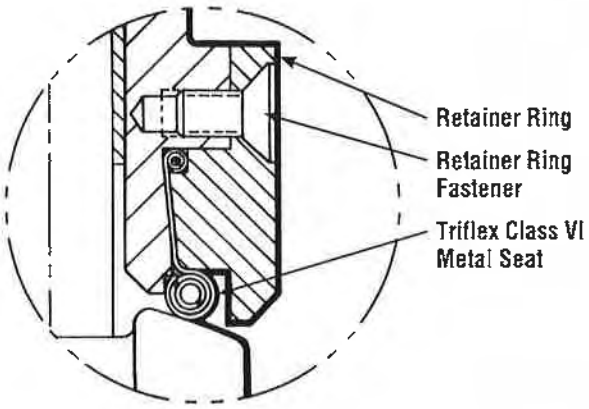
SECTION IV

SEAT REPLACEMENT (continued)

SEAT PACKAGE INSTALLATION – TRIFLEX CLASS IV METAL SEATED VALVE

1. Make certain the valve disc is fully closed and place the seat into the valve body with the rolled seal on the outside of the seat facing up, away from the valve body seat pocket.
2. For valves that use retainer ring fasteners, place the retainer ring on the valve body and line up the fastener holes. Using a press or "C" clamps, firmly press the retainer ring onto the valve body to compress the seat package. Insert and tighten the fasteners in a criss-cross pattern to 180 in-lbs (20 Nm).
3. For valves that use a wire retainer locking ring, place the retainer ring into the valve body seat pocket. Thread the wire through the slot in the valve body and rotate the retainer ring to pull the wire through the valve body until both ends of the wire extend through the slot. Bend each end of the wire back to lock the wire in place. Trim off extra wire length and tack weld each to the valve body.





FINAL PREPARATION FOR INSTALLATION – SEAT REPLACEMENT REPAIR

1. Stem packing fasteners should be re-tightened to the torque specifications listed on page 25 of this manual. Make certain to identify the style of packing used in the valve in order to select the proper fastener torque. Packing styles are illustrated on page 25 of this manual.
2. If manual operators were removed, re-install them using the procedures in Section VIII for gears or Section X for levers.
3. Operate the valves a few times to insure that the valve disc turns freely into and out of the seat. Seat testing of repaired valves is recommended.

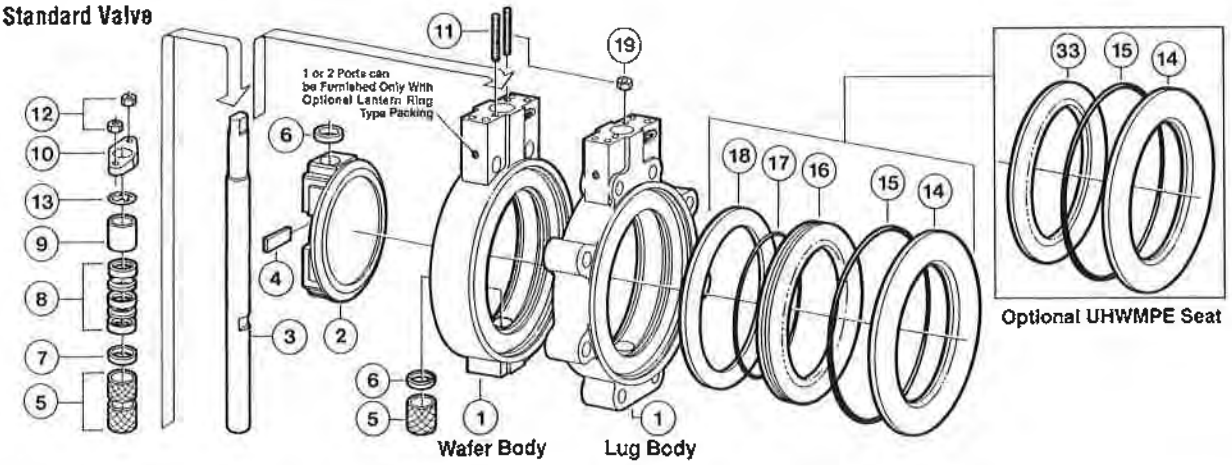
SECTION V

PARTS LIST 2" thru 12" – Standard, Fire Sealed and BX2L4 End of Line Valve

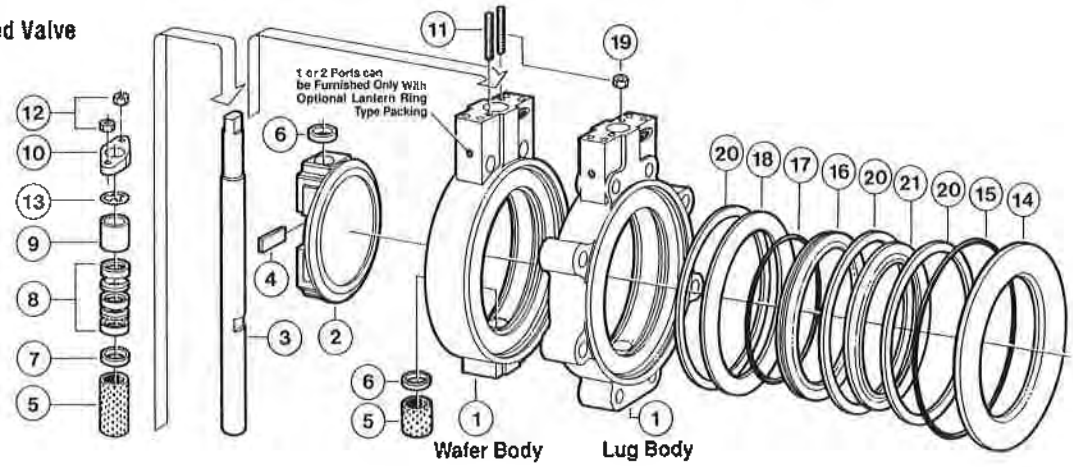
Item No.	Description	Qty.	Carbon Steel	Stainless Steel
1	Body	1	ASTM A216 Gr. WCB	ASTM A351 Gr. CF8M
2	Disc	1	ASTM A351 Gr. CF8M	ASTM A351 Gr. CF8M
3	Shaft	1	ASTM A564 Type 630 17-4 SS	ASTM A564 Type 630 17-4 SS
4	Pin	1	ASTM A564 Type 630 17-4 SS	ASTM A564 Type 630 17-4 SS
5	Bearing	*	PTFE/Fiberglass (■ PTFE/316 SS)	PTFE/Fiberglass (■ PTFE/316 SS)
6	Thrust Bearing	2	ASTM A564 Type 630 17-4 SS	ASTM A564 Type 630 17-4 SS
7	Thrust Washer	1	1018 Steel	316 SS
•8	Packing Set	1	PTFE Cup and Cone (■ Grafoil)	PTFE Cup and Cone (■ Grafoil)
9	Gland	1	304 SS	304 SS
10	Adjuster	1	ASTM A351 Gr. CD4MCu	ASTM A351 Gr. CD4MCu
11	Stud-Adjuster	2	B8-M3 (■ Gr. B-7)	B8-M3 (■ Gr. B-7)
12	Nut-Adjuster	2	Gr. 8 (■ Gr. 2H)	Gr. 8 (■ Gr. 2H)
13	Ground Spring	1	302 SS	302 SS
14	Retainer Ring	1	ASTM A515 Gr. 70 Carbon Steel	ASTM A240 Type 316 SS
•15	Lock Ring	1	Viton A**	Viton A
•16	Seat	1	PFA	PFA
•17	Seat Energizer	1	Viton A**	Viton A
18	Seat Ring	1	1020 Steel	ASTM A240 Type 316 SS
19	Jamb Nut	1	300 Series SS	300 Series SS
•20	Gasket-Fire Seal	3	■ Grafoil***	■ Grafoil
•21	Seat-Fire Seal	1	■ Inconel X750	■ Inconel X750
22	Capscrew	As Req'd	Chrome Steel	Chrome Steel
•33	Seat	1	UHMWPE	UHMWPE

* For quantities of PTFE/Fiberglass bearings, see **Table D** on page 22. All Fire Sealed have 1 upper and 1 lower bearing.
** Registered trademark of the DuPont Company. *** Registered trademark of Union Carbide. ■ Materials for Fire Sealed valves only. • Recommended spare parts.

Standard Valve

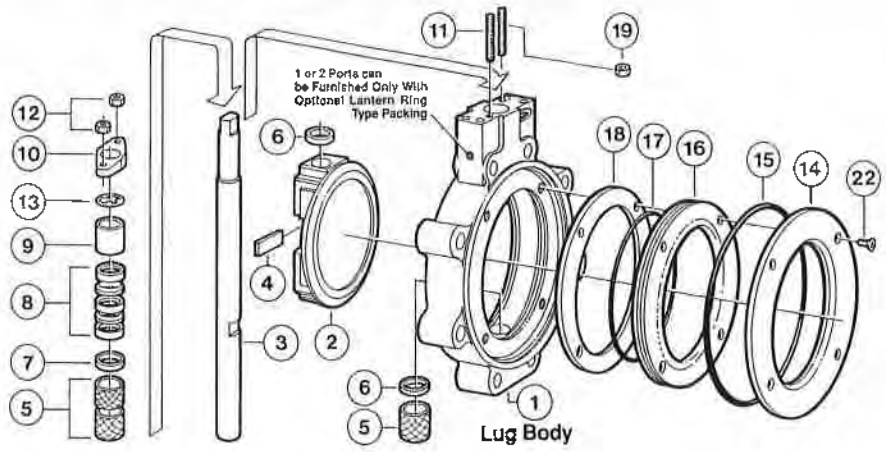


Fire Sealed Valve



SECTION V

BX2L4/BX2L9
End Of Line Lug Valve

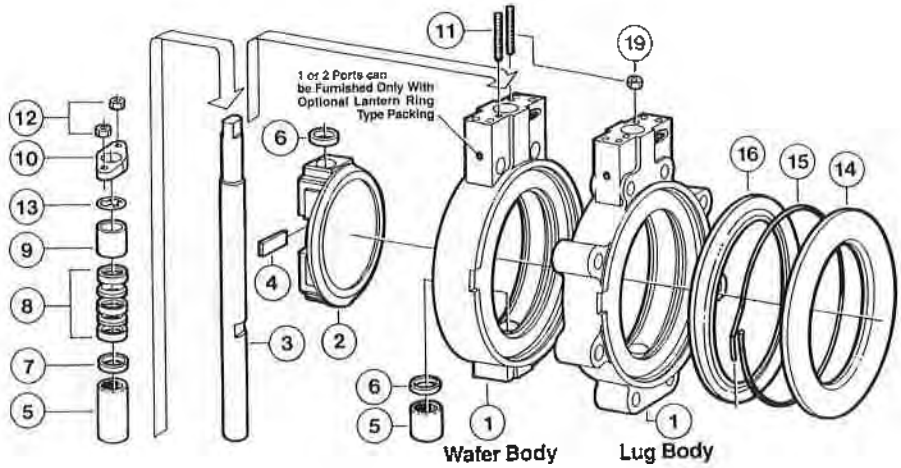


PARTS LIST 2" thru 12" – TriFlex L Class IV Metal Seat

Item No.	Description	Qty.	Carbon Steel	Stainless Steel
1	Body	1	ASTM A216 Gr. WCB	ASTM A351 Gr. CF8M
2	Disc	1	ASTM A351 Gr. CF8M (ENC)	ASTM A351 Gr. CF8M (ENC)
3	Shaft	1	ASTM A564 Type 630 17-4 SS to 600°F ASTM A479 Type XM19 SS - above 600°F	ASTM A564 Type 630 17-4 SS to 600°F ASTM A479 Type XM19 SS - above 600°F
4	Pin	1	ASTM A564 Type 630 17-4 SS to 600°F ASTM A479 Type XM19 SS - above 600°F	ASTM A564 Type 630 17-4 SS to 600°F ASMT A479 Type XM19 SS - above 600°F
5	Bearing	*	PTFE/Fiberglass - to 400°F 316 SS Chrome Plated above 400°F	PTFE/Fiberglass - to 400°F 316 SS Chrome Plated above 400°F
6	Thrust Bearing	2	ASTM Type 630 17-4 SS to 600°F ASTM A479 Type XM19 SS above 600°F	ASTM Type 630 17-4 SS to 600°F ASTM A479 Type XM19 SS above 600°F
7	Thrust Washer	1	ASTM Type 630 17-4 SS to 600°F ASTM A479 Type XM19 SS above 600°F	ASTM Type 630 17-4 SS to 600°F ASTM A479 Type XM19 SS above 600°F
8	Packing Set	1	PTFE Cup and Cone to 400°F Grafoil above 400°F	PTFE Cup and Cone to 400°F Grafoil above 400°F
9	Gland	1	304 SS	304 SS
10	Adjuster	1	ASTM A351 Gr. CD4MCu	ASTM A351 Gr. CD4MCu
11	Stud-Adjuster	2	B8M3 to 400°F — Gr. B-7 above 400°F	B8M3 to 400°F — Gr. B-7 above 400°F
12	Nut-Adjuster	2	Gr.8 to 400°F — Gr. 2H above 400°F	Gr.8 to 400°F — Gr. 2H above 400°F
13	Ground Spring	1	302 SS	302 SS
14	Retainer Ring	1	ASTM A515 Gr. 70 Carbon Steel	ASTM A240 Type 316 SS
15	Lock Ring	1	Inconel	Inconel
16	Seat	1	Inconel X750 Std. - Others as specified	Inconel X750 Std. - Others as specified
19	Jamb Nut	1	300 Series SS	300 Series SS

*For quantities of PTFE/Fiberglass bearings, see **Table D** on page 22.

TriFlex Valve



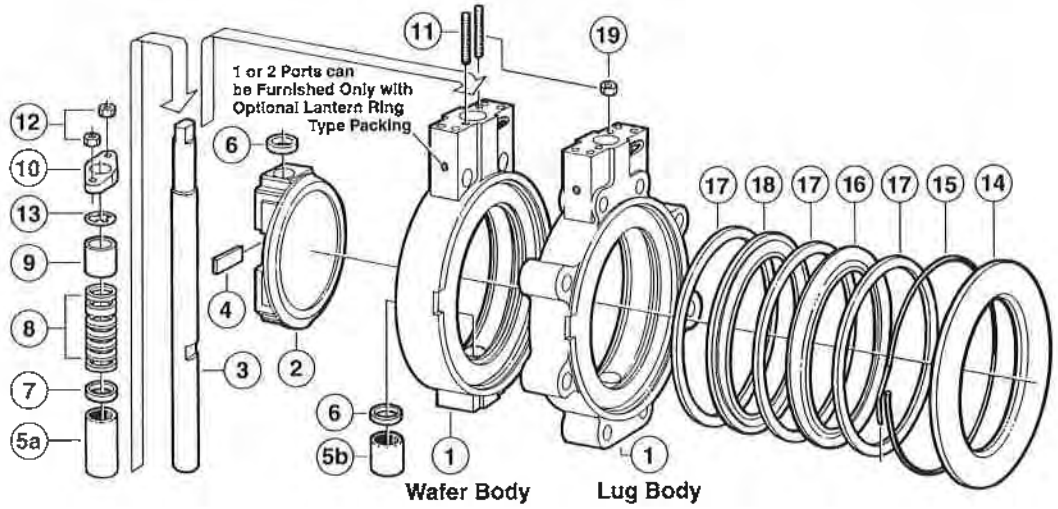
SECTION V

PARTS LIST 2" thru 12" – APEX Class IV Metal Seat

Apex				
Item No.	Description	Qty.	Carbon Steel	Stainless Steel
1	Body	1	ASTM A216 Gr. WCB	ASTM A351 Gr. CF8M
2	Disc	1	ASTM A351 Gr. CF8M (ENC)	ASTM A351 Gr. CF8M (ENC)
3	Shaft	1	ASTM A564 Type 630 17-4 SS	ASTM A564 Type 630 17-4 SS
4	Pin	1	ASTM A564 Type 630 17-4 SS	ASTM A564 Type 630 17-4 SS
5	Bearing	*	PTFE/Fiberglass to 400°F 316 SS Chrome Plated above 400°F	PTFE/Fiberglass to 400°F 316 SS Chrome Plated above 400°F
6	Thrust Bearing	2	ASTM Type 630 17-4 SS to 600°F ASTM A479 Type XM19 SS above 600°F	ASTM Type 630 17-4 SS to 600°F ASTM A479 Type XM19 SS above 600°F
7	Thrust Washer	1	ASTM Type 630 17-4 SS to 600°F ASTM A479 Type XM19 SS above 600°F	ASTM Type 630 17-4 SS to 600°F ASTM A479 Type XM19 SS above 600°F
8	Packing Set	1	PTFE Cup and Cone to 400 Deg. F Grafoil*** above 400°F	PTFE Cup and Cone to 400 Deg. F Grafoil*** above 400°F
9	Gland	1	304 SS	304 SS
10	Adjuster	1	ASTM A351 Gr. CD4MCu	ASTM A351 Gr. CD4MCu
11	Stud-Adjuster	2	B8M3 to 400°F — Gr. B-7 above 400°F	B8M3 to 400°F — Gr. B-7 above 400°F
12	Nut-Adjuster	2	Gr.8 to 400°F — Gr. 2H above 400°F	Gr.8 to 400°F — Gr. 2H above 400°F
13	Ground Spring	1	302 SS	302 SS
14	Retainer Ring	1	ASTM A515 Gr. 70 Carbon Steel	ASTM A240 Type 316 SS
•15	Lock Ring	1	Viton A** to 400°F — Inconel above 400°F	Viton A** to 400°F — Inconel above 400°F
•16	Seat	1	Inconel X750 - Others as specified	Inconel X750 - Others as specified
•17	Gasket	3	Grafoil***	Grafoil***
18	Seat Ring	1	ASTM A515 Gr. 70 Carbon Steel	ASTM A240 Type 316 SS
19	Jamb Nut	1	300 Series SS	300 Series SS

* For quantities of PTFE/Fiberglass bearings, see Table D on page 22. ** Registered trademark of the DuPont Company.
*** Registered trademark of Union Carbide. • Recommended spare parts.

APEX Valve



SECTION V

PARTS LIST 14" thru 36" – Standard and Fire Sealed

Item No.	Description	Qty.	Carbon Steel	Stainless Steel
1	Body	1	ASTM A216 Gr. WCB	ASTM A351 Gr. CF8M
2	Disc	1	ASTM A351 Gr. CF8M	ASTM A351 Gr. CF8M
2A	Taper Pin	As Req.	ASTM A276 Type 316 Condition B	ASTM A276 Type 316 Condition B
2B	Shaft	1	ASTM A564 UNS S17400 Type 630	ASTM A564 UNS S17400 Type 630
•3	Packing Set	As Req.	PTFE (■Grafoil)**	PTFE (■Grafoil)**
4	Packing Gland	As Req.	300 Series Stainless Steel	300 Series Stainless Steel
5	Thrust Washer 14", 16" & 18" only	2	PTFE	PTFE
6	Packing Washer	As Req.	Carbon Steel	316 Stainless Steel
7	Bearing	2	PTFE/Fiberglass (■PTFE/316 SS)	PTFE/Fiberglass (■PTFE/316 SS)
8	Adjuster Fastener	As Req.	B8M3 (■Gr. B-7)	B8M3 (■Gr. B-7)
9	Adjuster	As Req.	ASTM A351 Gr. CD4M-Cu	ASTM A351 Gr. CD4M-Cu
10	Grounding Spring	1	300 Series Stainless Steel	300 Series Stainless Steel
11	Retainer Ring	1	ASTM A516 Gr. 70	ASTM A240 UNS S31600 Type 316
12	Seat Ring	1	Carbon Steel	ASTM A240 UNS S31600 Type 316
•13	Seat Energizer	1	Viton A*	Viton A*
•14	Seat	1	PFA	PFA
•15	Retainer Fastener	As Req.	300 Series Stainless Steel	300 Series Stainless Steel
•16	Fire-Sealed Seat	1	Inconel X750	Inconel X750
•17	Retainer Gasket	1	■Grafoil**	■Grafoil**
•18	Seat Gasket	2	■Grafoil**	■Grafoil**
19	Jamb Nut	4	300 Series Stainless Steel	300 Series Stainless Steel
20	Thrust Bearing	2	PTFE	PTFE
21	Thrust Washer	2	300 Series Stainless Steel	300 Series Stainless Steel
22	Adjustment Stud	1	Carbon Steel - Zinc Plated	304 Stainless Steel
23	Support Stud	4	Carbon Steel - Zinc Plated	304 Stainless Steel
24	Lock Washer	4	Carbon Steel	300 Series Stainless Steel
25	Nut	4	Carbon Steel	300 Series Stainless Steel
26	Thrust Plate	1	Carbon Steel - Zinc Plated	304 Stainless Steel
31	Bottom Cap	1	ASTM A516 Gr. 70	ASTM A240 UNS S31600 Type 316
32	Bottom Cap Gasket	1	TFM 1600 (■Grafoil**)	TFM 1600 (■Grafoil**)
33	Bottom Cap Fastener	6	B8M3 (■Gr. B-7)	B8M3 (■Gr. B-7)
34	Bearing Cap	1	ASTM A240 UNS S31600 Type 316	ASTM A240 UNS S31600 Type 316
35	Bearing Cap Fastener	2	B8M3	B8M3
36	Thrust Bearing	2	TFM 1600	TFM 1600

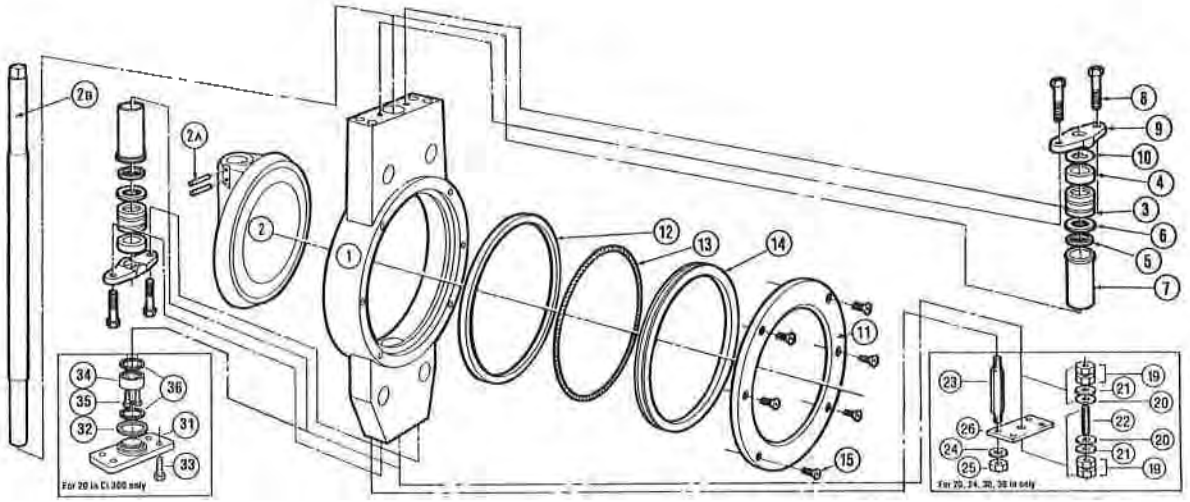
■ Materials for Fire Sealed valves only
* Registered trademark of DuPont Company
• Recommended spare parts
** Registered trademark of Union Carbide

SECTION V

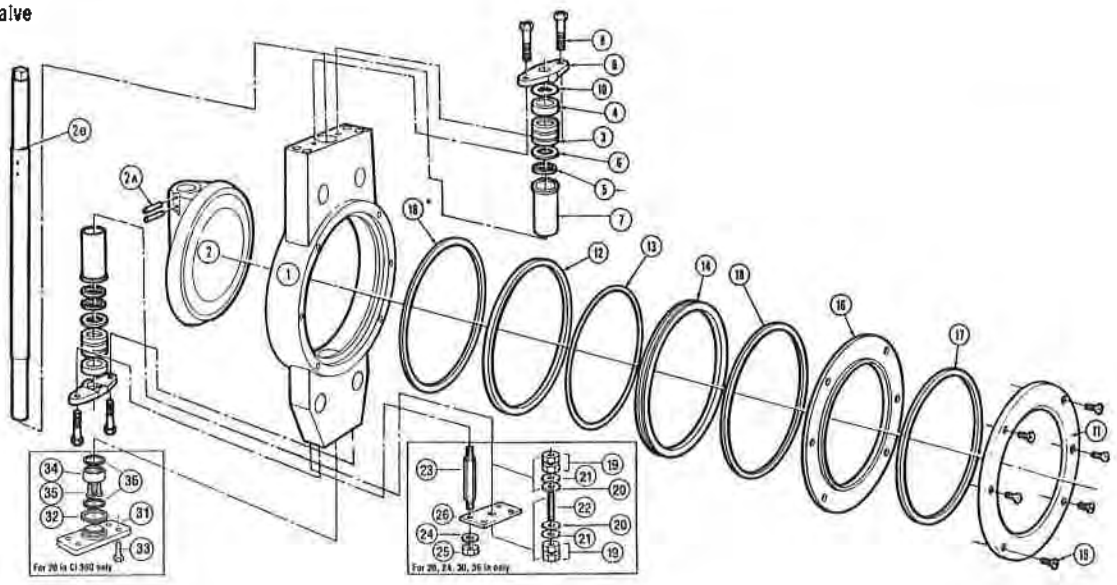
PARTS LIST 14" thru 36"

(See Parts List on page 16.)

Standard Valve



Fire Sealed Valve



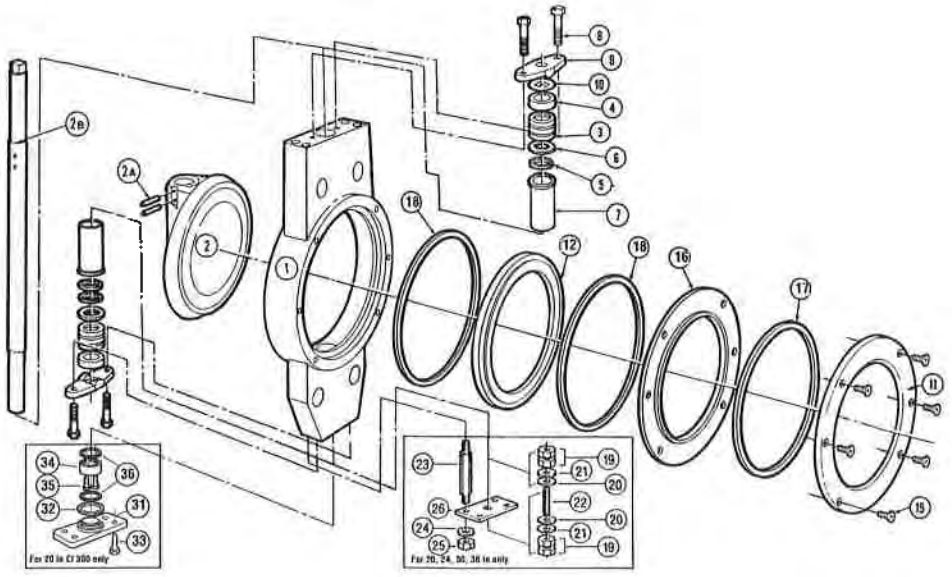
SECTION V

PARTS LIST 14" thru 36" – APEX Class IV Metal Seat

Item No.	Description	Qty.	Carbon Steel	Stainless Steel
1	Body	1	ASTM A216 Gr. WCB	ASTM A351 Gr. CF8M
2	Disc	1	ASTM A351 Gr. CF8M ENC	ASTM A351 Gr. CF8M
2A	Taper Pin	As Req.	ASTM A276 Type 316 Condition B	ASTM A276 Type 316 Condition B
2B	Shaft	1	ASTM A564 UNS S17400 Type 630	ASTM A564 UNS S17400 Type 630
•3	Packing Set	As Req.	PTFE to 400°F — Grafoil** above 400°F	PTFE to 400°F — Grafoil** above 400°F
4	Packing Gland	As Req.	300 Series Stainless Steel	300 Series Stainless Steel
5	Thrust Washer 14", 16" & 18" only	2	PTFE to 400°F — Grafoil** above 400°F	PTFE to 400°F — Grafoil** above 400°F
6	Packing Washer	As Req.	Carbon Steel	316 Stainless Steel
7	Bearing	2	PTFE/Fiberglass to 400°F 316 SS Chrome Plated above 400°F	PTFE/Fiberglass to 400°F 316 SS Chrome Plated above 400°F
8	Adjuster Fastener	As Req.	B8M3 to 400°F — Gr. B-7 above 400°F	B8M3 to 400°F — Gr. B-7 above 400°F
9	Adjuster	As Req.	ASTM A351 Gr. CD4M-Cu	ASTM A351 Gr. CD4M-Cu
10	Grounding Spring	1	300 Series Stainless Steel	300 Series Stainless Steel
11	Retainer Ring	1	ASTM A515 Gr. 70	ASTM A240 UNS S31600 Type 316
12	Seat Ring	1	ASTM A516 Gr. 70	ASTM A240 UNS S31600 Type 316
•14	APEX Seat	1	Inconel X750 Std. — Others as specified	Inconel X750 Std. — Others as specified
•15	Retainer Fastener	As Req.	300 Series Stainless Steel	300 Series Stainless Steel
•17	Retainer Gasket	1	Grafoil**	Grafoil**
•18	Seat Gasket	2	Grafoil**	Grafoil**
19	Jamb Nut	4	300 Series Stainless Steel	300 Series Stainless Steel
20	Thrust Bearing	2	PTFE	PTFE
21	Thrust Washer	2	300 Series Stainless Steel	300 Series Stainless Steel
22	Adjustment Stud	1	Carbon Steel - Zinc Plated	304 Stainless Steel
23	Support Stud	4	Carbon Steel - Zinc Plated	304 Stainless Steel
24	Lock Washer	4	Carbon Steel	300 Series Stainless Steel
25	Nut	4	Carbon Steel	300 Series Stainless Steel
26	Thrust Plate	1	Carbon Steel - Zinc Plated	304 Stainless Steel
31	Bottom Cap	1	ASTM A516 Gr. 70	ASTM A240 UNS S31600 Type 316
32	Bottom Cap Gasket	1	TFM 1600 to 400°F — Grafoil** above 400°F	TFM 1600 to 400°F — Grafoil** above 400°F
33	Bottom Cap Fastener	6	B8M3 to 400°F — B7 above 400°F	B8M3 to 400°F — B7 above 400°F
34	Bearing Cap	1	ASTM A240 UNS S31600 Type 316	ASTM A240 UNS S31600 Type 316
35	Bearing Cap Fastener	2	B8M3	B8M3
36	Thrust Bearing	2	TFM 1600 to 400°F — Grafoil** above 400°F	TFM 1600 to 400°F — Grafoil** above 400°F

• Recommended spare parts * Registered trademark of DuPont Company ** Registered trademark of Union Carbide

APEX Valve



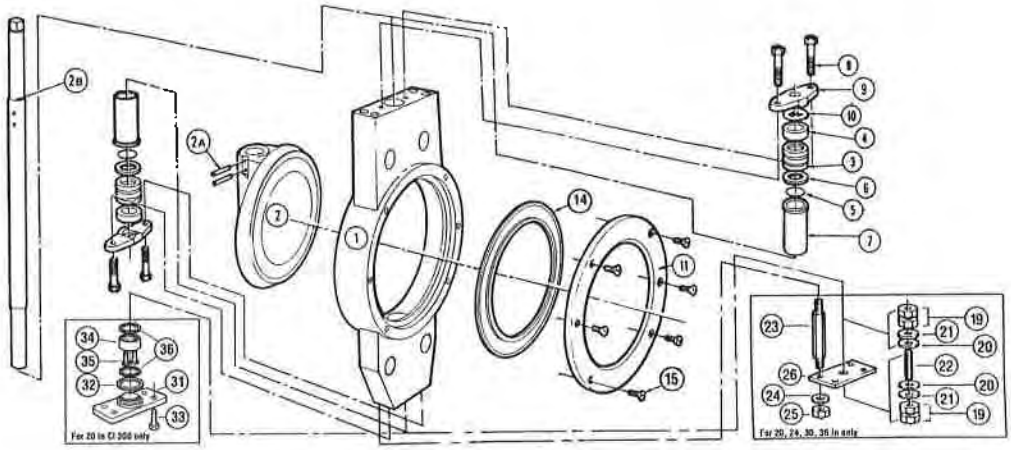
SECTION V

PARTS LIST 14" thru 36" – TriFlex Class IV Metal Seat

Item No.	Description	Qty.	Carbon Steel	Stainless Steel
1	Body	1	ASTM A216 Gr. WCB	ASTM A351 Gr. CF8M
2	Disc	1	ASTM A351 Gr. CF8M ENC	ASTM A351 Gr. CF8M ENC
2A	Taper Pin	As Req.	ASTM A276 Type 316 Condition B to 600°F Monel K-500 above 600°F	ASTM A276 Type 316 Condition B to 600°F Monel K-500 above 600°F
2B	Shaft	1	ASTM A564 UNS S17400 Type 630 to 600°F ASTM A479 Type XM-19 above 600°F	ASTM A564 UNS S17400 Type 630 to 600°F ASTM A479 Type XM-19 above 600°F
•3	Packing Set	As Req.	PTFE to 400°F — Grafoil** above 400°F	PTFE to 400°F — Grafoil** above 400°F
4	Packing Gland	As Req.	300 Series Stainless Steel	300 Series Stainless Steel
5	Thrust Washer 14", 16" & 18" only	2	PTFE to 400°F — Grafoil** above 400°F	PTFE to 400°F — Grafoil** above 400°F
6	Packing Washer	As Req.	Carbon Steel	316 Stainless Steel
7	Bearing	2	PTFE/Fiberglass to 400°F 316 SS Chrome Plated above 400°F	PTFE/Fiberglass to 400°F 316 SS Chrome Plated above 400°F
8	Adjuster Fastener	As Req.	B8M3 to 400°F — Gr. B-7 above 400°F	B8M3 to 400°F — Gr. B-7 above 400°F
9	Adjuster	As Req.	ASTM A351 Gr. CD4M-Cu	ASTM A351 Gr. CD4M-Cu
10	Grounding Spring	1	300 Series Stainless Steel	300 Series Stainless Steel
11	Retainer Ring	1	ASTM A516 Gr. 70	ASTM A240 UNS S31600 Type 316
•14	Triflex Seat	1	Inconel X750 Std. — Others as specified	Inconel X750 Std. — Others as specified
•15	Retainer Fastener	As Req.	300 Series Stainless Steel	300 Series Stainless Steel
19	Jamb Nut	4	300 Series Stainless Steel	300 Series Stainless Steel
20	Thrust Bearing	2	PTFE	PTFE
21	Thrust Washer	2	300 Series Stainless Steel	300 Series Stainless Steel
22	Adjustment Stud	1	Carbon Steel - Zinc Plated	304 Stainless Steel
23	Support Stud	4	Carbon Steel - Zinc Plated	304 Stainless Steel
24	Lock Washer	4	Carbon Steel	300 Series Stainless Steel
25	Nut	4	Carbon Steel	300 Series Stainless Steel
26	Thrust Plate	1	Carbon Steel - Zinc Plated	304 Stainless Steel
31	Bottom Cap	1	ASTM A516 Gr. 70	ASTM A240 UNS S31600 Type 316
32	Bottom Cap Gasket	1	TFM 1600 to 400°F — Grafoil** above 400°F	TFM 1600 to 400°F — Grafoil** above 400°F
33	Bottom Cap Fastener	6	B8M3 to 400°F — B7 above 400°F	B8M3 to 400°F — B7 above 400°F
34	Bearing Cap	1	ASTM A240 UNS S31600 Type 316	ASTM A240 UNS S31600 Type 316
35	Bearing Cap Fastener	2	B8M3	B8M3
36	Thrust Bearing	2	TFM 1600 to 400°F — Grafoil** above 400°F	TFM 1600 to 400°F — Grafoil** above 400°F

• Recommended spare parts * Registered trademark of DuPont Company ** Registered trademark of Union Carbide

TriFlex Valve



SECTION VI

SERVICE KITS

Service kits are offered in **Table C**. Seat kits include all components necessary for seat replacement. Complete kits include the seat kit plus other components required for complete valve repair. When ordering, indicate size, model number, pressure class and material of construction (as detailed on valve nameplate) for the valve to be repaired.

For valves that have special material configurations, consult the factory with original valve's smart number.

IMPORTANT NOTE
The use of parts and components other than those supplied by Flowserve Corporation could severely restrict the operation and performance of this valve. Unauthorized or substitutions of components can lead to valve failure due to corrosion and/or premature failure of the substituted parts.

TABLE C – Service Kits

BX2001 ASME Class 150 Repair Kits	BX2301 ASME Class 300 Repair Kits
SX = Standard BX2001 Seat Kit	SX3 = Standard BX2301 Seat Kit
CX = Standard BX2001 Complete Kit	CX3 = Standard BX2301 Complete Kit
SL = Std. BX2 End of Line Lug Seat Kit	SL3 = Std. BX2301 End of Line Lug Seat Kit
CL = Std. BX2 End of Line Lug Complete Kit	CL3 = Std. BX2301 End of Line Lug Complete Kit
SU = UHWMPE BX2001 Seat Kit	SU3 = UHWMPE BX2301 Seat Kit
CU = UHWMPE BX2001 Complete Kit	CU3 = UHWMPE BX2301 Complete Kit
SZ = Fire Sealed BX2001 Seat Kit	SZ3 = Fire Sealed BX2301 Seat Kit
CZ = Fire Sealed BX2001 Complete Kit	CZ3 = Fire Sealed BX2301 Complete Kit
ST = TriFlex BX2001 Seat Kit (Inconel Seat)	ST3 = TriFlex BX2301 Seat Kit (Inconel Seat)
CT = TriFlex BX2001 Complete Kit (Inconel Seat)	CT3 = TriFlex BX2301 Complete Kit (Inconel Seat)
S4 = APEX BX2001 Seat Kit (Inconel Seat)	S43 = APEX BX2301 Seat Kit (Inconel Seat)
C4 = APEX BX2001 Complete Kit (Inconel Seat)	C43 = APEX BX2301 Complete Kit (Inconel Seat)

Valve Type	Seat Kit Components	Complete Kit components
Standard, End of Line Lug, UHMWPE	PFA seat, seat energizer, retainer fasteners or locking ring	Seat kit, packing, bearings, disc pins, thrust washers
Fire Sealed	PFA seat, seat energizer, retainer fasteners or locking ring, Fire Sealed seat, Grafoil retainer and seat gaskets	Seat kit, packing, bearings, disc pins, thrust washers
Triflex	TriFlex seat, retainer fasteners or locking ring	Seat kit, packing, bearings, disc pins, thrust washers
APEX	APEX seat, retainer fasteners or locking rings, Grafoil retainer and seat gaskets	Seat kit, packing, bearings, disc pins, thrust washers

SECTION VII

COMPLETE VALVE REPAIR

DISASSEMBLY

1. Place the valve seat side up on a work table and remove manual operators.
2. Remove seat package following the procedure for seat replacement in **Section IV**.
3. Remove packing bolts or nuts, adjuster and gland. Remove external disc support hardware or bottom cap.
4. Grind away weld from end of disc pin and drive out pins using a punch and hammer. Discard pins.
5. Carefully pull or push shaft through the disc and out of the valve body.
6. Remove packing and bearings from valve body and discard.

CLEANUP AND PREPARATION

1. Clean and inspect seat components and valve disc, following the procedure for seat replacement in **Section IV**.
2. Remove any gasket material from the seat pocket, packing box and shaft bore of the valve body. Clean all surfaces thoroughly. Polish the valve body packing and stem bores, the disc shaft bore and the shaft using 600 grit or finer emery paper.

⚠CAUTION

Do not sandblast the valve body, disc or shaft.

3. Carefully inspect all machined bores and surfaces. Small scratches, scale or minor corrosion can be removed by polishing using 600 grit or finer emery paper. Under no circumstances should heavily worn, corroded or scratched valve bodies, discs or shafts be repaired by welding or re-machining.

VALVE ASSEMBLY — 2" THRU 12"

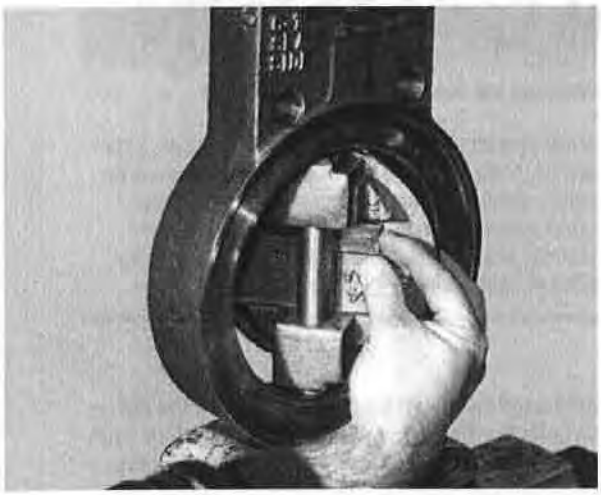
1. Clamp the valve body in a vice and insert the bearing(s) into the bottom (blind) shaft bore. For PTFE/fiberglass bearings, insert the bearing stack as shown in **Table D**. For severe service, fire sealed and metal bearings, insert the short bearing into the bottom shaft bore. **Note:** Severe service and fire sealed bearings are split. Align the split towards one side of the valve.

2. Place one disc thrust washer over the bearing and then place the disc (disc pin slot up toward the top end of the valve body) into the valve body, aligning the disc and body shaft bores. Slide the second disc thrust washer into the gap between the top of the disc and valve body.
3. Insert the top bearing(s) into the top shaft bore of the valve body. For PTFE/fiberglass bearings, insert the bearing stack as shown in **Table D**. For severe service, fire sealed and metal bearings, insert the long bearing into the top shaft bore. **Note:** Severe service and fire sealed bearings are split. Align the split of the top bearing in the opposite direction of the bottom bearing.
4. Slide the shaft through the top bearing and disc and into the bottom shaft bore. When fully inserted, the disc pin slot of the disc and shaft will be aligned.

SECTION VII

COMPLETE VALVE REPAIR (continued)

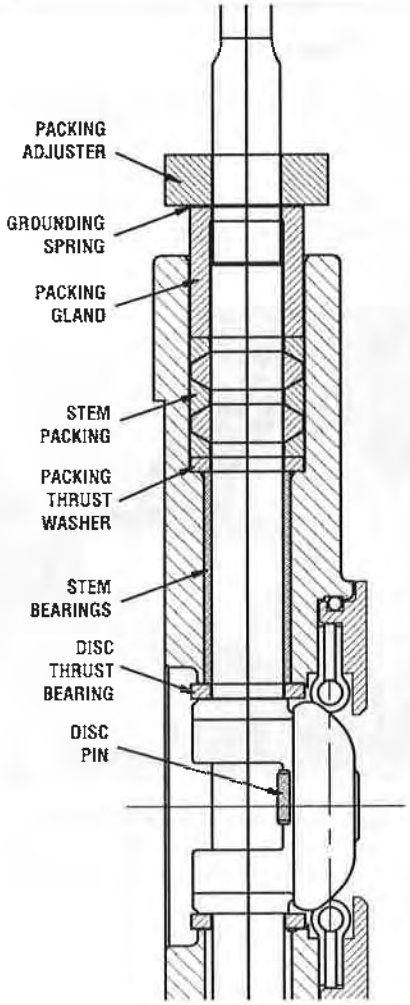
5. Insert the disc pin (thin end first) into the slot between the disc shaft. When the pin is installed in the proper orientation, the thick end of the pin will be adjacent to the small drilled hole in the slot of the disc (adjacent to the original pin weld). Also check alignment of shaft double D to the disc face. The flat of the double D should be parallel to the front face of the disc. Improper orientation of disc pin will cause the shaft flat and disc face to be off parallel by several degrees.



6. Using a punch and hammer on the thick end of the pin, firmly set the pin. Check disc and shaft connection to ensure there is no looseness.
7. Weld the thick end of the pin to the disc. Draw weld into the small drilled hole in the pin slot of the disc to act as a secondary mechanical lock. Be certain to use weld rod compatible with pin and disc materials and service environment.
8. Insert packing thrust washer, packing set and packing gland into the packing bore of the valve body. Slide the grounding spring over the shaft. Install packing adjuster and adjuster nuts.
9. Tighten adjuster nuts to the torque specifications listed on page 25 of this manual. Make certain to identify the style of packing used in the valve in order to select the proper fastener torque. **Note:** Packing styles are illustrated on page 25.
10. Install the seat package following the procedure for seat replacement in **Section IV**.
11. If manual operators were removed, re-install them using procedures in **Section VIII** for gears or **Section X** for levers.
12. Operate the valves a few times to insure that the valve disc turns freely into and out of the seat. Seat testing of repaired valves is recommended.

TABLE D – PTFE/Fiberglass Bearings

Valve Size	Pressure Class	Bottom Bearing		Top Bearing	
		Qty.	Length (in)	Qty.	Length (in)
2	150/300	2	0.81	1	1.00
3	150/300	1	1.00	2	1.00
4	150/300	1	1.00	2	1.00
6	150/300	1	1.00	2	1.00
8	150	1	1.50	1	1.00
					1.50
8	300	2	1.00	2	1.50
10	150	2	1.00	3	1.00
10	300	1	1.00	2	1.00
			1.50	1	1.50
12	150	2	1.13	3	1.13
12	300	2	1.50	2	1.50
				1	1.00



SECTION VII

COMPLETE VALVE REPAIR (continued)

VALVE ASSEMBLY — 14" THRU 36"

1. Lay the valve body on the table with the seat pocket side down. Insert a bearing into the top and bottom shaft bore. Some designs of fire sealed bearings require a separate metal outer sleeve (included in the repair kit). Insert the PTFE/stainless bearing into the metal sleeve prior to installing the bearing into the shaft bore. **Note:** Severe service and fire sealed bearings are split. Align the splits towards opposite sides of the valve.
2. Insert packing thrust washer, packing set and packing gland into the top packing bore of the valve body. Install packing adjuster and fasteners. Finger-tighten the fasteners. These fasteners will be tightened to the required torque after the shaft is installed. Do not install the bottom packing set. It is installed after the shaft.
3. Place the disc face down into the valve body with the disc pin holes towards the top of the body. Align the shaft bores of the disc and valve body. Very close alignment of the bores is required to insert the shaft.
4. Carefully slide the shaft through the bottom shaft bore (the end without the stem packing installed) of the valve body and into the disc bore.

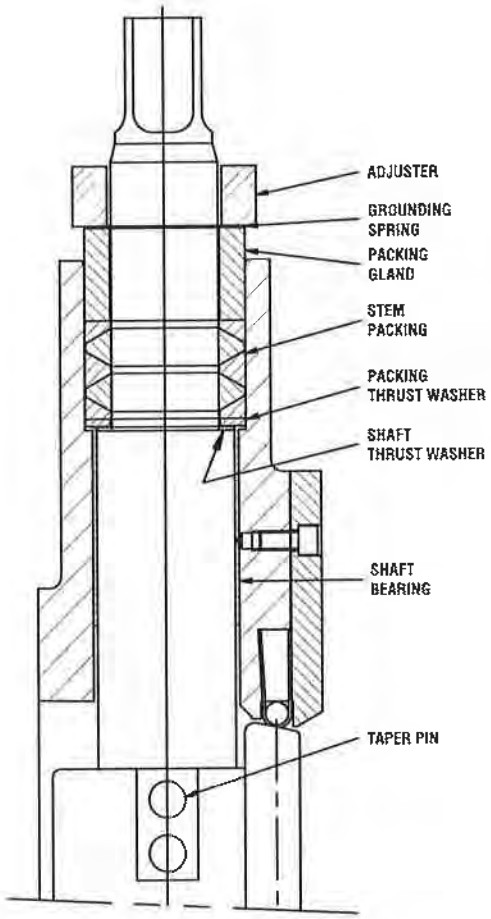
⚠CAUTION

Do not use excessive force to push the shaft through the disc or galling may occur.

Note: For valves with a stepped shaft design, place the shaft thrust washer over the top end of the shaft before the shaft enters into the top shaft bore of the body.

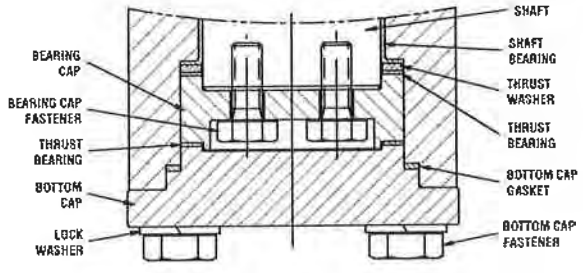
5. Push the shaft through the body until the tapered disc pin holes in the disc and shaft are aligned.
6. Verify that the orientation of the shaft is such that the taper direction of the pin holes in the shaft matches the taper direction of the pin holes in the disc. When properly orientated, the tapered holes will match perfectly and the word "DISC", stamped on the shaft below the shaft square, will be located on the same side as the front face of the disc (the seat pocket side of the valve body).
7. Insert the tapered disc pins and firmly set each pin using a punch and hammer. Check disc and shaft connection to ensure there is no looseness.
8. Weld the small end of each pin to the disc. Be certain to use weld rod compatible with pin and disc materials and service environment.
9. For valves with bottom stem packing, insert packing thrust washer, packing set and packing gland into the bottom packing bore of the valve body. Install packing adjuster and fasteners. Finger-tighten the fasteners. **Note:** For valves with a stepped shaft design, insert the shaft thrust washer into the packing bore prior to installing the packing thrust washer.

FIGURE 2
Stepped Shaft Design



10. For valves with bottom end cap design, slide one thrust bearing onto the shaft, attach the bearing cap to the end of the shaft (use thread cement and torque fasteners to 30 ft-lbs). Place the second thrust bearing on the bearing cap. Place the bottom cap gasket on the bottom cap and install the bottom cap. Torque bottom cap fasteners to 75 ft-lbs in a criss-cross pattern.

FIGURE 3
Bottom Cap Design

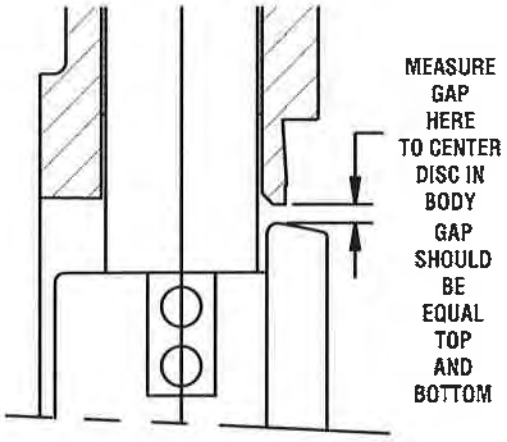


SECTION VII

COMPLETE VALVE REPAIR (continued)

11. Turn valve over so that the valve body seat pocket is up and level the disc face to the valve body.

12. Remove the top adjuster and slide the grounding spring over the shaft. Replace the adjuster and tighten the adjuster bolts to the torque specifications listed on page 25 of this manual. For valves that have top and bottom stem packing, the tightening of adjuster fasteners can push the disc assembly off-center to the valve body seat pocket. Alternate fastener tightening between top and bottom packing to keep disc centered in the valve body. Check the gap between the disc and the valve body seat pocket. The maximum acceptable gap difference (measured at the top and bottom of the disc) is .015". Make certain to identify the style of packing used in the valve in order to select the proper fastener torque. **Note:** Packing styles are illustrated on page 25.



13. For valves with an external disc support design, assemble the disc support hardware on the bottom of the valve body. See **Figure 4.**

(a) Thread the four support studs into the tapped holes on the end of the body.

(b) Apply thread cement and thread the ajustment stud into the shaft until it bottoms in the tapped hole and torque to 100 ft-lbs.

(c) Thread two jamb nuts onto the adjustment stud and slide one metal thrust washer (cup side away from nuts) and one PTFE thrust washer over the adjustment stud.

(d) Fasten the thrust plate to the support studs with four lock washers and nuts.

(e) Slide the remaining PTFE washer followed by the metal washer (cup side facing the PTFE washer) over the adjustment stud and thread the two jamb nuts onto the stud.

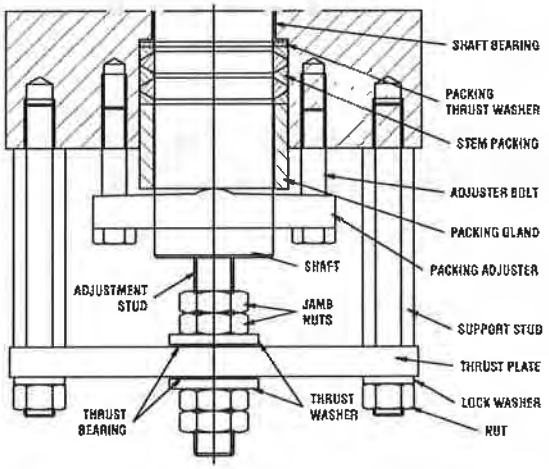
(f) Finger tighten the jamb nut adjacent to the metal thrust washer on each side of the thrust plate and check for acceptable centering of the disc in the valve body by measuring the gap as explained in Step 12. If the disc is off center, then adjust the position by turning either nut to pull or push the disc into position.

(g) Once the disc is centered, simultaneously tighten the two inside jamb nuts to 40 ft-lbs.

(h) Tighten the outside jamb nuts to 200 ft-lbs. Make certain that the inside jamb nuts do not turn while tightening the outside nuts. Check for acceptable disc centering.

(i) Tack weld the adjustment stud to the valve shaft and outside jamb nuts to the adjustment stud.

FIGURE 4
External Disc Support Design



14. Install the seat package following the procedure for seat replacement in **Section IV.**

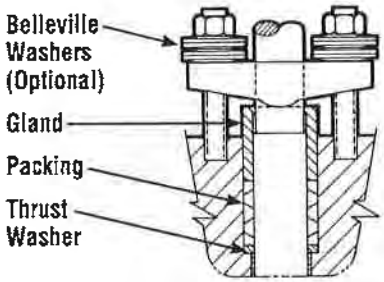
15. If manual operators were removed, re-install them using the procedures in **Section VIII** for gears or **Section X** for levers.

16. Operate the valves a few times to insure that the valve disc turns freely into and out of the seat. Seat testing of repaired valves is recommended.

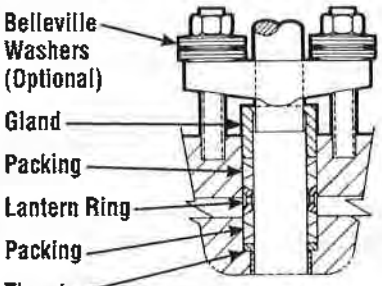
SECTION VII

COMPLETE VALVE REPAIR (continued)

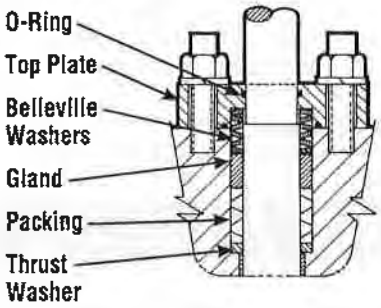
Single PTFE Cup and Cone



Double PTFE Cup and Cone



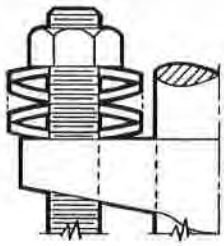
Triple Seal PTFE Cup and Cone



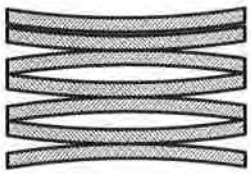
Adjuster Fastener Torque — PTFE Cup and Cone Packing

Valve Size		2	3	4	5	6	8	10	12	14	16	18	20	24	30	36
Fastener Torque – 150	Ft-lbs.	13	13	15	23	23	35	41	45	35	40	45	35	40	45	65
	(Nm)	(17)	(17)	(20)	(31)	(31)	(47)	(55)	(61)	(47)	(54)	(61)	(47)	(54)	(61)	(87)
Fastener Torque – 300	Ft-lbs.	13	13	15	—	23	35	45	50	35	40	45	40	—	—	—
	(Nm)	(17)	(17)	(20)	—	(31)	(47)	(61)	(68)	(47)	(54)	(61)	(54)	—	—	—

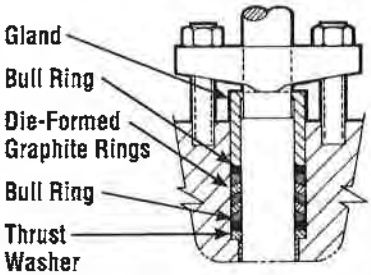
Adjuster Bolts Belleville Washer Arrangement



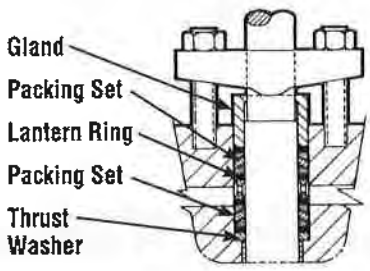
Triple Seal Belleville Washer Arrangement



Single Fire Sealed Grafoil



Double Fire Sealed Grafoil



Adjuster Fastener Torque — Fire Sealed Grafoil Packing

Valve Size		2	3	4	5	6	8	10	12	14	16	18	20	24	30	36
Fastener Torque – 150	Ft-lbs.	8	8	8	14	14	20	28	31	30	35	40	30	35	40	60
	(Nm)	(11)	(11)	(11)	(19)	(19)	(27)	(37)	(41)	(40)	(47)	(54)	(40)	(47)	(54)	(80)
Fastener Torque – 300	Ft-lbs.	8	8	8	—	14	20	31	40	30	35	40	35	—	—	—
	(Nm)	(11)	(11)	(11)	—	(19)	(27)	(41)	(54)	(40)	(47)	(54)	(47)	—	—	—

SECTION VIII

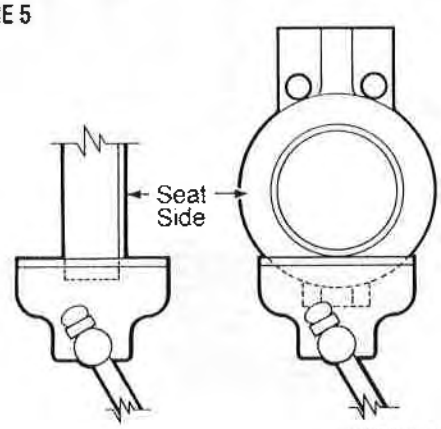
MANUAL GEAR OPERATOR INSTALLATION (See FIGURE 5 and FIGURE 6 below.)

1. Close the valve. The flats on top of the stem should be parallel with the valve flange face. (Refer to **FIGURE 6.**) **Note:** At this time, adjustments should be made to ensure that the body's machined flanged surface (6) is parallel with the disc. To accomplish this, place the valve body's machined flange surface (6) on a level plate. Position a bubble level on the upper side of the shaft flat and adjust the shaft until completely level.

⚠WARNING

*When placing the valve into the vice, grip the bottom of the valve only. Do not grip the bottom edge of the retainer ring, this can damage the retainer ring/gasket sealing surface. Refer to **FIGURE 5. Note**: Vice should have soft jaws.*

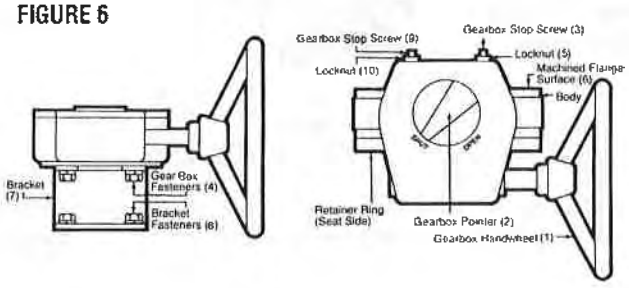
FIGURE 5



Recommended method **Alternate method acceptable but not recommended**

2. Place bracket (7) on the valve body as shown in **FIGURE 6.** Attach using the brackets fasteners (8), lock washers and hex nuts, making the fasteners finger-tight.
3. Rotate the gearbox handwheel (1) clockwise until the gearbox pointer (2) indicates the "shut" position.
4. Place the gearbox on the bracket (7) as shown in **FIGURE 6.**
5. Loosen the gearbox stopping screws (3) and (9).
6. Install the gearbox fasteners (4) and lock washers and tighten. Bracket fasteners (8) must also be tightened.
7. Turn the gearbox closing stop screw (9) clockwise until it stops, then tighten the locknut (10).
8. Turn the gearbox handwheel (1) counterclockwise to open the valve until the disc face is perpendicular to the valve body flange face.
9. Turn the gearbox opening stop screw (3) clockwise until it stops, then tighten the locknut (5).
10. Cycle the valve from closed to open to closed again using the gear operator. Recheck to make sure the disc is centered on the seat by measuring the distance from the machined surface on the disc to the machine flanged surface (6) on the body. This should be done at two points, one above or below the disc over travel stop and the other 180 degrees from the first. Both measurements should be equal.

FIGURE 6



SECTION IX

CHANGING MANUAL GEAR OPERATOR QUADRANTS

⚠CAUTION

Do not attempt to change the manual gear operator quadrant while the valve is in service.

1. Close the valve. The flats on top of the stem should be parallel with the valve flange face. Depressurize system if valve is installed as valve could open when the manual gear operator is removed.
2. Remove manual gear operator.
3. Remount gear operator 180 degrees from the position shown in **FIGURE 6.**
4. Follow Steps 5 through 9 of the Manual Gear Operator Installation instructions above.

SECTION X

LOCKING LEVER HANDLE AND INDICATOR PLATE INSTALLATION (See FIGURE 7 below.)

1. Close the valve. The flats on top of the stem should be parallel with the valve flange face. (Refer to **FIGURE 7**.) **Note:** At this time, adjustments should be made to ensure that the valve body's machined flanged surface (5) is parallel with the disc. To accomplish this, place the valve body's machined flanged surface (5) on a level plate. Position a bubble level on the upper side of the shaft flat and adjust the shaft until completely level.
2. Place bracket (6) on the valve body as shown in **FIGURE 7**. Attach using the bracket fasteners (7), lock washers and hex fasteners. Secure hex fasteners finger-tight.
3. Mount the indicator plate (1) to the bracket (6) as shown in **FIGURE 7** with the shakeproof washers placed between the indicator plate (1) and the bracket (6). The indicator plate fasteners (4) should be finger-tight at this time.
4. Place the locking lever handle (2) on the valve stem as shown in **FIGURE 7** and tighten the pinch fastener (3) provided.
5. Position the indicator plate (1) so that the locking lever fits in the "closed" position of the indicator plate (1). Tighten the indicator plate fasteners (4) and the bracket fasteners (7). (Be sure that the lever cannot be moved with a $^{5}/_{16}$ padlock installed in locking hole.)
6. Cycle the valve from closed to open, to closed again, using the locking lever handle. Recheck to make sure the disc is centered on the seat by measuring the distance from the machined surface on the disc to the machined flanged surface (6) on the body. This should be done at two points, one above or below the disc over travel stop and the other 180 degrees from the first. Both measurements should be equal.

SECTION XI

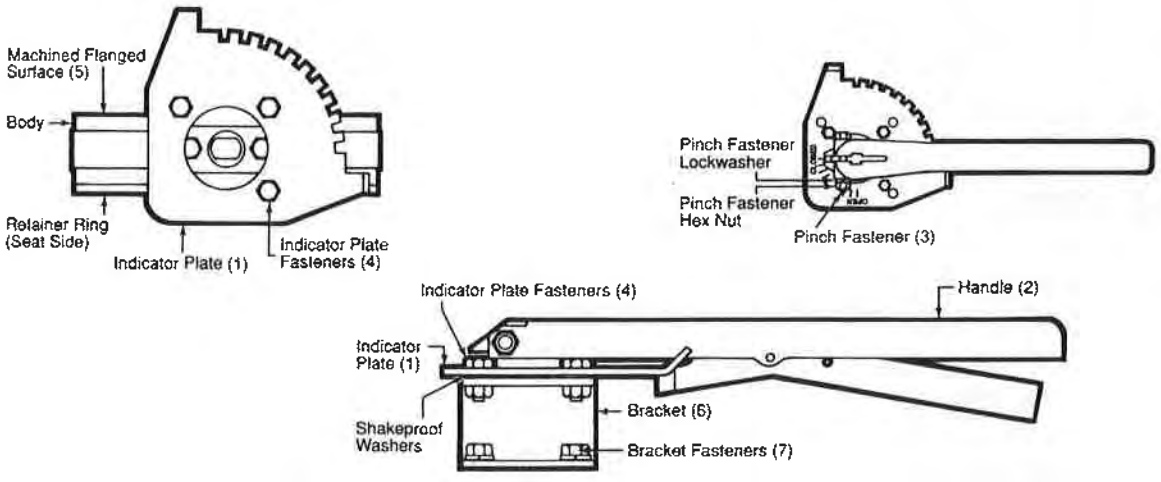
CHANGING LOCKING LEVER HANDLE QUADRANTS

⚠CAUTION

Do not attempt to change locking lever handle quadrants while the valve is in service.

1. Close the valve. The flats on top of the stem should be parallel with the valve flange face. Depressurize system if valve is installed as valve could open when the locking lever handle is removed.
2. Remove the locking lever handle (2) and indicator plate (1).
3. Mount the indicator plate (1) 180 degrees from the position shown in **FIGURE 7**. Do not tighten the indicator plate fasteners (4) at this time.
4. Follow Steps 4 and 5 in the Locking Lever Handle and Indicator Plate Installation Instructions above.

FIGURE 7



SECTION XII

BX2001 FLANGE DRILLING SPECIFICATIONS — Fastener Thread Sizes

Due to the hydrodynamic torque encountered with butterfly valves, safe operating practices dictate that manual gear operators, pneumatic actuators or electric actuators be used when these differential pressures are exceeded.

Wafer Style – Class 150 and 300 Drilling				Lug Style – Class 150 and 300 Drilling			
Size in (mm)	No. of Holes	Hole Size Inch	B.C. in (mm)	No. of Fasteners	Thread Size Inch	B.C in (mm)	B1 in (mm)
2 (50)	4	3/4	4 3/4 (121)	4	5/8-11	4 3/4 (121)	6 (152)
2 (50)	2	3/4	5 (127)	8	5/8-11	5 (127)	6 1/4 (154)
3 (80)	2	3/4	6 (152)	4	5/8-11	6 (152)	7 1/2 (191)
3 (80)	2	7/8	6 5/8 (168)	8	3/4-10	6 5/8 (168)	8 1/8 (206)
4 (100)	2	3/4	7 1/2 (191)	8	5/8-11	7 1/2 (191)	9 (229)
4 (100)	2	7/8	7 7/8 (200)	8	3/4-10	7 7/8 (200)	9 3/8 (238)
6 (150)	2	7/8	9 1/2 (241)	8	3/4-10	9 1/2 (241)	11 (279)
6 (150)	2	7/8	10 5/8 (270)	12	3/4-10	10 5/8 (270)	12 1/8 (308)
8 (200)	2	7/8	11 3/4 (298)	8	3/4-10	11 3/4 (298)	13 1/2 (343)
8 (200)	2	1	13 (330)	12	7/8-9	13 (330)	14 3/4 (315)
10 (250)	2	1	14 1/4 (362)	12	7/8-9	14 1/4 (362)	16 (406)
10 (250)	4***	1	15 1/4 (387)	16	1-8	15 1/4 (387)	17 1/4 (438)
12 (300)	2	1	17 (432)	12	7/8-9	17 (432)	19 (483)
12 (300)	4***	1 1/8	17 3/4 (451)	16	1 1/8-8	17 3/4 (451)	20 1/4 (514)
14 (350)	4	1 1/16	18 3/4 (476)	12	1-8	18 3/4 (476)	21 (533)
14 (350)	8*	1 1/8	20 1/4 (514)	20*	1 1/8-8	20 1/4 (514)	23 (584)
16 (400)	4	1 1/16	21 1/4 (540)	16	1-8	21 1/4 (540)	23 1/2 (597)
16 (400)	8*	1 1/4	22 1/2 (572)	20*	1 1/4-8	22 1/2 (572)	25 1/2 (648)
18 (450)	4	1 3/16	22 3/4 (578)	16	1 1/8-8	22 3/4 (578)	25 (635)
18 (450)	8*	1 1/4	24 3/4 (628)	24*	1 1/4-8	24 3/4 (628)	28 (711)
20 (500)	8*	1 1/8	25 (635)	20*	1 1/8-8	25 (635)	27 1/2 (699)
20 (500)	10*	1 1/4	27 (686)	24*	1 1/4-8	27 (686)	30 (762)
24 (600)	8*	1 1/4	29 1/2 (749)	20*	1 1/4-8	29 1/2 (749)	32 (813)
30 (750)	16*	1 1/4	36 (914)	28**	1 1/4-8	36 (914)	38 3/4 (984)
36 (900)	16**	1 1/2	42 3/4 (1086)	32**	1 1/2-8	42 3/4 (1086)	46 (1168)

ASME Class 150 ASME Class 300

All dimensions are approximate and for illustration purposes only. For exact dimensions request certified dimensional prints.

* The two fastener holes on either side of the shaft, top and bottom, are tapped blind holes (both sides).

** Four fastener holes, two on either side of the shaft top and bottom, are tapped blind holes, both sides.

*** The two fastener holes on either side of the shaft, top and bottom, are tapped through.

Maximum Differential Pressures	
Valve Size in (mm)	Max ΔP – Valve 90° open†
3 (80)	34 PSIG (2.3 bar)
4 (100)	16 PSIG (1.1 bar)
6 (150)	7 PSIG (.5 bar)
8 (200)	5 PSIG (.3 bar)

†Based on a 120 pound maximum force on wrench. See MSS SP91 for further clarification.

Big Max high performance butterfly valves meet the following flange specifications:

ASME B16.5	2 in (50 mm) - 24 in (600 mm)
MSS SP44	30 in (750 mm) & 36 in (900 mm)
ASME B16.47 (Series A)	30 in (750 mm) & 36 in (900 mm)

SECTION XIII

BX2001 VALVE AND OPERATOR WEIGHTS

BX Manual Operator Weights

Valve Size in (mm)	Locking Lever	Gear
2 (50)	6 lbs (2.7 kg)	11 lbs (5 kg)
2 (50)	6 lbs (2.7 kg)	11 lbs (5 kg)
3 (80)	6 lbs (2.7 kg)	11 lbs (5 kg)
3 (80)	6 lbs (2.7 kg)	11 lbs (5 kg)
4 (100)	6 lbs (2.7 kg)	11 lbs (5 kg)
4 (100)	6 lbs (2.7 kg)	11 lbs (5 kg)
6 (150)	6 lbs (2.7 kg)	11 lbs (5 kg)
6 (150)	6 lbs (2.7 kg)	11 lbs (5 kg)
8 (200)	20 lbs (9.1 kg)	28 lbs (12.7 kg)
8 (200)	20 lbs (9.1 kg)	28 lbs (12.7 kg)
10 (250)	N/A	28 lbs (12.7 kg)
10 (250)	N/A	28 lbs (12.7 kg)
12 (300)	N/A	31 lbs (14 kg)
12 (300)	N/A	31 lbs (14 kg)
14 (350)	N/A	64 lbs (29.0 kg)
14 (350)	N/A	94 lbs (42.6 kg)
16 (400)	N/A	76 lbs (34.5 kg)
16 (400)	N/A	108 lbs (49.0 kg)
18 (450)	N/A	76 lbs (34.5 kg)
18 (450)	N/A	125 lbs (56.7 kg)
20 (500)	N/A	76 lbs (34.5 kg)
20 (500)	N/A	101 lbs (45.8 kg)
24 (600)	N/A	101 lbs (45.8 kg)
30 (750)	N/A	156 lbs (70.8 kg)
36 (900)	N/A	HFM GF/S5 156 lbs (70.8 kg) HFM GF/D9 224 lbs (101.6 kg)

BX Valve Weights* in Pounds (Kilograms)

Valve Size in (mm)	BX2W	BX2L
2 (50)	12 lbs (5.4 kg)	12 lbs (5.4 kg)
2 (50)	10 lbs (4.5 kg)	14 lbs (6.4 kg)
3 (80)	16 lbs (7.3 kg)	18 lbs (8.2 kg)
3 (80)	15 lbs (6.8 kg)	21 lbs (9.5 kg)
4 (100)	20 lbs (9.1 kg)	26 lbs (11.8 kg)
4 (100)	20 lbs (9.1 kg)	27 lbs (12.2 kg)
5 (125)	30 lbs (13.5 kg)	35 lbs (15.8 kg)
6 (150)	35 lbs (15.9 kg)	40 lbs (18.1 kg)
6 (150)	36 lbs (16.3 kg)	52 lbs (23.6 kg)
8 (200)	58 lbs (26.3 kg)	68 lbs (30.8 kg)
8 (200)	63 lbs (28.6 kg)	90 lbs (40.8 kg)
10 (250)	86 lbs (39 kg)	104 lbs (47.1 kg)
10 (250)	106 lbs (48 kg)	146 lbs (66 kg)
12 (300)	125 lbs (56.7 kg)	160 lbs (72.6 kg)
12 (300)	161 lbs (73 kg)	230 lbs (104 kg)
14 (350)	250 lbs (113.4 kg)	300 lbs (136 kg)
14 (350)	345 lbs (157 kg)	636 lbs (289 kg)
16 (400)	325 lbs (147.4 kg)	400 lbs (181.4 kg)
16 (400)	480 lbs (218 kg)	900 lbs (408 kg)
18 (450)	400 lbs (181.4 kg)	500 lbs (226.8 kg)
18 (450)	685 lbs (311 kg)	1170 lbs (530.7 kg)
20 (500)	467 lbs (211.8 kg)	624 lbs (283 kg)
20 (500)	650 lbs (295 kg)	950 lbs (432 kg)
24 (600)	665 lbs (301.6 kg)	880 lbs (399 kg)
30 (750)	1050 lbs (476.3 kg)	1425 lbs (646.4 kg)
36 (900)	2162 lbs (980.7 kg)	2748 lbs (1246.5 kg)

ASME Class 150 ASME Class 300

All dimensions are approximate and for illustration purposes only. For exact dimensions request certified dimensional prints.

SECTION XIV

DIMENSIONS OF FASTENERS REQUIRED FOR INSTALLATION — CLASS 150

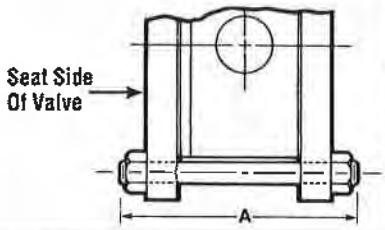
STUD FASTENERS

BX2-Valves
Wafer Style

Class-150

2" Thru 12"
ASME B16.5 Flange
Thickness

1/8" Thick Composite
Gasket



Valve Size	in (mm)	2 (50)	3 (80)	4 (100)	5 (125)	6 (150)	8 (200)	10 (250)	12 (300)
Size - Dia. & Thread	in	5/8 - 11			3/4 - 10			7/8 - 9	
No. of Stud Fasteners		4	4	8	8	8	8	12	12
"A" Length of Stud Fasteners	in (mm)	5 (127)	5 1/2 (140)	5 3/4 (146)	6 1/4 (159)	6 1/4 (159)	6 3/4 (171)	7 1/4 (184)	8 (203)

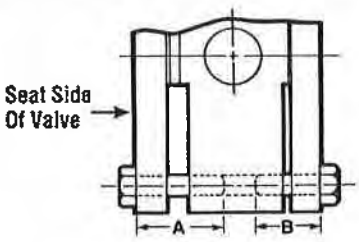
CAP SCREW FASTENERS

BX2-Valves
Lug Style

Class-150

3" Thru 12"
ASME B16.5 Flange
Thickness

1/8" Thick Composite
Gasket



Valve Size	in (mm)	2 (50)	3 (80)	4 (100)	5 (125)	6 (150)	8 (200)	10 (250)	12 (300)
Size - Dia. & Thread	in	5/8 - 11			3/4 - 10			7/8 - 9	
No. of "A" Fasteners		4	4	8	8	8	8	12	12
"A" Length of Fasteners	in (mm)	2 (50)	2 (50)	2 1/4 (57)	2 1/4 (57)	2 1/4 (57)	2 1/2 (63)	2 3/4 (70)	2 3/4 (70)
No. of "B" Fasteners		4	4	8	8	8	8	12	12
"B" Length of Fasteners	in (mm)	1 3/4 (44)	1 3/4 (44)	1 3/4 (44)	2 (50)	2 (50)	2 (50)	2 1/4 (57)	2 1/4 (57)

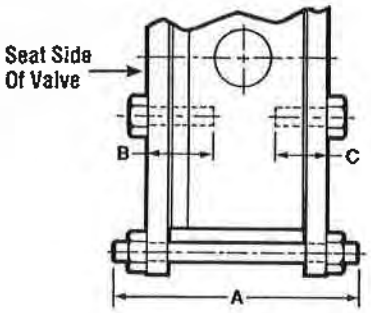
STUD FASTENERS

BX2-Valves
Wafer Style

Class-150
14" Thru 24"
ASME B16.5
Flange Thickness

30" and 36"
MSS SP44
and B16.47
(Series A)
Flange Thickness

1/8" Thick Composite
Gasket



Valve Size	in (mm)	14 (350)	16 (400)	18 (450)	20 (500)	24 (600)	30 (750)	36 (900)
Size - Dia. & Thread	in	1 - 8		1 1/8 - 8		1 1/4 - 8		1 1/2 - 8
No. of Stud Fasteners		12	16	16	16	16	24	24
"A" Length of Stud Fasteners	in (mm)	9 (230)	9 1/2 (240)	10 1/2 (270)	11 1/4 (290)	13 (330)	16 1/2 (420)	19 (480)
No. of "B" Fasteners		—	—	—	4	4	4	8
"B" Length of Fasteners	in (mm)	—	—	—	3 1/2 (90)	3 1/4 (85)	4 1/4 (110)	5 1/2 (140)
No. of "C" Fasteners		—	—	—	4	4	4	8
"C" Length of Fasteners	in (mm)	—	—	—	3 (75)	3 1/2 (90)	4 1/2 (115)	5 1/4 (135)

CAP SCREW FASTENERS

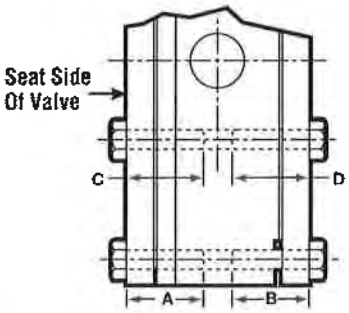
BX2-Valves
Lug Style

Class-150

14" Thru 24"
ASME B16.5
Flange Thickness

30" and 36"
MSS SP44
and B16.47
(Series A)
Flange Thickness

1/8" Thick Composite
Gasket



Valve Size	in (mm)	14" (350)	16" (400)	18" (450)	20" (500)	24" (600)	30" (750)	36" (900)
Size - Dia. & Thread	in	1 - 8		1 1/8 - 8		1 1/4 - 8		1 1/2 - 8
No. of Stud Fasteners		12	16	16	16	16	24	24
"A" Length of Stud Fasteners	in (mm)	3 1/4 (85)	3 1/4 (85)	3 1/4 (85)	3 3/4 (95)	4 1/4 (110)	5 (130)	7 1/2 (190)
No. of "B" Fasteners		12	16	16	16	16	24	24
"B" Length of Fasteners	in (mm)	2 3/4 (70)	3 (75)	3 1/4 (85)	3 1/2 (90)	4 1/4 (110)	5 (130)	7 (180)
No. of "C" Fasteners		—	—	—	4	4	4	8
"C" Length of Fasteners	in (mm)	—	—	—	3 1/2 (90)	4 (100)	4 3/4 (120)	5 1/2 (140)
No. of "D" Fasteners		—	—	—	4	4	4	8
"D" Length of Fasteners	in (mm)	—	—	—	3 (75)	3 1/2 (90)	4 1/2 (115)	5 1/4 (135)

SECTION XV

DIMENSIONS OF FASTENERS REQUIRED FOR INSTALLATION — CLASS 300

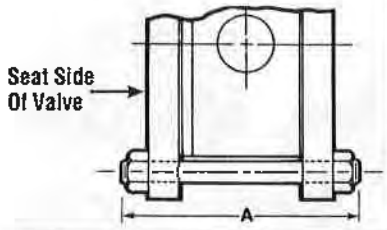
STUD FASTENERS

BX2-Valves
Wafer Style

Class-300

2" Thru 12"
ASME B16.5 Flange
Thickness

1/8" Thick Composite
Gasket



Valve Size	in (mm)	2 (50)	3 (80)	4 (100)	6 (150)	8 (200)
Size - Dia. & Thread	in	5/8 - 11	3/4 - 10			7/8 - 9
No. of Stud Fasteners		8	8	8	12	12
"A" Length of Stud Fasteners	in (mm)	5 1/2 (140)	6 1/2 (165)	7 (178)	7 1/2 (190)	8 1/2 (215)

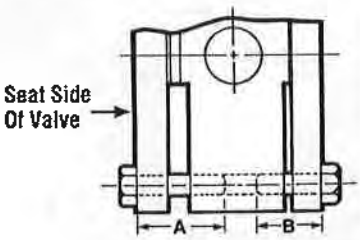
CAP SCREW FASTENERS

BX2-Valves
Lug Style

Class-300

3" Thru 12"
ASME B16.5 Flange
Thickness

1/8" Thick Composite
Gasket



Valve Size	in (mm)	2 (50)	3 (80)	4 (100)	6 (150)	8 (200)
Size - Dia. & Thread	in	5/8 - 11	3/4 - 10			7/8 - 9
No. of "A" Fasteners		8	8	8	12	12
"A" Length of Fasteners	in (mm)	1 3/4 (44)	2 1/4 (57)	2 1/2 (64)	2 3/4 (70)	3 (75)
No. of "B" Fasteners		8	8	8	12	12
"B" Length of Fasteners	in (mm)	1 3/4 (44)	2 (50)	2 1/4 (57)	2 1/2 (64)	3 (75)

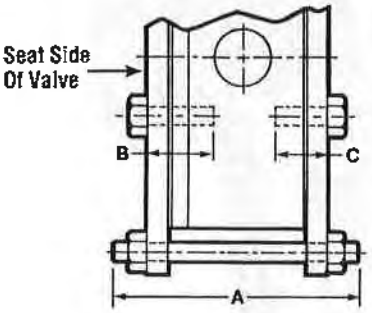
STUD FASTENERS

BX2-Valves
Wafer Style

Class-300
14" Thru 24"
ASME B16.5
Flange Thickness

30" and 36"
MSS SP44
and B16.47
(Series A)
Flange Thickness

1/8" Thick Composite
Gasket



Valve Size	in (mm)	10 (250)	12 (300)	14 (350)	16 (400)	18 (450)	20 (500)
Size - Dia. & Thread	in	1 - 8	1 1/8 - 8		1 1/4 - 8		
No. of Stud Fasteners		12	12	16	16	20	20
"A" Length of Stud Fasteners	in (mm)	10 (254)	10 3/4 (275)	12 1/4 (310)	13 1/4 (340)	14 1/2 (370)	15 (380)
No. of "B" Fasteners		4	4	4	4	4	4
"B" Length of Fasteners	in (mm)	3 1/2 (90)	3 3/4 (95)	3 1/2 (90)	3 3/4 (95)	3 3/4 (95)	4 (100)
No. of "C" Fasteners		4	4	4	4	4	4
"C" Length of Fasteners	in (mm)	3 1/4 (85)	3 1/2 (90)	3 1/2 (90)	3 3/4 (95)	3 3/4 (95)	4 (100)

CAP SCREW FASTENERS

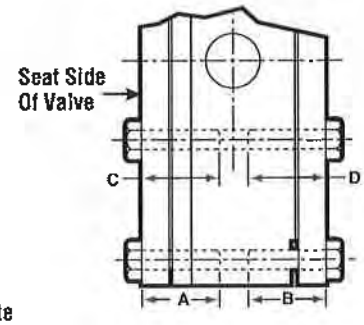
BX2-Valves
Lug Style

Class-300

14" Thru 24"
ASME B16.5
Flange Thickness

30" and 36"
MSS SP44
and B16.47
(Series A)
Flange Thickness

1/8" Thick Composite
Gasket



Valve Size	in (mm)	10 (250)	12 (300)	14 (350)	16 (400)	18 (450)	20 (500)
Size - Dia. & Thread	in	1 - 8	1 1/8 - 8		1 1/4 - 8		
No. of Stud Fasteners		16	16	16	16	20	20
"A" Length of Stud Fasteners	in (mm)	3 1/2 (90)	3 3/4 (95)	3 1/2 (90)	3 3/4 (95)	3 3/4 (95)	5 1/2 (140)
No. of "B" Fasteners		16	16	16	16	20	20
"B" Length of Fasteners	in (mm)	3 1/4 (85)	3 1/2 (90)	4 (100)	4 1/2 (115)	5 (130)	5 1/2 (140)
No. of "C" Fasteners		—	—	4	4	4	4
"C" Length of Fasteners	in (mm)	—	—	3 1/2 (90)	3 3/4 (95)	3 3/4 (95)	4 (100)
No. of "D" Fasteners		—	—	4	4	4	4
"D" Length of Fasteners	in (mm)	—	—	3 1/2 (90)	3 3/4 (95)	3 3/4 (95)	4 (100)

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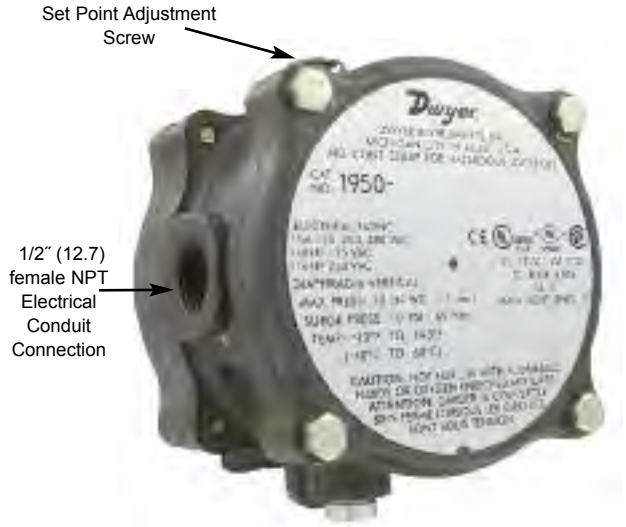
(Bulletin V-390(E)
May 2016

flowserve.com

Series 1950 Explosion-Proof Differential Pressure Switches

Specifications - Installation and Operating Instructions



Series 1950 Explosion-Proof Differential Pressure Switches combine the best features of the Series 1900 Pressure Switch with an integral explosion-proof and weather-proof housing. Each unit is UL & CSA listed; FM approved for use in Class I, Groups C & D; Class II, Groups E, F, & G; and Class III atmospheres (NEMA 7 & 9). They are totally rain-tight for outdoor installations. Twelve models allow set-points from .03 to 20 inches w.c. and from .5 to 50 psi (3.4 to 345 kPa).

Easy access to the SPDT switch for electrical hook-up is provided by removing the top plate of the three-part aluminum housing. Adjustment to the set point of the switch can be made without disassembling the housing. The unit is very compact, about half the weight and bulk of equivalent conventional explosion-proof switches.

CAUTION
For use only with air or compatible gases. Use of the Model 1950 switch with explosive media connected to the Low pressure port (including differential pressure applications in such media) is not recommended. Switch contact arcing can cause an explosion inside the switch housing which, while contained, may render the switch inoperative. If switch is being used to sense a single positive pressure relative to atmosphere, run a line from the low pressure port to a non-hazardous area free of combustible gases. This may increase response time on -0 and -00 models.

Note: The last number-letter combination in the model number identifies the switch's electrical rating (number) and diaphragm material (letter). The 2F combination is standard as described in the physical data above. In case of special models, a number 1 rating is the same as 2; a number 3 or 4 rating is 10A 125, 250, 480 VAC; 1/8 H.P. 125 VAC; 1/4 H.P. 250 VAC; a number 5 or 6 rating is 1A 125 VAC. Letter B indicates a Buna-N diaphragm; N = Neoprene; S = Silicone; and V = Viton®.

UL and CSA Listed, FM Approved For
CL. I GR. C, D - CL. II GR. E, F, G - CL. III

Series 1950 Switches
Operating ranges and deadbands

To order specify Model Number	Operating Range: Inches, W.C.	Approximate Dead Band	
		At Min. Set Point	At Max. Set Point
1950-02-2S	0.03 to 0.10	0.025	0.05
1950-00-2F	0.07 to 0.15	0.04	0.05
1950-0-2F	0.15 to 0.5	0.10	0.15
1950-1-2F	0.4 to 1.6	0.15	0.20
1950-5-2F	1.4 to 5.5	0.3	0.4
1950-10-2F	3.0 to 11.0	0.4	0.5
1950-20-2F	4.0 to 20.0	0.4	0.6
	Operating	Approximate Dead Band	
Model Number	Range: PSI	Min. Set Point	Max. Set Point
1950P-2-2F	0.5 to 2.0	0.3 psi	0.3 psi
1950P-8-2F	1.5 to 8.0	1.0 psi	1.0 psi
1950P-15-2F	3.0 to 15.0	0.9 psi	0.9 psi
1950P-25-2F	4.0 to 25.0	0.7 psi	0.7 psi
1950P-50-2F	15.0 to 50	1.0 psi	1.5 psi

SPECIFICATIONS
Service: Air and non-combustible, compatible gases.
Wetted Materials: Consult factory.
Temperature Limits: -40 to 140°F (-40 to 60°C); 0 to 140°F (-17.8 to 60°C) for 1950P-8, 15, 25, and 50. -30 to 130°F (-34.4 to 54.4°C) for 1950-02.
Pressure Limits:
Continuous: 1950's - 45″ w.c. (0.11 bar);
1950P's - 35 psi (2.41 bar); 1950P-50 only - 70 psi (4.83 bar).
Surge: 1950's - 10 psi (0.69 bar), 1950P's - 50 psi (3.45 bar), 1950P-50 only - 90 psi (6.21 bar).
Enclosure Rating: IP54, NEMA 3, 7 and 9.
Switch Type: Single-pole double-throw (SPDT).
Electrical Rating: 15 A @, 125, 250, 480 VAC, 60 Hz. Resistive 1/8 HP @ 125 VAC, 1/4 HP @ 250 VAC, 60 Hz.
Electrical Connections: 3 screw type, common, normally open and normally closed.
Process Connections: 1/8″ female NPT.
Mounting Orientation: Diaphragm in vertical position. Consult factory for other position orientations.
Set Point Adjustment: Screw type on top of housing.
Weight: 3.25 lb (1.5 kg); 1950-02 model, 4.4 lb (2 kg).
Agency Approvals: CE, UL, CSA, FM.

RESPONSE TIME: Because of restrictive effect of flame arrestors, switch response time may be as much as 10-25 seconds where applied pressures are near set point.

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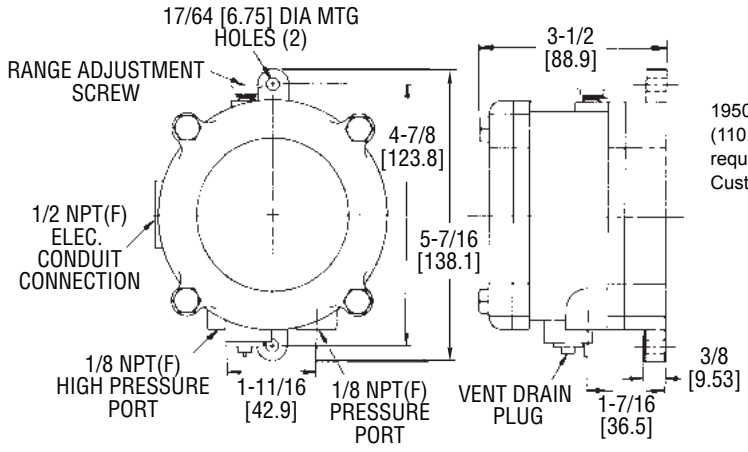

1950-02: 7-3/4″ (196.9) dia. x 4-11/32″ (110.3) depth. For complete dimensions request drawing 28-700175-00 from our Customer Service Department

1950 Switch Outline Dimensions

INSTALLATION

1. Select a location free from excess vibration and corrosive atmospheres where temperatures will be within the limits noted under Specifications on reverse. Switch may be installed outdoors or in areas where the hazard of explosion exists. See reverse for specific types of hazardous service.

2. Mount standard switches with the diaphragm in a vertical plane and with switch lettering and nameplate in an upright position. Some switches are position sensitive and may not reset properly unless they are mounted with the diaphragm vertical.

3. Connect switch to source of pressure, vacuum or differential pressure. Metal tubing with 1/4″ O.D. is recommended, but any tubing which will not restrict the air flow can be used. Connect to the two 1/8″ female NPT pressure ports as noted below:

A. Differential pressures - connect pipes or tubes from source of greater pressure to high pressure port marked HIGH PRESS, and from source of lower pressure to low pressure port marked LOW PRESS.

B. Pressure only (above atmospheric pressure) - connect tube from source of pressure to high pressure port. The low pressure port is left open to atmosphere.

C. Vacuum only (below atmospheric pressure) - connect tube from source of vacuum to low pressure port. The high pressure port is left open to atmosphere.

4. To make electrical connections, remove the three hex head screws from the cover and after loosening the fourth captive screw, swing the cover aside. Electrical connections to the standard single pole, double throw snap switch are provided by means of terminals marked “COM” (common), “NO” (norm open), “NC” (norm closed). The normally open contacts close and the normally closed contacts open when pressure increases beyond the set point. Switch loads for standard models should not exceed the maximum specified current rating of 15 amps resistive. Switch capabilities decrease with an increase in ambient temperature, load inductance, or cycling rate. Whenever an application involves one or more of these factors, the user may find it desirable to limit the switched current to 10 amps or less in the interest of prolonging switch life.

ADJUSTMENT: To Change the Set point

1. Remove the plastic cap and turn the slotted Adjust-ment Screw at the top of the housing clockwise to raise the set point pressure and counterclockwise to lower the set point. After calibration, replace the plastic cap and re-check the set point.

2. The recommended procedure for calibrating or checking calibration is to use a “T” assembly with three rubber tubing leads, all as short as possible and the entire assembly offering minimum flow restriction. Run one lead to the pressure switch, another to a manometer of known accuracy and appropriate range, and apply pressure through the third tube. Make final approach to the set point very slowly. Note that manometer and pressure switch will have different response times due to different internal volumes, lengths of tubing, fluid drainage, etc. Be certain the switch is checked in the position it will assume in use, i.e. with diaphragm in a vertical plane and switch lettering and Dwyer nameplate in an upright position.

3. For highly critical applications check the set point adjustment and if necessary, reset it as noted in step A.

MAINTENANCE

The moving parts of these switches need no maintenance or lubrication. The only adjustment is that of the set point. Care should be taken to keep the switch reasonably clean. Periodically the vent drain plug should be rotated, then returned to its original position. This will dislodge deposits which could accumulate in applications where there is excessive condensation within the switch. The Series 1950 Explosion-Proof Differential Pressure Switch is not field serviceable and should be returned if repair is needed (field repair should not be attempted and may void warranty). Be sure to include a brief description of the problem plus any relevant application notes. Contact customer service to receive a return goods authorization number before shipping.

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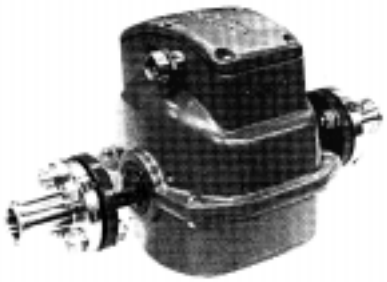
FOXBORO®

Instruction

MI 021-381
January 1996

8300 Series
Flanged Magnetic Flowtubes
ptfe, Polyurethane, and Neoprene Lined,
1/2- through 36-inch Sizes

Flowtube Installation



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Tables

Introduction

The 8300 Series Magnetic Flowtubes together with an I/A Series® Magnetic Flow Transmitter or an 8000 Series Magnetic Flow Transmitter combine to form an easy-to-use, versatile magnetic flowmeter that measures the volumetric flow rate of virtually any conductive liquid. The transmitter converts the low level, high impedance signal from the flowtube to a standard transmission signal, either 4 to 20 mA, digital, or pulse output, that is proportional to flow rate. The stainless steel tubes can be lined with either ptfe, polyurethane, or Neoprene. Various end connections are provided. The flanged end tubes (either ANSI or metric) are available in sizes from 15 to 900 mm (1/2 to 36 in). Sanitary Tri-Clamp end connections can also be provided in flowtube sizes from 15 to 80 mm (1/2 to 3 in) to accommodate sanitary liquid applications.

Reference Documents

Doc. No.	Description
PSS 1-6F2 D	8000 Series Transmitter, Product Specifications
PSS 1-6F3 A	IMT10 (I/A Series) Transmitter, Product Specifications
PSS 1-6F3 B	IMT20 (I/A Series) Transmitter, Product Specifications
PSS 1-6F5 A	IMT25 (I/A Series) transmitter, Product Specifications
DP 021-360	8300 Flanged Flowtubes, 1/2 to 36 in, Dimensions
DP 021-361	8300 Sanitary Flowtubes, 1/2 to 3 in, Dimensions
MI 021-369	8000 Series Transmitters, Remote Mounted, Installation
MI 021-372	IMT10 Series Transmitters, Remote Mounted, Installation
MI 021-382	IMT20 Series Transmitters, Remote Mounted, Installation
MI 021-365	8300 Series Magnetic Flowtube, Type Y Purge
MI 021-151	Magnetic Flow Sealing Kit for Flowtube Submergence
MI 021-387	IMT25 Series Transmitter, Installation
PL 008-742	8300 Flanged Flowtubes, 1/2 to 36 in, Parts List
PL 008-743	8300 Sanitary Flowtubes, 1/2 to 3 in, Parts List
TI 27-71f	Magnetic Flowtube Materials Selection Guide
TI 027-072	Magnetic Flowmeter Liquid Conductivity Tables

General Description

The 8300 Series Flowtubes have been designed to operate in harsh in-plant or outdoor environments and are suitable for installation in most hazardous area locations. A selection of High Humidity/Condensate, General Purpose NEMA 4X, Accidental Submergence, or Accidental/Total Submergence Housings are offered.

Foxboro offers the I/A Series Magnetic Flow Transmitters for use with these flowtubes. The transmitter is connected to the flowtube with a signal cable having a maximum length of 300 m (1000 ft).

The stainless steel flowtube is lined with a choice of ptfe, polyurethane, or Neoprene lining. Together with the choice of lining materials, a selection of electrode metals and electrode shapes enables these flowtubes to handle a wide variety of liquids such as water, slurries, and sticky, abrasive, and highly corrosive processes. A ptfe-lined flowtube may also be used in sanitary applications by attaching a sanitary, quick-disconnect end connection assembly to each flange.

All flowtubes are wet calibrated to verify their specified accuracy with traceability to the U.S. National Institute of Science and Technology (NIST).

The transmitter uses a pulsed-dc technique to energize the flux-producing coils of the flowtube. As the process liquid passes through the magnetic field in the flowtube, low-level voltage pulses are developed across a pair of electrodes. The voltage level of these pulses is directly proportional to the average velocity of the liquid. The transmitter converts the voltage pulse to both a standard 4 to 20 mA and pulse output signal. The 4 to 20 mA signal is used with a suitable receiver to indicate, record, and/or control a variable. The proportional pulse output can be used for totalization and can be configured for either a high rate or low rate pulse. With an I/A Series transmitter, a digital output signal is also provided for flowmeters serving as a primary device in an I/A Series system. Both the digital and 4 to 20 mA outputs are simultaneously available at a common pair of output terminals. Details of the output signals are given in the applicable transmitter instruction.

This instruction relates to the installation of the flowtube portion of the magnetic flowmeter system. For installation, wiring, operation, configuration, and maintenance details relating to the flowmeter system, refer to the applicable transmitter documents.

Standard Specifications

Ambient Temperature

Normal Operating Condition Limits: -10 and +50°C (20 and 120°F)

Operative Limits: -30 and +60°C (-20 and +140°F)

Nominal Line Sizes

Flanged Flowtubes:

15, 25, 40, 50, 80, 100, 150, 200, 250, 300, 350, 400, 450, 500, 600, 750, and 900 mm

(1/2, 1, 1 1/2, 2, 3, 4, 6, 8, 10, 12, 14, 16, 18, 20, 24, 30, and 36 in)

Sanitary Flowtubes:

15, 25, 40, 50, and 80 mm (1/2, 1, 1 1/2, 2, and 3 in) flowtube size. These flowtubes are fitted with Sanitary Tri-clamp end connections for installation in line sizes 25, 40, 50, 80, and 100 mm (1, 1-1/2, 2, 3, and 4 in).

Electrodes

Tantalum, 316 ss, Hastelloy C, platinum, or titanium. 316 ss and Hastelloy C electrodes are also offered in conical shaped configurations. Refer to TI 27-71f for process-wetted materials selection guide.

Metering Tube

AISI Type 304 or 310 stainless steel.

Process Fluid Conductivity

The minimum process fluid conductivity required is 5 µS/cm.

Signal and Coil Driver Cable Length

Using Foxboro cable Part Number R0101ZS, the maximum allowable cable length is 300 m (1000 ft) between flowtube and transmitter. Refer to appropriate transmitter installation instruction for additional detail.

Minimum and Maximum Upper Range Values and Nominal Calibration Factors

Minimum and maximum upper range value (URV) flow rates and nominal calibration factors are shown in Table 2 for the different tube sizes and linings. In this table, URV is not the lowest flow rate that the flowtube can measure; it is the lowest flow rate which can correspond to the 4 to 20 mA signal. For example: for the 8301, the minimum range is 0 to 3.8 U.S. gpm, and this will generate 4 to 20 mA.

Process Liquid Earth (Ground)

If connecting piping is unlined metal:

System grounded through flange bolts or ground straps.

If connecting piping is lined metal or nonmetallic:

Systems grounded using earthing (grounding) rings at each end of the flowtube. Grounding rings (i.e., orifice plates) are available from Foxboro, if needed. Sanitary flowtubes do not require any additional grounding.

Process Pressure and Temperature Limits

See Tables 3, 4, 5, and 6.

Enclosure Construction

Model 830H TO 8312

Housing is cast from low-copper aluminum alloy, and silicone sealant and gaskets are used in all joints. Offered for high humidity, NEMA 4X, or for both accidental or accidental/total submergence applications, as specified.

Model 8314 TO 8336

Housing is fabricated from fiberglass reinforced plastic (FRP), silicone sealant, and gaskets are used to seal all joints. Offered for high humidity, NEMA 4X, or accidental submergence applications, as specified.

Enclosure Finish

Model 830H TO 8312

High-build epoxy paint.

Model 8314 TO 8336

Polyurethane paint.

Electrical Connections

The housing has two 3/4 NPT tapped holes for power conduit fittings and one 1/2 NPT tapped hole for an optionally provided 3/4 NPT signal cable seal.

Mounting Position

The flowtube can be mounted in any orientation provided that during normal flow, it remains full of process liquid. In a horizontal installation, position the flowtube so that the electrodes are in the horizontal plane.

End Connection

ANSI Class 150 and 300, AWWA Class D; Metric PN 6, 10, 16, 25, and 40 flanges; and Sanitary quick-disconnect ferrules for flowtube sizes up to 80 mm (3 in).

Product Safety Specifications

Refer to Table 7 for Electrical Classifications.

Approximate Mass

Refer to Table 1.

Table 1. Approximate Flowtube Mass

Flowtube Size		Approximate Flowtube Mass				Flowtube Size		Approximate Flowtube Mass			
		Flanged Ends		Sanitary Ends				Flanged Ends		Sanitary Ends	
mm	in	kg	lb	kg	lb	mm	in	kg	lb	kg	lb
15	1/2	21	46	23	50	300	12	125	275	N/A	N/A
25	1	18	40	20	45	350	14	170	375	N/A	N/A
40	1 1/2	20	45	23	51	400	16	195	425	N/A	N/A
50	2	21	47	25	56	450	18	215	475	N/A	N/A
80	3	27	60	33	73	500	20	285	625	N/A	N/A
100	4	34	76	N/A	N/A	600	24	410	900	N/A	N/A
150	6	55	122	N/A	N/A	750	30	545	1200	N/A	N/A
200	8	85	188	N/A	N/A	900	36	660	1450	N/A	N/A
250	10	91	200	N/A	N/A						

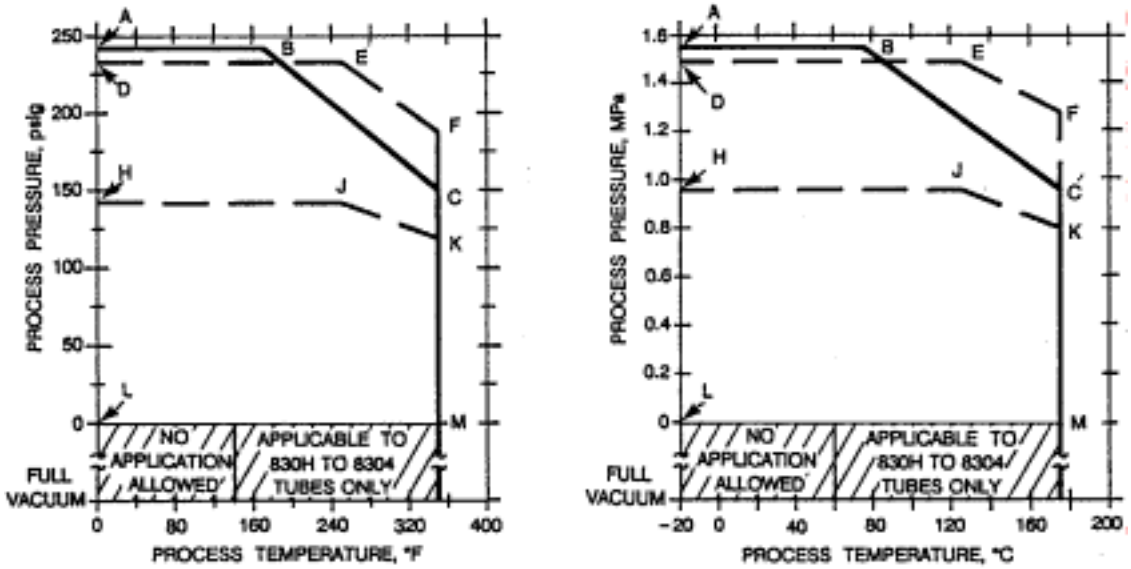
Table 2. Minimum and Maximum Upper Range Limits and Nominal Calibration Factors

Flowtube Line Size		Approximate Minimum and Maximum URV's*						Nominal Calibration Factor** with	
		with ptfe*		with Polyurethane*		with Neoprene*		ptfe or Neoprene	Poly-urethane
mm	in	L/m	U.S. gpm	L/m	U.S. gpm	L/m	U.S. gpm		
15	½	3.75 & 75	1 & 20	—	—	—	—	200	—
25	1	14.5 & 290	3.8 & 76	—	—	—	—	67	—
40	1 ½	37 & 740	10 & 195	—	—	—	—	28	—
50	2	63 & 1260	17 & 335	30 & 600	8 & 160	—	—	15	22
80	3	145 & 2900	39 & 770	96 & 1930	25 & 510	—	—	7.5	8.6
100	4	255 & 5100	68 & 1350	162 & 3240	43 & 855	—	—	4.1	5.2
150	6	570 & 11400	150 & 3000	440 & 8800	115 & 2300	—	—	1.7	1.9
200	8	975 & 19500	260 & 5150	820 & 16400	220 & 4300	—	—	0.79	0.88
250	10	1550 & 31000	410 & 8200	1350 & 27000	360 & 7150	—	—	0.51	0.55
300	12	2210 & 44200	590 & 11700	1980 & 39600	525 & 10450	—	—	0.30	0.32
350	14	2725 & 54500	720 & 14400	2725 & 54500	720 & 14400	2725 & 54500	720 & 14400	0.23	0.23
400	16	3600 & 72000	950 & 19000	3600 & 72000	950 & 19000	3600 & 72000	950 & 19000	0.136	0.136
450	18	4550 & 91000	1200 & 24000	4550 & 91000	1200 & 24000	4550 & 91000	1200 & 24000	0.115	0.115
500	20	6170 & 11400	1630 & 30000	6170 & 114000	1630 & 30000	6170 & 114000	1630 & 30000	0.079	0.079
600	24	10500 & 162000	2780 & 43000	10500 & 162000	2780 & 43000	10500 & 162000	2780 & 43000	0.046	0.046
750	30	—	—	22700 & 258000	6000 & 68000	22700 & 258000	6000 & 68000	0.024	0.024
900	36	—	—	37800 & 374000	10000 & 99000	37800 & 374000	10000 & 99000	0.014	0.014

* The inside diameter of each flowtube size varies depending on the lining used. Therefore, different URVs are indicated for flowtube sizes through 300 mm (12 in), depending on the lining used. However, on sizes larger than 300 mm (12 in), the variance in inside diameter is sufficiently small percentagewise to approximate the same URV regardless of the lining used for the line size.

** The nominal calibration factor is unitless.

Table 3. Process Pressure and Temperature Limits — ptfe-Lined Flowtubes — 830H to 8312 Sizes Only (See Table 4 for 8314 to 8324 Sizes)



NOTES

1. PROCESS PRESSURE AND TEMPERATURE MUST BE WITHIN THE BOUNDARIES:

   LABCM FOR FLOWTUBES WITH ANSI CLASS 150 OR 300 FLANGES
   LHJKM FOR FLOWTUBES WITH PN 10 FLANGES
   LDEFM FOR FLOWTUBES WITH PN 16, 25, OR 40 FLANGES

2. REFER TO FOXBORO FOR APPLICATIONS INVOLVING ELEVATED PRESSURE.

Table 4. Process Pressure and Temperature Limits — ptfe-Lined Flowtubes — 8314-8324 Sizes Only

cf Flange Rating	Flowtube Line Size	Process Pressure Limits		Process Temperature Limits	
		Lower Limit	Upper Limit	Lower Limit	Upper Limit
ANSI Class 150	8314 and 8316	Zero (No Vacuum)	1.38 MPa (200 psig)	–18 °C (0 °F)	82 °C (180 °F)
	8318 to 8324	Zero (No Vacuum)	1.03 MPa (150 psig)	–18 °C (0 °F)	82 °C (180 °F)
Metric PN 6	8314 to 8324	Zero (No Vacuum)	0.60 MPa (87 psig)	–18 °C (0 °F)	82 °C (180 °F)
Metric PN 10	8314 to 8324	Zero (No Vacuum)	1.00 MPa (145 psig)	–18 °C (0 °F)	82 °C (180 °F)

Table 5. Process Pressure and Temperature Limits — Polyurethane-Lined Flowtubes — 8302 to 8336 Sizes

Flange Rating	Flowtube Line Size	Process Pressure Limits		Process Temperature Limits	
		Lower Limit	Upper Limit	Lower Limit	Upper Limit
ANSI Class 150	8302 to 8312	Full Vacuum	1.65 MPa (240 psig)	–18 °C (0 °F)	71 °C (160 °F)
	8314 and 8316	Full Vacuum	1.38 MPa (200 psig)	–18 °C (0 °F)	71 °C (160 °F)
	8316 to 8324	Full Vacuum	1.03 MPa (150 psig)	–18 °C (0 °F)	71 °C (160 °F)
ANSI Class 300	8302 to 8304	Full Vacuum	4.83 MPa (700 psig)	–18 °C (0 °F)	71 °C (160 °F)
	8306 and 8308	Full Vacuum	1.65 MPa (240 psig)	–18 °C (0 °F)	71 °C (160 °F)
Metric PN 10	8302 to 8324	Full Vacuum	1.00 MPa (145 psig)	–18 °C (0 °F)	71 °C (160 °F)
	8330	Full Vacuum	0.69 MPa (100 psig)	–18 °C (0 °F)	71 °C (160 °F)
	8336	Full Vacuum	0.62 MPa (90 psig)	–18 °C (0 °F)	71 °C (160 °F)
Metric PN 16	8302 to 8312	Full Vacuum	1.62 MPa (235 psig)	–18 °C (0 °F)	71 °C (160 °F)
Metric PN 25	8302 to 8304	Full Vacuum	2.50 MPa (362 psig)	–18 °C (0 °F)	71 °C (160 °F)
	8306 to 8312	Full Vacuum	1.65 MPa (240 psig)	–18 °C (0 °F)	71 °C (160 °F)
Metric PN 40	8302 to 8304	Full Vacuum	4.00 MPa (580 psig)	–18 °C (0 °F)	71 °C (160 °F)
	8306 to 8312	Full Vacuum	1.65 MPa (240 psig)	–18 °C (0 °F)	71 °C (160 °F)
Metric PN 6	8314 to 8336	Full Vacuum	0.60 MPa (87 psig)	–18 °C (0 °F)	71 °C (160 °F)
AWWA Class D	8330	Full Vacuum	0.69 MPa (100 psig)	–18 °C (0 °F)	71 °C (160 °F)
	8336	Full Vacuum	0.62 MPa (90 psig)	–18 °C (0 °F)	71 °C (160 °F)

Table 6. Process Pressure and Temperature Limits — Neoprene-Lined Flowtubes — 8314 to 8336 Sizes

Flange Rating	Flowtube Line Size	Process Pressure Limits		Process Temperature Limits	
		Lower Limit	Upper Limit	Lower Limit	Upper Limit
ANSI Class 150	2814 and 2816	Full Vacuum	1.38 MPa (200 psig)	–18 °C (0 °F)	82 °C (180 °F)
	2818 to 2824	Full Vacuum	1.03 MPa (150 psig)	–18 °C (0 °F)	82 °C (180 °F)
AWWA Class D	2830	Full Vacuum	0.69 MPa (100 psig)	–18 °C (0 °F)	82 °C (180 °F)
	2836	Full Vacuum	0.62 MPa (90 psig)	–18 °C (0 °F)	82 °C (180 °F)
Metric PN 6	2814 to 2836	Full Vacuum	0.60 MPa (87 psig)	–18 °C (0 °F)	82 °C (180 °F)
Metric PN 10	2814 to 2824	Full Vacuum	1.00 MPa (145 psig)	–18 °C (0 °F)	82 °C (180 °F)
	2830	Full Vacuum	0.69 MPa (100 psig)	–18 °C (0 °F)	82 °C (180 °F)
	2836	Full Vacuum	0.62 MPa (90 psig)	–18 °C (0 °F)	82 °C (180 °F)

Table 7. Electrical Classifications

Testing Laboratory, Types of Protection, and Area Classification	Application Conditions	Electrical Safety Design Code
CSA for use in General Purpose (Ordinary) Locations.	---	CGZ
CSA for use in Class I, Division 2, Groups A, B, C, and D, hazardous locations.	Temperature Class T6.	CNZ
CSA for Type Y Purging for Class I, Division 1, Groups A, B, C, and D.	Model 830H through 8312. Temperature Class T6.	CPZ
FM for use in general purpose (ordinary) locations.	---	FGZ
FM for use in Class I, Division 2, Groups A, B, C, and D, hazardous locations.	Temperature Class T6.	FNA
FM for Type Y purging for Class I, Division 1, Groups A, B, C, and D	Model 830H through 8312. Temperature Class T6.	FPA

NOTE: These flowtubes have been designed to meet the electrical safety descriptions listed in the table above. For detailed information, or status of testing laboratory approvals/certifications, contact Foxboro.

Flowtube Identification

The flowtube can be identified by a data plate located on the housing surface of the flowtube. Typical data plates are shown in Figure 1. Refer to the applicable transmitter instruction for information regarding transmitter data plates.

NOTE: Do not remove flowtube from shipping carton without first reviewing the "Unpacking and Handling Procedures" section that follows.

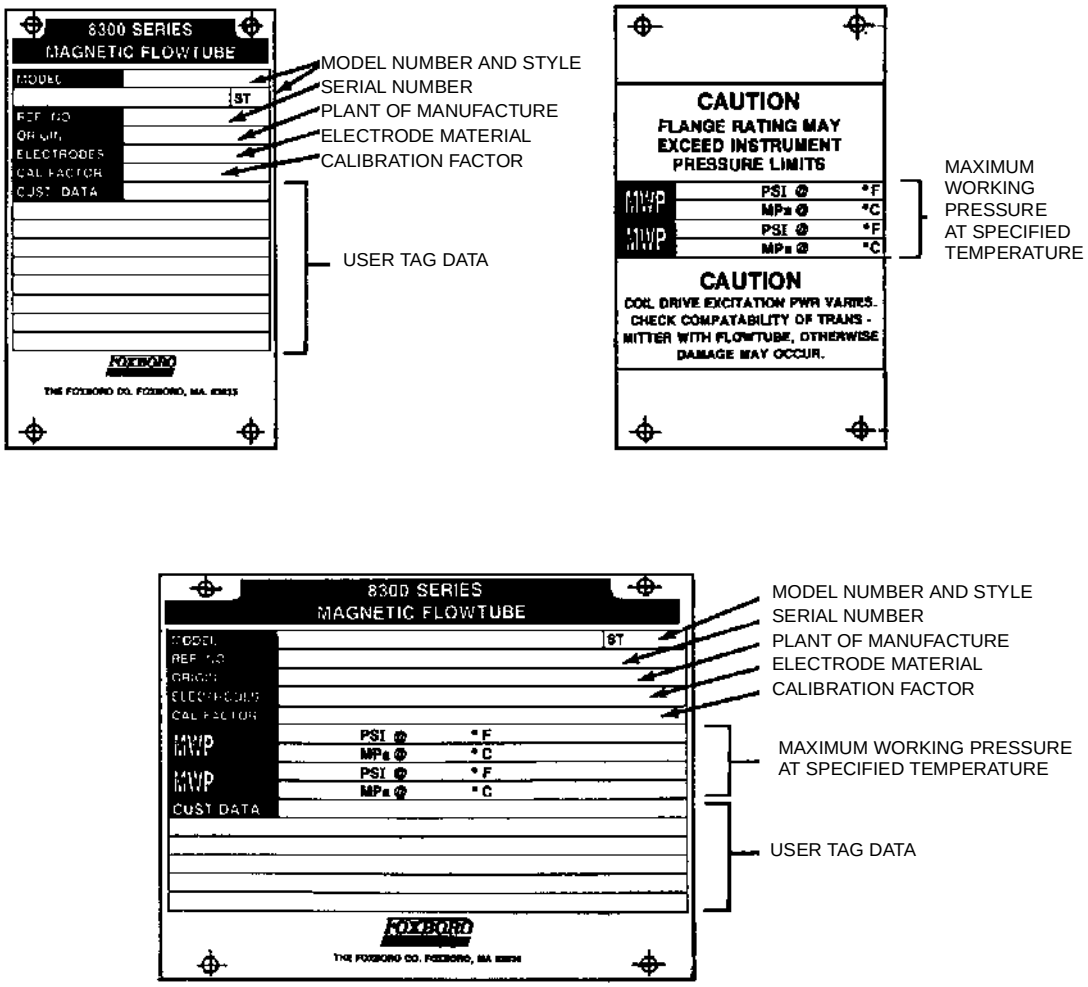


Figure 1. Flowtube Data Plate

Unpacking and Handling Considerations

Unpacking for Inspection

The Foxboro magnetic flowtube is built to be durable, but it is also part of a calibrated precision system and should be handled as such. Avoid dropping or otherwise subjecting it to impact, particularly at the flange faces.

The flowtube is shipped from the factory in a sturdy carton and cradled between flange covers for protection. Before removing it from the carton, move it as close as possible to its installation point. If the flowtube must be removed for receiving inspection, *reinstall the end covers after inspection*. This is particularly true with ptfe-lined flowtubes.

Lift flowtube out of carton with rope falls, chain hoist, etc. as shown in the “Flowtube Handling” sections that follow. In some instances it may be more convenient to insert bolts into the flange bolt holes and use hooks around the bolts for lifting (rather than tying slings

around the flowtube). *Never put anything through the flowtube to lift it, since this will cause damage to the lining.*

After removing flowtube from its shipping carton, inspect it for visible damage. If any damage is observed, notify the carrier immediately and request an inspection report. Obtain a signed copy of the report from the carrier.

Avoid touching electrodes with fingers or materials that can contaminate electrodes. Deposit on electrodes will result in high impedance boundary between electrodes and conductive fluid. If electrodes have been touched, clean them with isopropyl alcohol.

General Precautions

1. Leave end covers installed over flanges any time flowtube is put in storage. Do not cut or remove flowtube lining.

NOTE: In ptfe-lined flowtubes, the white material extending over the flanges is the ptfe lining, not packaging material. DO NOT ATTEMPT TO REMOVE OR CUT THE FLOWTUBE LINING.

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2. Check that cable length between flowtube and transmitter is within limit for specified system accuracy. Maximum cable length is 300 m (1000 ft).
3. Good piping practice should be used for the installation of all magnetic flowtubes. Gaskets are recommended. Select a gasket material which is compatible with the process liquid.
4. The flowtube lining extends outward and over the raised face of the flange.

CAUTION: To avoid damage to the lining extension, do not exceed torque values specified when tightening flange bolts.

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5. The flowtube lining (especially polyurethane) is susceptible to damage from excessive heat. Avoid such heat sources (such as welding adjacent piping).

To avoid excessive lining wear (especially with ptfe), it is recommended that five pipe diameters of straight section of pipe be connected from the flowtube flange end. If this recommendation cannot be met, it is suggested that a protective device (i.e., grounding ring) be installed on the upstream end of the flowtube.

Lifting Flowtube For Mounting

Care should be taken in lifting the flowtube into the pipeline position required for horizontal or vertical mounting. In order to prevent damage to the flowtube lining, housing, or the tube's structural integrity, it is important to reiterate flowtube handling precautions.

1. Never put anything through the flowtube to lift it.
2. Do not use the housing to support or lift the flowtube. Figures 2 through 5 show correct and incorrect methods for lifting the flowtubes. Note that in

Figure 2, Figure 3, and Figure 4 (horizontal lifting), the suggested approach is to place the lifting rope between the flange and flowtube body. For vertical lifting, shown in Figure 5, the use of eye bolts in the flange to which the lifting rope is attached is the preferred method. This ensures that the lifting force is applied to the eye bolts as nearly straight upward as possible.

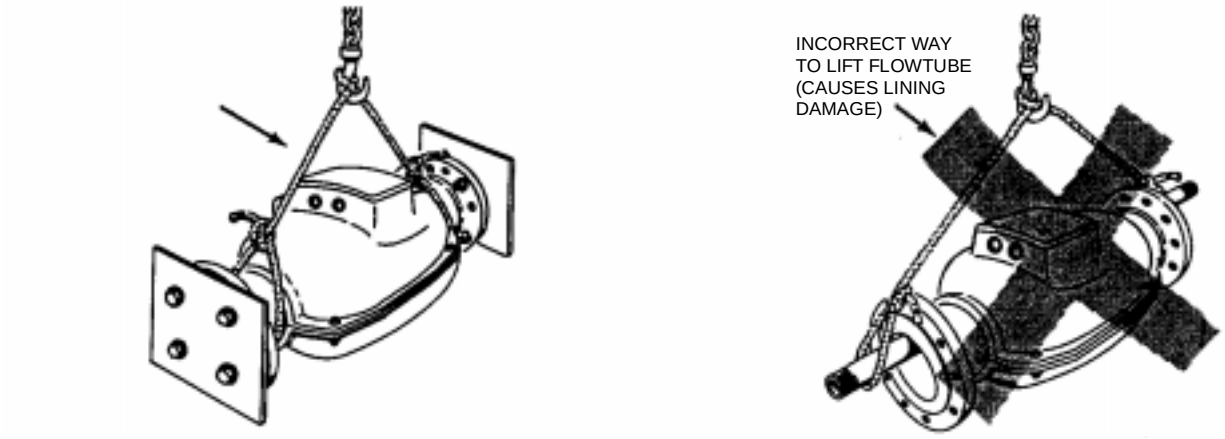

Figure 2. Lifting Flanged Flowtube for Horizontal Mounting (1/2- to 12-in Size Shown)

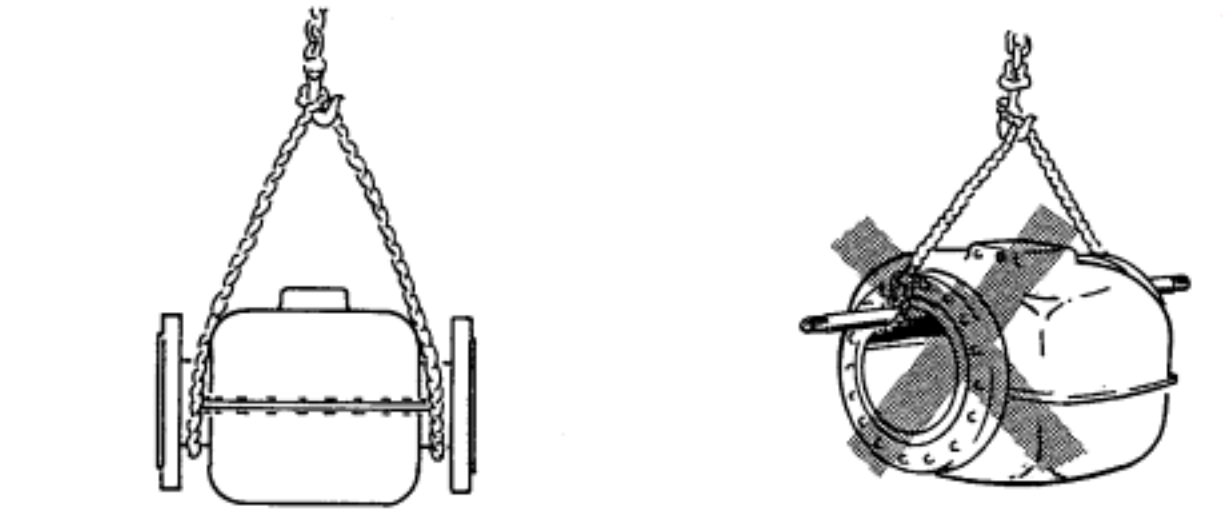

Figure 3. Lifting Flanged Flowtube for Horizontal Mounting (14- to 36-in Size Shown)

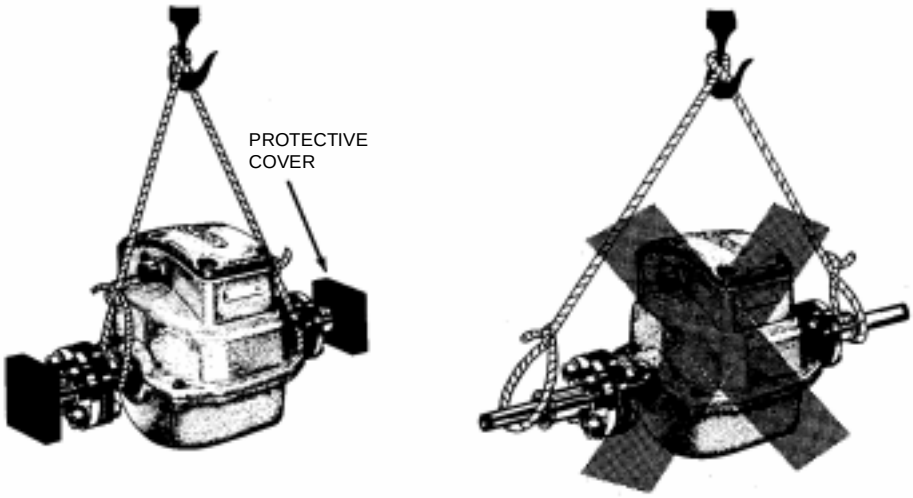

Figure 4. Lifting Sanitary Flowtube for Horizontal Mounting

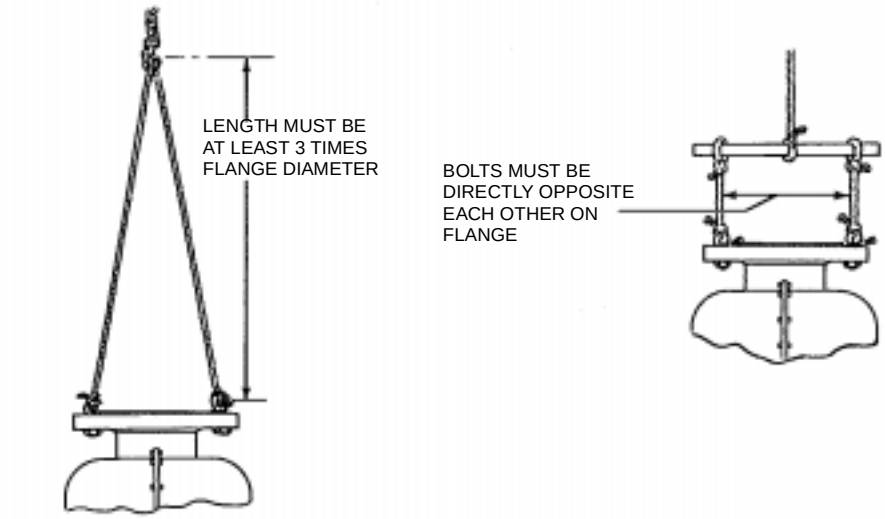

Figure 5. Lifting Flanged Flowtube for Vertical Mounting (14- to 36-in Size Shown)

Installation Procedures

The installation must comply with any local regulations. See MI 021-382 for electrical wiring. If flowtube is installed in a Division 1 area, refer to MI 021-365 for installation of purge to flowtube.

Flowtube Dimensions

Refer to the Dimensional Prints listed in the “Reference Documents” section.

Lining Application

Refer to Table 8 for recommended application of each lining. Also refer to TI 27-71f to best determine compatibility of lining with fluid types and fluid characteristics.

Table 8. Lining Application Guide

Flowtube Construction	Fluid Characteristic*					
	Clean	Mild Corrosion	Severe Corrosion	Mild Abrasion	Severe Abrasion	Mild Corrosion and Abrasion
ptfe Lining	A	A	A	B	X	B
Polyurethane Lining	A	B	X	A	A	B
Neoprene Lining	A	A	X	A	X	A

*A = Preferred: Generally considered best choices.
B = Satisfactory: Reasonable life under most conditions.
X = Not Recommended: Generally considered unsuitable.

Use of ptfe Lining

Because of its inertness to a wide range of acids and bases, the ptfe lining is best suited for corrosive processes.

Use of Polyurethane Lining

Because of its abrasive resistance and high wear resistance, this lining is best suited for abrasive slurries.

Use of Neoprene Lining

This lining is best suited for general purpose use.

CAUTION: Do not use hydrocarbon defoamers, such as kerosene or sulfonated oils, with the neoprene lining as they cause Neoprene to swell.

Pre-Startup Flowtube Cleaning

If possible, make up a flanged "spool piece" the same length as the flowtube. Insert it in the line before startup. On startup, any foreign objects in the line, such as pieces of wood or metal, should be located and removed before the flowtube is installed. This greatly lessens the possibility of accidental damage to the flowtube. Refer to Table 9 for end-to-end dimensions of the different flowtube sizes.

Table 9. End-to-End Dimensions, Flanged End and Sanitary End Connections

Flowtube Size		Flanged End Flowtubes with the Following Linings			Sanitary End Flowtubes with the Following Lining
mm	in	ptfe(a)	Polyurethane	Neoprene	ptfe
15	½	365 mm (14.4 in)	–	–	518 mm (20.4 in)
25	1	365 mm (14.4 in)	–	–	518 mm (20.4 in)
40	1 ½	365 mm (14.4 in)	–	–	518 mm (20.4 in)
50	2	365 mm (14.4 in)	356 mm (14.0 in)	–	518 mm (20.4 in)
80	3	418 mm (16.4 in)	406 mm (16.0 in)	–	568 mm (22.4 in)
100	4	418 mm (16.4 in)	406 mm (16.0 in)	–	–
150	6	522 mm (20.6 in)	508 mm (20.0 in)	–	–
200	8	624 mm (24.6 in)	610 mm (24.0 in)	–	–
250	10	726 mm (28.6 in)	711 mm (28.0 in)	–	–
300	12	828 mm (32.6 in)	813 mm (32.0 in)	–	–
350	14	726 mm (28.6 in)	711 mm (28.0 in)	711 mm (28.0 in)	–
400	16	772 mm (30.6 in)	762 mm (30.0 in)	762 mm (30.0 in)	–
450	18	879 mm (34.6 in)	864 mm (34.0 in)	864 mm (34.0 in)	–
500	20	879 mm (34.6 in)	864 mm (34.0 in)	864 mm (34.0 in)	–
600	24	980 mm (38.6 in)	965 mm (38.0 in)	965 mm (38.0 in)	–
750	30	–	1067 mm (42.0 in)	1067 mm (42.0 in)	–
900	36	–	1219 mm (42.0 in)	1219 mm (42.0 in)	–

(a) On flanged end flowtubes with ptfe lining, when the optional ptfe lining protector is used, add 25 mm (1 in) to the end-to-end dimension.

Mounting Positions

The flowtube can be mounted in any position: vertical, horizontal, or at an angle, as long as both electrodes are in constant contact with the measured liquid (see Figure 6). However, for accurate measurement, the flowtube must be completely full. Vertical installation with flow in an upward direction, as shown in Figure 7, is generally recommended. This is particularly so

in slurries with abrasive solids. If mounting flowtube in other than a vertical position, it is recommended that it be turned about the flow axis shown in Figure 8 so that electrodes are in a horizontal plane. Electrodes should be in a horizontal plane to avoid contacting bubbles (at top) or sediment (at bottom) inside metering flowtube.

NOTE: Figure 7 and Figure 8 also show the recommended length of straight piping upstream and downstream from the center of the flowtube. To avoid possible loss of accuracy with a flowtube, it is recommended that the flowtube be connected in a straight section of pipe at least five pipe diameters upstream from the center line of the flowtube and three pipe diameters downstream. The center line of the flowtube is the same location as the electrode location. Note, on some small line size flowtubes, the recommended straight runs of pipe are already included in the overall length of the flowtube.

Flow through the flowtube can be in either direction. However, if it is installed with the "direction-of-flow" arrow pointing upstream, it will be necessary to reverse the flowtube coil-drive wires. An indication that the coil-drive wires should be reversed is given by a negative flow reading or "-A" reading during process flow. Wiring details are given in the System Wiring section of the applicable transmitter installation instructions.

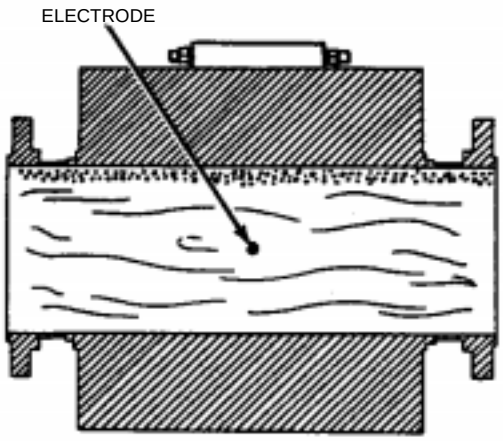

Figure 6. Horizontally Mounted Flowtube Showing Correct Relationship of Electrodes

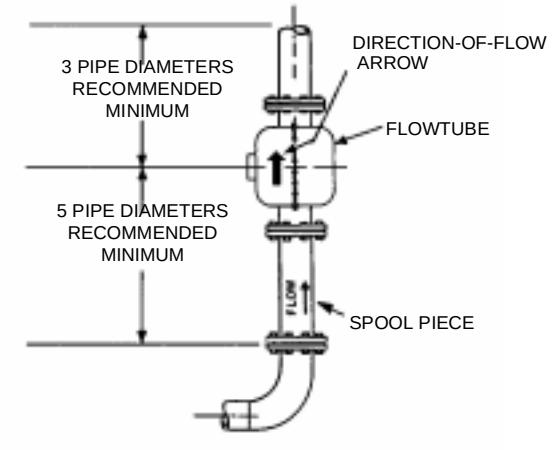

Figure 7. Flanged Body Flowtube Mounted Vertically

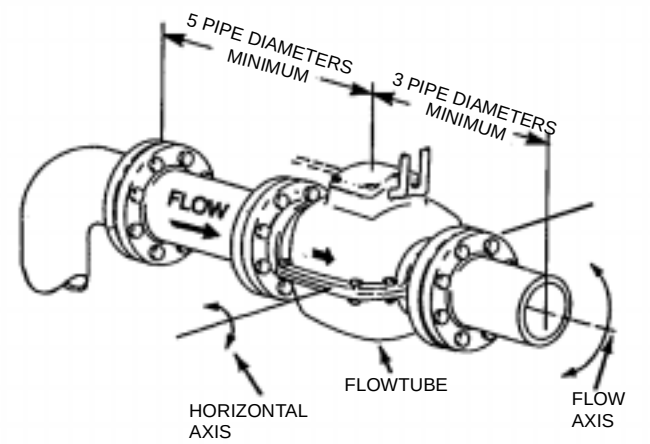

Figure 8. Flanged Body Flowtube Mounted Horizontally

Flowtube Earthing (Grounding)

Continuity between flowing liquid and metal metering tube is required to provide a reference for the measurement signal. With *unlined metal pipe* connected to the flowtube flange, continuity is provided by the pipe and the flange bolts. Refer to the System Wiring section of the applicable transmitter installation instructions for earthing (grounding) details between the transmitter, flowtube, and earth.

Installations in which *non-metal or lined metal* pipe is used require installation of earthing rings (grounding rings) on each flowtube flange as shown in Figure 9. To provide continuity, connect one end of a wire (recommended size is 8 AWG or 10 mm^2) to the grounding ring; connect the other end to a flange bolt or to a hole drilled and tapped in the flange. For flowtube sizes greater than 300 mm (12 in), use two ground wires on each end. Ground rings can be made from orifice plates. Inside diameters of the grounding rings should be slightly less than the inside diameter of the flowtube liners. This reduced grounding ring inside diameter

will provide positive contact with the process liquid and protect the leading edge of the flowtube liner from abrasives. Refer to Table 10 for the inside bore diameter of grounding rings.

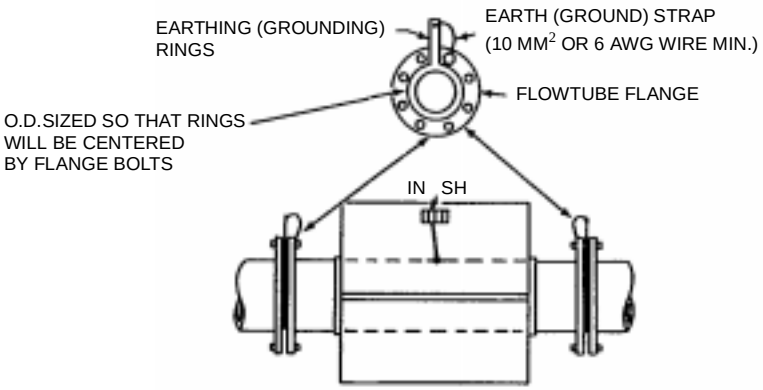

Figure 9. Use of Earthing (Grounding) Rings with Flanged End Flowtubes

Table 10. Grounding Ring Bore Diameters

Flowtube Size		Bore Diameter					
		ptfe		Polyurethane		Neoprene	
mm	in	mm	in	mm	in	mm	in
15	½	11.1	0.437	N/A	N/A	N/A	N/A
25	1	21.4	0.843	N/A	N/A	N/A	N/A
40	1½	36.5	1.437	N/A	N/A	N/A	N/A
50	2	48.4	1.906	42.1	1.656	N/A	N/A
80	3	75.4	2.968	70.2	2.765	N/A	N/A
100	4	101	3.968	92.5	3.640	N/A	N/A
150	6	152	5.984	146	5.734	N/A	N/A
200	8	200	7.875	196	7.703	N/A	N/A
250	10	253	9.968	249	9.796	N/A	N/A
300	12	303	11.937	299	11.765	N/A	N/A
350	14	330	13.000	337	13.25	340	13.38
400	16	381	15.000	387	15.25	391	15.38
450	18	432	17.000	438	17.25	442	17.38
500	20	483	19.000	489	19.25	492	19.38
600	24	584	23.000	584	23.00	594	23.38
750	30	737	29.000	737	29.00	746	29.38
900	36	889	35.000	889	35.00	899	35.38

Mounting Procedure - Flanged End Flowtubes

CAUTION: Excessive forces during installation and operation of flowtube can crush extended ends of flowtube lining. Some causes of these forces are excessive bolt torque, weight of vertical pipeline, thermal expansion of pipeline, and misalignment of flanges. To minimize these forces, adhere to the following procedure.

1. Before installing flowtube, install and adequately support the piping. If flowtube is being mounted vertically, add piping supports above and below flowtube to avoid strain to flanges and to avoid damaging lining. Also, for horizontal mounting, do not rest flowtube on floor as this can cause undue flange alignment and stresses. The pipeline can support the flowtube adequately by merely using piping supports.
2. Leave space for later installation of flowtube. Adjust piping and flanges so that flanges will be aligned and parallel with flowtube flanges when flowtube is installed. Flanges must *not* be forced into alignment during installation of flowtube. See Figure 10 for correct alignment of piping. See Figure 11 for correct use of hoist in installing flowtube. Also allow for thermal expansion of piping during operation, as required.

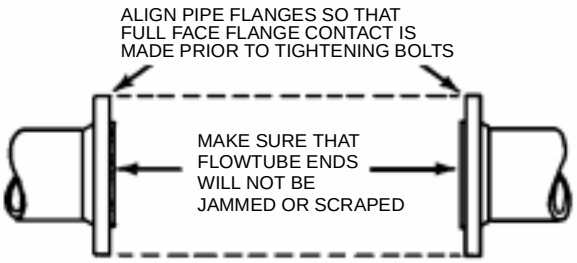

Figure 10. Piping Alignment for Flanged End Flowtube

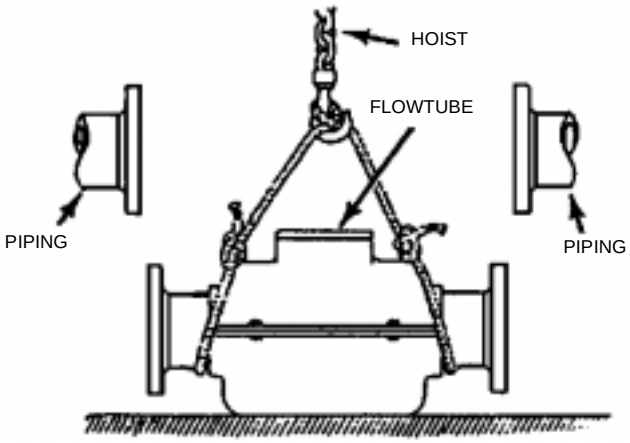

Figure 11. Hoisting Flowtube into Place

CAUTION: Piping supports must be firm enough so that addition of process fluid does not disrupt alignment of flowtube and adjacent piping.

3. Locate and remove all foreign objects from the piping. If possible, make up and install a section of pipe (spool piece) in the space provided for the flowtube. Start up the process to help locate any foreign objects.
4. To install the flowtube into the pipeline, proceed as follows:
   a. Hoist flowtube into place (see Figure 11).
   b. Refer to Figure 12. Spring back piping to allow clearance as necessary to insert flowtube without causing damage to lining.
   c. Install gaskets and grounding rings (as applicable) adjacent to flowtube flanges.
   d. Align flanges, install bolts, and position piping into place.
   e. Tighten flange bolts alternately and uniformly to torque values given in Table 11.

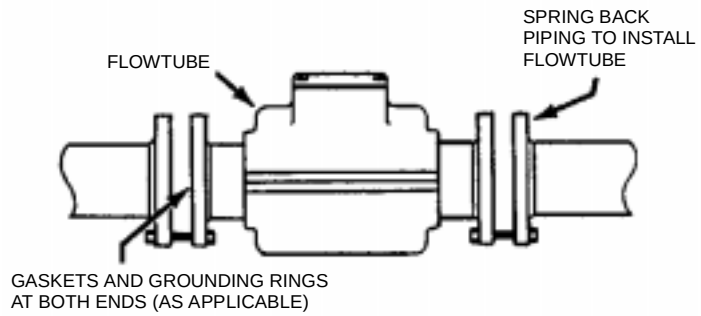

Figure 12. Installing Flowtube into Pipeline

Table 11. Flange-Bolt Torque Values for Flanged-End Flowtubes

Flowtube Size		Number of Bolts in Flange	Flange-Bolt Torque				Flowtube Size		Number of Bolts in Flange	Flange-Bolt Torque	
			ptfe		Polyurethane					All Liners	
mm	in		n·m	lb·ft	n·m	lb·ft	mm	in		n·m	lb·ft
15	½	4	7	5	–	–	350	14	12* 16**	135 110	100 80
25	1	4	15	10	–	–	400	16	16	135	100
40	1½	4* 8**	20 15	15 10	–	–	450	18	16* 20**	170 135	125 100
50	2	4* 8**	35 20	25 15	55 30	40 20	500	20	20	170	125
80	3	4* 8**	55 35	40 25	80 55	60 40	600	24	20	200	150
100	4	8	40	30	60	45	750	30	24* 28**	200 200	150 150
150	6	8* 12**	80 60	60 45	120 95	90 70	900	36	28* 32**	240 240	175 175
200	8	8* 12**	100 80	75 60	150 120	120 90					
250	10	12* 16**	95 80	70 60	250	10					
300	12	12* 16**	110 95	80 70	300	12					

* 150-lb flange
**300-lb flange

Mounting Procedure - Sanitary End Flowtubes

Sanitary end flowtubes have the Tri-Clamp end connections already assembled to the magnetic flowtube. This is necessary to comply with 3A Sanitary Standards.

Prior to mounting the sanitary end flowtubes, if the abutting piping is in place, spring back this piping on either side to allow as much space as is required to install the flowtube without damaging the flowtube ends. Full face contact should be made prior to installing Tri-Clover clamps or clamping nuts. Refer to Table 9 for end-to-end dimensions, and to Figure 13 for mounting information.

The flowtube generally requires no more support than an equal length of pipe. However, care should be taken not to overstress the end connection interfaces. When the flowtube is vertically mounted, it should not be used to support the piping above it. When the flowtube is horizontally mounted, use either floor supports or hanger supports at surfaces A or B. Do not use the flowtube housing surface to support the installation. Refer to Figure 13.

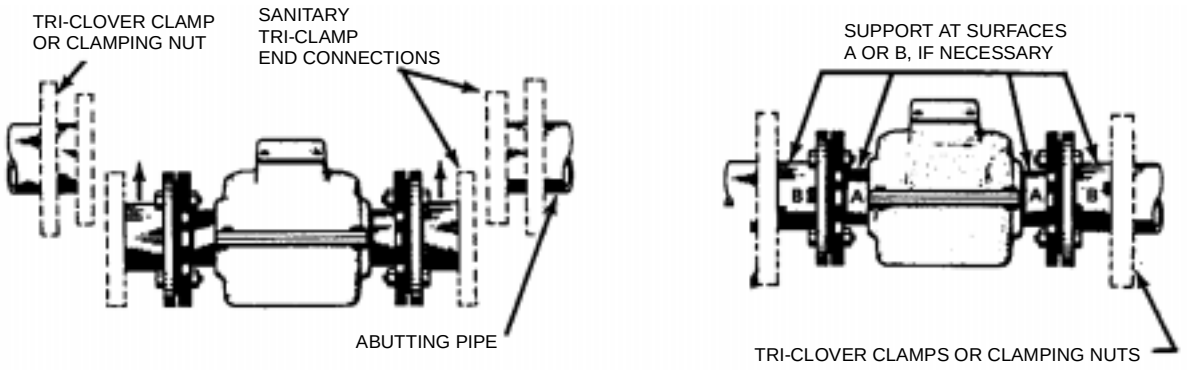

Figure 13. Mounting Sanitary End Flowtubes

Should it become necessary to remove or replace the sanitary end connection extension assembly, remove the flange bolts and remove the extension assembly. Reassemble the extension assembly as shown in Figure 14, and in accordance with the flange-bolt torques listed in Table 12.

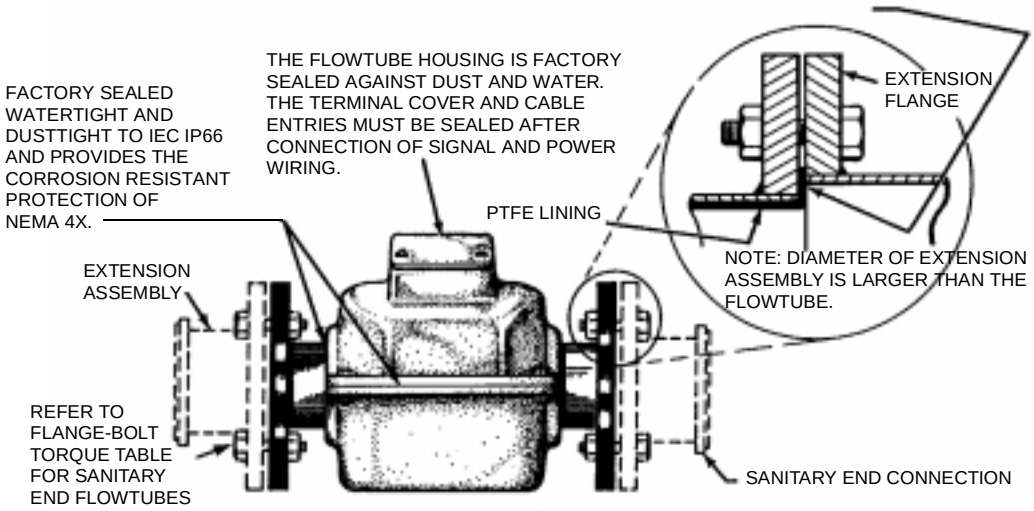

Figure 14. Assembling Sanitary End Connection Assembly to Flowtube

Table 12. Flange-Bolt Torque Values for Sanitary End Flowtubes

Flowtube Size		Line Size		Number of Bolts in Flange	Flange-Bolt Torque	
mm	in	mm	in		N·m	lb·ft
15	1/2	25	1	4	6	4
25	1	40	1-1/2	4	10	7
40	1-1/2	50	2	4	20	15
				8	14	10
50	2	80	3	4	27	20
				8	20	15
80	3	100	4	4	54	40
				8	34	25

NOTE: Bolts should be tightened gradually and in a sequence consistent with good flange-bolt tightening procedures. Do not overtighten, as this may damage the ptfe lining.

Flowtube Field Coil Connections

For pulsed dc systems, the flowtube coils are always wired in series as shown in Figure 15.

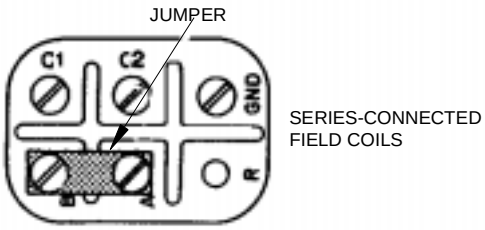

Figure 15. 8300 Series-Connected Field Coils Showing Jumper Position

Transmitter Installation And System Wiring

Transmitter installation and system wiring (flowtube and transmitter) are described in the applicable transmitter installation instructions. Refer to the “Reference Documents” section for the applicable transmitter document.

Maintenance

System fault location and maintenance information are described in the instruction book shipped with the applicable transmitter. For flowtube parts, refer to the applicable flowtube parts list in the “Reference Document” section.

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INSTRUCTION MANUAL
IM007

Models 3642/3742

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

GOULDS
WATER TECHNOLOGY
a xylem brand

Table of Contents

Owner's Information

Pump Model Number: _____

Pump Serial Number: _____

Dealer: _____

Dealer Phone No.: _____

Date of Purchase: _____

Date of Installation: _____

Current Readings at Startup:

1 Ø	3 Ø	L1-2	L2-3	L3-1
Amps: _____	Amps: _____	_____	_____	_____
Volts: _____	Volts: _____	_____	_____	_____

MODELS	
3642	**3742**
1 x 1¼ - 5	1 x 1¼ - 5
1¼ x 1½ - 5	1¼ x 1½ - 5

SAFETY INSTRUCTIONS

TO AVOID SERIOUS OR FATAL PERSONAL INJURY OR MAJOR PROPERTY DAMAGE, READ AND FOLLOW ALL SAFETY INSTRUCTIONS IN MANUAL AND ON PUMP.

THIS MANUAL IS INTENDED TO ASSIST IN THE INSTALLATION AND OPERATION OF THIS UNIT AND MUST BE KEPT WITH THE PUMP.

This is a SAFETY ALERT SYMBOL. When you see this symbol on the pump or in the manual, look for one of the following signal words and be alert to the potential for personal injury or property damage.

⚠ DANGER Warns of hazards that **WILL** cause serious personal injury, death or major property damage.

⚠ WARNING Warns of hazards that **CAN** cause serious personal injury, death or major property damage.

⚠ CAUTION Warns of hazards that **CAN** cause personal injury or property damage.

NOTICE: INDICATES SPECIAL INSTRUCTIONS WHICH ARE VERY IMPORTANT AND MUST BE FOLLOWED.

THOROUGHLY REVIEW ALL INSTRUCTIONS AND WARNINGS PRIOR TO PERFORMING ANY WORK ON THIS PUMP.

MAINTAIN ALL SAFETY DECALS.

⚠ WARNING

Hazardous fluids can cause fire, burns or death.

UNIT NOT DESIGNED FOR USE WITH HAZARDOUS LIQUIDS OR FLAMMABLE GASES. THESE FLUIDS MAY BE PRESENT IN CONTAINMENT AREAS.

DESCRIPTION and SPECIFICATIONS:

The 3642 (closed-coupled) and 3742 (frame-mounted) are single stage, end suction, centrifugal pumps for water circulation, booster service, liquid transfer, spraying systems, jockey pump and general service pumping. Pumps are available in three different materials of construction: all iron, bronze-fitted and all bronze.

Pump impellers are enclosed design for high efficiency, threaded directly on the motor shaft.

Close-coupled units have NEMA standard frame motors with C-face mounting and threaded shaft extensions. Frame mounted units can be coupled to motors through a spacer coupling, or belt driven.

ENGINEERING DATA

Maximum Liquid Temperature:

212° F (100° C) – standard seal

250° F (120° C) – Optional high temp. seal

Maximum Working Pressure: 125 psi

Starts per Hour: 20 - Evenly distributed

3642/3742		
Model	**Suction**	**Discharge**
1 x 1¼ - 5	1¼" NPT	1" NPT
1¼ x 1½ - 5	1½" NPT	1¼" NPT

INSTALLATION

Location:

Locate pump as near liquid source as practical; below level of liquid for repriming capability.

Allow adequate space for servicing and ventilation. Protect the unit from weather and water damage due to rain, flooding or freezing temperatures.

Close - Coupled Units

Units may be installed horizontally, inclined or vertically with the motor above the pump.

NOTICE: DO NOT INSTALL WITH MOTOR BELOW PUMP. ANY LEAKAGE OR CONDENSATION WILL AFFECT THE MOTOR.

Foundation:

A flat and substantial foundation surface **MUST** be provided to avoid distortion and/or strain when tightening the foundation bolts. A rubber mounting is acceptable to reduce noise or excessive vibration.

Tighten motor hold-down bolts **BEFORE** connecting piping to pump.

Frame-Mounted Units:

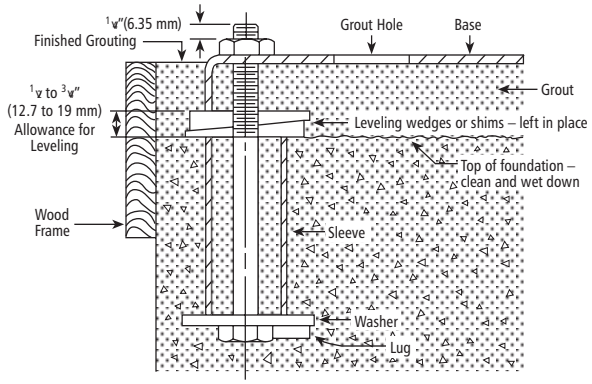


Figure 1

Bedplate must be grouted to a foundation with solid footing. Refer to Figure 1.

Place unit in position on wedges located at four points, two below approximate center of driver and two below approximate center of pump. Adjust wedges to level unit. Level or plumb suction and discharge flanges.

Make sure bedplate is not distorted and final coupling alignment can be made within the limits of movement of motor and by shimming, if necessary.

Tighten foundation bolts finger tight and build dam around foundation. Pour grout under bedplate mak-

ing sure the areas under the pump and motor feet are filled solid. Allow grout to harden 48 hours before fully tightening foundation bolts.

Tighten pump and motor hold-down bolts before aligning shaft or connecting the piping to pump.

PIPING

Piping should be no smaller than pump's discharge and suction connections and kept as short as possible, avoiding unnecessary fittings to minimize friction losses.

All piping **MUST** be independently supported and **MUST NOT** place any piping loads on the pump

NOTICE: DO NOT FORCE PIPING INTO PLACE AT PUMP SUCTION AND DISCHARGE CONNECTIONS.

All pipe joints **MUST** be airtight.

Piping – Suction

For suction lifts over 15 ft. (4.6 m), consult pump performance curve for net positive suction head required ($NPSH^R$).

If a pipe size larger than pump suction is required, an eccentric pipe reducer, with the straight side up, **MUST** be installed at the pump suction.

If pump is installed below the liquid source, install a gate valve in the suction for pump inspection and maintenance.

NOTICE: DO NOT USE THE GATE VALVE TO THROTTLE PUMP. THIS MAY CAUSE LOSS OF PRIME, EXCESSIVE TEMPERATURES AND DAMAGE TO PUMP, VOIDING WARRANTY.

If the pump is installed above the liquid source, the following **MUST** be provided:

To avoid air pockets, no part of the piping should be above the pump suction connection.

Slope the piping upward from liquid source.

Use a foot valve or check valve **ONLY** if necessary for priming or to hold prime during intermittent duty.

The suction strainer or suction bell **MUST** be at least three times the suction pipe diameter area.

Insure that the size and minimum submergence over suction inlet is sufficient to prevent air from entering pump through a suction vortex. See Figures 2 through 5.

Piping – Discharge

Install a check valve suitable to handle the flow, liquids and to prevent backflow. After the check valve, install an appropriately sized gate valve to be used to regulate the pump capacity, pump inspection and for maintenance.

When required, pipe increaser should be installed between the check valve and the pump discharge.

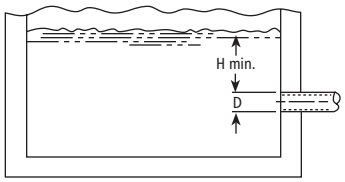


Figure 2

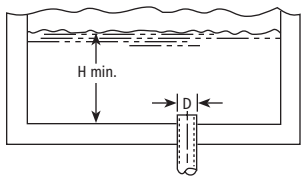


Figure 3

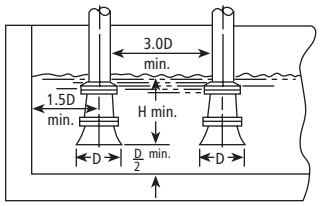


Figure 4

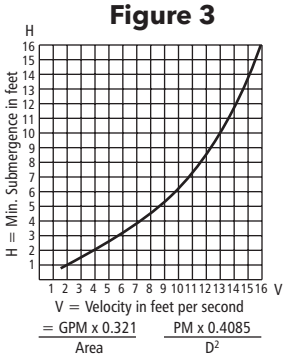


Figure 5

WIRING AND GROUNDING

Install, ground and wire according to local and National Electrical Code Requirements.

Install an all leg disconnect switch near the pump.

Disconnect and lockout electrical power before installing or servicing the pump.

Electrical supply **MUST** match pump's nameplate specifications. Incorrect voltage can cause fire, damage to the motor and voids the warranty.

Motors not protected **MUST** be provided with contactors and thermal overloads for single phase motors, or starters with heaters for three phase motors. See motor nameplate.

Use only copper wire to motor and ground. The ground wire **MUST** be at least as large as the wire to the motor. Wires should be color coded for ease of maintenance.

Follow motor manufacturer's wiring diagram on the motor nameplate or terminal cover carefully.

WARNING
Hazardous voltage

FAILURE TO PERMANENTLY GROUND THE PUMP, MOTOR AND CONTROLS BEFORE CONNECTING TO ELECTRICAL POWER CAN CAUSE SHOCK, BURNS OR DEATH.

COUPLING ALIGNMENT

FAILURE TO DISCONNECT AND LOCKOUT ELECTRICAL POWER BEFORE ATTEMPTING ANY MAINTENANCE CAN CAUSE SEVERE PERSONAL INJURY.

Alignment **MUST** be checked prior to running. See Figure 6.

Tighten all hold-down bolts before checking the alignment.

If realignment is necessary, always move the motor. Shim as required.

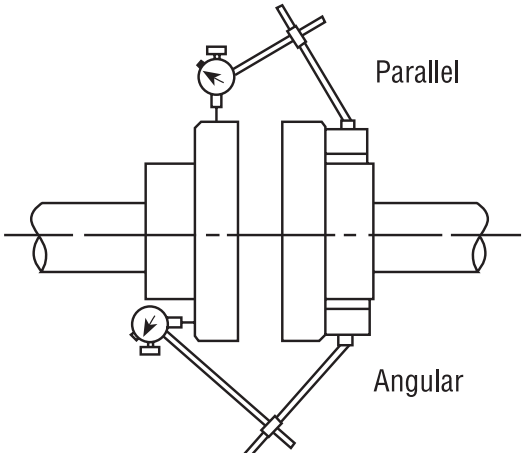


Figure 6

Parallel misalignment (shafts with axis parallel but not concentric). Place dial indicator on one hub and rotate this hub 360° while taking readings on the outside diameter of the other hub. Parallel alignment is achieved when reading is 0.005" (0.127 mm) TIR, or less.

Angular misalignment (shaft with axis concentric but not parallel). Place dial indicator on one hub and rotate this hub 360° while taking readings on the face of the other hub. Angular alignment is achieved when reading is 0.005" (0.127 mm) TIR, or less.

Final alignment is achieved when parallel and angular requirements are satisfied with motor hold-down bolts tight.

NOTICE: ALWAYS RECHECK BOTH ALIGNMENTS AFTER MAKING ANY MECHANICAL ADJUSTMENTS.

ROTATION

NOTICE: INCORRECT ROTATION MAY CAUSE DAMAGE TO THE PUMP AND VOIDS THE WARRANTY.

Correct rotation is right-hand, **CLOCKWISE** when viewed from the motor end. Remove motor end plug or cover to observe rotation.

To reverse three phase motor rotation, interchange any two power supply leads.

OPERATION

DO NOT OPERATE FRAME MOUNTED UNITS WITHOUT SAFETY GUARDS IN PLACE OR SEVERE PERSONAL INJURY MAY RESULT.

SPLASHING OR IMMERSING OPEN DRIP PROOF MOTORS IN FLUID CAN CAUSE FIRE, SHOCK, BURNS OR DEATH.

OPERATION AT OR NEAR ZERO FLOW CAN CAUSE EXTREME HEAT, PERSONAL INJURY OR PROPERTY DAMAGE.

NOTICE: NO NOT RUN PUMP DRY OR SEAL DAMAGE WILL RESULT.

After stabilizing the system at normal operating conditions, check the piping. If necessary, adjust the pipe supports.

On frame-mounted units, coupling alignment may have changed due to the temperature differential between pump and motor. Recheck alignment following procedures and hazard warnings in **"COUPLING ALIGNMENT"** section of this manual.

MAINTENANCE

FAILURE TO DISCONNECT AND LOCKOUT ELECTRICAL POWER BEFORE ATTEMPTING ANY MAINTENANCE CAN CAUSE SHOCK, BURNS OR DEATH.

FAILURE TO RELIEVE SYSTEM PRESSURE AND DRAIN SYSTEM BEFORE ATTEMPTING ANY MAINTENANCE CAN CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

Close-Coupled Units:

Bearings are located in and are part of the motor. For lubrication information, refer to motor manufacturer's instructions.

Frame-Mounted Units:

Pump bearing frames have greased for life bearings. No lubrication is possible or necessary.

Follow motor and coupling manufacturer's lubrication instructions.

Seasonal Service:

To **REMOVE** pump from service, remove drain plug and drain all unprotected piping.

To **RETURN** pump to service, replace drain plug using Teflon™ tape or equivalent.

Reconnect suction line if removed, examine union and repair if necessary.

Refer to "**OPERATION**" section of manual.

DISASSEMBLY

Follow ALL warnings and instructions in the "**MAINTENANCE**" section of this manual.

Close-coupled units: Remove motor hold-down bolts.

Frame-mounted units: Remove coupling guard, spacer, coupling and frame hold-down bolts.

Liquid End:

1. Remove casing bolts (370).
2. Remove back pull-out assembly from casing (100).
3. Remove casing gasket (351). Discard.
4. On close-coupled units, remove motor end plug or cover to expose screwdriver slot or flats on end of motor shaft.
5. While restraining shaft with an appropriate tool (close-coupled units) or with a strap wrench (frame-mounted units) remove impeller nut (304) by turning **COUNTERCLOCKWISE**. Impeller nut may need to be heated with torch to remove.

NOTICE: EXERCISE CAUTION WHEN HANDLING HOT IMPELLER NUT.

6. While restraining shaft, remove impeller (101) by turning **COUNTERCLOCKWISE**. Impeller may need to be heated to remove.

NOTICE: EXERCISE CAUTION WHEN HANDLING HOT IMPELLER.

7. Using two screwdrivers, pry off rotating section of mechanical seal assembly (383), discard. See Figure 7.

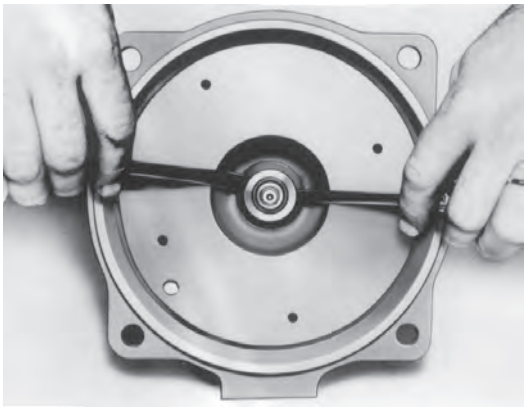


Figure 7

8. Remove adapter bolts (371) and adapter (108), pulling with it the mechanical seal stationary seat.
9. Push out the mechanical seal stationary seat from the motor side of the adapter. Discard.

Bearing Frame:

1. Remove bearing cover (109).
2. Remove retaining ring (361).
3. Remove shaft assembly from frame.
4. If worn or damaged, remove lip seals (138, 139) from bearing frame (228) and bearing cover (109).
6. Use bearing puller or arbor press to remove ball bearings (112, 168).

REASSEMBLY

All parts should be cleaned before assembly.

Refer to parts list for description of replacement items. Specify pump index number when ordering parts.

Bearing Frame:

1. Replace lip seals if removed.
2. Replace ball bearings if loose, rough or noisy when rotated.
3. Check shaft (122) for runout. Maximum permissible is 0.002" (0.051 mm) TIR.

Liquid End:

1. Inspect shaft removing any debris or burrs.
2. Treat shaft threads with LOCQUIC® Primer "T", or equivalent, following manufacturer's instructions carefully.

NOTICE: MECHANICAL SEAL MUST BE REPLACED WHENEVER SEAL HAS BEEN REMOVED. FOLLOW SEAL MANUFACTURER'S INSTRUCTIONS CAREFULLY.

3. Stationary seal seat may be dipped in water or glycerin to ease installation. Place stationary seal seat squarely into adapter seal bore. Cover the polished face of the seat with a thin piece of cardboard or paper towel. Press seat firmly into bore using a round piece of plastic or wood that disperses the force over the entire seal face.
4. Place adapter, concave face pointing up, over motor shaft and lower it onto the motor adapter. Exercise care in that the motor shaft does not dislodge or damage seal seat.
5. Fully and squarely install the rotary assembly of seal against the stationary seat.
6. Apply LOCTITE® #262 or equivalent, to shaft threads and install impeller on shaft by turning **CLOCKWISE** until it bottoms on the motor shaft.
7. Apply LOCTITE® #262 or equivalent, to impeller nut and tighten to 20 lbs. ft. (27 N•m).
8. Replace casing gasket.

9. Replace casing bolts, tightening to 37 lbs. ft. (50 N•m) in a crossing sequence.

10. Check reassembled unit for binding by rotating shaft.

11. If rubbing exists, loosen casing bolts and proceed with tightening sequence again.

12. On close-coupled units, replace motor end plug or cover and motor hold-down bolts.

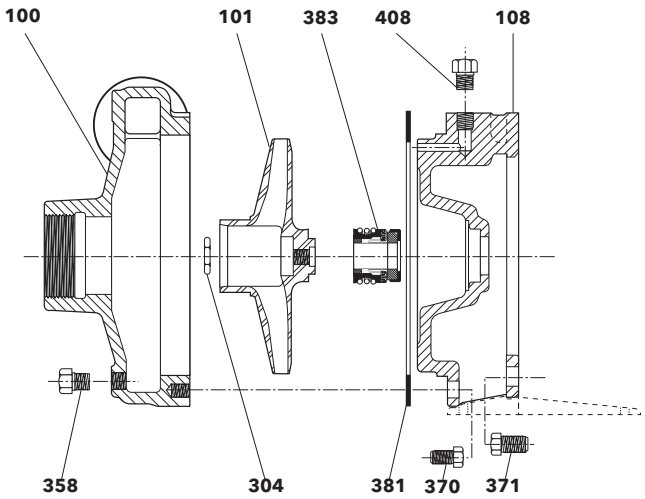
13. On frame-mounted units, replace coupling, spacer, coupling guard and frame hold-down bolts.

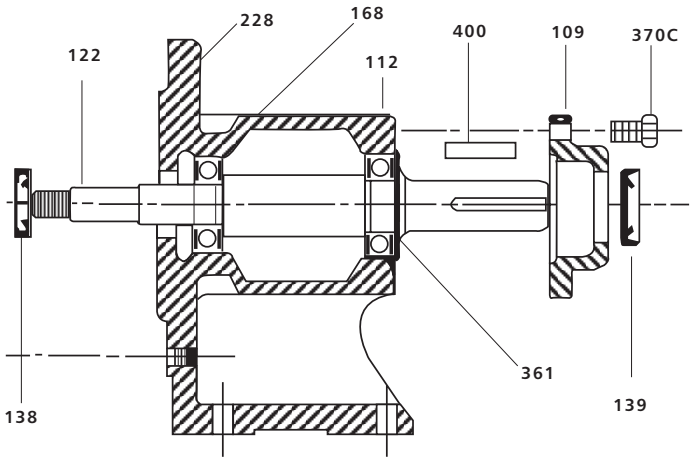
NOTICE: ALWAYS RECHECK BOTH COUPLING ALIGNMENTS AFTER MAKING ANY ADJUSTMENTS.

14. Refer to "**COUPLING ALIGNMENT**" section of manual to realign shaft.

15. Assembly is complete.

REPAIR PARTS





LIQUID END COMPONENTS			POWER END COMPONENTS		
Item #	**Description**	**Material**	**Item #**	**Description**	**Material**
100	Casing	Iron/Bronze	109	Bearing Cover	Cast Iron
101	Impeller	Iron/Bronze	112	Bell Bearing (Outboard)	Stainless Steel
108	Adapter	Iron/Bronze	122	Pump Shaft	Stainless Steel
304	Impeller Nut	Stainless Steel	138	Lip Seal - Inboard	BUNA-N/Steel
351	Casing Gasket	Composite	139	Lip Seal - Outboard	BUNA-N/Steel
358	Drain Plug	Steel	168	Ball Bearing-Inboard	Stainless Steel
370	Hex Head Cap Screw (Casing to Adapter)	Steel	228	Bearing Frame	Cast Iron
371	Hex Head Cap Screw (Adapter to Motor)	Steel	361	Retaining Ring	BUNA-N/Steel
383	Mechanical Seal	See Chart	370C	Hex Head Cap Screw (Frame to Cover)	Steel
408	Prime Plug - ¼" NPT	Steel/Brass	400	Shaft Key	Stainless Steel

Mechanical Seal Options					
Equipment	**Service**	**Rotary**	**Stationary**	**Elastomers**	**Metal Parts**
Standard	General	Carbon	Ceramic	BUNA-N	300 Series Stainless Steel
Optional	Heavy-Duty		Ni-Resist	BUNA-N	
	Hi-Temperature		Ni-Resist	EPR	
	Chemical		Ceramic	Viton	

FAILURE TO DISCONNECT AND LOCKOUT ELECTRICAL POWER BEFORE ATTEMPTING ANY MAINTENANCE CAN CAUSE SHOCK, BURNS OR DEATH.

SYMPTOM:

Motor Not Running
See Probable Cause – 1 through 5

Little or No Liquid Delivered
See Probable Cause – 6 through 13

Excessive Power Consumption
See Probable Causes – 3, 13, 14, 15

Excessive Noise and Vibration
See Probable Causes – 3, 6, 7, 10, 12, 14, 16, 17

PROBABLE CAUSES:

1. Motor thermal protector tripped
2. Open circuit breaker or blown fuse
3. Impeller binding
4. Motor improperly wired
5. Defective motor
6. Pump is not primed, air or gases in pumpage
7. Discharge, suction plugged or valve closed
8. Incorrect rotation (3 phase only)
9. Low voltage or phase loss
10. Impeller worn or plugged
11. System head too high
12. $NPSH_A$ too low – Excessive suction lift or losses
13. Incorrect impeller diameter
14. Discharge head too low – excessive flow rate
15. Fluid viscosity, specific gravity too high
16. Worn bearing
17. Pump, motor or piping loose

GOULDS WATER TECHNOLOGY LIMITED WARRANTY

This warranty applies to all water systems pumps manufactured by Goulds Water Technology.

Any part or parts found to be defective within the warranty period shall be replaced at no charge to the dealer during the warranty period. The warranty period shall exist for a period of twelve (12) months from date of installation or eighteen (18) months from date of manufacture, whichever period is shorter.

A dealer who believes that a warranty claim exists must contact the authorized Goulds Water Technology distributor from whom the pump was purchased and furnish complete details regarding the claim. The distributor is authorized to adjust any warranty claims utilizing the Goulds Water Technology Customer Service Department.

The warranty excludes:

(a) Labor, transportation and related costs incurred by the dealer;
(b) Reinstallation costs of repaired equipment;
(c) Reinstallation costs of replacement equipment;
(d) Consequential damages of any kind; and,
(e) Reimbursement for loss caused by interruption of service.

For purposes of this warranty, the following terms have these definitions:

(1) "Distributor" means any individual, partnership, corporation, association, or other legal relationship that stands between Goulds Water Technology and the dealer in purchases, consignments or contracts for sale of the subject pumps.
(2) "Dealer" means any individual, partnership, corporation, association, or other legal relationship which engages in the business of selling or leasing pumps to customers.
(3) "Customer" means any entity who buys or leases the subject pumps from a dealer. The "customer" may mean an individual, partnership, corporation, limited liability company, association or other legal entity which may engage in any type of business.

THIS WARRANTY EXTENDS TO THE DEALER ONLY.

xylem
Let's Solve Water

Xylem, Inc.
2881 East Bayard Street Ext., Suite A
Seneca Falls, NY 13148
Phone: (800) 453-6777
Fax: (888) 322-5877
www.xyleminc.com/brands/goulds watertechnology

Griffco Valve Inc.

6010 North Bailey Ave, Suite 1B
Amherst, NY 14226
Phone: 716-835-0891 or 1-800-GRIFFCO
Fax: 716-835-0893 or 1-888-830-7979

Instruction Manual

Back Pressure Valves
Pressure Relief Valves

Call 1 - 800 - GRIFFCO **Website: www.griffcovalve.com**

INS 1002-2005

INTRODUCTION

GRIFFCO diaphragm back pressure valves are used to enhance the performance of chemical feed pumps and systems by providing a constant discharge head pressure. These valves also function as an anti-siphon valve. The diaphragm is held against the seat by the internal spring. Back pressure is adjustable from 10 - 150 psi via the adjustment screw. When the inlet pressure exceeds the preset pressure the diaphragm lifts off the seat and the chemical flows to the injection point. After each discharge stroke of the pump, as the pressure drops, the diaphragm reseats itself.

GRIFFCO diaphragm pressure relief valves are designed to protect chemical feed pumps and systems from overpressure caused by defective equipment or blockages in the chemical line.

The 3 port design allows chemical to flow through the valve via an internal chamber. When the pressure in the chemical line exceeds the preset pressure of the valve the diaphragm lifts off the seat and the chemical then flows out the bottom port back to the chemical tank. Relief pressure is adjustable form 10 - 150 psi via the adjustment screw in the top of the valve.

INSTALLATION

Back Pressure Valve:

Generally, the back pressure valve can be installed anywhere in the discharge line, provided there is some downstream pressure at the dosage point. If there is no downstream pressure the back pressure valve should be installed at the dosage point to prevent siphoning and drainage of the chemical line. All **GRIFFCO** valves are factory set at 50 psi, unless otherwise specified. Field adjustment is possible with the adjustment screw.

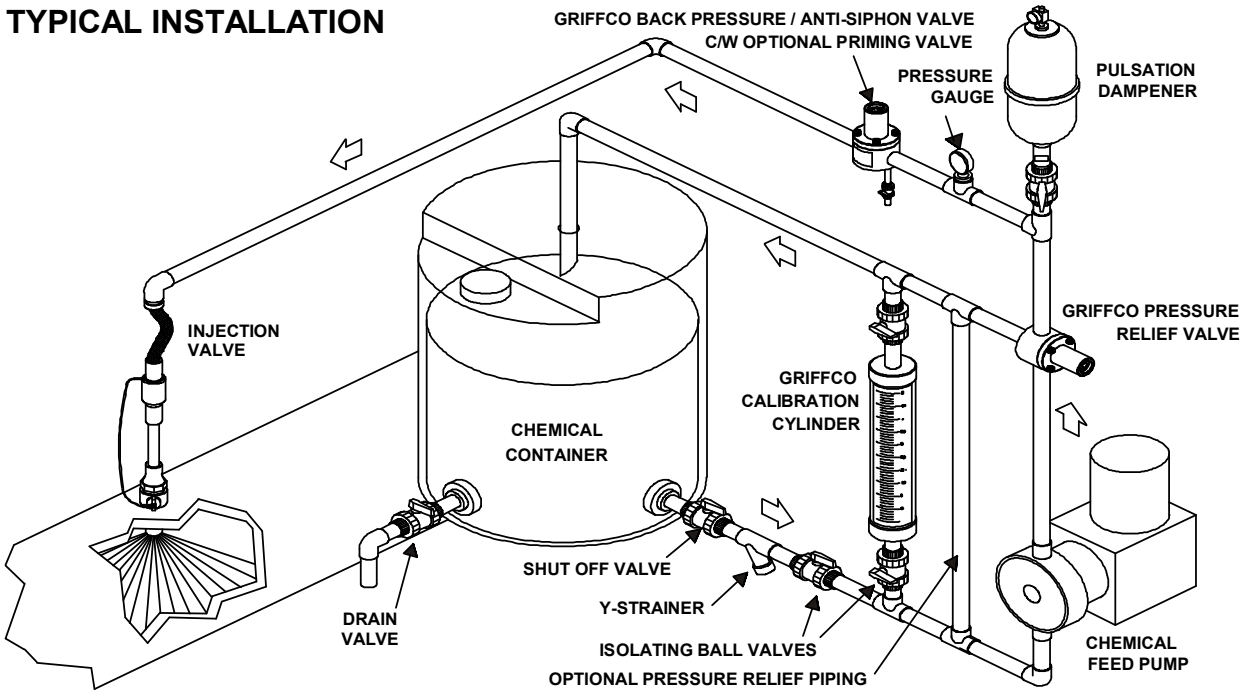
Back pressure valve performance will be enhanced with the installation of a pulsation dampener to smooth out the discharge / suction cycles of the pump. Thus, the diaphragm is free to float inside the valve chamber, minimizing the wear on the stress points of the diaphragm. For many low pressure applications dampeners without diaphragms are acceptable. These pulsation dampeners should be sized at 12 - 15 times the dosage volume of the pump head. For some applications diaphragm type dampeners are required. Generally speaking 5 to 10% dampening is sufficient. Consult with your pump manufacturer to get his recommendations.

Pressure Relief Valve:

Installation should be made as close to the chemical pump discharge valve as possible, without any equipment, especially shut-off valves, between the valve and the pump. Direction of flow must be across the valve, however the side of entry is not important. All **GRIFFCO** valves are factory set at 50psi, however field adjustment is possible with the adjustment screw.

The optimum installation for the relief valve is to vent the relief port back to the chemical tank, or directly to a containment area. However if this is not possible, the relief port can be piped back into the suction side of the pump. This will apply the suction head to the relief port. To compensate, divide the NPSH by 4 and add this pressure to the relief valve setting.

TYPICAL INSTALLATION



MAINTENANCE:

The pressure relief and back pressure valves were designed with minimizing the amount of maintenance required to keep the valves in operation. However, periodic replacement of the diaphragm is required. To facilitate inspection and replacement, the valve layout is such that removal of the diaphragm can be done without taking the valve out of the chemical line.

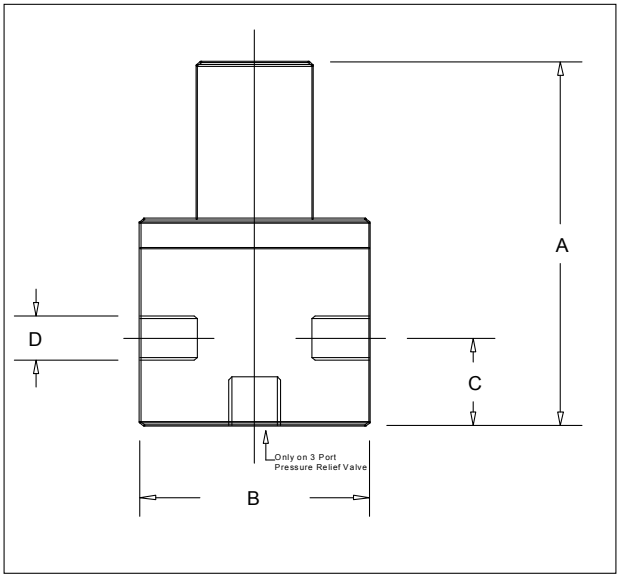
Caution: Ensure the system is not under pressure and that the chemical lines are flushed with water before disassembly.

Unscrew the pressure adjustment screw to remove the pressure from the diaphragm. Remove the 4 cap nuts and lift off the valve top. (On T-Series valves unscrew the valve top)

After the diaphragm and the valve seat have been inspected and replaced if necessary check the adjustment spring. Make sure there is no rust or corrosion. Replaced the spring and the spring bumper into the valve top and slide the top back over the four bolts. (On T-Series valves thread the valve top to the valve body)

Snug down the four cap nuts. (On T-Series – Snug hand tight then tighten ¼ turn) Screw in the tension adjuster to approximately the same position as it was prior to disassembly. If an exact pressure setting is required or a different pressure is desired a pressure gauge should be used to verify the setting. Pressure can be increased by turning the pressure adjustment screw clockwise.

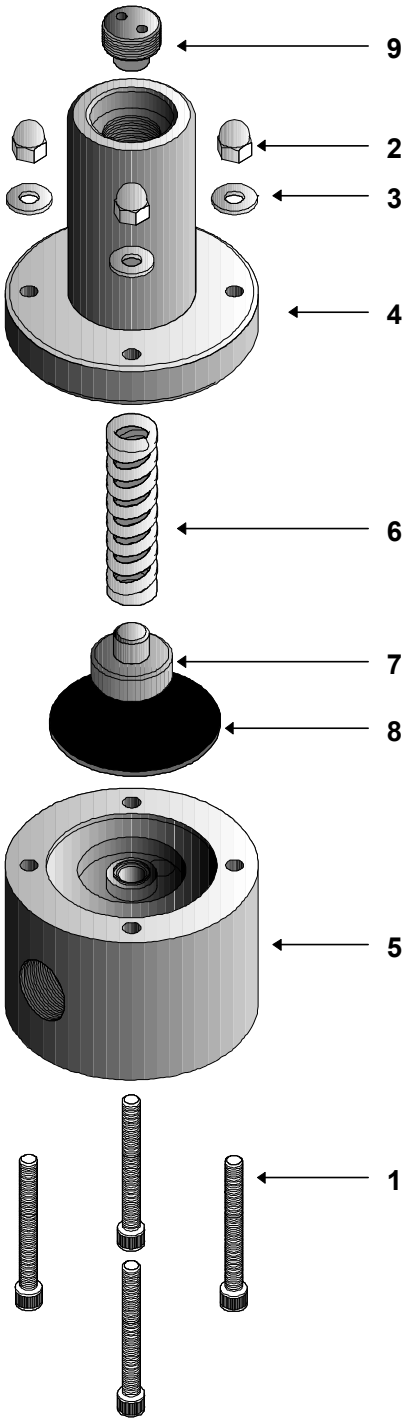
DIMENSIONS:



D	A	B	C
1/4”	3.50	2.375	0.750
3/8”	3.50	2.375	0.750
1/2”T-Series	4.60	2.375	1.125
1/2”	5.50	3.50	1.125
3/4”	5.50	3.50	1.125
1”	6.25	3.50	1.375
1 1/2”	9.00	4.50	2.10
2”	9.00	5.00	2.10

NOTE: Dimensions are general. See dimension sheets for exact sizes of various material valves.

PARTS LIST



ITEM	DESCRIPTION	PART #
1	Bolt - 1/2 - 1" Plastic Valves – ¼ - 20 X 2 ¾"	PV-00101
	Bolt - 1 1/2" - 2" Metal Valves – 5/16 – 18 X 1 ½"	PV-00102
	Bolt - 1 1/2" - 2" Plastic Valves – 5/16 – 18 X 5"	PV-00105
	Bolt - 1/4" Plastic Valves – 10/32 x 1 ¾"	PV-00106
	Bolt - 1/4" Metal Valves – 10/32 X ¾"	PV-00107
	Bolt - 1/2 - 1" Metal Valves – ¼ - 20 x 1 ¼"	PV-00108
2	10/32 Cap hex nut	PV-00201
	1/4 - 20 Cap hex nut	PV-00202
	5/16 - 18 Cap hex nut	PV-00203
3	10/32 Flat washer	PV-00301
	1/4 Flat washer	PV-00302
	5/16 Flat washer	PV-00303
4	1/4" – 1/2" T-Series Alloy Valve Top, Bolted – Noryl, Grey	PV-004011
	1/4" – 1/2" T-Series Alloy Valve Top, Bolted – PVC, Orange	PV-004012
	1/4" – 1/2" T-Series Alloy Valve Top, Bolted – PVC, Yellow	PV-004013
	1/4" – 1/2" T-Series Alloy Valve Top, Bolted – PVC, Green	PV-004014
	1/4" – 1/2" T-Series Valve Top, Threaded – Noryl, Grey	PV-004015
	1/4" – 1/2" T-Series Valve Top, Threaded – PVC, Orange	PV-004016
	1/4" – 1/2" T-Series Valve Top, Threaded – PVC, Yellow	PV-004017
	1/4" – 1/2" T-Series Valve Top, Threaded – PVC, Green	PV-004018
	1/2" – External Adjustment Valve Top – PVC (Tiberian)	PV-004019
	1/4" – 1/2 " T-Series Alloy Valve Top – Coated Steel	PV-00402
	1/4" – 1/2" T-Series Alloy Valve Top – 316 SS	PV-00403
	1/2" - 1" Valve Top – PVC. Grey	PV-004051
	1/2" - 1" Valve Top – PVC, Orange	PV-004052
	1/2" - 1" Valve Top – PVC, Yellow	PV-004053
	1/2" - 1" Valve Top – PVC, Green	PV-004054
	1/2" - 1" Valve Top – CPVC	PV-004055
	1/2" - 1" Valve Top - Steel	PV-00406
	1/2" - 1" Valve Top - 316 SS	PV-00407
	1 1/2" - 2" Valve Top; 5 ½" Valves, PVC	PV-00408
	1 1/2" - 2" Valve Top; 5 ½" Valves. Coated Steel	PV-00409
	1 1/2" - 2" Valve Top; 5 ½" Valves. 316 SS	PV-00410
	1 1/2" Valve Top; 4 ½" Valves, PVC	PV-00411
	1 1/2" Valve Top; 4 ½" Valves. Coated Steel	PV-00412
	1 1/2" Valve Top; 4 ½" Valves. 316 SS	PV-00413
	2" Valve Top; 5" Valves, PVC	PV-00414
	2" Valve Top; 5" Valves. Coated Steel	PV-00415
	2" Valve Top; 5" Valves. 316 SS	PV-00416
6	Pressure Spring - 1/4" – 1/2" T-Series Valve; 0 – 150 psi	PV-00601
	Pressure Spring - 1/4" – 1/2" T-Series Valve; 0 – 50 psi	PV-006011
	Pressure Spring - 1/4" – 1/2" T-Series Valve; 50 – 350 psi	PV-006012
	Pressure Spring - 1/2" - 1" Valve; 0 – 150 psi	PV-00602
	Pressure Spring - 1/2" - 1" Valve; 0 – 50 psi	PV-006021
	Pressure Spring - 1/2" - 1" Valve; 50 – 350 psi	PV-006122
	Pressure Spring - 1/2" - 1" Valve; 0 – 100 psi, 316 SS	PV-006123
	Pressure Spring - 1 1/2" - 2" Valve	PV-00603
7	Support Disc - 1/4" –1/2" T-Series Valve, PP	PV-00701
	Support Disc - 1/4" –1/2" T-Series Valve, 316 SS	PV-00702
	Support Disc –1/2" - 1" Valve, PP	PV-00705
	Support Disc –1/2"- 1" Valve, 316 SS	PV-00706
	Support Disc – 1 1/2" - 2" Valve, PP	PV-00708
	Support Disc – 1 1/2" - 2" Valve, 316 SS	PV-00709
8	Diaphragm - 1/4" – 1 /2" T-Series Valve - PTFE / EPDM	PV-00800
	Diaphragm - 1/4" – 1 /2" T-Series Valve - Viton	PV-00802
	Diaphragm - 1/4" – 1 /2" T-Series Valve - PTFE / Viton (High Temp)	PV-00803
	Diaphragm - 1/2" - 1" Valve - PTFE / EPDM	PV-00810
	Diaphragm - 1/2" - 1" Valve – Viton	PV-00812
	Diaphragm - 1/2" - 1" Valve - PTFE / Viton (High Temperature)	PV-00813
	Diaphragm - 1 1/2" – PTFE / EPDM – 3.25" Diameter	PV-00820
	Diaphragm - 1 1/2" - Viton – 3.25" Diameter	PV-00821
	Diaphragm – 2" Valve – 3.5" Diameter	PV-00830
	Diaphragm – 2" Valve – Viton – 3.5" Diameter	PV-00831
9	Adjustment Screw - 1/4" - 1" Valve PVC	PV-00900
	Adjustment Screw - 1/4" - 1" Valve PVC, Slotted	PV-00902
	Adjustment Screw - 1/4" - 1" Valve Coated Steel	PV-00901
	Adjustment Screw - 1/4" - 1" Valve Coated Steel, Slotted	PV-00903
	Adjustment Screw - 1 ½" - 2" Valve PVC	PV-00920
	Adjustment Screw - 1 ½" - 2" Valve Coated Steel	PV-00921

ITEM	DESCRIPTION	BPV #	PRV #
5	1/4" Valve Body PVC	BPV-00501	PRV-00501
	1/4" T-Series Valve Body PVC,	BPV-005011	PRV-005011
	1/4" Valve Body PP	BPV-00502	PRV-00502
	1/4" T-Series Valve Body PP	BPV-005021	PRV-005021
	1/4" Valve Body PTFE	BPV-00503	PRV-00503
	1/4" T-Series Valve Body PTFE	BPV-005031	PRV-005031
	1/4" Valve Body PVDF	BPV-00504	PRV-00504
	1/4" T-Series Valve Body PVDF	BPV-005041	PRV-005041
	1/4" Valve Body 316 SS	BPV-00505	PRV-00505
	1/4" Valve Body Alloy 20	BPV-00506	PRV-00506
	1/4" Valve Body Hast C	BPV-00507	PRV-00507
	1/4" Valve Body CPVC	BPV-00508	PRV-00508
	1/4" T-Series Valve Body CPVC	BPV-005081	PRV-005081
	3/8" Valve Body PVC	BPV-00561	PRV-00561
	3/8" T-Series Valve Body PVC,	BPV-005611	PRV-005611
	3/8" Valve Body PP	BPV-00562	PRV-00562
	3/8" T-Series Valve Body PP	BPV-005621	PRV-005621
	1/4" Valve Body PTFE	BPV-00563	PRV-00563
	3/8" T-Series Valve Body PTFE	BPV-005631	PRV-005631
	3/8" Valve Body PVDF	BPV-00564	PRV-00564
	3/8" T-Series Valve Body PVDF	BPV-005641	PRV-005641
	3/8" Valve Body 316 SS	BPV-00565	PRV-00565
	3/8" Valve Body Alloy 20	BPV-00566	PRV-00566
	3/8" Valve Body Hast C	BPV-00567	PRV-00567
	3/8" Valve Body CPVC	BPV-00568	PRV-00568
	3/8" T-Series Valve Body CPVC	BPV-005681	PRV-005681
	1/2" Valve Body PVC	BPV-00511	PRV-00511
	1/2" T-Series Valve Body PVC	BPV-005111	PRV-005111
	1/2" Valve Body PP	BPV-00512	PRV-00512
	1/2" T-Series Valve Body PP	BPV-005121	PRV-005121
	1/2" Valve Body PTFE	BPV-00513	PRV-00513
	1/2" T-Series Valve Body PTFE	BPV-005131	PRV-005131
	1/2" Valve Body PVDF	BPV-00514	PRV-00514
	1/2" T-Series Valve Body PVDF	BPV-005141	PRV-005141
	1/2" Valve Body 316 SS	BPV-00515	PRV-00515
	1/2" T-Series Valve Body 316 SS	BPV-005151	PRV-005151
	1/2" Valve Body Alloy 20	BPV-00516	PRV-00516
	1/2" T-Series Valve Body Alloy 20	BPV-005161	PRV-005161
	1/2" Valve Body Hast C	BPV-00517	PRV-00517
	1/2" T-Series Valve Body Hast C	BPV-005171	PRV-005171
	1/2" Valve Body CPVC	BPV-00518	PRV-00518
	1/2" T-Series Valve Body CPVC	BPV-005181	PRV-005181
	3/4" Valve Body PVC	BPV-00521	PRV-00521
	3/4" Valve Body PP	BPV-00522	PRV-00522
	3/4" Valve Body PTFE	BPV-00523	PRV-00523
	3/4" Valve Body PVDF	BPV-00524	PRV-00524
	3/4" Valve Body 316 SS	BPV-00525	PRV-00525
	3/4" Valve Body Alloy 20	BPV-00526	PRV-00526
	3/4" Valve Body Hast C	BPV-00527	PRV-00527
	3/4" Valve Body CPVC	BPV-00528	PRV-00528
	1" Valve Body PVC	BPV-00531	PRV-00531
	1" Valve Body PP	BPV-00532	PRV-00532
	1" Valve Body PTFE	BPV-00533	PRV-00533
	1" Valve Body PVDF	BPV-00534	PRV-00534
	1" Valve Body 316 SS	BPV-00535	PRV-00535
	1" Valve Body Alloy 20	BPV-00536	PRV-00536
	1" Valve Body Hast C	BPV-00537	PRV-00537
	1" Valve Body CPVC	BPV-00538	PRV-00538
	1 1/2" Valve Body PVC	BPV-00541	PRV-00541
	1 1/2" Valve Body PP	BPV-00542	PRV-00542
	1 1/2" Valve Body PTFE	BPV-00543	PRV-00543
	1 1/2" Valve Body PVDF	BPV-00544	PRV-00544
	1 1/2" Valve Body 316 SS	BPV-00545	PRV-00545
	1 1/2" Valve Body Alloy 20	BPV-00546	PRV-00546
	1 1/2" Valve Body Hast C	BPV-00547	PRV-00547
	1 1/2" Valve Body CPVC	BPV-00548	PRV-00548
	2" Valve Body PVC	BPV-00551	PRV-00551
	2" Valve Body PP	BPV-00552	PRV-00552
	2" Valve Body PTFE	BPV-00553	PRV-00553
	2" Valve Body PVDF	BPV-00554	PRV-00554
	2" Valve Body 316 SS	BPV-00555	PRV-00555
	2" Valve Body Alloy 20	BPV-00556	PRV-00556
	2" Valve Body Hast C	BPV-00557	PRV-00557
	2" Valve Body CPVC	BPV-00558	PRV-00558

KITZ

Λ-port® Quarter-Turn Control Valves

JIS 10K·20K / ASME Class 150·300

Corrosion Resistant Bodies and Trims

KITZ Λ-port® disc

Specially designed for control and shut-off of slurries, highly viscous fluids and fibrous fluids, such as pulp and paper material in processes. Recommended as a more reliable substitution for conventional knife gate valves, featuring a quarter-turn drive mechanism to ease automated valve operation and a rigid structure for longer service life. Also reduces space requirements and eliminates concerns about stem leakage.

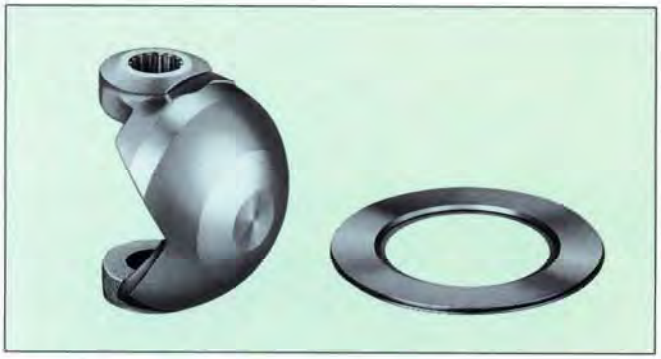
Λ: *Call it "Lambda", which symbolizes the shape of the valve port, where its sharp edge cuts through all objects suspended in the line fluid while the valve is being closed.*

KITZ CORPORATION OF AMERICA

Design Features

1. Sharp solid cutting

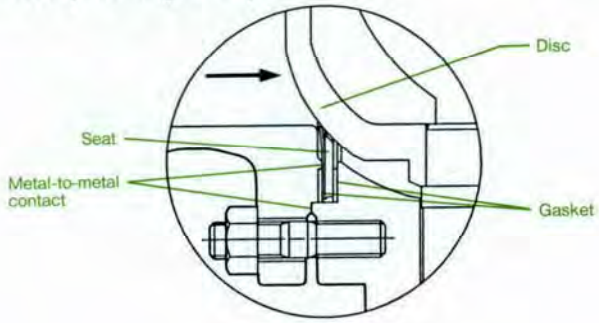
A trunnion mounted disc is sharply edged for cutting solids and fibrous objects mixed in line fluids, preventing disturbance to valve closing operation, and minimizing fluid residue within the valve bore.



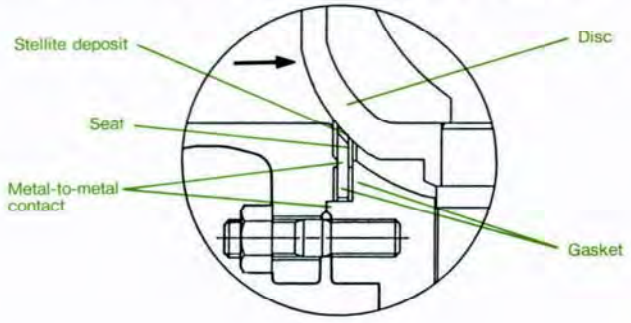
2. Choice of trims

Choice of two different trim configurations is available, depending on the planned service condition:

FLEKSEAT, made of spring steel Type 316, provides elasticity in its contact with the hard-chromium plated CF8M disc for higher sealing performance. Recommended for pulp and paper mill process control and services where higher sealing performance is critically required on valve shut-off. Always good for throttling service. (KITZ Fig. UVC)



KNIFESEAT made of Stellite deposited steel Type 316, contacts hard-chromium plated CF8M disc for heavy duty services. Recommended for slurry service, and all other abrasion services. Also good for high viscosity services including pulp and paper mill processes. Always recommended for throttling service. (KITZ Fig. UVCT)



3. Structural reliability

Metal-to-metal contact is accommodated between body and cap, and between seat and cap, for correct seat centering and adequate depressing force. Spline shafted stem ends are firmly jointed with the disc for correct disc centering and higher operational durability. In addition, trunnion mounting of the disc on the body helps increase total structural reliability of the valve against extraordinary piping stress.

4. Stabilized operating torque

Metal backed PTFE stem bearings are employed on top and bottom stems for minimized and stabilized torque of valve operation. Fine finish of the disc surface and other sliding surfaces of components also helps smooth operation of the valve.

5. Maintenance ease

Two-piece split-body construction provides the convenience of easy maintenance which is always critically required for handling viscous or fibrous line fluids.

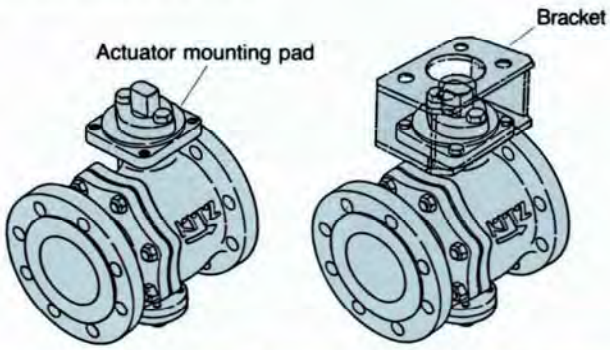
6. High flow efficiency

Full port design guarantees maximized and linearized flow characteristics with minimized pressure loss, helping viscous or fibrous line fluids pass through the valve bore smoothly.

7. Valve automation

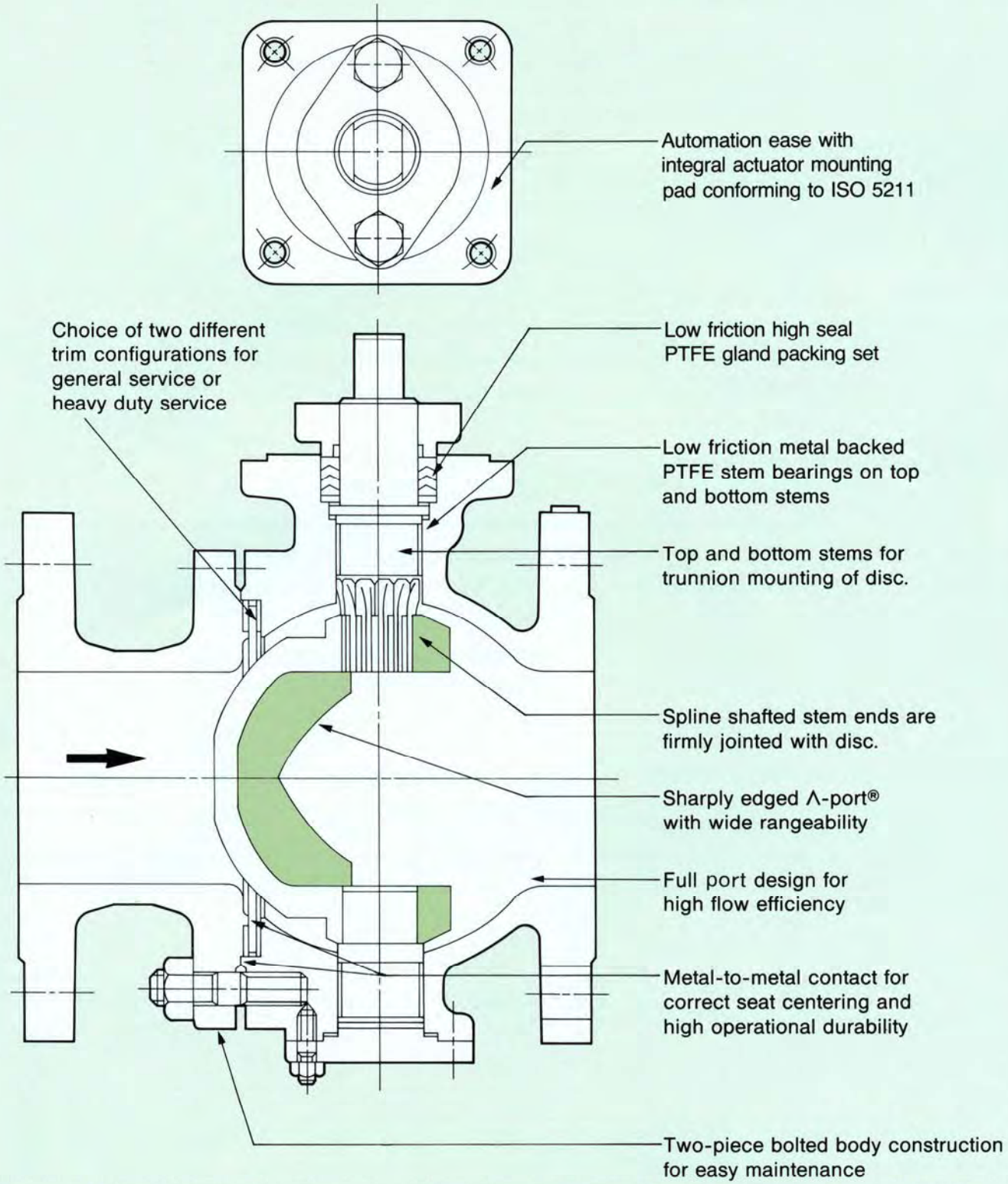
Quarter-turn valve drive mechanism enables technically easier mounting of valve automation measures such as electric and pneumatic actuators. Integral pads are provided for easy, safe and assured on-the-spot actuator mounting without disassembly of valve glands, as required by ISO standard.

Note: Customers are requested to prepare mounting brackets and connectors chosen for their valve actuation as illustrated here.



***Caution**: KITZ Λ-port® control valves are designed for uni-directional flow control. Be sure to mount the valve correctly so that the direction of line flow matches the direction of the arrow mark cast on the valve body.*

Design Features



Design Data

Design specifications

Valve structure	Split body side entry, RF-flanged, full port, trunnion mounted disc
Wall thickness	ASME B16.34 Class 150 / Class 300
F-F dimensions	JIS B2002 or ASME B16.10 Class 150 / Class 300 for ball valves
End connection	RF-flanged to JIS B2238 10K / 20K or ASME B16.5 Class 150 / Class 300
Actuator mounting pad	ISO 5211
P-T rating	JIS B2238 10K / 20K or ASME B16.34 Class 150 / Class 300
Operation	Quarter-turn

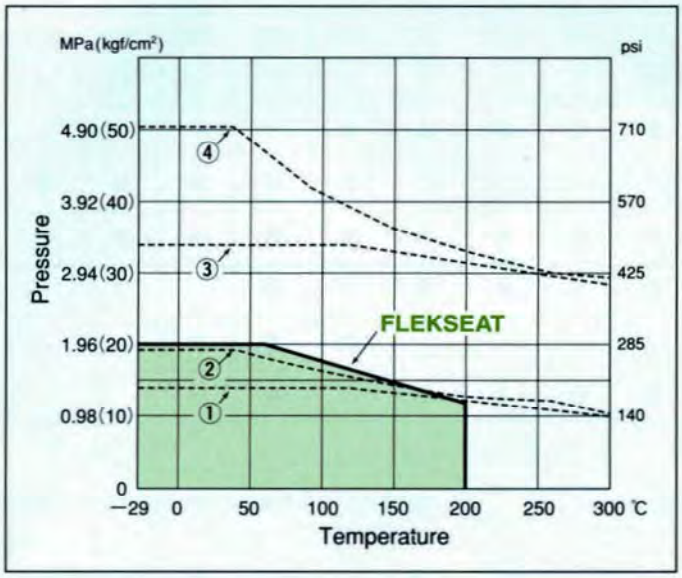
Test Pressure

Shell test Hydrostatic	JIS 10K JIS 20K	2.06MPa (21kgf/cm²) to JIS B2003 5.00MPa (51kgf/cm²) to JIS B2003
	ASME Class 150 ASME Class 300	2.93MPa (450psi) to API 598 7.59MPa (1,125psi) to API 598
Seat test Hydrostatic or pneumatic at 0.39MPa (4kgf/cm² or 60 psi)	**FLEKSEAT** for general service	Allowable leakage 0.0005% of Nominal Cv to IEC 534-4 Class IV-SI ANSI FCI 70-2 Class IV×0.05
	KNIFESEAT for heavy duty service	Allowable leakage 0.5% of Nominal Cv to IEC 534-4 Class II ANSI FCI 70-2 Class II

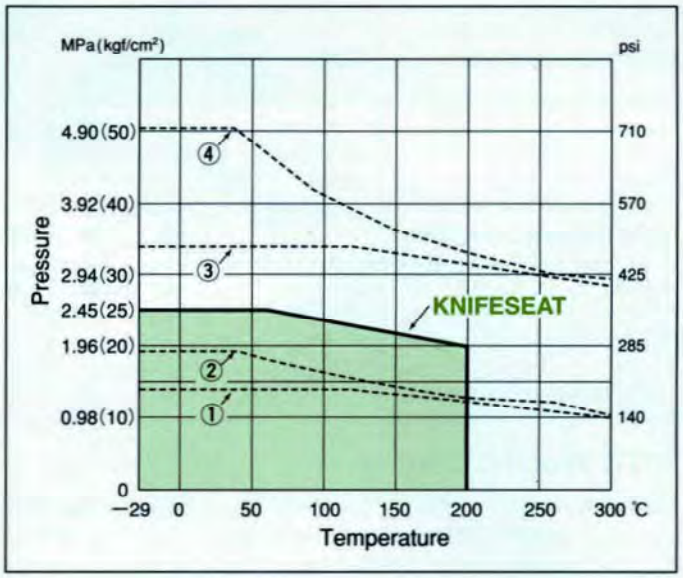
Maximum Allowable Seat Leakage 〔Per minute under 0.39MPa (4kgf/cm² or 60 psi) test pressure〕

Valve size		FLEKSEAT (UVC)			KNIFESEAT (UVCT)		
inch	mm	Cv at full opening	Hydrostatic (cc)	Pneumatic (Nℓ)	Cv at full opening	Hydrostatic (ℓ)	Pneumatic (Nℓ)
1	25	25	3.6	0.16	31	4.42	193
1½	40	85	12.1	0.53	100	14.2	622
2	50	145	20.7	0.90	160	22.8	994
2½	65	240	34.2	1.49	265	37.8	1646
3	80	380	54.1	2.36	400	57.0	2486
4	100	550	78.3	3.42	585	83.4	3636
5	125	960	137	5.97	1010	144	6276
6	150	1500	214	9.32	1550	220	9632
8	200	2700	385	16.8	2750	392	17090
10	250	4300	613	26.7	4400	626	27340
12	300	6200	883	38.5	6300	898	39140
14	350	8200	1168	51.0	8300	1182	51580

Pressure-Temperature Rating



①Valve body rating to JIS B2238 10K steel
②Valve body rating to ASME B16.34 Class 150 CF8
③Valve body rating to JIS B2238 20K steel
④Valve body rating to ASME B16.34 Class 300 CF8



①Valve body rating to JIS B2238 10K steel
②Valve body rating to ASME B16.34 Class 150 CF8
③Valve body rating to JIS B2238 20K steel
④Valve body rating to ASME B16.34 Class 300 CF8

KNIFESEAT made of hard-faced heavy stainless steel is coupled with hard-faced stainless steel ball for handling slurries under high differential pressure, and handling fluid of high viscosity.
FLEKSEAT made of hard-faced flexible stainless steel and supported by stainless steel spring is recommended where higher sealing performance is required.

The products introduced in this catalog are all covered by the ISO 9001 Certification awarded KITZ Corporation in 1989, the earliest in the valve industry.

Product Range

Valve operation by	Class	mm	25	40	50	65	80	100	125	150	200	250	300	350
		inch	1	1½	2	2½	3	4	5	6	8	10	12	14
Lever	JIS 10K / ASME Class 150		●	●	●	●	●	●	●	●	●			
Gear										●	●	●	●	●
KITZ pneumatic actuators			●	●	●	●	●	●	●	●	●	●	●	●
Lever	JIS 20K / ASME Class 300		●	●	●	●	●	●	●	●	●			
Gear										●	●	●		
KITZ pneumatic actuators			●	●	●	●	●	●	●	●	●	●		

KITZ Product Coding

Example: Lever operated ASME Class 150 Λ-port® control valve, CF8M shell material, KNIFESEAT trim

L — 150 U V C T M

1 2 3 4 5 6 7

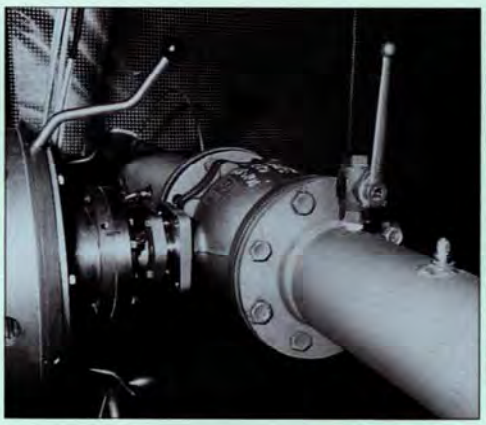
1. Valve operational measure
   - **L** ..... lever handle
   - **G** ..... worm gear
   - **B** ..... KITZ B-type double action pneumatic actuator
   - **BS** ..... KITZ BS-type spring return pneumatic actuator
   - **BSW** .... KITZ BSW-type spring return pneumatic actuator

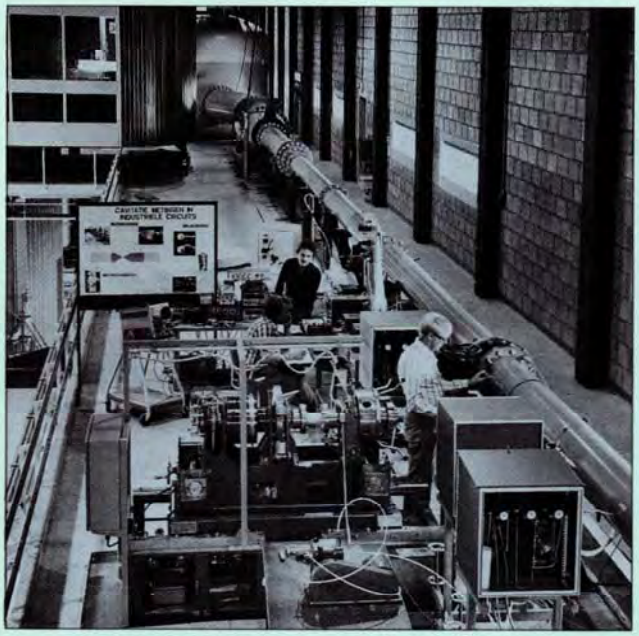
   Refer to KITZ Cat.No. E-350 or C-350 for detailed information of KITZ pneumatic actuators
2. Valve pressure class
   - **150** ..... ASME Class 150
   - **10** ..... JIS 10K
   - **300** ..... ASME Class 300
   - **20** ..... JIS 20K
3. Material symbol for stainless steel body
4. Symbol for Λ-port® control valve
5. Trunnion mounted disc
6. Trim symbol
   - **T** .....KNIFESEAT for heavy duty service
   - None ... FLEKSEAT for general service
7. Shell material
   - **M** .....ASTM CF8M or JIS SCS14A
   - None ... ASTM CF8 or JIS SCS13A

This catalog uses **MPa**, a SI unit, for indication of pressures. For readers' convenience, however, **psi** and **kgf/cm²** are also used for **ANSI** and **JIS** related products respectively.

KITZ Λ-port® control valves were tested by Delft Hydraulics Laboratory in Delft, the Netherlands and various flow data such as valve flow coefficient, liquid pressure recovery factor, cavitation coefficient and torque coefficient were satisfactorily measured and certified by this internationally respected technical institute.

Test report





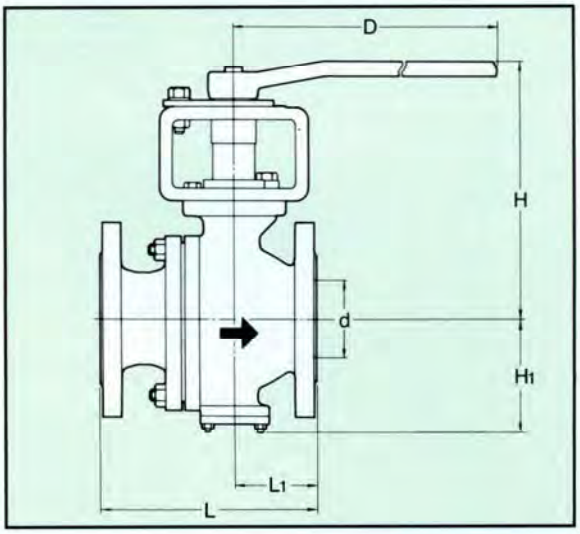
Delft Hydraulics Laboratory, Delft, the Netherlands

Dimensional Data

Class 150 / 10K Lever operated Λ-port® control valves

Trim	ASME Class 150	JIS 10K
FLEKSEAT	L-150UVC (M)	L-10UVC (M)
KNIFESEAT	L-150UVCT (M)	L-10UVCT (M)

In case of CF8M valve body, KITZ Fig. shall be suffixed with "M".



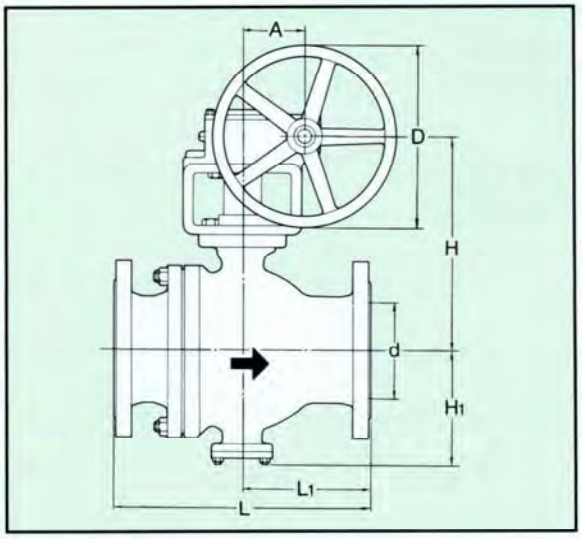
mm

Valve size inch	Valve size mm	d	L	L_1	H	H_1	D
1	25	25	127	48	181	68.5	160
1½	40	38	165	67	198	76	230
2	50	51	178	69	204	84.5	230
2½	65	64	190	76	245	97	400
3	80	76	203	77	252	106	400
4	100	102	229	89	283	133.5	460
5	125	127	356	158	305.5	157	460
6	150	152	394	197	392	182	1000
8	200	203	457	228.5	460	226.5	1500

Class 150 / 10K Gear operated Λ-port® control valves

Trim	ASME Class 150	JIS 10K
FLEKSEAT	G-150UVC (M)	G-10UVC (M)
KNIFESEAT	G-150UVCT (M)	G-10UVCT (M)

In case of CF8M valve body, KITZ Fig. shall be suffixed with "M".



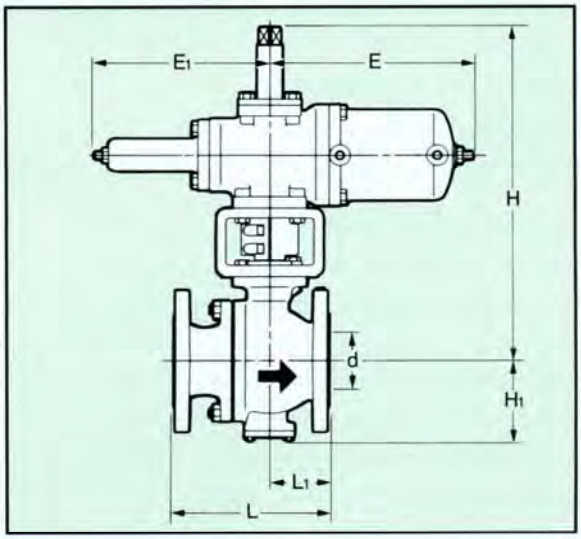
mm

Valve size inch	Valve size mm	d	L	L_1	H	H_1	D	A
6	150	152	394	197	330	182	310	65.5
8	200	203	457	228.5	410	226.5	360	88.5
10	250	254	533	266.5	446	268.5	500	93.5
12	300	305	610	260	524	365.5	500	134
14	350	337	686	293	547.5	403.5	500	134

Class 150 / 10K KITZ B-type actuator operated Λ-port® control valves

Trim	ASME Class 150	JIS 10K
FLEKSEAT	B-150UVC (M)	B-10UVC (M)
KNIFESEAT	B-150UVCT (M)	B-10UVCT (M)

In case of CF8M valve body, KITZ Fig. shall be suffixed with "M".



mm

Valve size inch	Valve size mm	d	L	L_1	H	H_1	E	E_1	Style
1	25	25	127	48	295	68.5	154	128	B-1
1½	40	38	165	67	363	76	205	177	B-2
2	50	51	178	69	369.5	84.5	205	177	
2½	65	64	190	76	447.5	97	272	235	B-3
3	80	76	203	77	454	106	272	235	
4	100	102	229	89	479	133.5	272	235	
5	125	127	356	158	594.5	157	328	284	B-4
6	150	152	394	197	614	182	328	284	
8	200	203	457	228.5	699	226.5	423	367	B-5
10	250	254	533	266.5	746	268.5	423	367	
12	300	305	610	260	813	365.5	631	527	B-6
14	350	337	686	293	850.5	403.5	631	527	

Dimensional Data

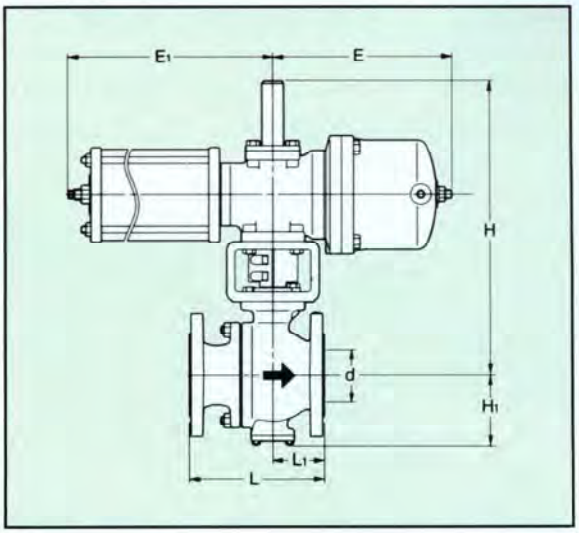
Class 150 / 10K KITZ BS-type actuator operated Λ-port® control valves

Trim	ASME Class 150	JIS 10K
FLEKSEAT	BS-150UVC (M)	BS-10UVC (M)
KNIFESEAT	BS-150UVCT (M)	BS-10UVCT (M)

In case of CF8M valve body, KITZ Fig. shall be suffixed with "M".

mm

Valve size inch	Valve size mm	d	L	L_1	H	H_1	E	E_1	Style
1	25	25	127	48	295	68.5	161	239	BS-1
1½	40	38	165	67	363	76	210	335	BS-2
2	50	51	178	69	369.5	84.5	210	335	
2½	65	64	190	76	447.5	97	276	451	BS-3
3	80	76	203	77	454	106	276	451	
4	100	102	229	89	479	133.5	276	451	
5	125	127	356	158	594.5	157	351	575	BS-4
6	150	152	394	197	614	182	351	575	
8	200	203	457	228.5	699	226.5	446	745	BS-5
10	250	254	533	266.5	746	268.5	446	745	
12	300	305	610	260	827	365.5	638	931	BS-6
14	350	337	686	293	850.5	403.5	638	931	



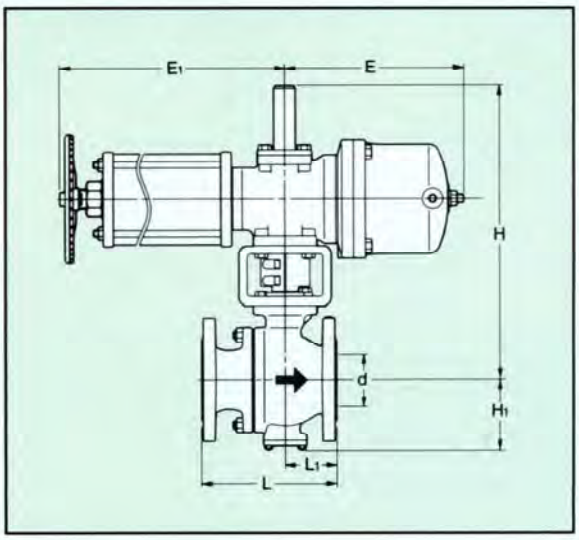
Class 150 / 10K KITZ BSW-type actuator operated Λ-port® control valves

Trim	ASME Class 150	JIS 10K
FLEKSEAT	BSW-150UVC (M)	BSW-10UVC (M)
KNIFESEAT	BSW-150UVCT (M)	BSW-10UVCT (M)

In case of CF8M valve body, KITZ Fig. shall be suffixed with "M".

mm

Valve size inch	Valve size mm	d	L	L_1	H	H_1	E	E_1	Style
1	25	25	127	48	295	68.5	161	259	BSW-1
1½	40	38	165	67	363	76	210	362	BSW-2
2	50	51	178	69	369.5	84.5	210	362	
2½	65	64	190	76	447.5	97	276	482	BSW-3
3	80	76	203	77	454	106	276	482	
4	100	102	229	89	479	133.5	276	482	
5	125	127	356	158	594.2	157	351	609	BSW-4
6	150	152	394	197	614	182	351	609	
8	200	203	457	228.5	699	226.5	446	795	BSW-5
10	250	254	533	266.5	746	268.5	446	795	
12	300	305	610	260	827	365.5	638	1006	BSW-6
14	350	337	686	293	850.5	403.5	638	1006	



Profile of KITZ Pneumatic Actuators

for details, refer to KITZ Cat. No. E-350 or C-350.

B-type : Double action
BS-type : Spring return
BSW-type : Spring return with manual handwheel

Design Specifications

Operating media: Air pressure
Standard operating pressure: 0.39MPa (4kgf/cm^2 or 60psi)
Pressure supply range: 0.39～0.69MPa (4～7kgf/cm^2 or 60～100psi)
Cylinder test pressure: 0.97MPa (9.9kgf/cm^2 or 140psi)
Driving shaft rotating angle: 90° (±5°)
Permissible ambient temperature range: −20～+60°C (− 4～+140°F)

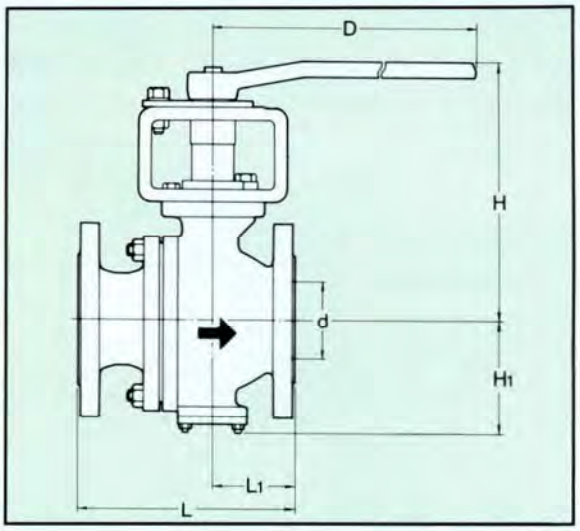
Refer to Page 8 for **Actuator Selection Guide**.

Dimensional Data

Class 300 / 20K Lever operated Λ-port® control valves

Trim	ASME Class 300	JIS 20K
FLEKSEAT	L-300UVC(M)	L-20UVC(M)
KNIFESEAT	L-300UVCT(M)	L-20UVCT(M)

In case of CF8M valve body, KITZ Fig. shall be suffixed with "M".



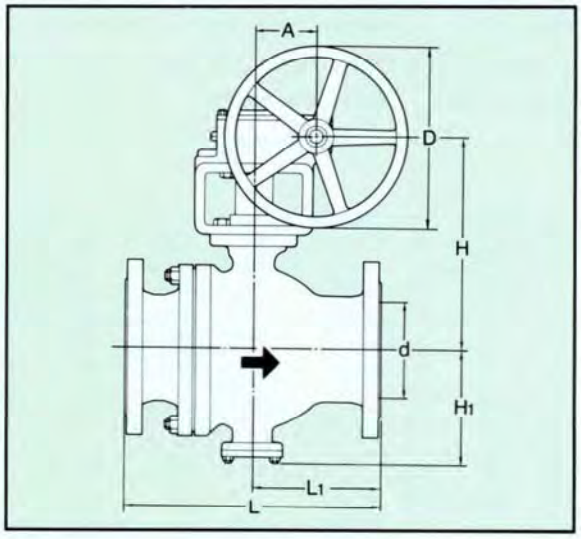
mm

Valve size inch	Valve size mm	d	L	L_1	H	H_1	D
1	25	25	165	68	181	71.5	160
1½	40	38	190	73.5	198	79	230
2	50	51	216	87.5	204	87.5	230
2½	65	64	241	102	245	100	400
3	80	76	283	120.5	252	109	400
4	100	102	305	125	283	133.5	460
5	125	127	381	158	305.5	157	460
6	150	152	403	182	392	182	1000
8	200	203	502	228.5	460	226.5	1500

Class 300 / 20K Gear operated Λ-port® control valves

Trim	ASME Class 300	JIS 20K
FLEKSEAT	G-300UVC(M)	G-20UVC(M)
KNIFESEAT	G-300UVCT(M)	G-20UVCT(M)

In case of CF8M valve body, KITZ Fig. shall be suffixed with "M".



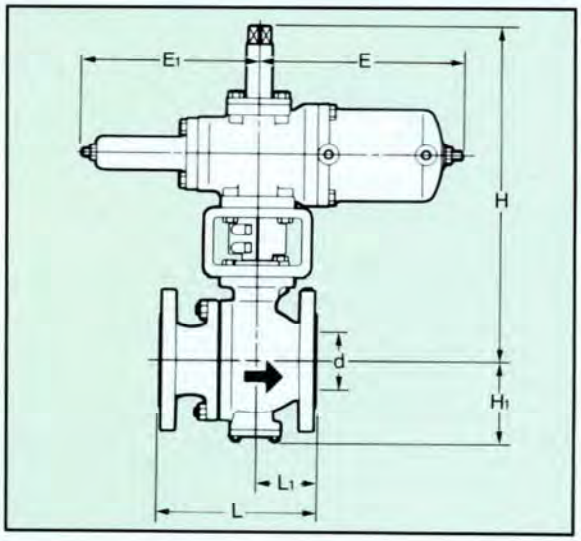
mm

Valve size inch	Valve size mm	d	L	L_1	H	H_1	D	A
6	150	152	403	182	330	182	310	65.5
8	200	203	502	228.5	410	226.5	360	88.5
10	250	254	568	242.5	446	268.5	500	93.5

Class 300 / 20K KITZ B-type actuator operated Λ-port® control valves

Trim	ASME Class 300	JIS 20K
FLEKSEAT	B-300UVC(M)	B-20UVC(M)
KNIFESEAT	B-300UVCT(M)	B-20UVCT(M)

In case of CF8M valve body, KITZ Fig. shall be suffixed with "M".



mm

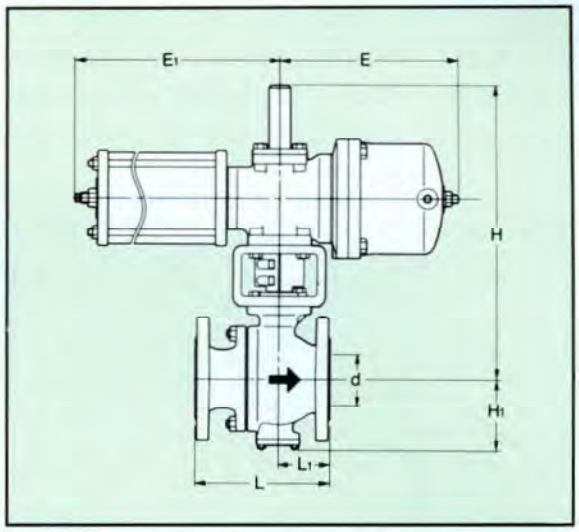
Valve size inch	Valve size mm	d	L	L_1	H	H_1	E	E_1	Style
1	25	25	165	68	295	71.5	154	128	B-1
1½	40	38	190	73.5	363	79	205	177	B-2
2	50	51	216	87.5	369.5	87.5			
2½	65	64	241	102	447.5	100	272	235	B-3
3	80	76	283	120.5	454	109			
4	100	102	305	125	479	133.5			
5	125	127	381	158	594.5	157	328	284	B-4
6	150	152	403	182	614	182			
8	200	203	502	228.5	699	226.5	423	367	B-5
10	250	254	568	242.5	746	268.5			

Dimensional Data

Class 300 / 20K KITZ BS-type actuator operated Λ-port® control valves

Trim	ASME Class 300	JIS 20K
FLEKSEAT	BS-300UVC(M)	BS-20UVC(M)
KNIFESEAT	BS-300UVCT(M)	BS-20UVCT(M)

In case of CF8M valve body, KITZ Fig. shall be suffixed with "M".



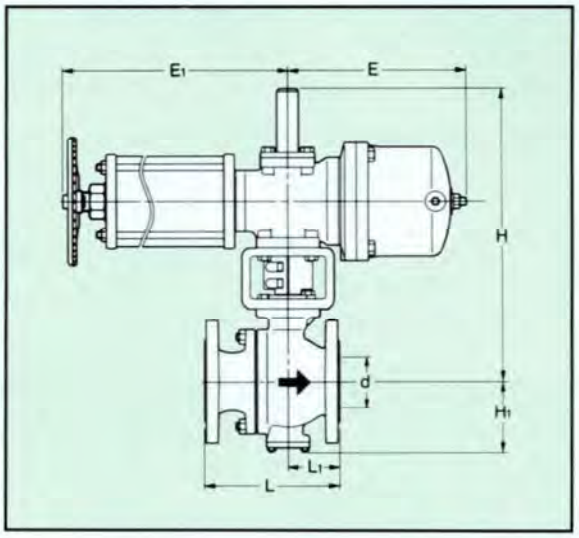
mm

Valve size inch	Valve size mm	d	L	L_1	H	H_1	E	E_1	Style
1	25	25	165	68	295	71.5	161	239	BS-1
1½	40	38	190	73.5	363	79	210	335	BS-2
2	50	51	216	87.5	369.5	87.5			
2½	65	64	241	102	447.5	100	276	451	BS-3
3	80	76	283	120.5	454	109			
4	100	102	305	125	479	133.5			
5	125	127	381	158	594.5	157	351	575	BS-4
6	150	152	403	182	614	182			
8	200	203	502	228.5	699	226.5	446	745	BS-5
10	250	254	568	242.5	746	268.5			

Class 300 / 20K KITZ BSW-type actuator operated Λ-port® control valves

Trim	ASME Class 300	JIS 20K
FLEKSEAT	BSW-300UVC(M)	BSW-20UVC(M)
KNIFESEAT	BSW-300UVCT(M)	BSW-20UVCT(M)

In case of CF8M valve body, KITZ Fig. shall be suffixed with "M".



mm

Valve size inch	Valve size mm	d	L	L_1	H	H_1	E	E_1	Style
1	25	25	165	68	295	71.5	161	259	BSW-1
1½	40	38	190	73.5	363	79	210	362	BSW-2
2	50	51	216	87.5	369.5	87.5			
2½	65	64	241	102	447.5	100	276	482	BSW-3
3	80	76	283	120.5	454	109			
4	100	102	305	125	479	133.5			
5	125	127	381	158	594.5	157	351	609	BSW-4
6	150	152	403	182	614	182			
8	200	203	502	228.5	699	226.5	446	795	BSW-5
10	250	254	568	242.5	746	268.5			

Actuator Selection Guide

FLEKSEAT

Valve size inch	Valve size mm	Differential pressure (Δp) MPa (kgf/cm² or psi) 0.49 (5 or 70)	0.98 (10 or 140)	1.47 (15 or 210)	1.96 (20 or 280)
1	25	B/BS/BSW-1			
1 1/2	40	B/BS/BSW-2			
2	50				
2 1/2	65	B/BS/BSW-3			
3	80				
4	100				
5	125	B/BS/BSW-4			
6	150				
8	200	B/BS/BSW-5			
10	250				
12	300	B/BS/BSW-6			
14	350				

KNIFESEAT

Valve size inch	Valve size mm	Differential pressure (Δp) MPa (kgf/cm² or psi) 0.49 (5 or 70)	0.98 (10 or 140)	1.47 (15 or 210)	1.96 (20 or 280)	2.45 (25 or 350)
1	25	B/BS/BSW-1				
1 1/2	40	B/BS/BSW-2				
2	50					
2 1/2	65	B/BS/BSW-3				
3	80					
4	100					
5	125	B/BS/BSW-4				
6	150					
8	200	B/BS/BSW-5				
10	250					
12	300	B/BS/BSW-6				
14	350					

Construction and Materials

Standard Parts and Materials (UVC/UVCT)

No.	Parts	JIS	ASTM
1	Body	SCS13A ※1	CF8 ※2
2	Body cap	SCS13A ※1	CF8 ※2
3	Stem	SUS316	Type 316
4	Disc	SCS14A Cr plated	CF8M Cr plated
7	Gland	SCS13A	CF8
8	Gland packing	PTFE	PTFE
19A	Seat gasket	Asbestos ※5	Asbestos ※5
19B	Gasket	Asbestos ※5	Asbestos ※5
20	Packing washer	SUS316	Type 316
30	Seat	SUS316 (UVC) SUS316 Hard faced (UVCT)	Type 316 (UVC) Type 316 Hard faced (UVCT)
31	Stem washer	SUS316	Type 316
33A	Cap nut	SUS304	8
33B	Cover nut	SUS304	8
35A	Cap bolt	SUS304	B8
35B	Cover bolt	SUS304	B8
36	Gland bolt	SUS304	B8
47A	Thrust washer	Glass filled PTFE	Glass filled PTFE
47B	Thrust washer	Glass filled PTFE	Glass filled PTFE
47C	Thrust washer	Glass filled PTFE	Glass filled PTFE
67	Stem bearing	Metal backed PTFE	Metal backed PTFE
103	Bottom stem	SUS316	Type 316
147	End plate	SUS304 ※3	Type 304 ※4
155	Shim	SUS316	Type 316

Special Materials for UVCM/UVCTM

※ 1. SCS14A
※ 2. CF8M
※ 3. SUS316
※ 4. Type 316
※ 5. Non-asbestos gaskets are optionally available

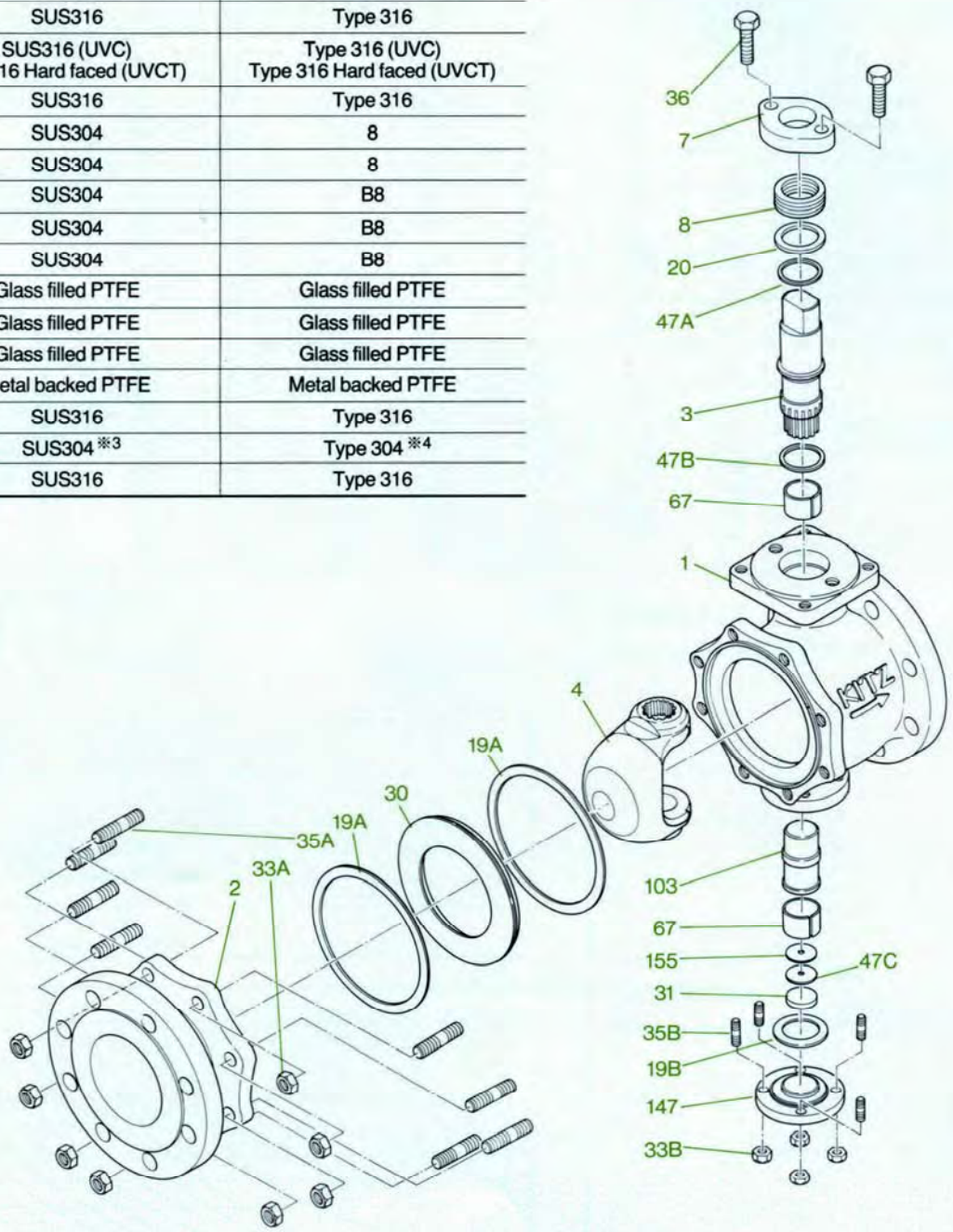
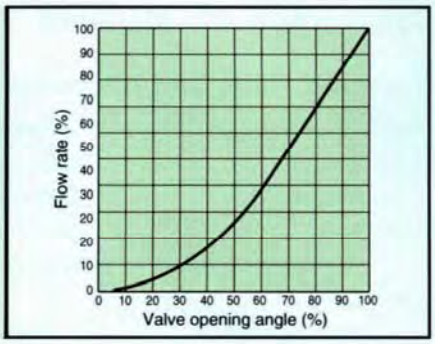


Illustration shows Size 4" and larger design.

Flow Characteristics

One advantage of KITZ Λ-port® control valves is more efficient flow characteristics than other types of control valves, due to its full port design. For correct determination of valve size, find the accurate valve flow coefficient by means of the flow equation detailed on Page 12 and compare with Cv values introduced on page 10 and 11. Valve opening by 40% to 80% is usually recommended for smooth fluid control.

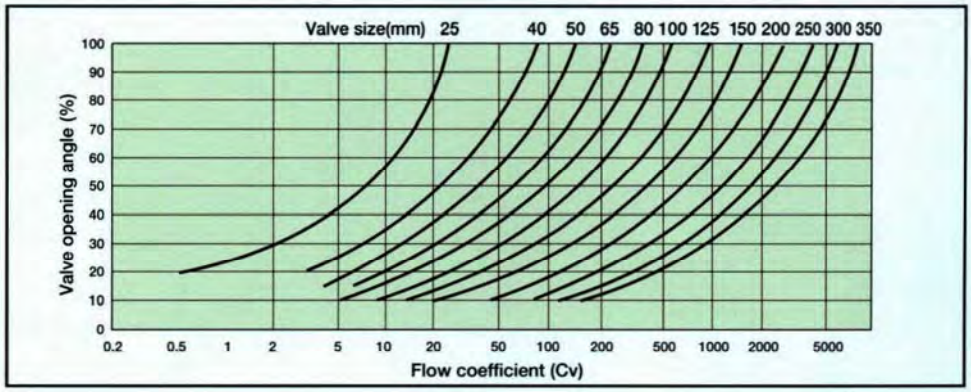


Flow Coefficient (Cv) by Valve Opening Angle for ASME Class 150 (10K) Λ-port® control valves

Seat	Valve size		Valve opening angle (%)									
	inch	mm	100	90	80	70	60	50	40	30	20	10
FLEKSEAT (UVC)	1	25	25	23	19	15	11	7.8	4.6	2.2	0.5	—
	1 1/2	40	85	74	60	45	32	22	13	7.4	3	—
	2	50	145	125	100	78	55	37	23	13	6.2	—
	2 1/2	65	240	205	165	130	90	60	37	20	10	—
	3	80	380	330	270	200	145	95	57	30	15	5.2
	4	100	550	480	400	310	220	145	92	51	24	8.8
	5	125	960	810	650	490	350	240	146	82	38	13
	6	150	1500	1260	1020	780	570	380	240	130	62	18
	8	200	2700	2300	1800	1350	950	640	400	235	115	42
	10	250	4300	3650	2900	2250	1600	1120	700	400	200	72
	12	300	6200	5200	4300	3300	2450	1680	1060	620	310	106
	14	350	8200	7100	5900	4600	3400	2300	1460	850	440	135
KNIFESEAT (UVCT)	1	25	31	28	24	19	14	9.5	5.5	2.6	0.6	—
	1 1/2	40	100	85	69	53	38	25	16	8.5	3.5	—
	2	50	160	138	110	84	60	40	25	14	6.9	—
	2 1/2	65	265	230	185	140	99	66	41	22	10	—
	3	80	400	345	280	215	155	100	61	33	15	5.5
	4	100	585	510	420	320	230	155	96	55	26	9.5
	5	125	1010	870	700	530	380	250	156	88	41	14
	6	150	1550	1320	1080	840	610	410	250	140	65	19
	8	200	2750	2340	1830	1370	970	650	410	240	120	43
	10	250	4400	3700	2950	2300	1660	1140	720	410	205	4
	12	300	6300	5300	4400	3400	2500	1700	1080	630	320	110
	14	350	8300	7200	5900	4600	3400	2350	1480	860	440	140

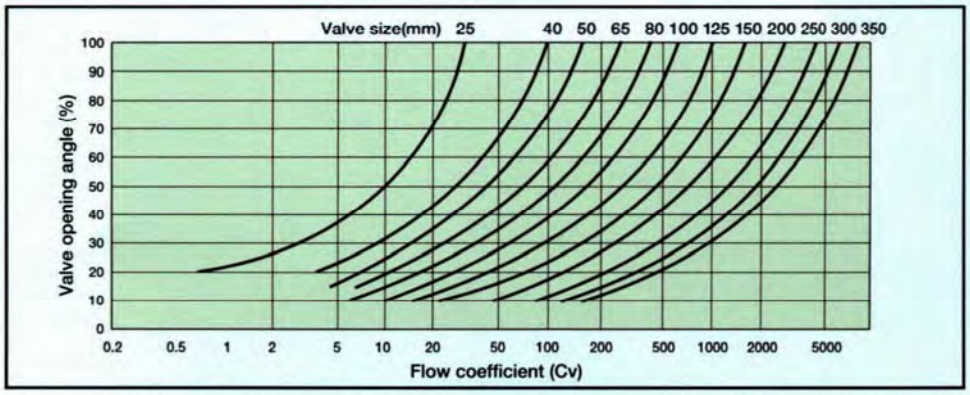
FLEKSEAT

(10 / 150 UVC for general service)



KNIFESEAT

(10 / 150 UVCT for heavy duty service)

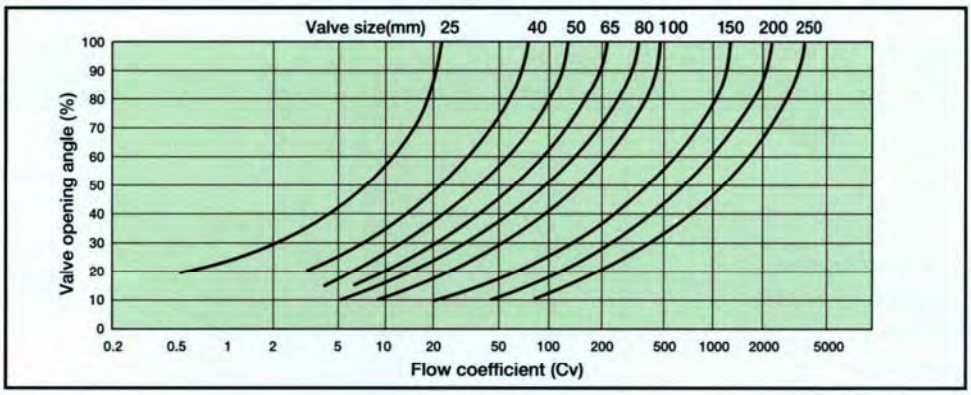


Flow Coefficient (Cv) by Valve Opening Angle for ASME Class 300 (20K) Λ-port® control valves

Seat	Valve size		Valve opening angle (%)									
	inch	mm	100	90	80	70	60	50	40	30	20	10
FLEKSEAT (UVC)	1	25	22	20	19	15	11	7.8	4.6	2.2	0.5	—
	1 1/2	40	79	66	60	45	32	22	13	7.4	3	—
	2	50	132	125	100	78	55	37	23	13	6.2	—
	2 1/2	65	217	193	165	130	90	60	37	20	10	—
	3	80	322	301	270	200	145	95	57	30	15	5.2
	4	100	476	441	400	310	220	145	92	51	24	8.8
	6	150	1480	1240	1020	780	570	380	240	130	62	18
	8	200	2570	2160	1800	1350	950	640	400	235	115	42
	10	250	4160	3510	2900	2250	1600	1120	700	400	200	72
KNIFESEAT (UVCT)	1	25	27	26	24	19	14	9.5	5.5	2.6	0.6	—
	1 1/2	40	96	84	69	53	38	25	16	8.5	3.5	—
	2	50	145	128	110	84	60	40	25	14	6.9	—
	2 1/2	65	235	211	185	140	99	66	41	22	10	—
	3	80	339	315	280	215	155	100	61	33	15	5.5
	4	100	507	465	420	320	230	155	96	55	26	9.5
	6	150	1530	1300	1080	840	610	410	250	140	65	19
	8	200	2620	2200	1830	1370	970	650	410	240	120	43
	10	250	4260	3730	2950	2300	1660	1140	720	410	205	74

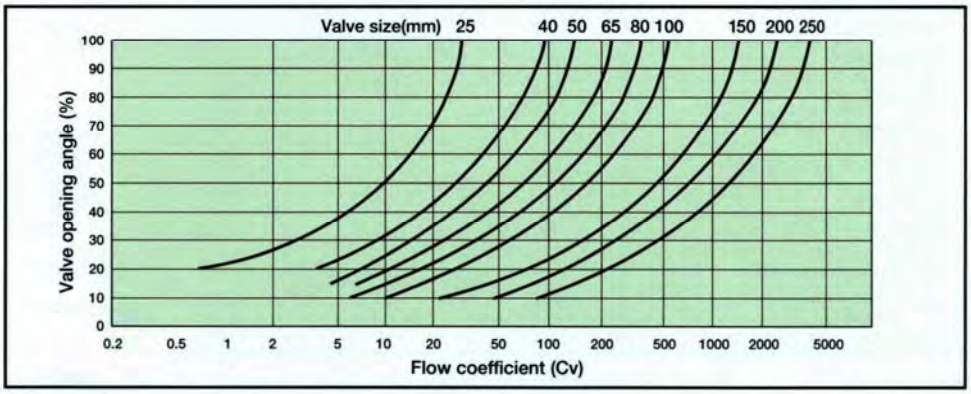
FLEKSEAT

(20 / 300 UVC for general service)



KNIFESEAT

(20 / 300 UVCT for heavy duty service)



Flow Equation

Fluid	Service condition	Equation
Liquid	Sub-critical condition $\Delta P < F_L^2 (P_1 - P_v)$	$C_V = 1.17 \cdot Q_L \cdot \sqrt{\frac{G_L}{\Delta P}}$ or $C_V = \frac{1.17 \cdot W_L}{\sqrt{\Delta P \cdot G_L}}$ (*1)
	Critical condition $\Delta P \geqq F_L^2 (P_1 - P_v)$	$C_V = \frac{1.17 \cdot Q_L}{F_L} \cdot \sqrt{\frac{G_L}{(P_1 - P_v)}}$ or $C_V = \frac{1.17 \cdot W_L}{F_L \cdot \sqrt{(P_1 - P_v) \cdot G_L}}$
Gas	$X < F_K \cdot X_T$	$C_V = \frac{Qg}{387 \cdot P_1 \cdot Y} \cdot \sqrt{\frac{Gg \cdot T_1 \cdot Z}{X}}$ or $C_V = \frac{Wg}{27.1 \cdot Y \cdot \sqrt{X \cdot P_1 \cdot \gamma_1}}$
	$X \geqq F_K \cdot X_T$	$C_V = \frac{Qg}{258 \cdot P_1} \cdot \sqrt{\frac{Gg \cdot T_1 \cdot Z}{F_K \cdot X_T}}$ or $C_V = \frac{Wg}{18.1 \cdot \sqrt{F_K \cdot X_T \cdot P_1 \cdot \gamma_1}}$
Saturated steam	$X < F_K \cdot X_T$	$C_V = \frac{Wg}{19.3 \cdot P_1 \cdot Y \cdot \sqrt{X}}$
	$X \geqq F_K \cdot X_T$	$C_V = \frac{Wg}{12.9 \cdot P_1 \cdot \sqrt{F_K \cdot X_T}}$
Superheated steam	$X < F_K \cdot X_T$	$C_V = \frac{Wg \cdot (1 + 0.00126 \cdot \Delta t)}{19.3 \cdot P_1 \cdot Y \cdot \sqrt{X}}$
	$X \geqq F_K \cdot X_T$	$C_V = \frac{Wg \cdot (1 + 0.00126 \cdot \Delta t)}{12.9 \cdot P_1 \cdot \sqrt{F_K \cdot X_T}}$

Nomenclature

(Symbol, description and unit)

- C_V : Valve flow coefficient
- F_L : Liquid pressure recovery factor of a valve without attached fittings, dimensionless 0.58 for fully opened full-bore Λ-port valve
- G_L : Liquid specific gravity (1.0 for water)
- P_1 : Upstream absolute static pressure (kgf/cm²A)
- P_2 : Downstream absolute static pressure (kgf/cm²A)
- P_v : Absolute vapor pressure of liquid at inlet temperature (kgf/cm²A)
- ΔP: Differential pressure ($P_1 - P_2$) (kgf/cm²)
- Q_L : Volumetric flow rate of liquid (m³/h)
- W_L: Weight or mass flow rate of liquid (t/h)
- Gg: Gas specific gravity (1 for air. Refer to Table 1)
- Qg: Gas volumetric specific gravity (Nm³/h)
- X : Ratio of pressure drop ($\Delta P / P_1$)
- X_T : Pressure drop ratio factor, dimensionless 0.25 for fully opened full-bore Λ-port valve
- Wg: Gas or steam weight or mass flow rate (kg/h)
- γ_1 : Specific gravity, upstream conditions (kg/m³)
- F_K : Ratio of specific heats factor, dimensionless (1 for air. Refer to Table 1) = Ratio of specific heats / 1.4
- Y : Expansion factor $= 1 - \frac{X}{3 \cdot F_K \cdot X_T}$
- T_1 : Absolute upstream temperature (°K)
- Δt : Upstream superheated steam temperature (°C)
- Z : Compressibility factor, dimensionless = 1 (*2)

*1: In case of servicing pulp, Q_P shall be applied instead of Q_L. Here, $Q_P = Q_L \cdot F_C$ (Correction factor of pulp density. Refer to Table 2)

*2: Detailed value may be determined by means of using, as a parameter, reduced pressure (Pr) and reduced temperature (Tr).
Here, $Pr = P_1 / P_C$ (absolute thermodynamic critical pressure)
$Tr = T_1 / T_C$ (absolute thermodynamic critical temperature)

Table 1 Gg and F_K Factors

Gas	Note	Gg	F_K
Air	—	1.00	1.00
Acetylene	C_2H_2	0.90	0.91
Ammonia	NH_3	0.59	0.92
Argon	Ar	1.38	1.19
Carbon dioxide	CO_2	1.52	0.91
Carbon monoxide	CO	0.97	1.01
Ethylene	C_2H_4	0.97	0.87
Chlorine	Cl_2	2.49	0.96
Ethan	C_2H_6	1.05	0.87
Helium	He	0.14	1.19
Hydrogen	H_2	0.07	1.00
Methan	CH_4	0.55	0.90
Oxygen	O_2	1.10	1.00
Sulfurous acid (gas)	SO_2	2.21	0.89
Propane	C_3H_8	1.56	0.81
Nitrogen	N_2	0.97	1.00
Nitrogen monoxide	NO	1.03	1.00
Saturated steam	H_2O	—	0.94
Superheated steam	H_2O	—	0.94

Table 2

Pulp density (%)	Correction factor (F_C)
1	1.00
2	1.05
3	1.15
4	1.22
5	1.30

Valve Disassembly and Reassembly for Maintenance

1. Valve Disassembly

1-1. Works to do before valve dismantling from the pipeline:

(a) Releave the line pressure completely and discharge all line fluids from the bore and body cavity of the valve.

(b) Mark the valve end flanges and coupled piping flanges adequately for easy remounting of the valve on the pipeline.

1-2. Works to do before valve disassembly:

(a) Remove and collect all inside residues of the valve, if there is any, and record their conditions and locations. Subsequent examination of these records may be found useful for better valve maintenance.

(b) Mark the body-cap coupling flanges of the valve adequately for easy valve reassembly.

(c) If flange boltings are found seized or stuck each other, apply some lubricant and leave it for a while for easier unthreading on valve disassembly.

1-3. Place the valve with the body flange down on the work bench, and proceed with disassembly of the cap from the body, referring to the illustration of Page 9. (No special tool is required.) Be careful not to damage the valve seat, which is the most important valve part.

1-4. After removal of the cap, place the valve body with "KITZ" mark up on the bench, and proceed with disassembly of the disc. Put soft clothes inside the valve body not to damage the disc, which is also an important member of the valve components.

1-5. Examination of the valve component parts:

(a) Clean the inside of the valve body and cap, and detect any wear, corrosion or crack of the castings using a magnifying glass, or, where visual access is not easy, using a tube inspector or a mirror and a flashlight. Non-destructive examination may be carried out if found necessary. Measure the wall thickness of castings periodically to check any dangerous sign to jeopardize valve shell soundness.

(b) Inspect surfaces of the valve seat and disc carefully to detect any scratch or wear, which may be a cause to replace the seat and/or disc on reassembly. Other metal parts must be also checked carefully to decide whether they are still usable.

2. Valve Reassembly

2-1. Prepare new non-metal valve parts such as gaskets, packings, thrust washers, gland bushes and stem bearings, and clean all metal parts before reassembly.

2-2. Proceed with valve reassembly, referring to the illustration of Page 9.

3. Acceptance Test

After reassembly, open and close the valve several times to check satisfactory valve operation. Then pressure-test the valve according to the specifications given on Page 2 to ensure the satisfactory sealing performance for final acceptance.

⚠ CAUTION

Pressure-temperature ratings and other performance data published in this catalog have been developed from our design calculation, in-house testing, field reports provided by our customers and/or published official standards or specifications. They are good only to cover typical applications as a general guideline to users of KITZ products introduced in this catalog.

For any specific application, users are kindly requested to contact KITZ Corporation for technical advice, or to carry out their own study and evaluation for proving suitability of these products to such an application. Failure to follow this request could result in property damage and/or personal injury, for which we shall not be liable.

While this catalog has been compiled with the utmost care, we assume no responsibility for errors, impropriety or inadequacy. Any information provided in this catalog is subject to from-time-to-time change without notice for error rectification, product discontinuation, design modification, new product introduction or any other cause that KITZ Corporation considers necessary. This edition cancels all previous issues.

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KITZ

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Printed in Japan

0009.4 CR-SP

Instruction **Manual**

Electronic Metering Pumps

Carefully read and understand all precautions before installing or servicing any metering

For file reference, please record the following data:

Model No: _____

Serial No: _____

Installation Date: _____

Installation Location:

When ordering replacement parts for your LMI Metering Pump or Accessory, please include complete Model Number and Serial Number of your unit.

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MILTON ROY

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1615.N 6/01

Contents

1.0 Introduction

LMI is the world's most versatile manufacturer of economical and efficient metering pumps. This manual addresses the installation, maintenance and troubleshooting procedures for manually and externally controlled pumps. LMI has a worldwide network of stocking representatives and authorized repair centers to give you prompt and efficient service.

Please review this manual carefully. Pay particular attention to warnings and precautions. Always follow good safety procedures, including the use of proper clothing, eye and face protection.

This manual is for Series A, B, C, E, J5, and P pumps.

1.1 Spare Parts

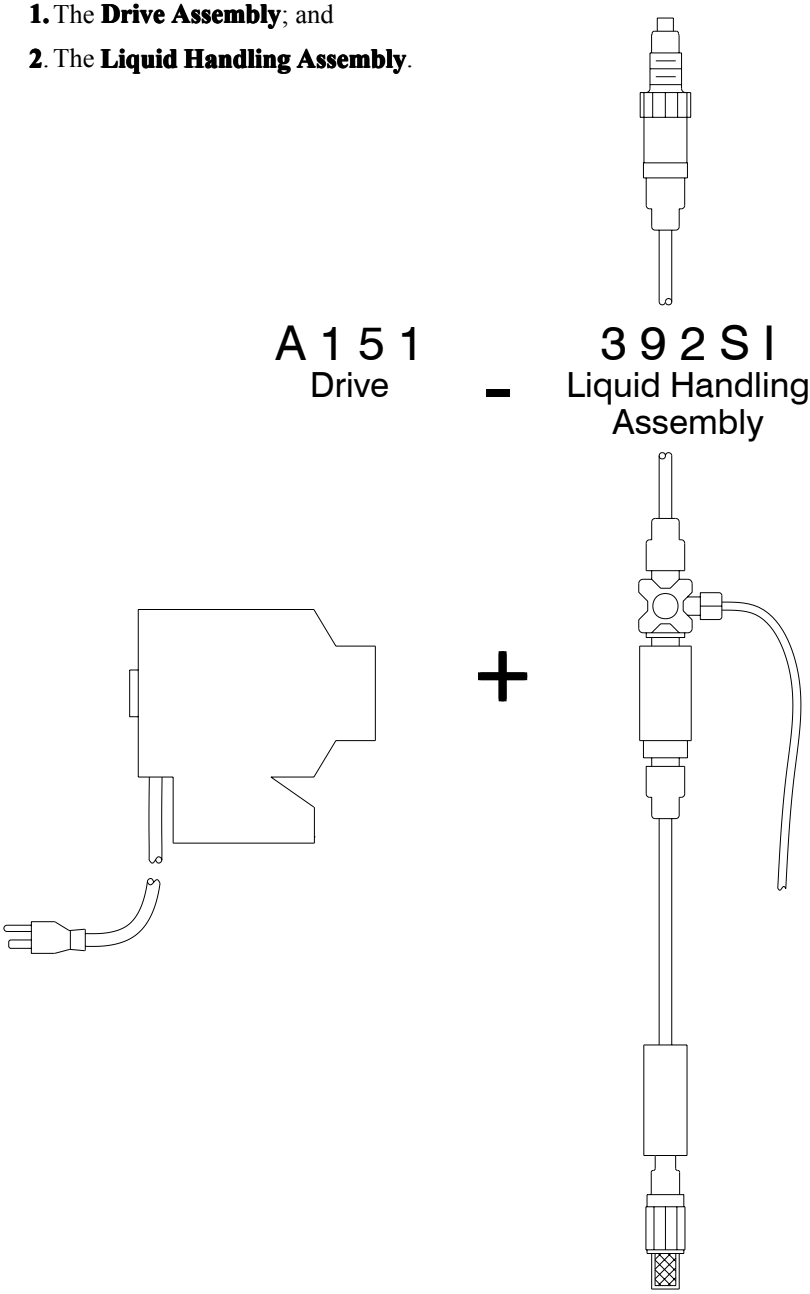
LMI recommends replacing the elastomeric components of the pump on an annual basis. RPM Pro Pacs™ and spare part kits are available from your local LMI Master Stocking Distributor.

Example:

Your pump consists of two main components:

1. The **Drive Assembly**; and

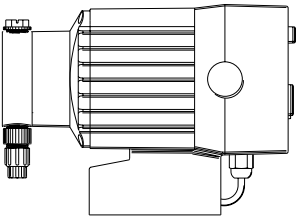
2. The **Liquid Handling Assembly**.



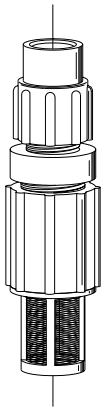
2.0 Unpacking Check List

Your carton will contain many or all of the following items. Please notify the carrier immediately if there are any signs of damage to the pump or its parts.

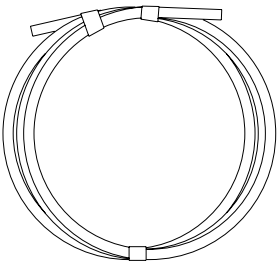
Please refer to the enclosed Instruction Supplement for an illustration and electrical diagram of your complete pump.



Metering Pump

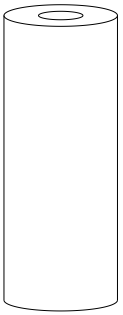


Foot Valve

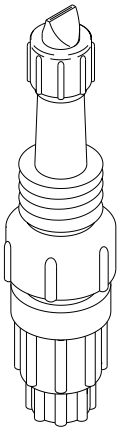


Tubing

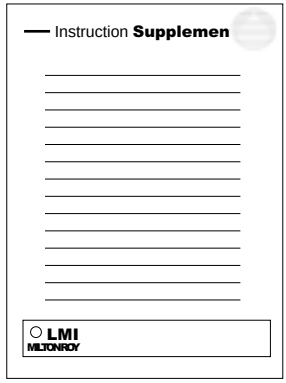
Depending on the model, your carton may contain 0, 1, 2 or 3 rolls of tubing. Your carton may contain a roll of clear vinyl tubing; this is for connection to the SUCTION SIDE OF THE PUMP HEAD ONLY.



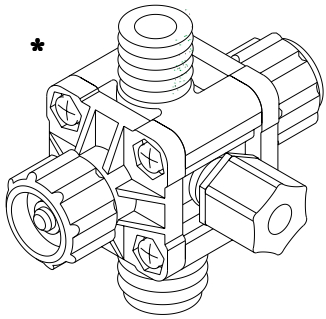
Ceramic Foot Valve Weight



Injection Check Valve



Instruction Supplement



MULTI-FUNCTION Valve and Tubing

* Your carton may or may not contain a 3-FV, 4-FV, or bleed 4-FV accessory.

3.0 Pre-Installation Instructions

The following precautions should be taken when working with LMI metering pumps. Please read this section carefully prior to installation.

Precautions

Protective Clothing

ALWAYS wear protective clothing, face shield, safety glasses and gloves when working on or near your metering pump. Additional precautions should be taken depending on the solution being pumped. Refer to MSDS precautions from your solution supplier.

Water Pre-Prime

All LMI pumps are pre-primed with water when shipped from the factory. If your solution is not compatible with water, disassemble the Pump Head Assembly. Thoroughly dry the pump head, valves, seal rings, balls and Liquifram™ (diaphragm). Reassemble head assembly tightening screws in a crisscross pattern. Refill the pump head with the solution to be pumped before priming the pump. (This will aid in priming.)

Solution Compatibility

Determine if the materials of construction included in the liquid handling portion of your pump are adequate for the solution (chemical) to be pumped. LMI pumps are tested by NSF for use on muriatic acid and sodium hypochlorite. Always refer to the solution supplier and the **LMI Chemical Resistance Chart** for compatibility of your specific LMI metering pump. Contact your local LMI distributor for further information.

Tubing Connections

Inlet and outlet tubing or pipe sizes must not be reduced. Make certain that all tubing is SECURELY ATTACHED to fittings prior to start-up (see Section 4.3, Tubing Connections). ALWAYS use LMI supplied tubing with your pump, as the tubing is specifically designed for use with the pump fittings. It is recommended that all tubing be shielded to prevent possible injury in case of rupture or accidental damage. If tubing is exposed to sunlight, black UV resistant tubing should be installed. Check tubing frequently for cracks and replace as necessary.

Fittings And Machine Threads

All fittings should be hand-tightened. An additional 1/8 - 1/4 turn after the fitting contacts the seal ring may be necessary to provide a leak-proof seal. Excessive overtightening or use of a pipe wrench can cause damage to the fittings, seals, or pump head.

All LMI pumps have straight screw machine threads on the head and fittings and are sealed by the seal rings or O-rings. **DO NOT use Teflon® tape or pipe dope to seal threads. Teflon® Tape may only be used on the 1/2" NPT thread side of the Injection Check Valve as well as stainless steel liquid end connections.**

Plumbing

Always adhere to your local plumbing codes and requirements. Be sure installation does not constitute a cross connection. Check local plumbing codes for guidelines. LMI is not responsible for improper installations.

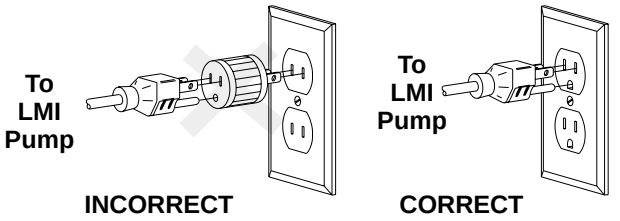
Back Pressure/Anti-Syphon Valve

If you are pumping downhill or into low or no system pressure, a back pressure/anti-syphon device such as LMI's Four Function Valve should be installed to prevent overpumping or syphoning. Contact your LMI distributor for furthur information.

Electrical Connections

CAUTION

To reduce the risk of electrical shock, the metering pump must be plugged into a grounded outlet with ratings conforming to the data on the pump control panel. The pump must be connected to a good ground. **DO NOT USE ADAPTERS!** All wiring must conform to local electrical codes.



4.0 Installation

4.1 Pump Location and Installation

Locate pump in an area convenient to solution tank and electrical supply.

The pump should be accessible for routine maintenance, and should not be subjected to ambient temperatures above 122°F (50°C). If the pump will be exposed to direct sunlight, LMI black, UV resistant tubing should be installed.

4.2 Pump Mounting

The pump can be mounted in one of two ways:

A. FLOODED SUCTION (ideal installation); or

B. SUCTION LIFT - when suction lift is less than 5 feet (1.5 m) for solutions having a specific gravity of water. For denser solutions, consult distributor.

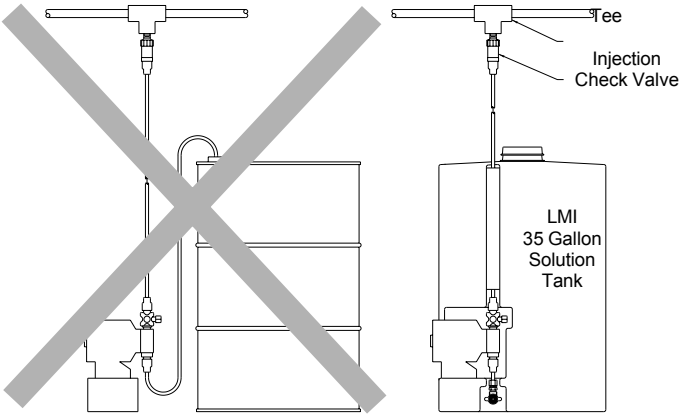
Your LMI metering pump must be mounted so that the suction and discharge valves are vertical. **NEVER position pump head and fittings horizontally.**

4.2.1 Flooded Suction

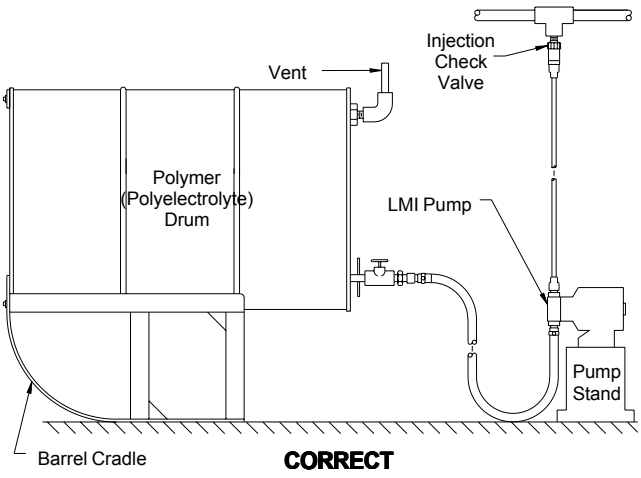
The pump is mounted at the base of the storage tank. This installation is the most trouble-free , and is recommended for very low outputs, solutions that gasify, and high-viscosity solutions. Since the suction tubing is filled with solution, priming is accomplished quickly and the chance of losing prime is reduced.

When pumping downhill or into low or no pressure system, a back pressure/anti-syphon device should be installed to prevent overpumping or syphoning.

Although popular for all solutions, LMI recommends flooded suction installations for all high-viscosity fluid applications.

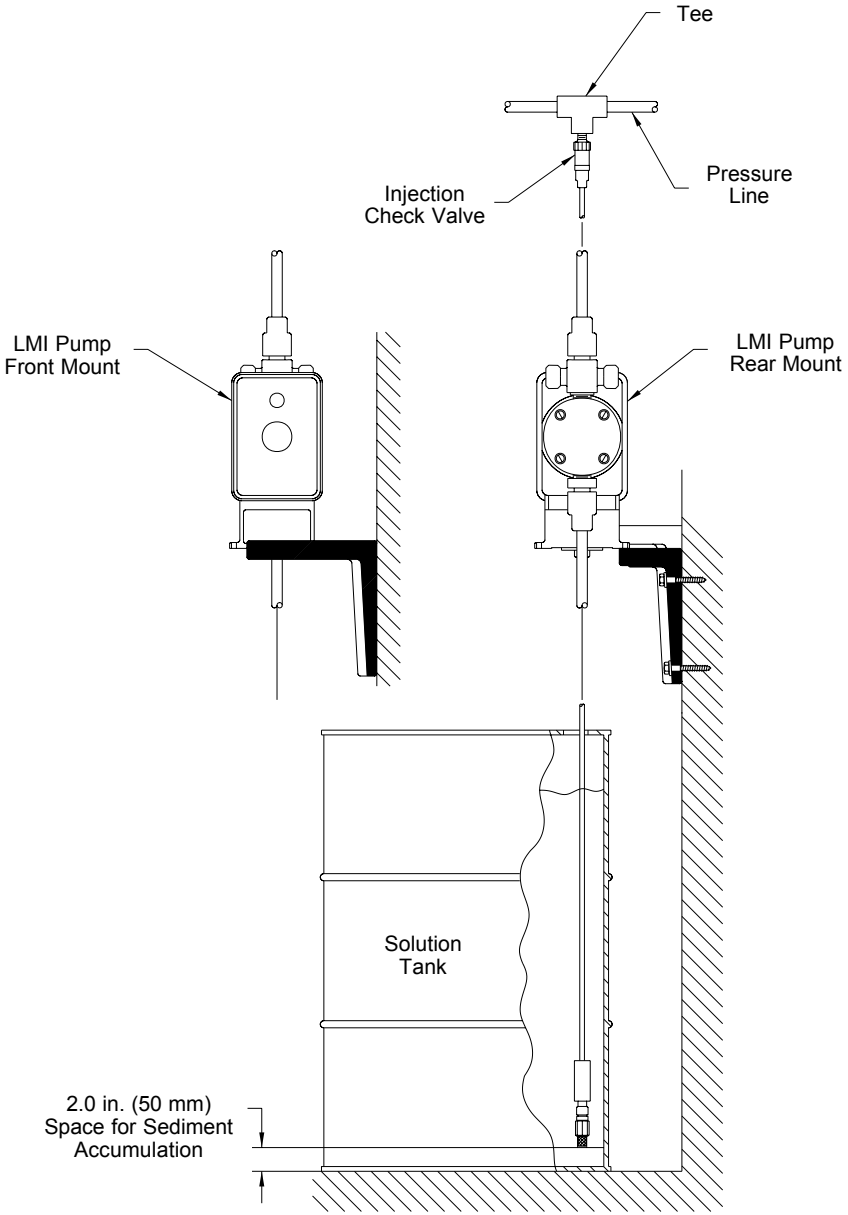


Avoid this type of false flooded suction.



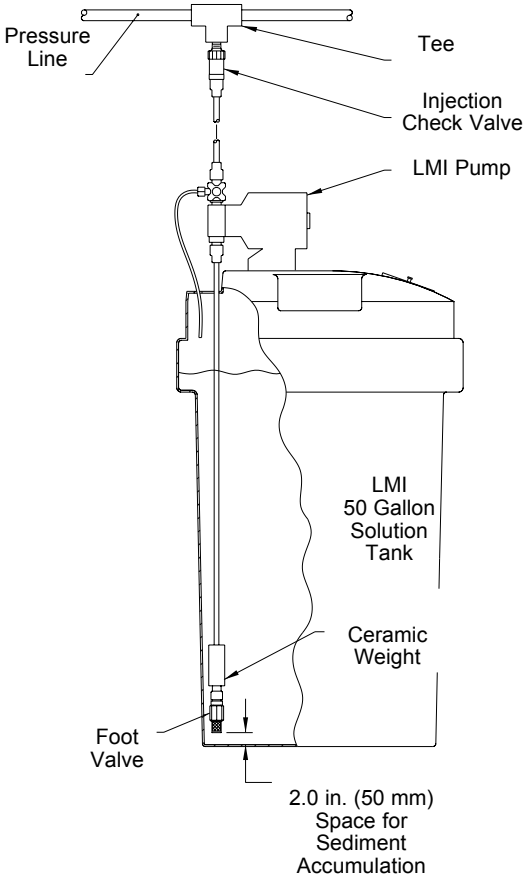
4.2.2 Suction Lift - Wall Bracket Mount

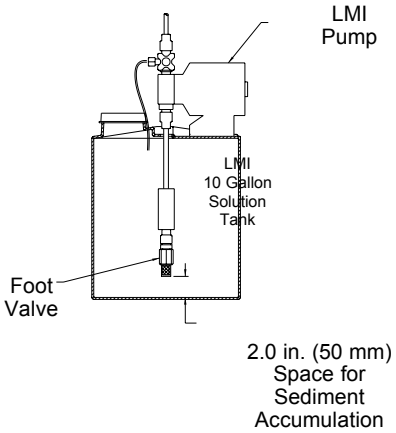
The pump may be mounted using an LMI Wall Mount Bracket Assembly (part no. 34643) directly above the solution tank. A pump mounted in this manner allows for easy changing of solution tanks or drums.



4.2.3 Suction Lift - Tank Mount

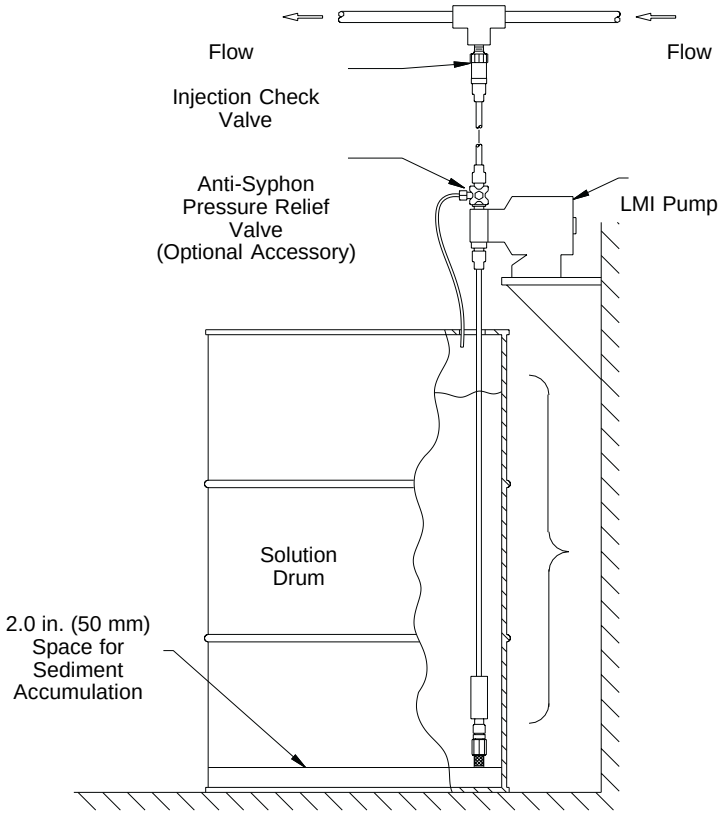
The pump may be mounted on a molded tank provided there is a recess to keep the pump stationary. LMI 10-gallon tank (part no. 27421), 35-gallon tank (part no. 27400), and 50-gallon tank (part no. 26350) have molded recesses for pump mounting.





4.2.4 Suction Lift - Shelf Mount

The pump may be mounted on a shelf (customer supplied) maintaining a suction lift of less than 5 ft (1.5 m). An LMI mounting kit (part number 10461) is available for securing the pump to a shelf.



4.3 Tubing Connections

A. Use only LMI tubing.

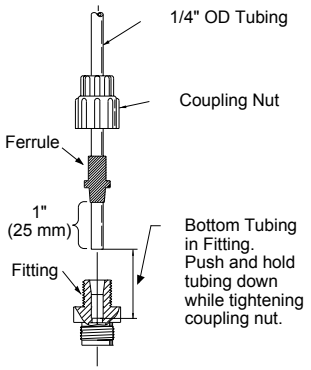
B. ***DO NOT USE CLEAR VINYL TUBING ON THE DISCHARGE SIDE OF THE PUMP.*** The pressure created by the pump can rupture vinyl tubing.

C. Before installation, all tubing must be cut with a clean square end.

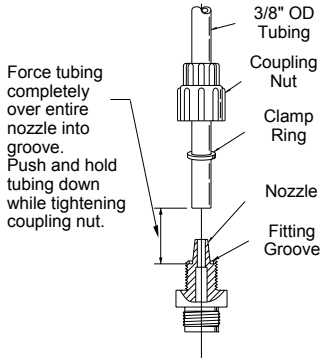
D. Valve and head connections from the factory are capped or plugged to retain pre-prime water. Remove and discard these caps or plugs before connecting tubing.

DO NOT USE PLIERS OR PIPE WRENCH ON COUPLING NUTS OR FITTINGS.

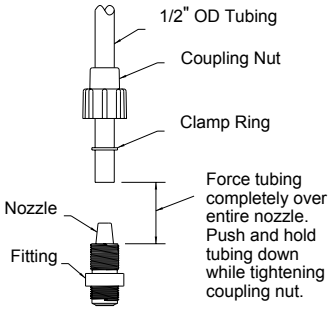
Tubing Connection
1/4" O.D. (.250") Tubing



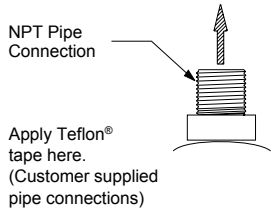
Tubing Connection
3/8" O.D. (.375") Tubing



Tubing Connection
1/2" O.D. (.5") Tubing



Pipe Thread Connection
1/4" or 1/2" NPT



4.4 Multi-Function Valves

Your pump may be equipped with one of the following multi-function valves: 3-FV, 4-FV, Bleed 4-FV, or standard discharge valve. If your pump is not equipped with a multi-function valve and you feel it is needed in your application, it can be purchased as an accessory. Contact your local LMI stocking distributor.

4.4.1 Three Function Valve (3-FV)

1. **Pressure Relief**

   If the discharge line is over pressurized, the valve opens sending solution back to the supply tank.

2. **Line Depressurization**

   Opening the relief knob provides line drain back to the supply tank.

3. **Priming Aid**

   Opening the relief knob assists in priming the pump by venting the discharge line to the atmosphere.

4.4.2 Four Function Valve (4-FV)

1. **Pressure Relief**

   If the discharge line is over pressurized, the valve opens sending solution back to the supply tank.

2. **Line Depressurization**

   Opening the relief knob provides line drain back to the supply tank.

3. **Anti-Syphon**

   Prevents syphoning when pumping solution downhill or into a vacuum.

4. **Back Pressure**

   Supplies approximately 25 psi back pressure to prevent overpumping when little or no system back pressure is present.

4.4.3 Bleed Four Function Valve (Bleed 4-FV)

1. Line Depressurization

Opening the relief port provides line drain back to the supply tank.

2. Anti-Syphon

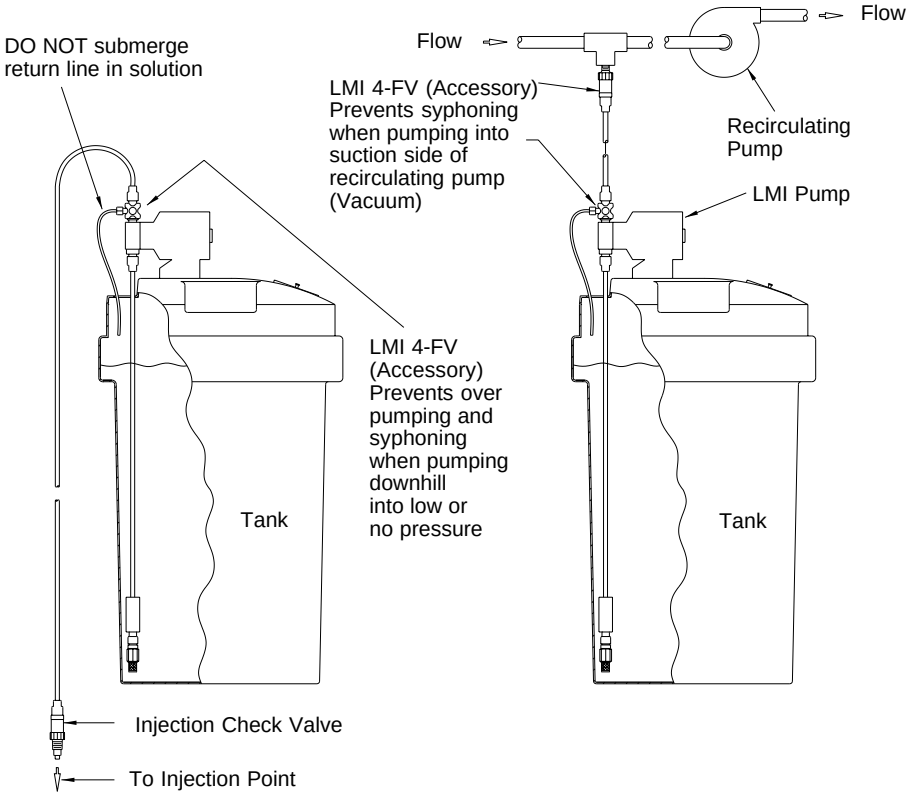
Prevents syphoning when pumping solution downhill or into a vacuum.

3. Back Pressure

Supplies approximately 25 psi back pressure to prevent overpumping when little or no system back pressure is present.

4. Bleed Function

Manually adjusted valve provides continuous bleed of entrapped vapors from Sodium Hypochlorite or Hydrogen Peroxide.



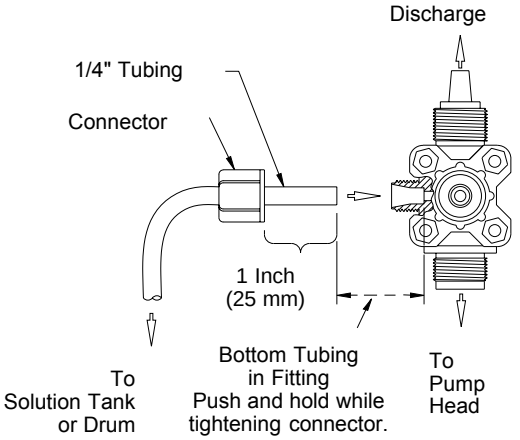
Typical 4-FV Installation

4.5 Multi-Function Valve Installation

To install the multi-function valve, remove the yellow screw cap on the top of the pump head and screw in the valve so that it contacts the seal ring. An additional 1/8 - 1/4 turn may be necessary to prevent leakage.

1/4" O.D. tubing connects to the side of the valve and acts as a return line to the solution tank. To ensure priming, this tubing must **NOT** be submerged in the solution.

This return line tubing must be secured to ensure pumped solution will safely return to supply tank.



Multi-Function Valve Tubing Connection

4.6 Foot Valve/Suction Tubing Installation

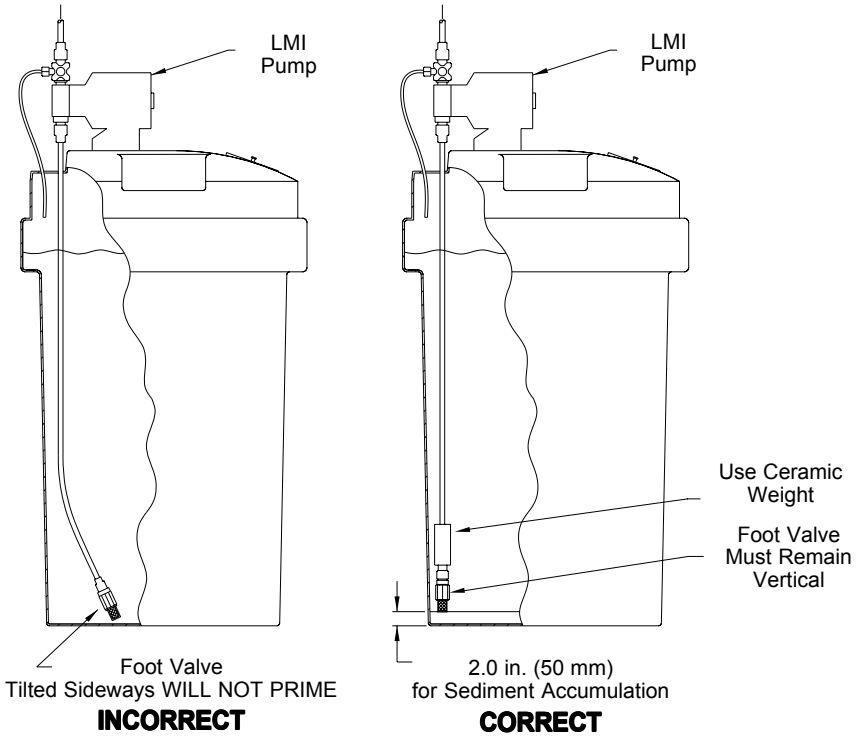
The Foot Valve acts as a check valve to keep the pump primed in suction lift applications.

The foot valve is designed to be submersed in the solution tank or drum and must sit in a vertical position at the bottom. Position approximately 2 inches (50 mm) off the bottom if the tank or drum contains sediment.

Pump models equipped with high-viscosity liquid ends are not equipped with foot valves. Flooded suction is recommended. A 1/2" NPT connector is included for flooded suction installations.

The ceramic weight, when installed, positions the foot valve in a vertical position.

1. Attach the foot valve to one end of the suction tubing (see Tubing Connections, Section 4.3).
2. Slide the ceramic weight over the tubing end until it contacts the top of the foot valve coupling nut.
3. Place foot valve and tubing into the solution tank. Check that the foot valve is vertical and approximately 2 inches (50 mm) from the bottom of the tank or drum (see illustration). Connect the other end of the tubing to the suction side of the pump head (bottom side) (see Tubing Connections, Section 4.3).



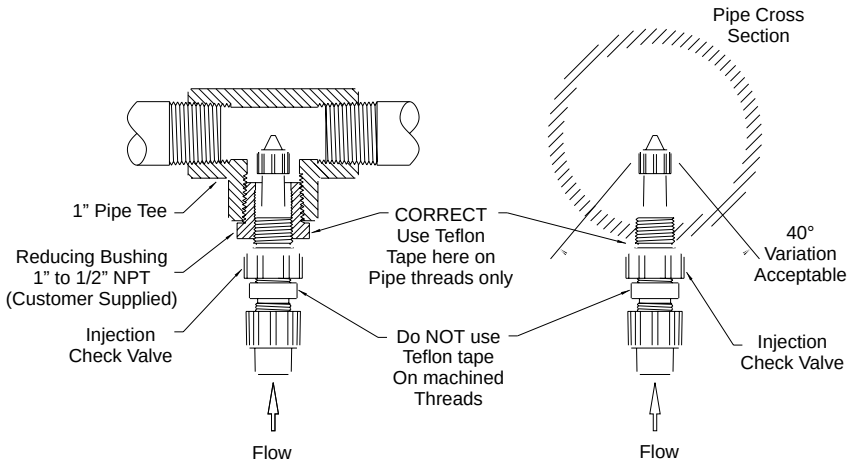
Proper Foot Valve Position

4.7 Injection Check Valve and Discharge Tubing Installation

The Injection Check Valve prevents backflow from a treated line. Connect the Injection Check Valve to your "DISCHARGE" (outlet) line. Any size NPTF fitting or pipe tee with a reducing bushing to 1/2" NPTF will accept the injection check valve. Use Teflon® tape or pipe dope to seal the pipe threads ***only***.

When installing the Injection Check Valve, be sure to position it so that the valve enters the bottom of your pipe in a vertical position. Variations left and right within 80° are acceptable (see illustration below).

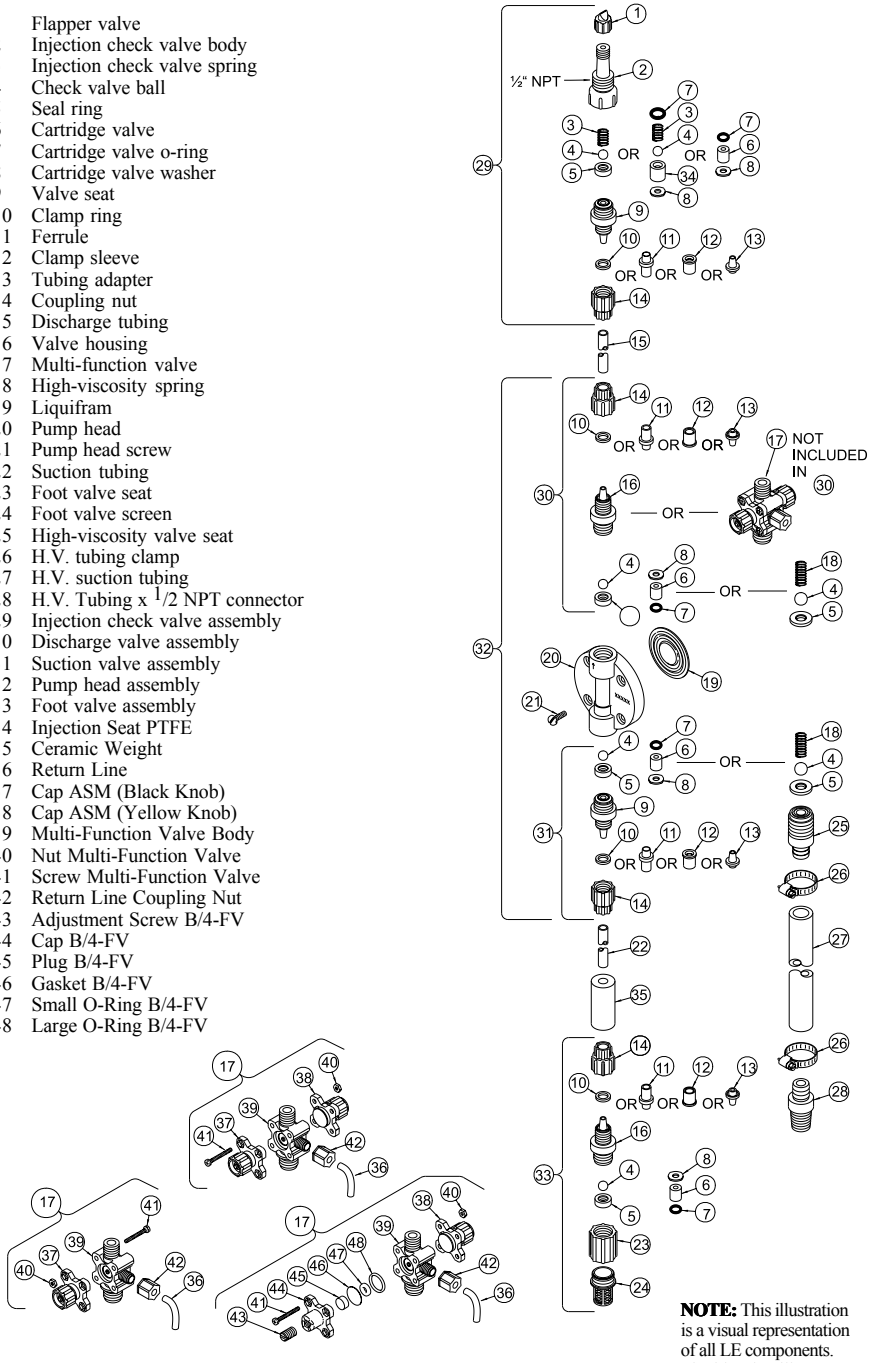
After cutting an appropriate length of tubing, connect tubing to the injection check valve then back to the discharge side of the pump head valve or discharge fitting (top side), making sure it does not crimp or come into contact with hot or sharp surfaces (see Tubing Connections, Section 4.3).



Typical Injection Check Valve Installations

5.0 Liquid End Parts List

1 Flapper valve
2 Injection check valve body
3 Injection check valve spring
4 Check valve ball
5 Seal ring
6 Cartridge valve
7 Cartridge valve o-ring
8 Cartridge valve washer
9 Valve seat
10 Clamp ring
11 Ferrule
12 Clamp sleeve
13 Tubing adapter
14 Coupling nut
15 Discharge tubing
16 Valve housing
17 Multi-function valve
18 High-viscosity spring
19 Liquifram
20 Pump head
21 Pump head screw
22 Suction tubing
23 Foot valve seat
24 Foot valve screen
25 High-viscosity valve seat
26 H.V. tubing clamp
27 H.V. suction tubing
28 H.V. Tubing x 1/2 NPT connector
29 Injection check valve assembly
30 Discharge valve assembly
31 Suction valve assembly
32 Pump head assembly
33 Foot valve assembly
34 Injection Seat PTFE
35 Ceramic Weight
36 Return Line
37 Cap ASM (Black Knob)
38 Cap ASM (Yellow Knob)
39 Multi-Function Valve Body
40 Nut Multi-Function Valve
41 Screw Multi-Function Valve
42 Return Line Coupling Nut
43 Adjustment Screw B/4-FV
44 Cap B/4-FV
45 Plug B/4-FV
46 Gasket B/4-FV
47 Small O-Ring B/4-FV
48 Large O-Ring B/4-FV



NOTE: This illustration is a visual representation of all LE components. Liquid ends will not include all parts shown.

6.0 Start-up and Adjustment

a.) The pump is normally self-priming if suction lift is 5 ft (1.5m) or less and the steps below are followed.

b.) Pumps are shipped from the factory with water in the pump head to aid in priming.

6.1 Output Adjustment Controls

Manual series pump controls are not equipped with pressure control.

1. Pressure Control Adjustment (if equipped): Pressure control provides the adjustment of the pump's pressure capability and power consumption, reducing heat, pipe shock and pulsation while increasing pump life. See Section 7.0 after priming for proper adjustment settings.
2. Speed Adjustment (Upper Knob) (if equipped): Speed control provides adjustment of the percent of maximum strokes per minute. Turning this knob clockwise increases stroke frequency (speed).
3. Stroke Adjustment (Lower Knob): Stroke control provides adjustment of the percent maximum of solution discharged during each pump actuation. Turning this knob clockwise ↻ increases solution displacement.

***A7 and P7 Only**: When operating the pump in external mode, the speed control knob should be turned fully counter-clockwise ↺.*

***A34 and A37 Only:** Pump comes equipped with a range selector switch which provides high or low speed adjustment. The high setting provides speed adjustments between 8 and 100 strokes per minute. The low setting provides accurate speed adjustments between 1 and 12.5 strokes per minute for applications requiring infrequent stroking.*

6.2 Start-Up/Priming for Pump Supplied with Multi-Function Valve

Read this entire section completely before proceeding.

When all precautionary steps have been taken, the pump is mounted, and the tubing is securely attached, you may now start priming the pump.

1. Plug in or switch the pump on.

2. While the pump is running, set the speed knob at 80% and the stroke knob at 100%.

If the pump is equipped with pressure control, turn fully clockwise.↷

3. 1/4 turn open the relief side (black knob) of the multi-function valve.

3A. (Bleed 4FV only) With screwdriver rotate bleed adjustment screw counter-clockwise ↶. 2 full turns. When solution begins to flow through translucent bleed return tubing, the pump is primed. Stop pump.

4. The suction tubing should begin to fill with solution from the tank.

5. A small amount of solution will begin to discharge out the return line of the multi-function valve. Once this happens, 1/4 turn or release the knob and **SHUT THE PUMP OFF**. (If pump is not equipped with an on/off switch, disconnect the power cord.)

6. The pump is now primed.

6A. (Bleed 4FV only)

a. Start pump and let pump inject solution into the discharge line.

b. Close the bleed adjustment screw by rotating it clockwise ↷ with a screwdriver.

c. Now adjust the pump stroke length and/or speed (frequency) to a range approximately 25% higher than you would normally want for the process.

d. Slowly rotate bleed adjustment screw counter-clockwise ↶. until just a small amount of solution begins to trickle

down inside the bleed return tubing. A small amount of solution pumped back to the tank with each stroke of the pump will allow gas and air to escape without air or gas locking in the pump head.

7. Proceed to output adjustment, Section 6.4.

If the pump does not self-prime, remove the multi-function valve on the discharge side of the pump head. Remove the check valve and pour water or solution into the port until the head is filled. Replace valve, then follow start up/priming steps.

6.3 Start-Up/Priming without Multi-Function Valve

Read this entire section completely before proceeding.

When all precautionary steps have been taken, the pump is mounted, and the tubing is securely attached, you may now prime the pump.

1. Plug in or switch on the pump.

2. While the pump is running, set the speed knob at 80% and the stroke knob at 100%.

If the pump is equipped with pressure control, turn fully clockwise ↻.

3. The suction tubing should begin to fill with solution from the tank.

4. Once the solution begins to exit the pump head on the discharge side, **SHUT THE PUMP OFF**. (If pump is not equipped with an on/off switch, disconnect the power cord).

5. The pump is now primed.

6. Proceed to output adjustment, Section 6.4.

If the pump does not self-prime, remove the fitting on the discharge side of the pump head. Remove the ball and pour water or solution into the port until the head is filled. Replace valve, then follow start up/priming steps.

6.4 Output Adjustment

Once the pump has been primed, an appropriate output adjustment **MUST** be made. Pump output should be calculated and adjustments made accordingly.

6.5 Total Pump Output

Calculate the total output of the pump as follows:

PUMP OUTPUT = MAX PUMP OUTPUT x % SPEED x % STROKE

Example: A151-392SI

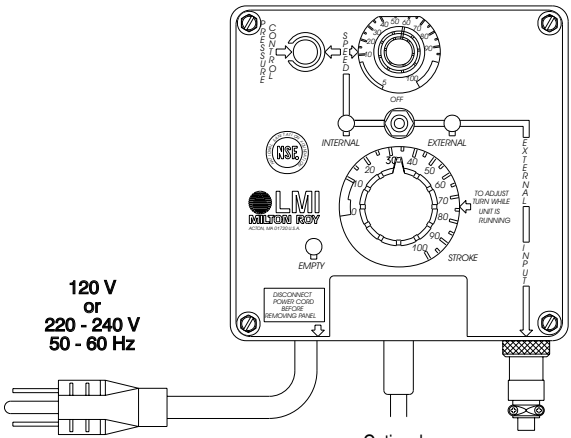
Use MAX Output (from dataplate on bottom center of pump control panel) = 24 GPD (24 gallons per day).

If the pump is set at 60% speed and 70% stroke length, the approximate pump output is:

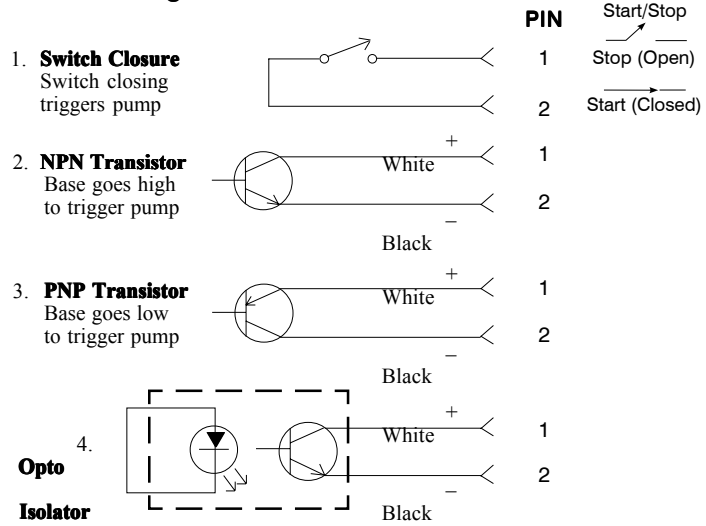
24.0 x 0.60 x 0.70 = 10.08 GPD (gallons per day). Divide by 24 (hours in one day) to calculate in gallons per hour.

If pump is not equipped with speed adjustment, calculate by ***Max Pump Output x % Stroke*** *only.*

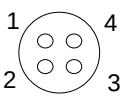
7.0 Methods of Externally Triggering

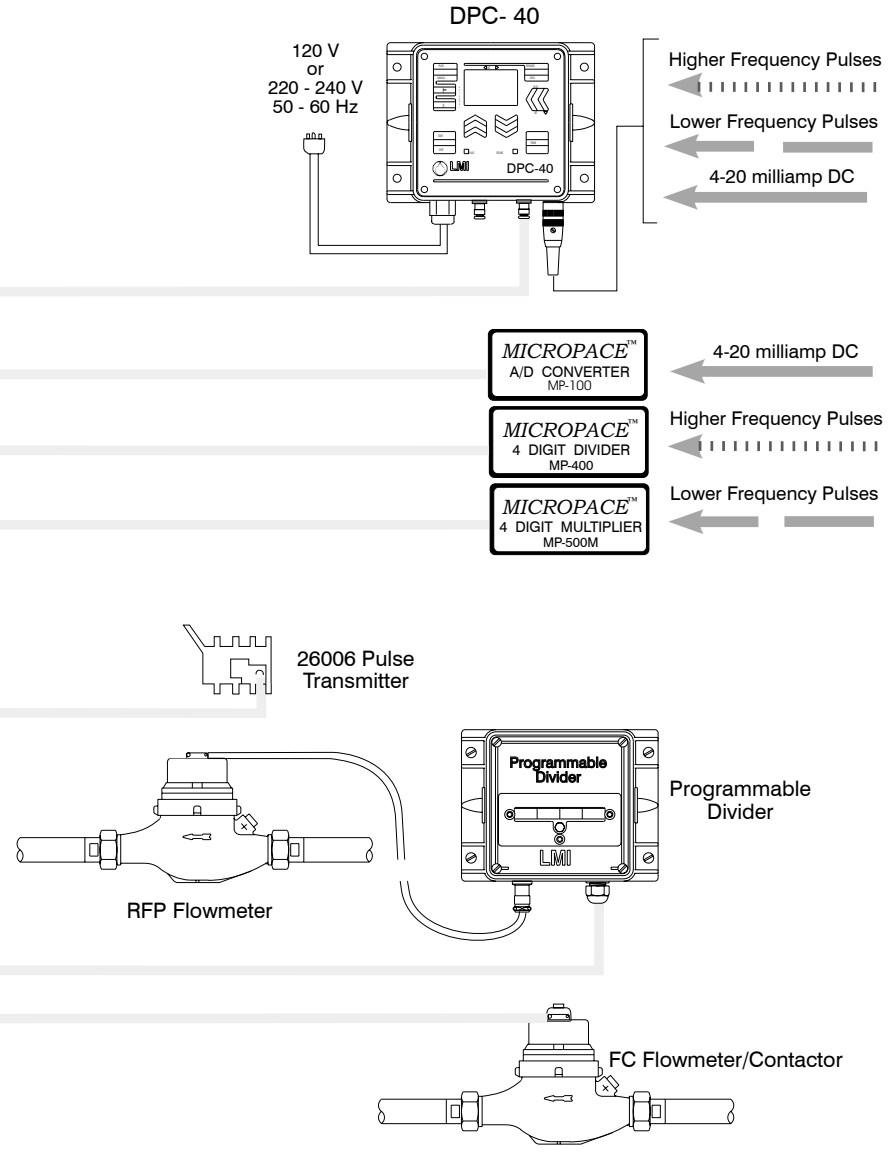


Method of Triggering LMI Pump Through 4-Pin Connector



Switch or transistors must be capable of switching 15V DC at 2 milliamperes. Minimum time in low impedance state (ON) is 50 milliseconds. Minimum time in high impedance state (OFF) is 100 milliseconds.




DPC- 40
120 V
or
220 - 240 V
50 - 60 Hz
LMI
DPC-40
Higher Frequency Pulses
Lower Frequency Pulses
4-20 milliamp DC
MICROPACE™
A/D CONVERTER
MP-100
4-20 milliamp DC
MICROPACE™
4 DIGIT DIVIDER
MP-400
Higher Frequency Pulses
MICROPACE™
4 DIGIT MULTIPLIER
MP-500M
Lower Frequency Pulses
26006 Pulse
Transmitter
Programmable
Divider
LMI
Programmable
Divider
RFP Flowmeter
FC Flowmeter/Contactor

8.0 Calibration

Once installation is complete and the approximate output has been determined, the pump should be calibrated to adjust speed and stroke for your actual desired output. (Calibration cylinders may be purchased from your local LMI distributor, ref. publication 1798.)

. **1**. Be sure the pump is primed, and discharge tubing and Injection Check Valve are installed as they would be in normal service (i.e., including factors such as injection pressure, fluid viscosity, and suction lift).

2. Place the Foot Valve in a graduated container with a volume of 1000 ml or more.

3. Plug in and switch pump to Internal Mode. Pump until all the air is exhausted from the suction line and head.

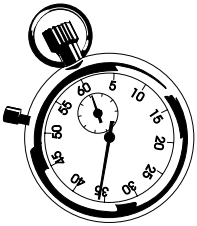
4. Turn the pump off. Refill graduated container to a level starting point.

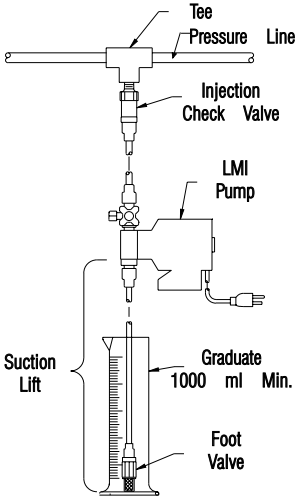
If pump is equipped with pressure control, see Section 8.1 before proceeding.

5. Using a stopwatch or timer, turn the pump on for a measured amount of time (50 pump strokes minimum). The longer the time period, the more confident you can be of the results. Be sure to count the number of strokes during the calibration period when making comparisons.

6. Turn the pump off. Note the time elapsed in relation to volume displaced in the graduate. Now, calculate the output in the time unit you choose (minutes, hours, days, etc.).

7. If the output is too low or too great, adjust speed and or stroke, estimating required correction and repeat steps 1-7.

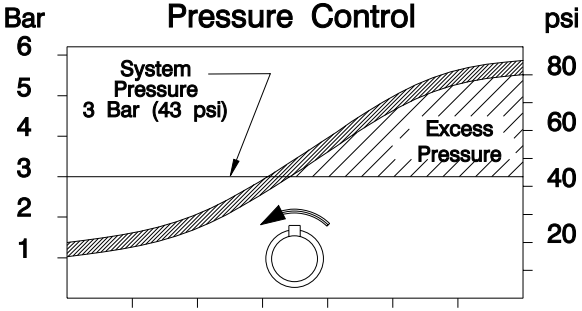




8.1 Pressure Control

Adjust Pressure Control: While unit is running, turn Pressure Control Potentiometer slowly counter-clockwise ↺ until unit just begins to stall. From this stall point, now turn Pressure Control Potentiometer clockwise ↻ halfway between the stall point and maximum setting. This is the optimum pressure control setting for your application.

Increase setting if back pressure is increased. Adjusting pressure control decreases pressure rating of pump.



Adjust pressure control to reduce heat, shock, and pulsations; and to prolong pump life.

8.2 Calibration Procedure - On-Site Volumetric Calibration in External Mode

1. Since pump output is governed by an external device such as Flowmeter-Pulser, Liquitron™ Controller, or 4-20 mA DC signal from an instrument with an LMI Analog-to-Digital Converter, **only the output per stroke may be calibrated**.
2. With pump primed and discharge tubing connected to the injection point as it would be in normal service, place Foot Valve Assembly in a graduated container with a volume of 1000 ml or more.
3. Switch pump to **Internal** mode with Speed Knob set at 100 until air is exhausted from suction line and pump head.
4. **Adjust Pressure Control (if desired)** - See Section 8.1.
5. Switch pump **OFF** and note solution level in graduated container. Refill graduate to a starting point.
6. Switch pump **ON** and **count the number of strokes** for exactly one minute, then switch pump **OFF**.
7. Note volume pumped during the calibration period of one minute. Divide into this the number of strokes to determine the volume of solution pumped per stroke.

   Example: 500 ml in 100 strokes = 5.0 ml per stroke.

Multiply this by your expected stroke rate per minute, per hour or per day and compare with desired output requirements.

8. Adjust Stroke Length Knob (lower knob) to your best estimate of required correction and repeat calibration procedure.

9.0 Spare Parts Replacement Routine Maintenance

9.1 Depressurizing the Discharge Line (For Pumps Equipped with a 3-FV or a 4-FV only)

ALWAYS wear protective clothing, face shield, safety glasses and gloves when performing any maintenance or replacement on your pump.

Read steps 1 and 2 below before proceeding.

1. Be sure the Injection Check Valve is properly installed and is operating. If a shut off valve has been installed downstream of the Injection Valve, it should be closed.

Be sure your relief tubing is connected to your multi-function valve and runs back to your solution drum or tank.

2. 1/4 turn the black knob on the valve. The discharge line is now depressurized. Keep valve open until solution drains back down the discharge tubing into solution drum or tank. Then 1/4 turn knob to normal position.

9.2 Liquifram™ (Diaphragm) Replacement

ALWAYS wear protective clothing, face shield, safety glasses and gloves when working near or performing any maintenance or replacement on your pump. See MSDS information from solution supplier for additional precautions.

LMI metering pumps are designed for trouble-free operation, yet routine maintenance of elastomeric parts is essential for optimum performance. This involves replacing the Liquifram™, cartridge valves or seal rings/valve balls, multi-function valve cap assemblies and the injection check valve spring. LMI recommends replacing these parts at least once a year; however, frequency will depend on your particular application.

When replacing the Liquifram™ and the cartridge valves or seal rings/valve balls, the injection check valve spring should also be replaced (see next Section 9.3). A Spare Parts Kit (SP-#) or RPM Pro Pac™ kit containing these parts may be obtained from your local distributor.

Replacing the Liquifram™:

1. Carefully depressurize, drain, and disconnect the discharge line (see Section 8.1 in this manual). Place the Foot Valve into a container of water or other neutralizing solution. Turn the pump on to flush the head assembly. Once the pump head has been flushed, lift the Foot Valve out of the solution and continue to pump air into the pump head until the pump head is purged of water or neutralizing solution.

If the liquid cannot be pumped due to Liquifram™ rupture using protective clothing, gloves and face shield, carefully disconnect the suction and discharge tubing. Remove the four screws to the head and immerse the head in water or other neutralizing solution.

2. Start the pump. While running, set the stroke knob to zero and turn the pump off.

See Section 10.0 for proper zero

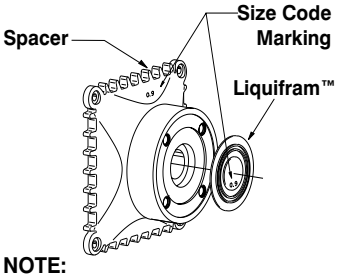
.

3. With the unit off, unscrew the Liquifram™ by carefully grasping the outer edge and turning it counter-clockwise ↺. Discard old Liquifram™. Remove the Liquifram™ disk if so equipped (located behind the Liquifram™) and check that the size code matches the size code on the replacement Liquifram™ (see illustration).

4. Reinstall the disk so the alignment pin on the disk (if present) seats in the recessed hole in the EPU.

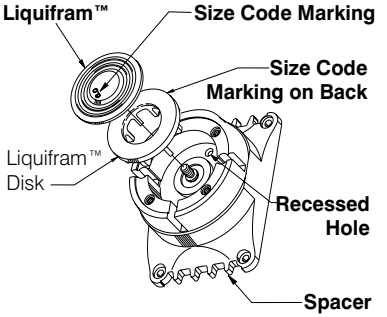
CAUTION ***Be careful not to scratch the Teflon® face of the new Liquifram™.***

For Series B, C, & E



NOTE:
Size code markings for pumps supplied with 6.0 Liquiframs™ (diaphragms) should be referenced to the 6.0 Black Adapter, not the 3.0 Spacer

For Series A, J, & P



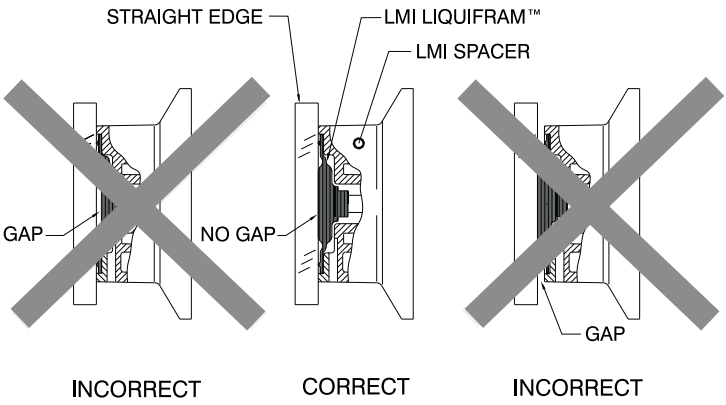
5. Start the pump and turn the stroke knob to the setting indicated on the following Stroke Setting Chart which matches the pump series number located on the pump dataplate. With the pump stroking (running), screw on the new Liquifram™ clockwise ↻ until the center begins to buckle inwards. Stop the pump.

Liquifram™ Stroke Setting Chart

Pump Series	Stroke Knob Setting
All A, B, J, P, Z Series C10, C11, C12, C70, C71, C72, C76, C90, C91, C92, E70, E71, E72	90%
All L Series	85%
C78	50%
C13, C14, C73, C74, C77, C93, C94, E73, E74	70%
All M Series	100% *

* Liquifram™ on M Series pumps only, must be bottomed completely (turned all the way in). ***Do Not Use Straight Edge***.

6. Grasp the outer edge of the Liquifram™ and adjust by screwing it in or out so that the center of the Liquifram™ is flush with the outside of the spacer edge (see illustration below).



(Liquifram™ is flush with spacer and straight edge.)

7. Once the Liquifram™ is properly positioned, remount the pump head to the spacer using the four (4) screws. Tighten in a criss-cross pattern. After one week of operation, recheck the screws and tighten if necessary.

9.3 Cartridge Valves, Seal Rings/Valve Balls and Injection Check Valve Spring Replacement

ALWAYS wear protective clothing, face shield, safety glasses and gloves when working on or performing any maintenance or replacement on your pump. See MSDS information from solution supplier for additional precautions.

1. Refer to the LMI Metering Pump Price List for the proper Spare Parts Kit or RPM Pro Pac™ kit number or contact your local LMI stocking distributor.

2. Carefully depressurize and disconnect the discharge line (see Section 9.1 in this manual). Place the Foot Valve into a container of water or other neutralizing solution. Turn the pump on to flush the head assembly. Once the pump has been flushed, lift the Foot Valve out and continue to pump to let air into the pump head until pump is purged of water or neutralizing solution.

Once the pump has been flushed, lift the Foot Valve out and continue to let air into the pump head until pump is purged of water or neutralizing solution.

If the liquid cannot be pumped due to Liquifram™ rupture, with protective clothing, gloves and face shield, carefully disconnect the tubing and four screws to remove the head. Immerse the head in water or other neutralizing solution.

Spare part replacement kits include specific instructions for valve replacement. Please follow the instructions included with the replacement kit.

***IMPORTANT**: Before disassembling the check valves, note the orientation of the valve.*

3. Carefully disconnect one tubing connection and fitting at a time, then remove and replace the worn valve.

If necessary, carefully loosen stuck valves by prying side to side using a small screwdriver through the center hole of the valve.

4. Install new check valves in each location.

IMPORTANT: *Note correct orientation of each check valve.*

5. Install the new spring in the Injection Check Valve.

Depressurize and drain pipeline (or isolate I.C.V. point using valves) so that I.C.V. can safely be disassembled.

10.0 Checking Pump for Proper Zero Position (Stroke Knob)

1. With pump running, turn stroke knob counter-clockwise ↷ toward zero or end of black or red band on dial.

2. LISTEN to the clicking as the pump is running. The pump should operate quietly at the zero position (no clicking).

3. If the pump continues to click at zero or stops clicking before zero is reached, the pump zero must be reset (see Section 10.1 or 10.2).

10.1 Type I - Push on Knob Re-Zeroing and Stroke Knob Disassembly and Assembly

1. Remove stroke knob from the pump by grasping the knob firmly and pulling it toward you.

2. Pry off the yellow cap.

3. Place the knob on a flat surface.

4. Using needle-nose pliers, squeeze the inner section together while lifting the outer section up.

5. Push the inner section back onto the "D" shaped stroke shaft.

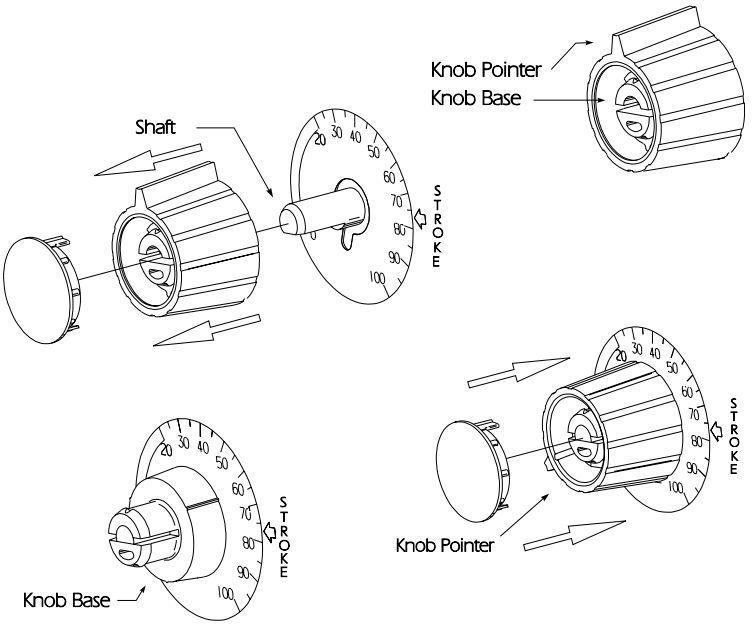
6. With the pump running, zero the pump by turning the inner section of the knob counter-clockwise ↶ until the pump stops clicking.

7. Position the outer section of the knob so that the pointer aligns with zero on the nameplate or end of the black or red band.

8. Push down on the outer section (a snap sound indicates parts are locked together).

9. Replace the yellow cap over the outer section of the knob, aligning the tabs on the cap with the slots inside the knob.

Stroke Knob Assembly (Type I)



10.2 Type II Collet Knob
Re-Zeroing and Stroke Knob Disassembly and Assembly

1. Remove Yellow Cap.
2. Hold knob with soft jaw pliers.
3. Disconnect knob by loosening 5/16" (8 mm) collet nut. There is no need to remove nut.
4. Remove knob by pulling towards you.
5. With pump running, zero the pump using a screw driver to turn the stroke shaft counter-clockwise ↶ until the pump just stops clicking.
6. Pump is now zeroed.
7. Position knob at zero, or the end of the low range band, and tighten 5/16" (8 mm) collet nut.
8. Replace yellow cap.

11.0 Troubleshooting

PROBLEM	POSSIBLE CAUSE
Pump Will Not Prime	1. Pump not turned on or plugged in.
	2. Output dials not set properly.
	3. Foot Valve not in vertical position on bottom of tank.
	4. Pump suction lift too high.
	5. Suction tubing is curved or coiled in tank.
	6. Fittings are over tightened.
	7. Air trap in suction valve tubing.
	8. Too much pressure at discharge. (Pumps without multi-function valve.)
Pump Loses Prime	1. Solution container ran dry.
	2. Foot Valve is not in a vertical position on the bottom of the tank.
	3. Pump suction lift is too high.
	4. Suction tubing is curved or coiled in tank.
	5. Fittings are over tightened.
	6. Air trap in suction valve tubing.
	7. Air leak on suction side.

	SOLUTION
	1. Turn on pump/plug in pump.
	2. Always prime pump with speed at 80% and stroke at 100%.
	3. Foot Valve must be vertical (see Foot Valve Installation, Section 4.6).
	4. Maximum suction lift is 5 ft (1.5 m). Pumps with High Viscosity Liquid Handling Assemblies require flooded suction.
	5. Suction tubing must be vertical. Use LMI tubing straightener supplied with pump (see Section 4.6).
	6. Do not overtighten fittings. This causes seal rings to distort and not seat properly which causes pump to leak back or lose prime.
	7. Suction tubing should be as vertical as possible. AVOID FALSE FLOODED SUCTION! (see Section 4.2.1).
	8. Shut off valves in pressurized line. Disconnect tubing at injection check valve (see Priming Section 6.0). When pump is primed, reconnect discharge tubing.
	1. Refill container with solution and reprime (see Section 6.0).
	2. Foot Valve must be vertical (see Foot Valve Installation, Section 4.6).
	3. Maximum suction lift is 5 ft (1.5 m). Pumps with High Viscosity Liquid Handling Assemblies require flooded suction.
	4. Suction tubing must be vertical. Use LMI tubing straightener supplied with pump (see Section 4.6).
	5. DO NOT OVERTIGHTEN FITTINGS. This causes seal rings to distort and not seat properly which caused pump to leak back or lose prime.
	6. Suction tubing should be as vertical as possible. AVOID FALSE FLOODED SUCTION! (see Section 4.2.1).
	7. Check for pinholes, cracks. Replace if necessary.

Troubleshooting (continued)

PROBLEM	POSSIBLE CAUSE
Leakage at tubing	1. Worn tubing ends.
	2. Loose or cracked fitting.
	3. Worn seal rings.
	4. Solution attacking Liquid Handling Assembly material.
Low Output or Failure to Pump Against Pressure	1. Pump's maximum pressure rating is exceeded by injection pressure.
	2. Worn Seal Rings.
	3. Ruptured Liquifram™.
	4. Incorrect stroke length.
	5. Tubing run on discharge may be too long.
	6. Clogged Foot Valve strainer.
Failure to Run	1. Pump not turned on or plugged in.
	2. EPU failure.
	3. Pulser failure.
Excessive Pump Output	1. Syphoning. (Pumping downhill without a multi-function valve).
	2. Little or no pressure at injection point.
	3. Excessive strokes per minute.

	SOLUTION
	1. Cut about 1 in (25 mm) off tubing and then replace as before.
	2. Replace fitting if cracked. Carefully hand tighten fittings. *DO NOT USE PIPE WRENCH.* Once fitting comes into contact with seal ring, tighten an additional 1/8 or 1/4 turn.
	3. Replace balls and seal rings (see Section 8.3) Spare Parts (SP-#).
	4. Consult your local distributor for alternate materials.
	1. Injection pressure cannot exceed pump's maximum pressure. See pump data plate.
	2. Worn seal rings or cartridge valves may need replacement (see Section 9.3). Spare Parts (SP- #), or RPM Pro Pac™ kit.
	3. Replace Liquifram™ (see Section 9.2).
	4. Check zero on pump/Re-zero pump (see Section 10.0).
	5. Longer tubing runs may create frictional losses sufficient to reduce pump's pressure rating. Consult factory for more information.
	6. Remove Foot Valve strainer when pumping slurries or when solution particles cause strainer to clog.
	1. Turn on or plug in pump.
	2. Disassemble pump and measure the resistance of the EPU across the EPU wires. Resistance reading should be in accordance to the EPU Resistance Chart (see Section 12.0). Also, check EPU leads to ground. Consult supplier or factory.
	3. The pulser should be replaced if EPU checks out OK. Consult supplier or factory.
	1. Move injection point to a pressurized location or install an LMI 4-FV (see Section 4.4).
	2. If pressure at injection point is less than 25 psi (1.7 Bar), an LMI 4-FV should be installed (see Section 4.4).
	3. Replace pulser or resistor. Consult factory.

12.0 EPU Resistance Chart

Pump Series	Voltage	Coil Resistance (Ohms) @ 20° C (68° F)*
A14, A15, A16, A34 A74, A75, A76 A94, A95, A96 J02, J03, J04, J05, J06 J13, J15, J16 PW4, PW5, PW6 P04, P05, P06 P08, P14, P15 P16, P18, P74 P75, P76, P78	 115 VAC 230 VAC	 76 - 87 307 - 353
(see Note 1) A17, A37, A77, A97, A18, A78 P02,P03 P12,P13	 115 VAC 230 VAC	 152 - 176 583 - 671
(see Note 2) A17, A37, A77, A97, A18, A78 P02, P03 P12, P13	 115 VAC 230 VAC	 76- 87 291- 335
J54D, J55D, J56D	12 VDC	1.1 - 1.3
D10, D11, D12, D13, D14 D70, D71, D72, D73, D74	115 VAC 230 VAC	25.7- 29.6 97 - 112
E70, E71, E72, E73, E74	115 VAC 230 VAC	22.8 - 26.2 91 - 105
B11, B12, B13, B14 B71, B72, B73, B74	115 VAC 230 VAC	43 - 49 167 - 193
C10, C11, C12, C13, C14 C70, C71, C72, C73, C74	115 VAC 230 VAC	22.8 - 26.2 91 - 105
C76, C77, C78	115 VAC 230 VAC	14.4 - 16.6 57.7 - 66.3

***** Let pump cool down completely before checking resistance. EPU checked within 10 hours of operation can increase coil resistance reading as much as 20%.

NOTES:

1. Pumps with serial numbers **LOWER** than: **960113429**
2. Pumps with serial numbers **HIGHER** than: **960113429**

LMI MILTON ROY

8 Post Office Square
Acton, MA 01720 USA
TEL: (978) 263-9800
FAX: (978) 264-9172
http://www.lmipumps.com

MARCH PUMPS

1819 PICKWICK AVE., GLENVIEW, IL 60026-1306, U.S.A
PHONE: (847) 729-5300 - FAX: (847) 729-7062
WWW.MARCHPUMP.COM

TE-7R-MD, TE-7K-MD TE-7S-MD

DESCRIPTION:

Series 7 are centrifugal magnetic drive pumps, eliminating the need for a shaft seal. Pumps can be serviced with an adjustable wrench. See the parts list for a breakdown of parts.

OPERATION:

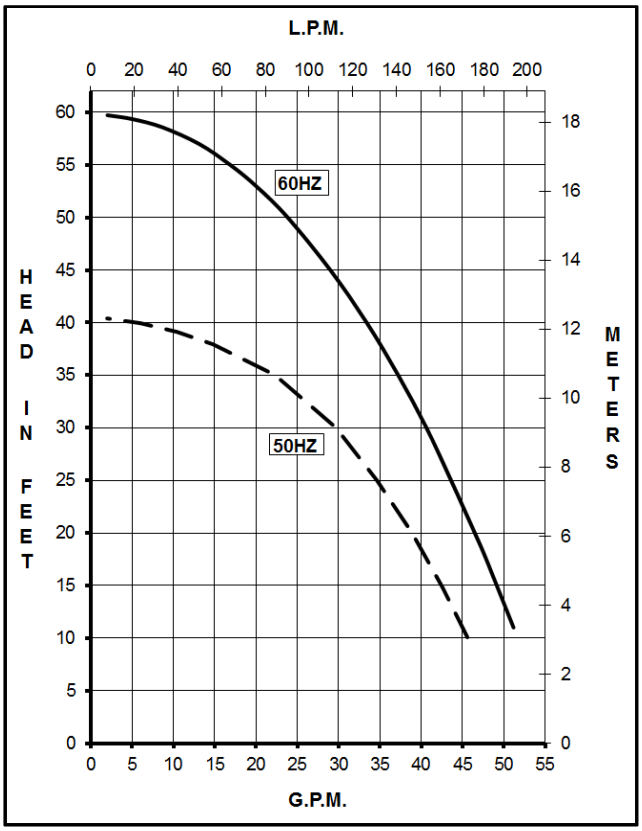
Pumps are not self-priming, lack a suction lift, and thus require a **flooded suction**. Pumps **cannot be run dry** because the impeller requires the liquid being pumped for lubrication. The direction of motor rotation should be clockwise when facing the inlet of the pump. For liquids with a specific gravity greater than water, have a higher viscosity, or for elevated temperatures, a trimmed impeller may be necessary. For application assistance, contact March Pump.

ELECTRICAL:

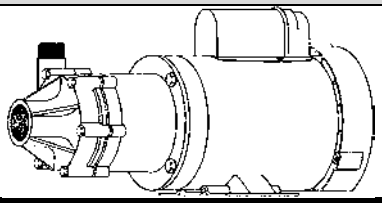
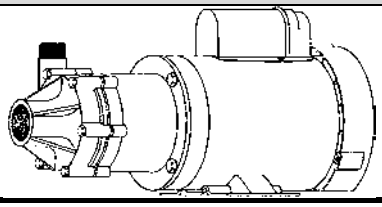
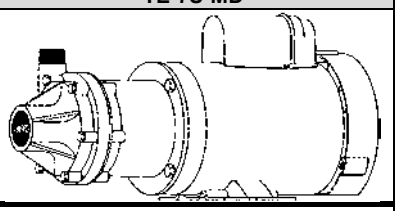
TE-7-MD pumps are dual voltage 115/230, 1 phase 50/60 Hz (TE-7S-MD 110/220 50 Hz) or dual voltage 230/460 60 Hz (190/380 50 Hz), 3 phase, TEFC. Motors are totally enclosed fan cooled and are U.L. listed as well as rated for continuous operation. All motors have a conduit box for electrical connections.

LIMITED WARRANTY:

March pumps are guaranteed only against defects in workmanship or materials for a period of one year from date of manufacture pumping water. For the complete warranty and to register online go to www.marchpump.com/warranty-registration



Model Abbreviations: R: Polypropylene/Ryton, K: Kynar, S: Stainless Steel

MODELS		TE-7R-MD	TE-7K-MD	TE-7S-MD
				
Product #	1 Phase	0155-0011-0200	0155-0011-0300	0155-0173-0300
	3 Phase	0155-0011-0400	0155-0011-0500	0155-0174-0300

UNITS	TE-7R-MD 60 Hz	TE-7R-MD 50 Hz	TE-7K-MD 60 Hz	TE-7K-MD 50 Hz	TE-7S-MD 60 Hz	TE-7S-MD 50 Hz
Max Flow	53 gpm	180 lpm	53 gpm	180 lpm	53 gpm	180 lpm
Max Head	60 ft / 26 psi	12.3 m	60 ft / 26 psi	12.3 m	57.5 ft / 25 psi	12 m
Inlet - Outlet	1-1/2" FPT - 1" MPT		1-1/2" FPT - 1" MPT		1-1/2" FPT - 1" MPT	
Max Internal Pressure	50 psi / 344 kPa		75 psi / 517 kPa		200 psi / 1378 kPa	
Max Liquid Temperature	190 °F / 87 °C		200 °F / 93 °C		250 °F / 121 °C	
Packed Weight 1 Phase	38.55 lbs / 17.48 kg		38.75 lbs / 17.57 kg		49.75 lbs / 22.56 kg	
Packed Weight 3 Phase	34.95 lbs / 15.85 kg		35.10 lbs / 15.92 kg		45.25 lbs / 20.52 kg	

ELECTRICAL 60 Hz	TE-7R-MD W	A	Hp	Rpm	TE-7K-MD W	A	Hp	Rpm	TE-7S-MD W	A	Hp	Rpm
1 Phase 115 V	1231	9.7	3/4	3450	1231	9.7	3/4	3450	1140	11.8	1	3450
1 Phase 230 V	1231	4.9	3/4	3450	1231	4.9	3/4	3450	1140	5.90	1	3450
3 Phase 230 V	1023	2.2	3/4	3450	1023	2.2	3/4	3450	1118	3.0	1	3450
3 Phase 460 V	1023	1.1	3/4	3450	1023	1.1	3/4	3450	1118	1.5	1	3450

ELECTRICAL 50 Hz	TE-7R-MD W	A	kW	Rpm	TE-7K-MD W	A	kW	Rpm	TE-7S-MD W	A	kW	Rpm
1 Phase 115 V (110 V)	764	10.4	0.497	2850	764	10.4	0.497	2850	(740)	(12.4)	0.745	2850
1 Phase 230 V (220 V)	764	5.20	0.497	2850	764	5.20	0.497	2850	(740)	(6.20)	0.745	2850
3 Phase 190 V	628	2.2	0.559	2850	628	2.2	0.559	2850	730	2.6	0.559	2850
3 Phase 380 V	628	1.1	0.559	2850	628	1.1	0.559	2850	730	1.3	0.559	2850

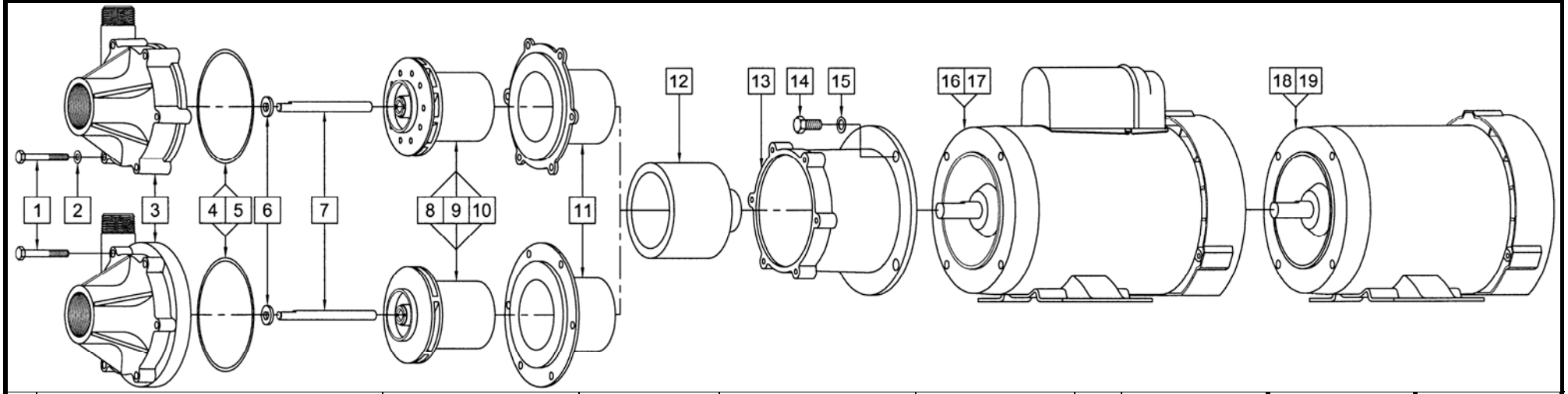
OVERALL SIZE		TE-7R-MD Height	Width	Length	TE-7K-MD Height	Width	Length	TE-7S-MD Height	Width	Length
1 Phase		8.94"	8.96"	17.81"	8.94"	8.96"	17.81"	8.94"	8.96"	18.29"
		22.7 cm	22.7 cm	45.2 cm	22.7 cm	22.7 cm	45.2 cm	22.7 cm	22.7 cm	46.4 cm
3 Phase		7.38"	8.96"	17.31"	7.38"	8.96"	17.31"	7.38"	8.96"	17.29"
		18.7 cm	22.7 cm	43.9 cm	18.7 cm	22.7 cm	43.9 cm	18.7 cm	22.7 cm	43.9 cm
Materials in Contact with Solution:		Polypropylene, Ryton, Viton, Ceramic, Ryton/Teflon/Carbon			Kynar/Carbon Filled, Viton, Ceramic, Carbon			316 Stainless Steel, Viton, Ceramic, Carbon		

All specifications/values are based on pumping water and are intended as a guideline only. Values may vary with different motors.

TE-7S-MD PUMP ONLY: The Impeller, shaft, and Thrust washer are packed separately within the carton to prevent damage during shipping. These items need to be assembled into the pump before installation. Be sure all parts are assembled per the exploded view shown.

NOTE:
When replacing Impeller Bushing in the field: The plastic bushings must be bored to size after they have been pressed into the impeller. Bore to 0.378/0.381 I.D. The carbon and ceramic bushings are to finished size and do not require boring. When attaching drive magnet to the motor shaft, position the face of the drive magnet 1/8 inch below the face of the motor bracket.

PARTS LIST



#	DESCRIPTION	TE-7R-MD	TE-7K-MD	TE-7S-MD	SIZE (Inches)	QTY.	TE-7R-MD	TE-7K-MD	TE-7S-MD
1	Screw	Stainless			1/4-20 x 2 Lg.	6	0155-0014-1000		
2	Washer	Stainless			1/4 ID x 1/2 OD	6	0155-0021-1000		
3	Front Housing	Polypropylene	Kynar	316 Stainless		1	0155-0011-1000	0155-0125-1000	0155-0036-0001
4	“O” Ring	Viton			1/8 CS x 4-3/8 OD	1	0155-0010-1000		
5	“O” Ring	Viton/Teflon (Option)			1/8 CS x 4-3/8 OD	1	0155-0071-1000		
6	Thrust Washer	Ceramic				1	0155-0009-1000		
7	Shaft	Ceramic			4.070 Lg.	1	0155-0039-1000		
	Shaft			Ceramic	4.257 Lg.	1			0155-0117-1000
8	Impeller w/Teflon/Ryton/Carbon Bushing	Polypropylene	Kynar (Option)	316 Stainless (Option)		1	0155-0159-0500	0155-0160-0500	0155-0112-0300
9	Impeller w/Carbon Bushing	Polypropylene (Option)	Kynar	316 Stainless		1	0155-0159-0200	0155-0160-0200	0155-0112-0400
10	Impeller w/Mica Teflon Bushing	Polypropylene (Option)	Kynar (Option)	316 Stainless (Option)		1	0155-0159-0400	0155-0160-0400	0155-0112-0800
11	Rear Housing w/Ceramic Thrust Washer	Ryton	Kynar			1	0155-0067-0100	0155-0124-0100	
	Rear Housing			316 Stainless		1			0155-0035-0000
12	Drive Magnet					1	0155-0130-0200		
13	Motor Bracket	Plastic				1	0155-0092-0100		
14	Screw	Stainless			3/8-16 x 3/4 Lg.	4	0155-0017-1000		
15	Washer	Stainless			3/8 ID x 5/8 OD	4	0155-0019-1000		
16	Motor, TEFC, 3/4 HP, 1 Phase, 115/230V, 50/50Hz					1	0155-0016-1000		
17	Motor, TEFC, 1 HP, 1 Phase, 115/230V, 50/60Hz					1	0155-0173-1000		
18	Motor, TEFC, 3/4 HP, 3 Phase, 230/460V, 50/60Hz					1	0155-0022-1000		
19	Motor, TEFC, 1 HP, 3 Phase, 230/460V, 50/60Hz					1	0155-0174-1000		
W	Wet End Kit	1, 2, 3, 4, 6, 7, 8, 11				1	0155-0165-0100		
W	Wet End Kit	1, 2, 3, 4, 6, 7, 9, 11				1		0155-0166-0100	

NOTE: Contact Factory for other materials and/or parts not listed. Explosion proof & special voltage motors are available upon special order. 0155-0046-1000 R25

HydroRanger

Instruction Manual

PL-514

November 1996

33455140
Rev 1.1

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Thank you for purchasing Milltronics' products. We endeavour to design equipment that is simple to use and reliable in its operation, with the aim of satisfying our customers' needs.

Milltronics has been designing and manufacturing process equipment since 1954. Our fields of expertise include ultrasonic level measurement, in-line weighing of dry bulk solids and motion sensing.

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Tel.: 575-31-44 / 575-83-13 / 575-27-78 Fax: 575-26-86

Internet : http://www.milltronics.com

MILLTRONICS ISO 9001

Table of Contents

GENERAL INFORMATION

ABOUT THIS MANUAL

First and foremost it is essential that this manual be read and understood before installation and start up of the HydroRanger.

"Applications" provides a general description of the common applications found in industry and illustrates them with examples. It is suggested that you refer to the sub-section which most suits your application. The programming of the HydroRanger can be optimized by referring to Parameter Description or Appendices \ Alphabetical Parameter Listing.

ABOUT THE HYDRORANGER

The HydroRanger is to be used only in the manner outlined in this instruction manual.

The HydroRanger is a multi-purpose liquid level monitoring device used in conjunction with an ultrasonic transducer.

The HydroRanger emits an ultrasonic pulse via the transducer. The echo is reflected from the material and received by the transducer. The echo is processed by the HydroRanger and the time at which the ultrasonic pulse hits the level or target is extracted and compared to the time at which it was sent. The time differential is then converted into distance, material level, volume, flow or differential level as a basis for display, relay control, analog output and totalling.

As well as simple level measurement, the HydroRanger was designed to handle specific applications such as: pumped volume totalling, differential level and open channel flow measurement.

SPECIFICATIONS

HYDRORANGER

Power:		» 100/115/200/230 V ac ±15%, 50/60 Hz, 15 VA
		» optional: » 12 V dc model, 10 to 15 V dc, 15W » 24 V dc model, 18 to 30 V dc, 15W
Environmental:		» location: » indoor / outdoor » altitude: » 2000 m max » ambient temp.: » – 20 to 50 °C » relative humidity: » suitable for outdoor (Type 4 X / NEMA 4X / IP65 enclosure) » installation category » II »pollution degree: » 4
Range:		» 0.3 to 10 m (1 to 33 ft)
Accuracy:		» 0.25% of program range* or 6 mm (0.24"), whichever is greater
Resolution:		» 0.1% of program range* or 2 mm (0.08"), whichever is greater
Memory:		» EEPROM (non-volatile) no back-up battery required
Display:		» Liquid Crystal Display of 4 digits, 18mm (0.7") high
Outputs:	transducer drive:	» 41 KHz, 400 V peak pulses of 1 msec max duration at a max repetition rate of 300 msec
	analog:	» 0 - 20 or 4 - 20 mA
		» max loading: » 350 ohms, return to ground » 750 ohms, return to –12 V
		» resolution: 0.1% of range
		» optional mA isolator
	relays:	» 5 multipurpose relays (for alarms, pump control,...)
		» 1 Form "C" SPDT contact per relay, rated 5 A at 250 V ac non-inductive
		» adjustable deadband

All relays are certified for use in equipment where the short circuit capacity of the circuits in which they are connected is limited by fuses having ratings not exceeding the rating of the relays.

* program range is defined as the empty distance from the face of the transducer (P-3) plus any range extension (P-87).

Enclosure:	» Type 4X / NEMA 4X / IP65 » 160 mm W x 250 mm H x 82 mm D (6.3" W x 9.5"H x 3.2"D) » polycarbonate
Approvals:	» CE*, FM, CSA NRTL/C * EMC performance available upon request.
Weight:	» 1.8 kg (4lb)

PROGRAMMER

Enclosure:	» general purpose » 67 mm W x 100 mm H x 25mm D (2.6" W x 4" H x 1" D) » ABS plastic
Operating Temperature:	» – 20 to 50 °C (– 5 to 122 °F)
Power:	» 9 V battery (style - ANSI/NEDA 1604)

TRANSDUCER

Compatible models:	» ST-H, XCT-8, and XPS-10 » Refer to associated Transducer manual.

TEMPERATURE SENSOR

Refer to associated Temperature Sensor manual.

CURRENT OUTPUT ISOLATOR (Optional)

Model:	» LIs-1 loop isolator
Input:	» 4 - 20 mA dc (from HydroRanger)
Output:	» 4 - 20 mA dc into 600 ohm max

CABLING

Optional:	» RG-62 A/U coax » max distance to electronics: 365 m (1200 ft) » must be run in grounded metal conduit
Temperature Sensor:	» Belden 8760, 2 wire shielded » max distance to electronics: 365 m (1200 ft) » can be run with transducer cable

INSTALLATION

Installation shall only be performed by qualified personnel and in accordance with local governing regulations.

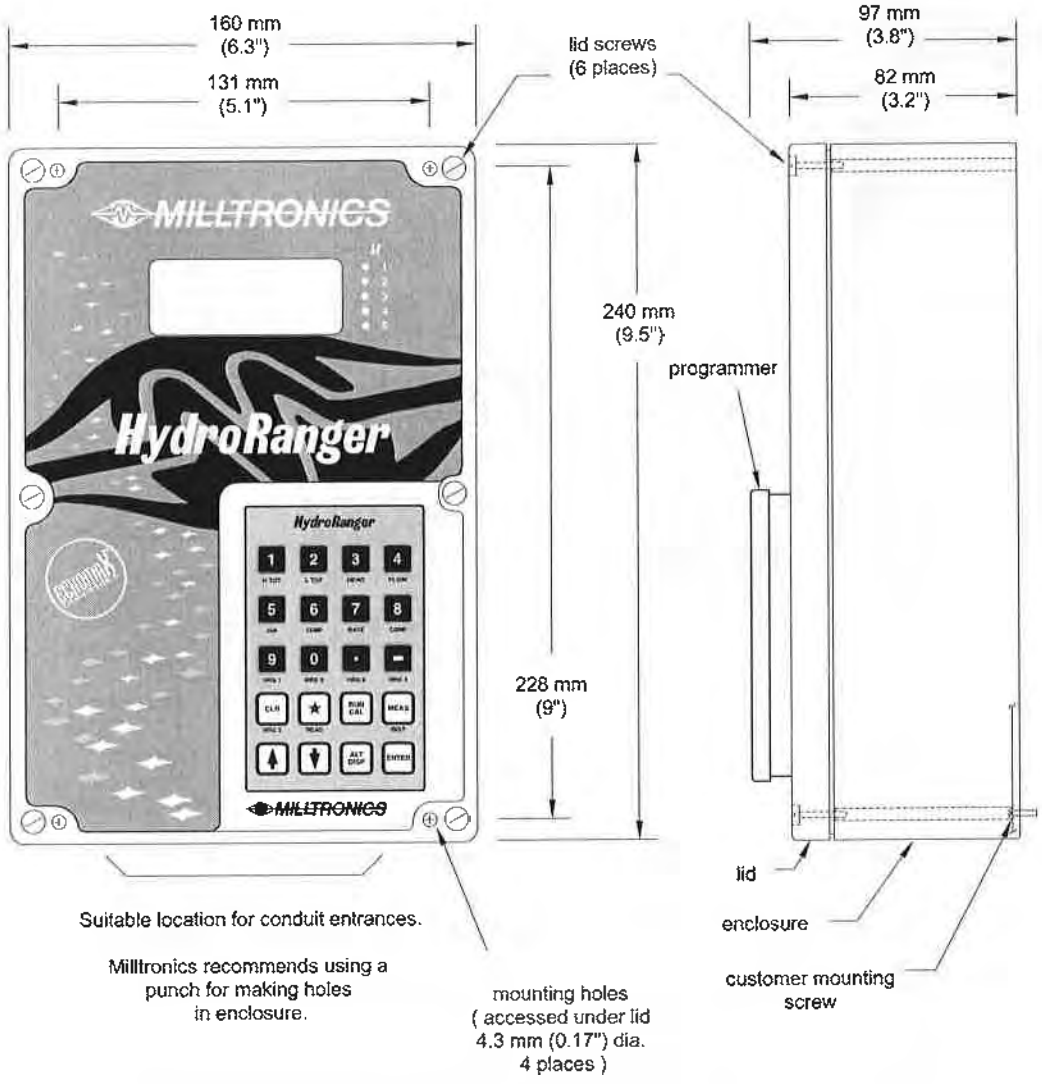
HYDRORANGER

The HydroRanger should be mounted in an area that is within the unit's ambient temperature range, and is suitable for the specified enclosure. The front cover should be accessible for programming and viewing.

It is advisable to keep the HydroRanger away from high voltage or current runs, contactors and SCR control drives.

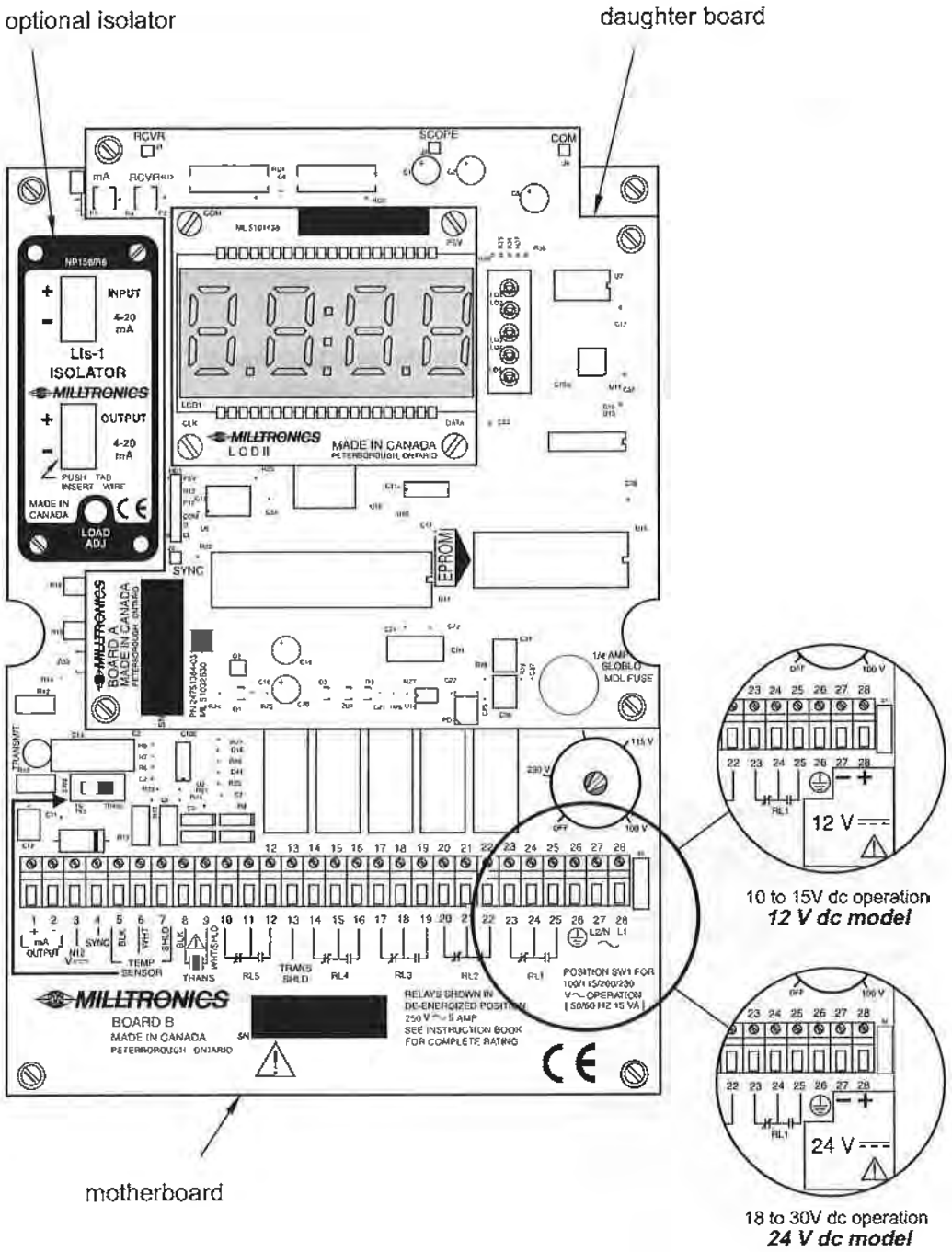
This product is susceptible to electrostatic shock. Follow proper grounding procedures.

OUTLINE AND MOUNTING



Non metallic enclosure does not provide grounding between conduit connections. Use grounding type bushings and jumpers.

CIRCUIT BOARD LAYOUT



All field wiring must have insulation suitable for at least 250 V.

Hazardous voltage present on transducer terminals during operation.

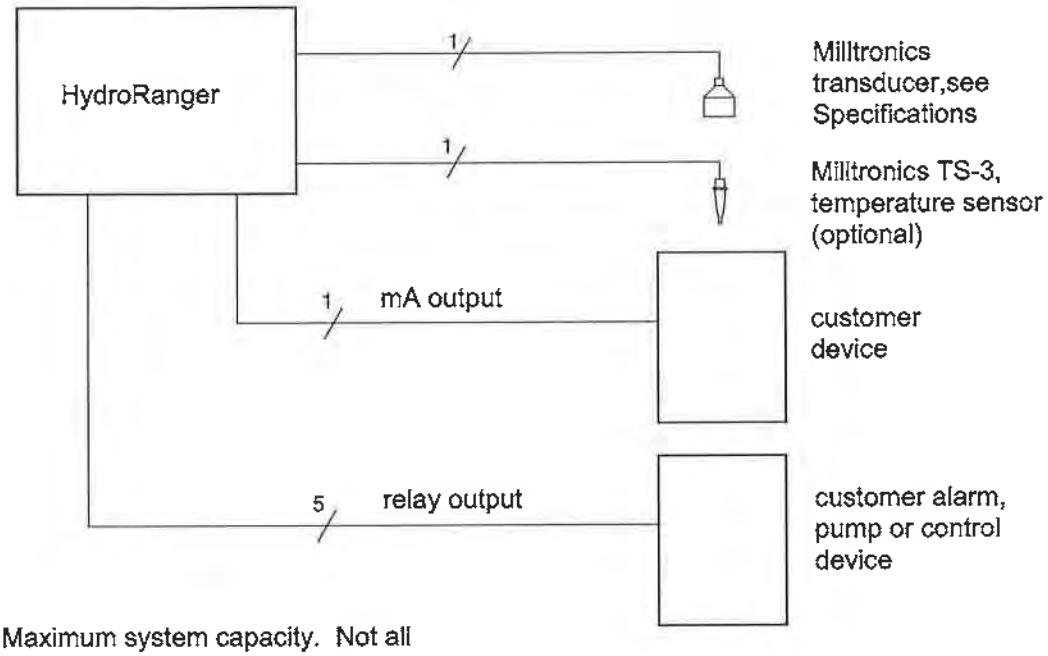
dc terminals shall be supplied from an SELV source in accordance with IEC 1010-1 Annex H.

Relay contact terminals are for use with equipment having no accessible live parts and wiring having insulation suitable for at least 250 V.

The maximum allowable working voltage between adjacent relay contacts shall be 250 V.

INTERCONNECTION

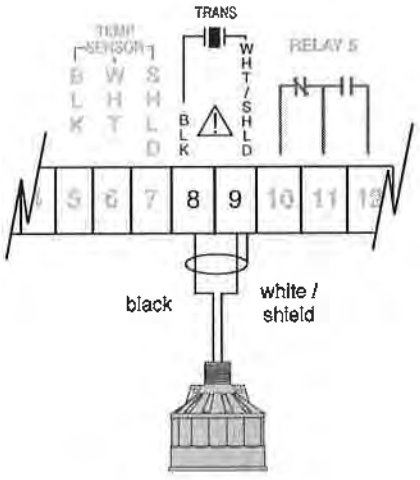
SYSTEM DIAGRAM



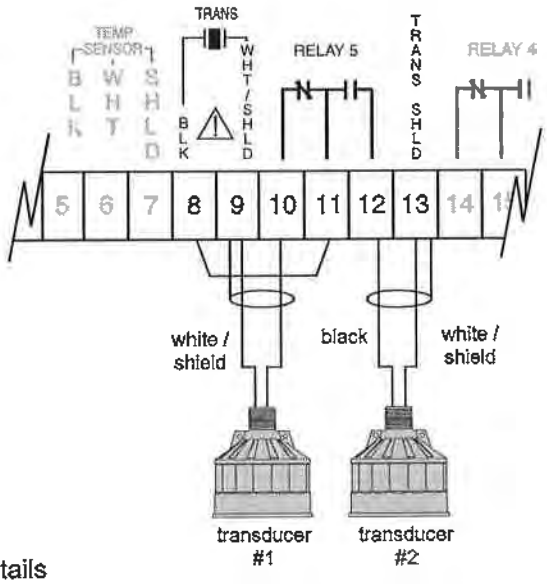
Maximum system capacity. Not all components or their maximum quantity may be required.

INSTALLING THE TRANSDUCER

Basic Wiring



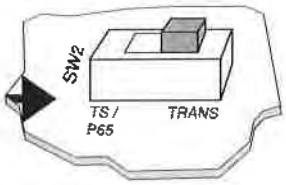
Differential Level - Basic Wiring



Refer to transducer manual for wiring details

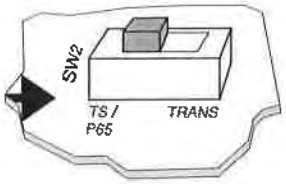
SELECTING TEMPERATURE SOURCE

Integral Sensor

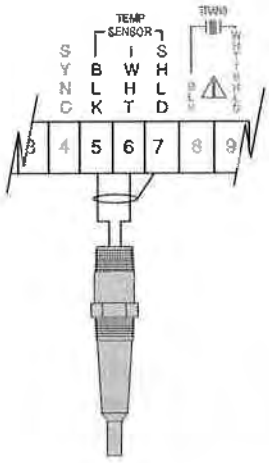


board 'B'

TS-3 or Program

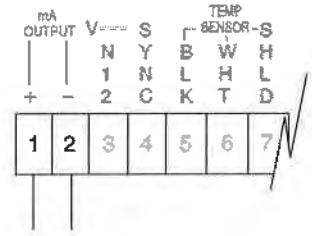


board 'B'



CURRENT OUTPUT

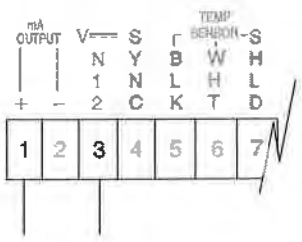
mA Output - GROUNDED
(additional to basic wiring)



to customer's equipment
maximum loading 350 Ω

Note : TB1-2 is internally connected to electrical ground TB1-26.

mA Output - FLOATING
(additional to basic wiring)



mA output wiring into floating input ONLY.
750 Ω max. Do Not Ground!

CURRENT OUTPUT ISOLATOR

If the isolator has not been factory installed, mount it on the upper left hand corner of the mother board using the two long machine screws provided. The input terminals of the isolator are then connected to the motherboard output terminals,TB-1, using twisted pair maximum 16 gauge wire.

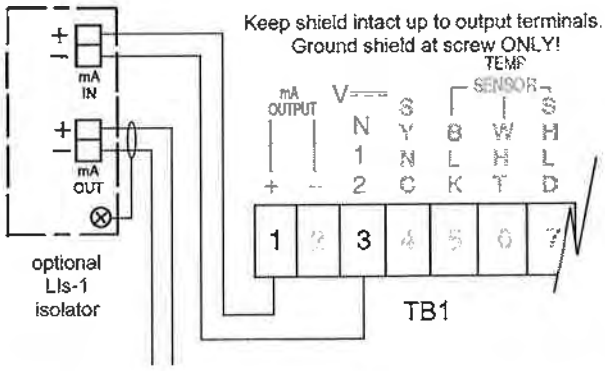
Proper shielding and grounding are required in order to minimize noise levels that could otherwise affect weak receiver signals by introducing false echoes.

The isolator enclosure is grounded by the mounting bolts to the motherboard. This can be checked with an ohmmeter if a poor connection is suspected.

The isolator output wiring must be a shielded twisted pair. The shield must be intact up to the isolator and the shield grounded at the isolator mounting screw only. Do not ground shield at any other point as this will void isolation.

mA Output - Optional Isolation
(additional to basic wiring)

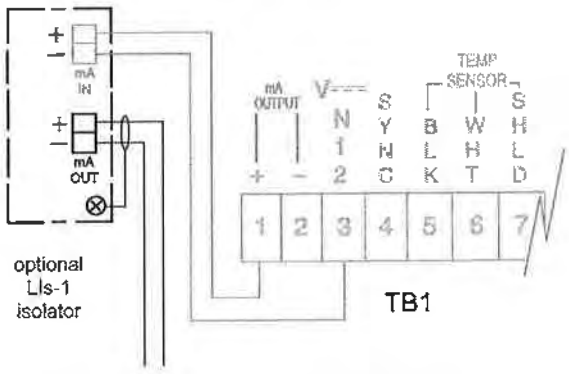
Customer Wired



isolated 4 - 20 mA output wiring into 600 Ω max

Route output wiring cable in separate conduit, entering enclosure as near as possible to isolator. Keep wiring as short as possible. Do not route cable along terminal board.

Factory Wired



isolated 4 - 20 mA output wiring into 600 Ω max

SYNCHRONIZATION

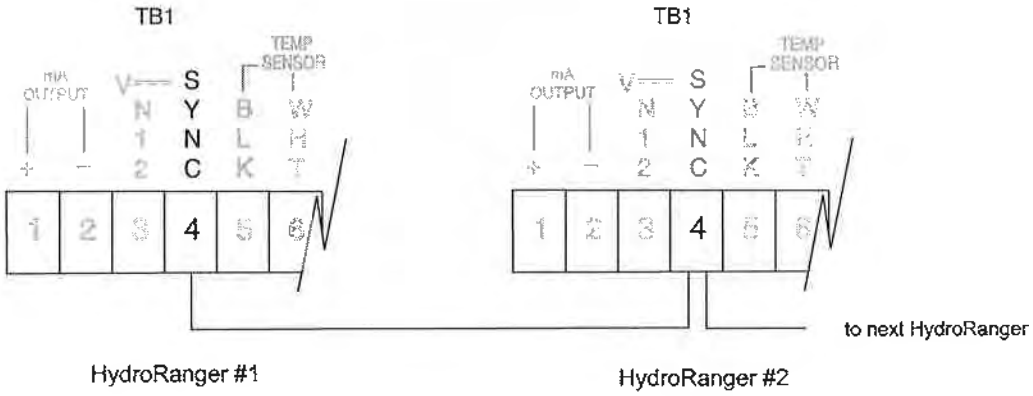
In applications where more than one HydroRanger, up to a maximum of 8, are going to be used or where their transducers will be sharing a common conduit, synchronization is required. When synchronized, no HydroRanger(s) will transmit within 180 msec of the prior one(s).

To synchronize HydroRanger's, interconnect the SYNC terminals TB1-4 of all motherboards and ensure that there is a common hydro ground interconnecting all units.

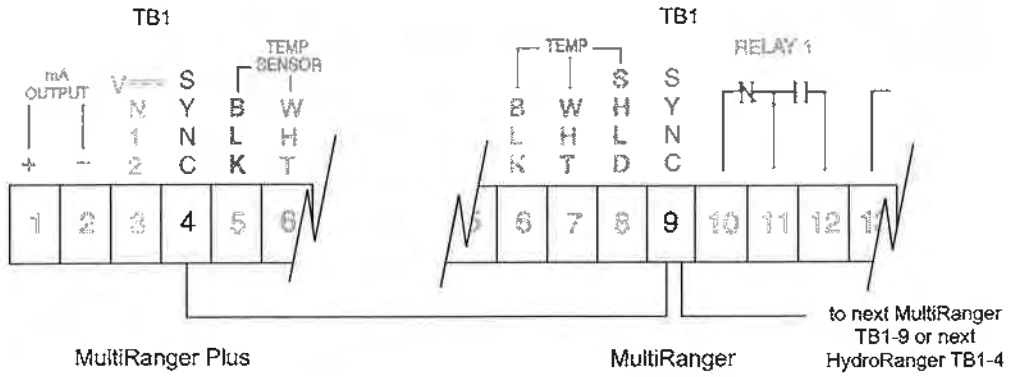
To synchronize HydroRanger's and MultiRangers, interconnect the SYNC terminal TB1-4 of the HydroRanger to the SYNC terminal TB1-9 of the MultiRanger.

To synchronize more than 8 HydroRangers or HydroRangers with other Milltronics ultrasonic level detection models (e.g. MicroRanger, AirRanger, etc...) consult Milltronics or your distributor.

Synchronization of 2 to 8 HydroRanger's
(additional to basic wiring)



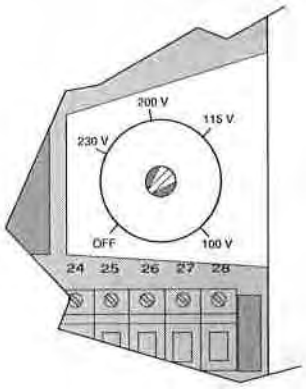
Synchronization of 2 to 8 MultiRanger / HydroRanger's
(additional to basic wiring)



All units to be synchronized must be interconnected by a common hydro ground.

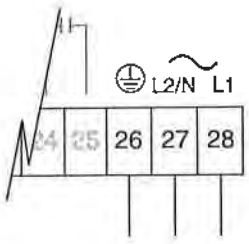
POWER CONNECTIONS

AC Power



VOLTAGE
SELECT

Switch shown in the 'OFF' position.
Select appropriate voltage.



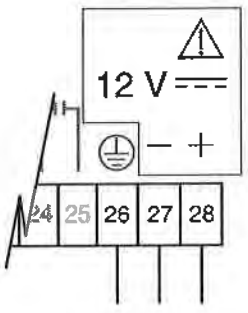
100 / 115 / 200 / 230 V
50 / 60 Hz 15 VA
select voltage via switch

The equipment must be protected by a 15 A fuse or circuit breaker in the building installation.

A circuit breaker or switch in the building installation, marked as the disconnect switch, shall be in close proximity to the equipment and within easy reach of the operator.

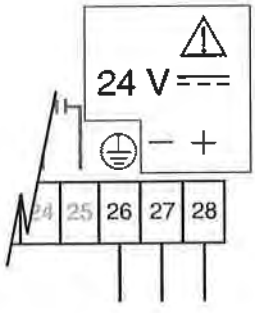
DC Power

12 V dc Model



10 to 15 V dc

24 V dc Model



18 to 30 V dc

Ground HydroRanger (ac Power) via terminal 26 to proper earth / ground. Ground dc model as required.

PROGRAMMER

In order to program the HydroRanger, a programmer (which has a magnetic back plate) must be placed into the front cover recess on the HydroRanger. Be sure to keep it away from objects such as floppy disks that are susceptible to damage from magnetic fields.

A programmer need not be ordered with each unit.
Check your order if you think that the programmer is missing.

START UP

GENERAL

The HydroRanger has two modes of operation: Run and Program (Cal). When the unit is powered up, after installation procedures have been completed, it is factory set to start up in the run mode, to detect the distance from the transducer face to the target in meters. This is the normal mode of operation, which can be programmed to display level, volume, totals or flow readings and yield corresponding mA output and relay closures for alarms, pump controls, etc.

The program mode is selected by pressing the *Run/Cal* key. This mode will enable the user to program the HydroRanger to suit his preference and to the particular application to which the HydroRanger is being applied.

The first step when programming is to reset all parameters to their factory setting by using the master reset P-99

After having entered all required parameters, the HydroRanger can be made to simulate its operation within the particular application giving display, relay operation and analog output. Refer to parameters P-76 through P-78.

When programming has been completed, the HydroRanger can be put into normal operation by pressing the *Run/Cal* key.

PROGRAMMER KEYPAD

All entries are made via the programmer keypad.

Run Mode

Press the associated key to view.

H TOT • high total; P-2 = 4 or 5 (P-55)
• PT 1; press to view level at DLD transducer #1 P-2 = 3

L TOT • low total; P-2 = 4 or 5 (P-54)
• PT 2; press to view level at DLD transducer #2, P-2 = 3

HEAD head reading, P-2 = 5

FLOW flow rate, P-2 = 5

mA mA output

TEMP temperature (P-65)

RATE rate of level change (P-70)

CONF echo confidence (P-80)

HRS 1 pump 1 service hours (P-24)

HRS 2 pump 2 service hours (P-25)

HRS 3 pump 3 service hours (P-26)

HRS 4 pump 4 service hours (P-27)

HRS 5 pump 5 service hours (P-28)

READ reading (P-76)

RUN CAL initiates access into program mode

DIST press to view distance (P-78)

Program Mode

1 to 9 numeric entry

• decimal point entry

– negative entry

CLR clear display

★ completes access into program mode

RUN CAL enter run mode

MEAS press to make a measurement

▲ increments display to show the next parameter

▼ decrements display to show the preceeding parameter

ALT DISP alternates display to show either the parameter number or parameter value

ENTER enters display as contents of selected parameter

LEGEND

Press the associated key on programmer: 

Display shown on HydroRanger: 300

Display appears for a short time: P-2

Programmer key: 

PARAMETER ENTRY

Initial start up

All entries are made via the programmer keypad. All programmers are interchangeable, thus any programmer can be used in conjunction with any HydroRanger.

Apply power to the HydroRanger and place the programmer in its front cover recess. run will be momentarily displayed and then a distance reading e.g. 6.57 will appear. This is a space or distance reading of up to approximately 12 m.

If CAbL LOE is alternately displayed, an open or short circuited transducer connection is being indicated.

If LOE is displayed rather than a continuous numeric reading the actual material distance may be beyond 12 m. Proceed with the programming and if LOE persists, consult Troubleshooting guide.

To enter Program mode

The user may now program the HydroRanger starting at parameter P-1.

To direct access a parameter:

The display should have a ' P- ' and the number of the currently selected parameter.

Current parameter selection P-??

Select desired parameter. 

P-20 e.g. select parameter P-20

To set a parameter:

access desired parameter e.g. P-20

display parameter value e.g. 0

select new option e.g. 5

new value is entered and displayed e.g. 5

To reset a parameter to its factory value:

e.g. reset P-20

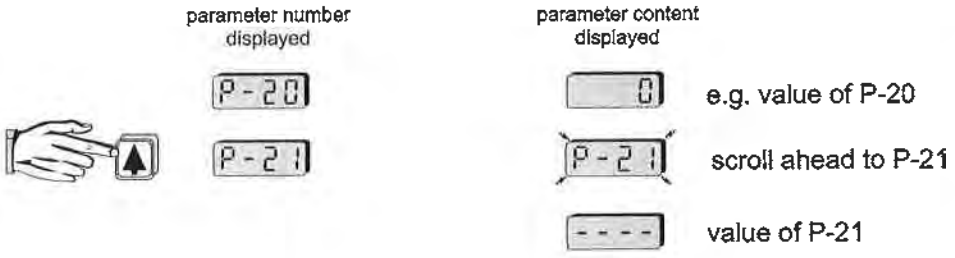
display parameter value

display will go blank

factory setting of parameter is entered and displayed

After a minute and a half, the content display will revert to the parameter number if the keypad is not used further. Press  again if it is desired to return to a display of the content.

To access the next parameter:



To access the previous parameter:

COMMON DISPLAY MESSAGES

	cable loss of echo	» messages CAbL and LOE will alternately flash, indicating open or short circuited transducer connection
	have entered program mode	» appears after pressing "RUN/CAL" key
	clear all parameters - return factory setting	» P-99
	overflow	» reading is larger than display capabilities
	loss of echo	» displayed in run mode to indicate loss of echo
	percent	» appears when programming units of measurement in percent
	parameter number	» indicates which parameter is being displayed
	have entered run mode	» appears after pressing "RUN/CAL" key
	no value	» contents of parameter empty or no reading display
	invalid request	» application does not yield requested reading option or spare parameter

FUNCTIONAL

TRANSCEIVER

The HydroRanger transceiver will transmit via the transducer, a set of long and/or short pulses per measurement. The number and duration of the pulses is dependent upon P-88.

A short pulse has a maximum measurement range of 2 m (6.6 ft) from the transducer face.

A long pulse has a measurement range of 2 m (6.6 ft) from the transducer face out to its maximum setting (P-3, empty distance to transducer plus P-87, range extension).

DAMPING AND PROCESS RATE

The HydroRanger provides damping to control the maximum rate of change of the displayed material level, volume or flow rate and of the mA output signal. As most relay functions respond to the dampened level reading, they indirectly fall under the control of the damping function. Damping may be set within the range of 0.001 to 9999 in units selected per minute (eg. if P-1 = 3 and P-68 = 15, then the fill damping rate is 15 ft/min). P-68 is set to provide damping specifically for filling conditions while P-69 is set to provide damping specifically for emptying conditions.

The required damping may be estimated by filling and emptying the vessel at its normal rate. The rate of material level change can be viewed via the process rate display parameter, P-70 or by pressing "7" while in the run mode. The value of P-68 and P-69 should be equal to or greater than the rates of level change encountered in P-70. The process rate averaging parameter P-71 selects the method of averaging used to determine the process rate display, however it has no bearing on the damping function.

Damping is often used to slow down the rate of response of the display especially where liquid surfaces are in agitation or material falls into the sound path during filling.

When in the program mode, the damping is automatically overridden to give fast response when "MEAS" is pressed. In the run mode, the response can be further increased by turning the fuzz filter (P-72) and agitator discriminator (P-73) off - ONLY if they are not required.

If the transducer aiming is being adjusted while in the run mode, it is suggested that damping be at its factory setting of 10 to start. The damping can later be changed to suit prevailing conditions.

Upon a loss of echo condition and after the fail-safe timer (P-75) expires, the display will go to fail-safe high at the fill damping rate if P-74 = 1 or to fail-safe low at the empty damping rate if P-74 = 2.

TEMPERATURE COMPENSATION

In order to provide compensation for uniform temperature variances of the sound medium, temperature compensation is provided. Temperature compensation consists of on board circuitry in the HydroRanger and the integal (transducer) temperature sensor. The integral temperature sensor uses the transducer's wiring and input terminals (TB1 - 8/9) to interface with the on board circuitry.

Note: board 'B' switch 'SW 2' must be set to 'TRANS'.

Optionally, the alternate TS-3 Temperature Sensor can be used to provide a temperature input, rather than by using the integral temperature sensor.

In order to do this:

» set board 'B' switch 'SW 2' to 'TS/P65'

» optional TS-3 Temperature Sensor must be connected to TB1 - 5/6/7

If the temperature of the sound medium is to remain constant, compensation may be programmed into the HydroRanger instead of using the remote sensor input by one of the following methods:

1. » set board 'B' switch 'SW 2' to 'TS/P65'
   » insure that the temperature sensor input TB1 - 5/6 is left open/unconnected
   » select P-65
   » enter temperature in °C

2 » set board 'B' switch 'SW 2' to 'TS/P65'
   » insure that the temperature sensor input TB1 - 5/6 is left open/unconnected
   - select P-61
   - perform an empty calibration

The following temperature functions (in °C) can be viewed:

P-65 air temperature » present temperature at sensor
or
» programmed temperature, if sensor not used

P-66 max. air temperature » highest temperature encountered during operation

P-67 min. air temperture » lowest temperature encountered during operation

SOUND VELOCITY

The HydroRanger can be calibrated for transducer operation in homogeneous vapours with sound velocities other than that of air.

The basis is to physically measure the level (measuring tape or sight glass) and enter this value via P-61. The HydroRanger then calculates the sound velocity by comparing the entered physical measurement to its own ultrasonic measurement (empty calibration, P-61).

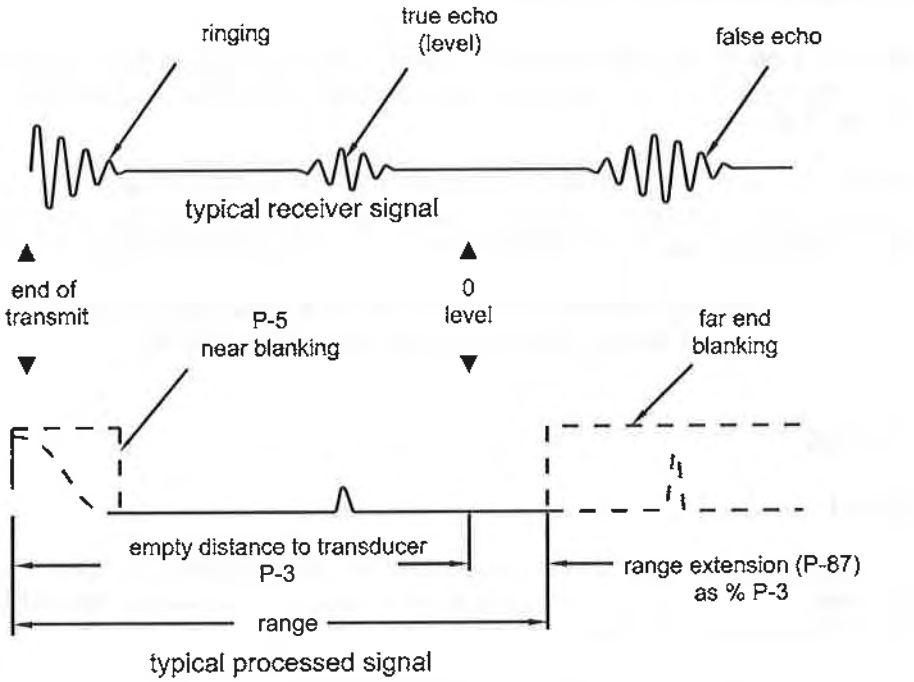
P-63, velocity at 20 °C can be used to enter the known velocity at 20 °C of sound in a particular gas or vapour to view the resultant velocity of a sound velocity compensation, normalized to 20 °C.

P-64, velocity at P-65, can be used to enter the known velocity of sound in a particular gas or vapour, or to view the resultant velocity of a sound velocity compensation, at the temperature of P-65.

Refer to Appendices/Sound Velocities, for typical sound velocities in various gases and vapours.

BLANKING

Near blanking (P-5) is used to ignore the zone in front of the transducer where ringing or other false echo is at a level with the processing of the true echo.



Ringing is the inherent nature of the transducer mass to continue vibrating after the transmit pulse has ceased. The amount of ringing varies with the type of transducer used and decays to acceptable levels in the order of milliseconds. Excessive cold and overtightening of the transducer mounting will increase the ring time such that it may appear as an echo during the receive cycle. This is usually indicated by an incorrect high level reading. This condition may be verified with the use of an oscilloscope and may be overcome by increasing the near blanking (refer to Troubleshooting).

Far end blanking is a design function that ignores the zone below the zero or empty level where false echoes may appear at levels that interfere with the processing of true echo.

In applications where the zero level is above the bottom of the vessel and it is desired to monitor the zone below the normal zero, range extension (P-87) may be used to extend the range into the far end blanking. Range extension is entered as a percent of P-3. As range extension reduces the protection afforded by the far end blanking, it should be used judiciously. Avoid excessive range extension as this may reduce the

measurement's reliability and accuracy. If it is found that false echoes are appearing ahead of the blanking zone, P-87 should be reduced accordingly.

Blanking is automatically corrected for sound velocity change where temperature and velocity compensation is used, keeping the blanking at the distance at which it was entered.

AGITATOR DISCRIMINATION

In applications where there is an agitator operating in the vessel, the blades may interfere with level readings when the material level is lower than the blades. In such a case, the agitator discriminator (P-73) can be turned on (factory setting).

With the agitator turned on, the reading will not change unless the echo is closer for at least 5 consecutive measurements nor will it change unless the echo is farther for at least 2 consecutive measurements.

This feature allows the HydroRanger to remain locked on the true echo, even if there are occasional false echoes due to the agitator blades, electrical noise or crosstalk from other ultrasonic units.

Agitator discrimination, however, slows down the HydroRanger's speed of response. Therefore, if fast response is required, especially when aiming the transducer while in the run mode, and there is no agitator involved, the discriminator should be turned off.

Agitator discrimination will not work if the blades are stationary and in the transducer's beam path.

RELAYS

General

Five onboard multi-purpose relays are provided on the HydroRanger. Each relay may be independently assigned to one function and has a corresponding status LED, visible through the front cover.

The relay functions fall under three modes of operation :

- » alarm : alarm ON = LED ON = relay coil de-energized
- » pump : pump ON = LED ON = relay coil energized
- » miscellaneous : contact closed = LED ON = relay coil energized

Complete programming of each relay requires two steps. Refer to the Relay Programming Chart Relays.

1 - select a relay function

2 - enter relay ON/OFF setpoints for function options 1-6 and 8-10.

OR

- set control parameters for function options 7,11,12,13 and 14.

Function

Alarm

level : - in high alarm, the function goes on when the level rises to the ON setpoint and goes off when the level lowers to the OFF setpoint. In low alarm, the function goes on when the level lowers to the ON setpoint and goes off when the level rises to the OFF setpoint.

in bounds : - the relay will be in alarm if the level is inside the zone between the setpoints.

out of bounds : - the relay will be in alarm if the level is outside the zone between the setpoints.

differential : - the high alarm function goes on when differential level increases to the ON setpoint and goes off when the differential level decreases to OFF setpoint. The low alarm function goes on when the differential level decreases to the ON setpoint and goes off when the differential level increases to the OFF setpoint.

rate of change : - in filling alarm, the function goes on when the rate of filling increases to the ON setpoint and goes off when the rate of filling drops to the OFF setpoint. In emptying alarm, the function goes on when the rate of emptying increases to the ON setpoint and goes OFF when the rate of emptying drops to the OFF setpoint. For emptying alarm, the setpoints must be entered as negative values.

temperature : - in high alarm, the function goes on when the temperature rises to the ON setpoint and goes off when the temperature lowers to the OFF setpoint. In low alarm, the function goes on when the temperature lowers to the ON setpoint and goes off when the temperature rises to the OFF setpoint.

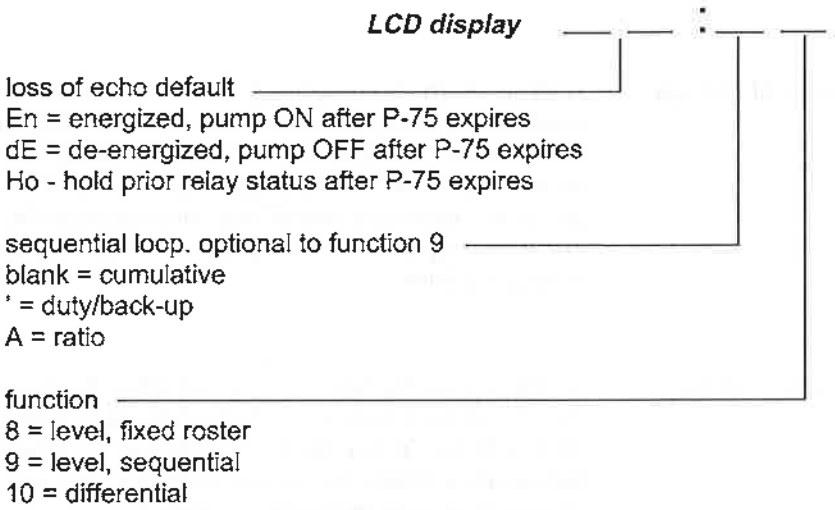
loss of echo : - the function goes on when the fail-safe timer expires. The function goes OFF when a valid echo is received (fail-safe timer is reset).

Pump

level : - in pump down, the function goes on when the level rises to the ON setpoint and goes off when the level lowers to the OFF setpoint. In pump up, the function goes on when the level lowers to the ON setpoint and goes off when the level rises to the OFF setpoint.

sequential : - refer to Applications\Pump Control. Select function option 8, 9 or 10 and press "*" to scroll through the loss of echo defaults. For option 9, pressing "*" will also scroll through the cumulative, ratio or duty/back-up mode of pump up operation.

differential : - the pump down function goes on when differential level increases to the ON setpoint and goes off when the differential level decreases to OFF setpoint. The pump up function goes on when the differential level decreases to the ON setpoint and goes off when the differential level increases to the OFF setpoint.



e.g. dE : '9 = duty/back up sequential pumping
de-energize under loss of echo

Miscellaneous

totalizer and samplers : - refer to Application Pump Totalizer and OCM . Relays are normally de-energized, contact closure is approximately 200 mSec duration.

scanner : - this function is specific to relay 5 and the DLD mode of operation. The transducer hot is wired to the common terminal of the relay so that when switched, the transceiver may alternately access transducer #1and #2.

Refer to Applications \ Differential Level Application.

Setpoint - ON / OFF

If the ON setpoint is higher than the OFF setpoint, the relay operates as :

» high alarm
» pump down control
» high differential alarm

If the ON setpoint is lower than the OFF setpoint, the relay operates as :

» low alarm
» pump up control
» low differential alarm

The ON and OFF setpoints can not be the same on an individual relay but may be common to other relays. The dead band or hysteresis is the difference between the ON and OFF setpoints. For in and out of bounds level alarms, the hysteresis is set ±2 % of span from either boundary.

The setpoints for alarm functions 1 - 4 and pump functions 8 - 10 are always entered in the P-1 units of measurement selected (but not %). The setpoints are measured from the bottom up, referenced to zero or empty except for the differential functions, 4 and 10. There the setpoints represent the absolute differential between levels, regardless of the level with respect to zero.

Relay status - non run modes

When the fail-safe timer expires, pump control relays respond as previously described. However, alarm relays will respond in the following manner.

FAIL-SAFE MODE	RELAY STATUS	
P-74	high alarm	low alarm
fail-safe high	on	off
fail-safe low	off	on
fail-safe hold	hold	hold

Upon entering the program mode, all pump control relays will be turned OFF. Alarm relays will hold their prior status, but will respond to measurements take when "MEAS" is pressed.

Simulation

Parameters P-76 through P-78 can be used to simulate relay operation in the program mode. Pump relays will be held OFF during simulation, however their corresponding LED's will respond. Remote totalizer and flow sampler relay operation do not apply to simulation. Refer to Parameter Description.

If the relay status can affect plant operation or personnel safety, it is advisable to override the relay functions or disconnect the relay wiring during calibration or simulation

Keep power disconnected at main breaker when HydroRanger cover is opened.

Relay Function Vs Mode of Operation

It should be noted that some relay functions can not be used in certain modes of operation. The following table shows the valid functions for the five modes of operation.

Function	Mode of Operation				
	Mat'l (P2 = 1)	Space (P2 = 2)	DLD (P2 = 3)	Pump Vol. (P2 = 4)	OCM (P2 = 5)
0	off	off	off	off	off
1	level	level	level	level	level
2	in bounds	in bounds	off	in bounds	in bounds
3	out of bounds	out of bounds	off	out of bounds	out of bounds
4	off	off	differential level	off	off
5	rate	rate	off	rate	rate
6	temp.	temp.	temp.	temp.	temp.
7	L.O.E.	L.O.E.	L.O.E.	L.O.E.	L.O.E.
8	pump	pump	pump	pump	pump
9	sequential	sequential	off	sequential	sequential
10	off	off	pump on differential	off	off
11	off	off	off	totalizer	totalizer
12	off	off	off	flow sampler	flow sampler
13	time sampler	time sampler	time sampler	time sampler	time sampler
14	off	off	scanner	off	off

RELAY PROGRAM CHART

Relay Function	Relay 1			Relay 2			Relay 3			Relay 4			Relay 5			Units
	Fctn P-8	Setpoints ON	OFF	Fctn P-11	Setpoints ON	OFF	Fctn P-14	Setpoints ON	OFF	Fctn P-17	Setpoints ON	OFF	Fctn P-20	Setpoints ON	OFF	
Alarm : Level	1	P-9	P-10	1	P-12	P-13	1	P-15	P-16	1	P-18	P-19	1	P-20	P-21	P-1
In bounds	2	"	"	2	"	"	2	"	"	2	"	"	2	"	"	"
Out of bounds	3	"	"	3	"	"	3	"	"	3	"	"	3	"	"	"
Differential	4	"	"	4	"	"	4	"	"	4	"	"	4	"	"	"
Rate of Change	5	"	"	5	"	"	5	"	"	5	"	"	5	"	"	P-1/min
Temperature	6	"	"	6	"	"	6	"	"	6	"	"	6	"	"	° C
Loss of Echo	7	set	P-75	7	set	P-75	7	set	P-75	7	set	P-75	7	set	P-75	n/a
Pump : Level En:	8*	P-9	P-10	8*	P-12	P-13	8*	P-15	P-16	8*	P-18	P-19	8*	P-21	P-22	P-1
dE:	8*	"	"	8*	"	"	8*	"	"	8*	"	"	8*	"	"	"
Ho:	8*	"	"	8*	"	"	8*	"	"	8*	"	"	8*	"	"	"
Sequential cumulative En:	9*	"	"	9*	"	"	9*	"	"	9*	"	"	9*	"	"	"
dE:	9*	"	"	9*	"	"	9*	"	"	9*	"	"	9*	"	"	"
Ho:	9*	"	"	9*	"	"	9*	"	"	9*	"	"	9*	"	"	"
duty / backup En:'	9*	"	"	9*	"	"	9*	"	"	9*	"	"	9*	"	"	"
dE:'	9*	"	"	9*	"	"	9*	"	"	9*	"	"	9*	"	"	"
Ho:'	9*	"	"	9*	"	"	9*	"	"	9*	"	"	9*	"	"	"
ratio En:A	9*	"	"	9*	"	"	9*	"	"	9*	"	"	9*	"	"	"
dE:A	9*	"	"	9*	"	"	9*	"	"	9*	"	"	9*	"	"	"
Ho:A	9*	"	"	9*	"	"	9*	"	"	9*	"	"	9*	"	"	"
Differential En:	10*	"	"	10*	"	"	10*	"	"	10*	"	"	10*	"	"	"
dE:	10*	"	"	10*	"	"	10*	"	"	10*	"	"	10*	"	"	"
Ho:	10*	"	"	10*	"	"	10*	"	"	10*	"	"	10*	"	"	"
Miscellaneous :																
Totalizer	11	set	P-56	11	set	P-56	11	set	P-56	11	set	P-56	11	set	P-56	vol.P-43
Flow Sampler	12	set	P-57 & P-58	12	set	P-57 & P-58	12	set	P-57 & P-58	12	set	P-57 & P-58	12	set	P-57 & P-58	volume
Time Sampler	13	set	P-59	13	set	P-59	13	set	P-59	13	set	P-59	13	set	P-59	hr
Scanner	n/a	n/a		n/a	n/a		n/a	n/a		n/a	n/a		14	set	P-2	n/a

* = Press ★ to select LOE default (En, dE & Ho) and sequential option (cumulative, duty / backup or ratio).

ANALOG OUTPUT

The HydroRanger can be programmed to provide analog output (P-6) of 0 or 4 - 20 mA, proportional or inverse span.

The 4 and 20 mA levels can be trimmed slightly via P-97 and P-98 respectively to compensate for any offset between the HydroRanger and the customer's equipment.

The analog output feature can be turned OFF by setting P-6=0. The output and alternate displays(5 &P-92) will immediately drop to 0 mA after a new measurement is processed. The output will remain disabled during simulation (P-76,77, & 78) However, the test routine of P- 92 and the trim parameters will remain active. If P-60 = 0, then the analog output will return to its programmed output after a new measurement is processed.

If the analog output must be isolated, the optional LIs-1 mA isolator must be mounted on the motherboard and wired. When using the isolator, the load adjust can be done via P-97 and 98 rather than via the load adjust potentiometer.

The analog output responds in the following manner :

		MODES					
		P2 = 1 LEVEL	P2 = 2 SPACE	P2 = 3 DLD	P2 =1 VOLUME	P2 = 4 PUMP TOTAL	P2 = 5 OCM
ANALOG OUTPUT	responds to	material level	material distance	• differential (if P-32 = 1) • level on xdcr 1 (if P-32 = 2)	volume	• level (if P-34 = 0) • volume (if P-34 ≠ 0)	• head 1 (if P-50 = 1) • flow (if P-50 = 2)
	if P-6 = 1 or 2, reads 20 mA when	full	empty	maximum differential or level	full	full	at max. head or flow
	if P-6 = 3 or 4, reads 20 mA when	empty	full	0 differential or level	empty	empty	at 0 head or flow

APPLICATIONS

This section highlights the most common applications for which the HydroRanger can be applied. Other applications not listed here may be similar to those listed or a combination thereof.

When programming, refer to the application which is most similar to yours. A practical example has been given to further expand on the programming features. As the example may not cover all facets of the particular application, the user should become familiar with the parameters available. Refer to Parameter Description or Appendices \ Alphabetical Parameters Listing.

For ease of reference and programming, parameters have been organized into groups relating to their function or application.

P-0	security
P-1 to P-7	general
P-8 to P-22	relays
P-23 to P-33	pump control
P-34 to P-39	volume and display conversion
P-40 to P-50	OCM
P-51 to P-59	OCM and pump totalizer
P-60 to P-67	custom calibration
P-68 to P-75	filters
P-76 to P-78	measurement and display
P-79 to P-88	echo processing and analysis
P-89 to P-98	testing
P-99	master reset

The minimum distance from the transducer face to the target is limited by the minimum near blanking value, P-5, of 30 cm (1 ft).

SIMPLE LEVEL
APPLICATION PARAMETERS

General		Relays		Pump Control		Vol. & Disp. Conversion		OCM		Totalizer		Custom		Filter	
P-1	**units**	P-8	1 function	P-23	submers.	P-34	tank	P-40	primary	P-51	OCM sim.	P-60	full	P-68	fill damp
P-2	**mode**	P-9	1 on	P-24	1 hrs.	P-35	dim. A	P-41	time	P-52	factor	P-61	empty	P-69	empty damp
P-3	**empty dist.**	P-10	1 off	P-25	2 hrs.	P-36	dim. L	P-42	expon.	P-53	decimal	P-62	offset	P-70	rate disp.
P-4	**span**	P-11	2 function	P-26	3 hrs.	P-37	convert	P-43	flume dim.	P-54	low tot.	P-63	vel. 20 °C	P-71	rate avg.
P-5	near blank	P-12	2 on	P-27	4 hrs.	P-38	disp. offset	P-44	spare	P-55	high tot.	P-64	vel. P-65	P-72	fuzz filter
P-6	mA out	P-13	2 off	P-28	5 hrs.	P-39	disp. opt'n	P-45	max. head	P-56	remote tot.	P-65	temp.	P-73	agitator
P-7	decimal	P-14	3 function	P-29	run-on			P-46	max. flow	P-57	flow samp.	P-66	max. temp	P-74	f-s mode
		P-15	3 on	P-30	run-on			P-47	auto zero	P-58	flow samp.	P-67	min. temp	P-75	f-s timer
		P-16	3 off	P-31	spare			P-48	cutoff	P-59	time samp.				
		P-17	4 function	P-32	DLD mA out			P-49	decimal						
		P-18	4 on	P-33	totaling			P-50	mA out						
		P-19	4 off												
		P-20	5 function												
		P-21	5 on												
		P-22	5 off												

P-# required parameters

P-# optional parameters

P-# parameters not required

SIMPLE LEVEL APPLICATION

The most common application of a Milltronics ultrasonic level measuring system is for simple level monitoring, whereby the material level or space measurement is displayed. This may or may not include alarms and mA output.

When in the program mode, alarm relays hold their contact state. However, they will respond to measurements taken when "MEAS" is pressed.

Simple Level Example

The application is to obtain a level measurement and corresponding 4-20 mA output of a 30 ft high vessel. The transducer face is level to the top of the vessel, the empty level will be at 0 ft (bottom) and the full level will be at 28 ft from the bottom (span). A high alarm is required at 4 ft from the top (26 ft from the bottom) and a low alarm is required at 5 ft from the bottom. The maximum emptying rate is 1 ft / min, a rate greater than this should set an alarm. In the event of a loss of echo, the HydroRanger is to go into fail-safe hold after 2 minutes.

select:

P-1	enter option "3",	units in feet

advance to:

P-2	enter option "1",	material level
P-3	enter "30",	empty distance to transducer
P-4	enter "28",	span
P-5	enter ".984",	blanking distance , (use factory setting)
P-6	enter option "2",	4 – 20 mA output
P-7	enter "2",	display max 2 digits after decimal
P-8	enter option "1",	relay 1 - alarm function
P-9	enter "26",	relay 1 - alarm ON (30' – 4' = 26')
P-10	enter "25.5",	relay 1 - alarm OFF deadband = 0.5', arbitrary setting
P-11	enter option "1",	relay 2 - alarm function
P-12	enter "5",	relay 2 - alarm ON
P-13	enter "5.5",	relay 2 - alarm OFF
P-14	enter option"5",	relay 3 - rate of change function
P-15	enter "–1",	relay 3 - alarm ON 9 '–' denotes emptying
P-16	enter "– 0.9",	relay 3 - alarm OFF
P-37	enter "1",	convert display (x1)
P-68	enter "1",	maximum fill damping 1 ft / min
P-69	enter "1",	maximum empty damping 1 ft / min
P-74	enter option "3",	fail-safe hold
P-75	enter "2",	fail-safe timer - 2 min.

to re-enter run mode

PUMP CONTROL
APPLICATION PARAMETERS

General		Relays		Pump Control		Vol. & Disp. Conversion		OCM		Totalizer		Custom		Filter	
P-1	**units**	**P-8**	**1 function**	P-23	submers.	P-34	tank	P-40	primary	P-51	OCM sim.	P-60	full	P-68	fill damp
P-2	**mode**	**P-9**	**1 on**	P-24	1 hrs.	P-35	dim. A	P-41	time	P-52	factor	P-61	empty	P-69	empty damp
P-3	**empty dist.**	**P-10**	**1 off**	P-25	2 hrs.	P-36	dim. L	P-42	expon.	P-53	decimal	P-62	offset	P-70	rate disp.
P-4	**span**	P-11	2 function	P-26	3 hrs.	P-37	convert	P-43	flume dim.	P-54	low tot.	P-63	vel. 20 °C	P-71	rate avg.
P-5	near blank	P-12	2 on	P-27	4 hrs.	P-38	disp. offset	P-44	spare	P-55	high tot.	P-64	vel. P-65	P-72	fuzz filter
P-6	mA out	P-13	2 off	P-28	5 hrs.	P-39	disp. opt'n	P-45	max. head	P-56	remote tot.	P-65	temp.	P-73	agitator
P-7	decimal	P-14	3 function	P-29	run-on			P-46	max. flow	P-57	flow samp.	P-66	max. temp	P-74	f-s mode
		P-15	3 on	P-30	run-on			P-47	auto zero	P-58	flow samp.	P-67	min. temp	P-75	f-s timer
		P-16	3 off	P-31	spare			P-48	cutoff	P-59	time samp.				
		P-17	4 function	P-32	DLD mA out			P-49	decimal						
		P-18	4 on	P-33	totaling			P-50	mA out						
		P-19	4 off												
		P-20	5 function												
		P-21	5 on												
		P-22	5 off												

P-# required parameters

P-# optional parameters

P-# parameters not required

PUMP CONTROL APPLICATIONS

The basic difference between a simple level application and a pump control application is that the relays assigned to pump functions are normally in a de-energized state and are energized when pumping is required.

The HydroRanger can be programmed to control up to 5 pumps. Each may be configured in one of the following ways.

1. Fixed roster: (P-8,11,14,17& 20 = 8)

   selected pump relays 1-5 always operate in conjunction with their respective relay setpoints. i.e. relay 1's operation is always subject to relay 1's setpoints (P-9 & P-10). Any combination of the selected pumps can be operating at a time.

2. Sequential loop: (P-8,11,14,17& 20 = 9)

   cumulative — selected pump relays 1 - 5 sequentially rotate through the associated relay setpoints changing pump / setpoint assignment each time the lead pump is turned off. The lead pump is defined as the pump responding to the first ON setpoint.

   duty / back-up — similar to the cumulative sequential loop except that only one of the pumps designated as duty/back-up can be on at a time. This feature is useful in older installations where the discharge main cannot tolerate excessive pressure. If the lead pump, through wear or blockage, cannot keep up with the inflow, the next pump in sequence will come on and the lead pump will be turned off. The ON setpoints are generally in close proximity, but the OFF setpoints must be common for all pumps on the loop.

Sequential operation can be programmed as either cumulative or duty/back-up, but not both. The HydroRanger will take the last mode entered as the common choice for all sequenced relays.

3. Assignment of a pump / relay contact to a setpoint parameter is done by ratio of the logged service hours. When the service of a pump is required, the pump with the least amount of service hours (P\C-24 to 28) with respect to the set ratio (P\A - 24 to 28)is started. When a pump is to be taken out of service, the pump with the least amount of service hours is stopped.

e.g. relays 1, 2 and 3 control three pumps by service ratio. It is required that pump 1 operate 60% of the time, pump 2 operate 10% of the time and pump 3 operate 30%of the time.

» set the relay function : P-8, 11, 14 = dE : A9
» set the relay setpoints : P-9/10, 12/13, 15/16
» set the P-24, 25, 26 ratios : A-24 = 60
A-25 = 10
A-26 = 30

Relays assigned to pump control operation are software set that no two pumps can start up within 10 seconds of each other, a power failure or return to the run mode.

When in the program mode, pump relays will be held de-energized (OFF). In the event of a loss of echo condition, the pump relays can be individually programmed to be:

» de-energized (dE)
» energized (En)
» hold (Ho)

when the fail-safe timer P-75 expires. Refer to Applications/Relays.

In applications where flooding is possible, a submersible transducer should be used. The submersible transducer's air cavity insures that a high level reading will be maintained rather than a loss of echo condition when the liquid level reaches the transducer. ***When using a submersible transducer, set P-23.***

When relays are assigned a pump function, parameters P-24 through P-28 are used to log the respective service hours and number of pump starts for pump relays 1 - 5. These parameters may also be viewed while in the run mode by pressing the appropriate programmer keys. The initial pressing of the key causes the display to show the service hours. Holding the key in for at least five seconds causes the number of starts to be displayed. Each register may be reset to 0 by pressing "CLR" and then "ENTER" or preset by entering a particular value.

The preset value is immediately stored in memory, however subsequent values are only stored every 4 hours. Thus, after a power failure, the registers will display the last value stored. The registers will automatically reset to 0.000 after reaching a value of 9,999.

Pump Control Example

The application is to control the level in a wet well 3 meters deep. It is required that :

- » the level is displayed in meters
- » to start/stop two constant speed pumps: start pump 1 at 1 m level
start pump 2 at 2 m level
stop both pumps at 0.5 m level
- » the two pumps operate on a cumulative sequential loop, de-energized under loss of echo
- » low alarm is set at 0.4 m to protect the two pumps from cavitating
- » the transducer is mounted 3.4 meters from the bottom of the wet well
- » the span of level in the well is 3 m
- » maximum fill rate is 1m / min, maximum draw rate is 0.2 m / min
- » in the event of loss of echo, go into fail-safe low after 30 seconds to protect pumps
- » the transducer is the submersible type as there is a possibility of flooding

select :

P-1	enter option "1",	units in meters

advance to:

P-2	enter option "1",	material level
P-3	enter "3.3",	empty distance to transducer
P-4	enter "3",	span
P-5	enter ".300",	blanking distance, (use factory setting)
P-7	enter "2",	display max 2 digits after decimal
P-8	enter option "dE 9" (press "9" and then "-" until "dE 9" is displayed)	relay 1 - pump function
P-9	enter "1",	relay 1 - pump ON
P-10	enter ".5",	relay 1 - pump OFF
P-11	enter option "dE 9" (press "9" and then "-" until "dE 9" is displayed)	relay 2 - pump function

P-12	enter "2",	relay 2 - pump ON
P-13	enter ".5",	relay 2 - pump OFF
P-14	enter option "1",	relay 3 - alarm function
P-15	enter ".4",	relay 3 - alarm ON
P-16	enter ".45",	relay 3 - alarm OFF deadband = 0.05 m, arbitrary setting
P-23	enter option "1",	using submersible transducer
P-37	enter "1",	convert display (x1)
P-68	enter "1",	fill damping 1 m / min
P-69	enter ".2",	empty damping 0.2 m / min
P-74	enter option "2",	fail-safe low to protect pumps
P-75	enter ".5",	fail-safe timer at a maximum draw rate of 0.2 m / min, this would protect pumps. If a loss of echo occurred at 0.5 m, after 30 sec the level would equal that of acceptable low level alarm and the pump would shut off.

to re-enter run mode

Pump Run-On

Pump run-on is a special feature designed to allow the pump assigned, temporarily (sequential loop) or permanently (fixed roster), to the lowest OFF setpoint to continue pumping after it has reached that OFF setpoint. The duration of run-on is set by P-30. Only one run-on duration is allowed per interval. The interval is the time period set by P-29 which begins upon return to the run mode or resumption of power. No run-on is allowed during the first interval.

Caution: extended pump run-on can lead to cavitation, causing air lock or pump damage

Conditions of use :

» Do not use run-on feature during pump-up operation as an overflow condition may occur. Set P-29 and 30 to 0.

» Select the loss of echo default "dE" to protect pumps from cavitating in the event of loss of echo

» The run-on interval must be greater that the run-on duration.

e.g. P-29 = 24 and P-30 = 15

After 24 hours from going into the run mode, the HydroRanger enters the second run-on interval allowing only one pump run-on cycle of 15 seconds, at the first time the lead pump turns off. If the lead pump turns off a second time during that 24 hour interval, no run-on will occur. After the 24 hour interval has elapsed, whether a pump run-on has occurred or not, the next run-on interval will begin, allowing one run-on cycle.

PUMP TOTALIZER
APPLICATION PARAMETERS

General		Relays		Pump Control		Vol. & Disp. Conversion		OCM		Totalizer		Custom		Filter	
P-1	**units**	**P-8**	**1 function**	P-23	submers.	P-34	tank	P-40	primary	P-51	OCM sim.	P-60	full	P-68	fill damp
P-2	**mode**	**P-9**	**1 on**	P-24	1 hrs.	P-35	dim. A	P-41	time	P-52	factor	P-61	empty	P-69	empty damp
P-3	**empty dist.**	**P-10**	**1 off**	P-25	2 hrs.	P-36	dim. L	P-42	expon.	P-53	decimal	P-62	offset	P-70	rate disp.
P-4	**span**	P-11	2 function	P-26	3 hrs.	P-37	convert	P-43	flume dim.	P-54	low tot.	P-63	vel. 20 °C	P-71	rate avg.
P-5	near blank	P-12	2 on	P-27	4 hrs.	P-38	disp. offset	P-44	spare	P-55	high tot.	P-64	vel. P-65	P-72	fuzz filter
P-6	mA out	P-13	2 off	P-28	5 hrs.	P-39	disp. opt'n	P-45	max. head	P-56	remote tot.	P-65	temp.	P-73	agitator
P-7	decimal	P-14	3 function	P-29	run-on			P-46	max. flow	P-57	flow samp.	P-66	max. temp	P-74	f-s mode
		P-15	3 on	P-30	run-on			P-47	auto zero	P-58	flow samp.	P-67	min. temp	P-75	f-s timer
		P-16	3 off	P-31	spare			P-48	cutoff	P-59	time samp.				
		P-17	4 function	P-32	DLD mA out			P-49	decimal						
		P-18	4 on	**P-33**	**totaling**			P-50	mA out						
		P-19	4 off												
		P-20	5 function												
		P-21	5 on												
		P-22	5 off												

P-# required parameters

P-# optional parameters

P-# parameters not required

PUMP TOTALIZER APPLICATION

This type of application is an extension of the pump control application, accessed by setting P- 2 = 4. Unlike a pump application in which the mode of the measurement (P-2) can be of material or space, the pump volume totalizer mode is a measurement of the liquid volume pumped with reference to the material level.

The material level must be converted to volume using volume conversion parameters P-34, 35 and 36 and / or convert display P-37. The HydroRanger in pump-down, will record the volume being pumped out. Alternately, the HydroRanger will record the volume pumped in if the pump setpoints are set for pump-up.

When the pump(s) is OFF, the HydroRanger estimates the volume of the inflow or discharge by recording the rate at which the liquid level changes. When the pump(s) is operating, the estimated inflow or discharge volume may be added (P-33 = 1) to the pumped volume total, as in batch processing.

When the pump(s) stops, the pumped volume of the previous pump cycle is added to the total volume pumped in the 8 digit totalizer.

The totalizer contents are stored in RAM and will be lost in the event of a power failure. However, after every 1 hour of continuous operation, the totalizer contents are stored in the EEPROM. Thus, after a power failure, the totalizer will be loaded with the last value stored.

In the event of a loss of echo, the totalizer will continue being incremented by the flowrate established from the last valid echo. The totalizer will stop being incremented and hold its last updated value when in the program mode or if the fail-safe timer expires ("LOE" is displayed"). Once the totalizer has been filled (99999999), it will automatically reset itself to zero and resume totalling.

The HydroRanger can be programmed (P-39) to normally display one of the following readings :

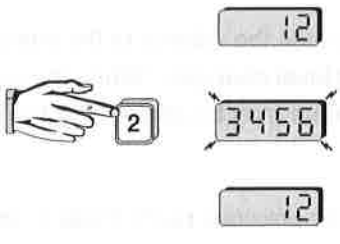
- » enter option "0", hold last reading selected in run mode
- » enter option "1", high total: 4 highest digits of the 8 digit totalizer
- » enter option "2", low total: 4 lowest digits of the 8 digit totalizer
- » enter option "5", level

It must be noted that only half of the totalizer digits can be accessed or viewed at one time.

e.g.	***high total***	***low total***
	P-54	P-55
8 digit total	1325	4679

If it is wished to momentarily view an alternate reading while in the run mode and P-39 ≠ 0, press the desired programmer key ('HEAD' and 'FLOW' are not applicable to the pumped volume totalling)

e.g.



normal display is high total, P-39 = 1

low total is momentarily displayed

normal display of the high total returns

If P-39 = 0, alternate reading cannot be momentarily displayed. Pressing the desired key will change the display and hold it there until the next alternate reading is selected.

In the program mode, the high and low totals can be viewed or preset to any value by P-54 and P-55 respectively.

The pumped volume readings (high and low total) may be scaled down by factors of 10 (P-52) to slow down the totalizer's rate of fill, and its decimal point (P-53) positioned for the resolution required. If it is desired to change the scaling factor or decimal point location after totalling has begun, record the high and low totals and reset the totalizer to zero.

Further to alarm and pump functions, relays may be programmed to act as a momentary contact closure for a remote totalizer, flow sampler or time sampler (refer to Applications \ Relays). The duration of a momentary contact closure is 200 msec for which the corresponding relay status LED will flash. As a remote totalizer relay, the contact is closed each time the displayed total is increased by the amount entered into P-56. As a flow sampler relay, the contact is closed each time the volume of liquid, as set by P-57 and P-58, is pumped. As a time sampler relay, the contact is closed at the rate of the time period entered into P-59.

The mA output responds to the liquid reading only (level, if P-34 = 0 or volume if P-34 ≠ 0). In the event of fail-safe due to loss of echo, the mA output will respond as programmed by P-6 and P-74, but the totalized volume will hold its last reading.

Pump Totalizer Example

Further to the Pump Control Example it is required that the volume pumped be totalized. A daily flow total of 1,200 cubic meters is expected and a contact closure is required every 10 cu. m. The full level of the well is equal to 42 cu.m. The following parameters should be set.

select:

P-2	enter option "4",	volume totalizer
P-17	enter option "11",	relay 4-remote totalizer contact
P-33	enter option "1",	estimated inflow volume is added to pumped volume
P-37	enter "14",	convert display, x14 (42 / 3 = 14)
P-39	enter option "2",	display low total
P-52	enter "1",	totalizer convert display, totalized volume will read as tens of cubic meters or 1 count per 10 cubic metres.
P-53	enter option "0",	totalizer decimal point no decimal digits or resolution equals 100% of a count
P-54	press "CLR" enter "0",	totalizer preset value, arbitrarily chosen
P-55	press "CLR" enter "0",	totalizer preset value, arbitrarily chosen
P-56	enter "1",	totalizer contact control-closure every 10 cu. m

to re-enter run mode.

VOLUME
APPLICATION PARAMETERS

General		Relays		Pump Control		Vol. & Disp. Conversion		OCM		Totalizer		Custom		Filter	
P-1	**units**	P-8	1 function	P-23	submers.	P-34	tank	P-40	primary	P-51	OCM sim.	P-60	full	P-68	fill damp
P-2	**mode**	P-9	1 on	P-24	1 hrs.	P-35	dim. A	P-41	time	P-52	factor	P-61	empty	P-69	empty damp
P-3	**empty dist.**	P-10	1 off	P-25	2 hrs.	P-36	dim. L	P-42	expon.	P-53	decimal	P-62	offset	P-70	rate disp.
P-4	**span**	P-11	2 function	P-26	3 hrs.	P-37	convert	P-43	flume dim.	P-54	low tot.	P-63	vel. 20 °C	P-71	rate avg.
P-5	near blank	P-12	2 on	P-27	4 hrs.	P-38	disp. offset	P-44	spare	P-55	high tot.	P-64	vel. P-65	P-72	fuzz filter
P-6	mA out	P-13	2 off	P-28	5 hrs.	P-39	disp. opt'n	P-45	max. head	P-56	remote tot.	P-65	temp.	P-73	agitator
P-7	decimal	P-14	3 function	P-29	run-on			P-46	max. flow	P-57	flow samp.	P-66	max. temp	P-74	f-s mode
		P-15	3 on	P-30	run-on			P-47	auto zero	P-58	flow samp.	P-67	min. temp	P-75	f-s timer
		P-16	3 off	P-31	spare			P-48	cutoff	P-59	time samp.				
		P-17	4 function	P-32	DLD mA out			P-49	decimal						
		P-18	4 on	P-33	totaling			P-50	mA out						
		P-19	4 off												
		P-20	5 function												
		P-21	5 on												
		P-22	5 off												

P-# required parameters

P-# optional parameters

P-# parameters not required

VOLUME APPLICATION

In addition to simple liquid level and pump applications, volume conversions can be included in the programming.

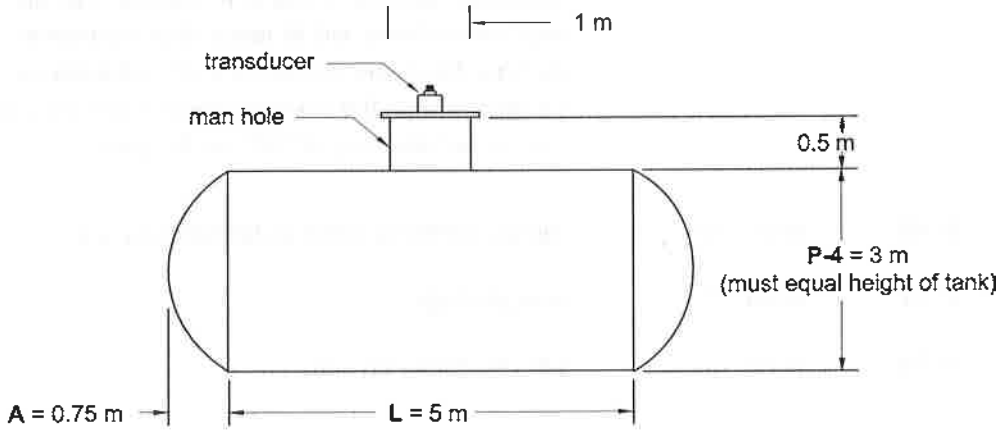
Common Tank Shapes

Volume conversion is provided for 8 common tank shapes, (P-34). Dimensions are entered using P-4 and 36. Volume is displayed as 0-100% and may be converted to volume units using P-37.

P-4, span, must be equal to the 100% (full) level of tank.

Volume Example

The application is to measure the volume of glue in a horizontal tank with parabolic ends. The tank manufacturer's specifications state that the volume is 40.6 cubic metres.



The maximum fill / draw rate is 0.35 cu. m / min. In the event of a loss of echo, the HydroRanger is to go into fail-safe high after 30 sec.

select:

P-1	enter option "1",	units in meters

advance to:

P-2	enter option "1",	material level
P-3	enter "3.5",	empty distance to transducer
P-4	enter "3",	span (inside diameter of tank)
P-5	enter ".300",	near blanking distance, (use factory setting)
P-7	enter "1",	display maximum 1 digit after decimal
P-34	enter option "7",	tank shape for volumetric conversion

P-35	enter ".75",	tank dimension **A**
P-36	enter "5",	tank dimension **L**
P-37	enter ".406",	convert display, x.406 (automatically shows the levels in %). As 100% full = 40.6 cubic metres, a conversion factor of .406 must be entered. $\frac{\text{actual volume}}{\text{percentage}}$ = conversion factor
P-68	enter "10",	fill damping 10 m/min $\frac{40.6 \text{ cu. m}}{0.35 \text{ cu. m / min}}$ = 116 min total fill time $\frac{3 \text{ m}}{116 \text{ min}}$ = 0.025 m / min average fill rate However, because of the tank's shape, the top and bottom levels will fill faster than the middle section. Therefore the actual P-68 value should be greater than the average value. Typically, the factory set damping of "10" can be used.
P-69	enter "10",	empty damping-same as fill damping rate
P-74	enter "1",	fail-safe high
P-75	enter ".5",	fail-safe timer, 30 sec.

to re-enter run mode

Custom Design Tanks

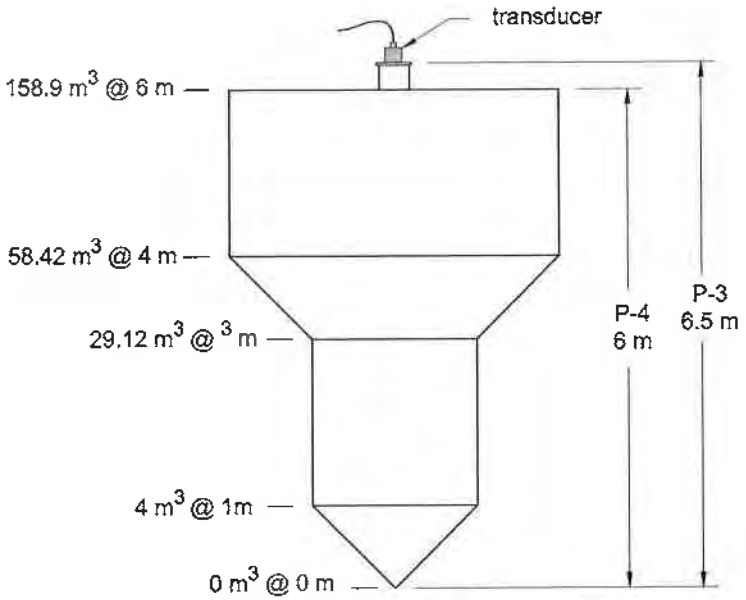
Where the tank design does not match one of the eight common tank shapes, P-34 may be programmed for level versus volume characterization.

Characterization is achieved by entering the level (H parameters) and corresponding volume (F parameters) for the elevations where there is a change in the tank profile. Where curves are involved, the more breakpoints that are defined, the more accurate will be the volume of measurement. A maximum of eleven breakpoints can be defined.

Level data is entered in the linear units selected (P-1) and volume data is entered in the tank desired volumetric units. Both of these are referenced to the bottom of the tank.

Custom Design Tanks Example 'A'

The application is to measure the level of liquid in a custom designed tank. The tank manufacturer specifies the following level versus volume data.



select :

P-1	enter option "1",	units in metres

advance to :

P-2	enter option "1",	material level
P-3	enter "6.5",	empty distance to transducer
P-4	enter "6",	span
P-5	enter ".5"	near blanking distance
P-34	enter option "9"	universal level vs volume

press	***display will show***
★	H - 1
ALT DISP	- - - -
0 ENTER	0.0 0 0
▲	H - 2 *(then)* - - - -
1 ENTER	1.0 0 0

press	*display will show*
▲	H - 3 *(then)* - - - -
3 ENTER	3.000
▲	H - 4 *(then)* - - - -
4 ENTER	4.000
▲	H - 5 *(then)* - - - -
6 ENTER	6.000
★	F - 5 *(then)* - - - -
ALT DISP	F - 5
1	F - 1
ALT DISP	- - - -
0 ENTER	0.000
▲	F - 2 *(then)* - - - -
4 ENTER	4.000
▲	F - 3 *(then)* - - - -
2 9 • 1 2 ENTER	29.12
▲	F - 4 *(then)* - - - -
5 8 • 4 2 ENTER	58.42
▲	F - 5 *(then)* - - - -
1 5 8 • 9 ENTER	158.9
ALT DISP	F - 5
CLR	P - 34

to re-enter run mode

Compensation

In many volume applications, the ambient atmosphere is other than air or at a temperature other than 20 °C. Refer to Functional \ Temperature or \ Sound Velocity, for details on compensating for such circumstances.

If it is noted that the HydroRanger reading is consistently off by a constant amount as compared to the physical reading, this may be compensated for by P-62. This tank measurement offset might occur when P-3 or P-4 does not exactly match the tank dimensions referenced for volume conversion. If the cause of the offset appears below the relay setpoints, the setpoint parameters may need to be reset as these will have shifted accordingly.

Custom Design Tanks Example 'B'

Further to the Volume Example or the Custom Design Tank Example 'A', the liquid is a glue giving off formaldehyde vapour. Velocity compensation will be required.

As the next two steps involve physical measurements, for convenience sake, P-60 can be done before P-61.

select:

P-62	(optional to P-60)	record present offset for reference
P-60	(optional)	with the tank as full as permissible, without going into the blanking zone, press "MEAS". The HydroRanger will take a measurement and display the level. Press "meas" at least 5 times and insure that a stable reading is being obtained. Enter the "physical measurement". The HydroRanger will now calculate the measurement offset to be used in future level measurements. The offset reading will be automatically entered into P-62 and can now be viewed.
P-63	record present sound velocity for reference	

P-61 with the tank as empty as permissible and filled with its normal vapour and at its normal temperature press "MEAS".
The HydroRanger will take a measurement and display the level in the units selected, regardless that percent, volume or convert display are used. Press "MEAS" at least 5 times and insure that a stable reading is being obtained.

Enter the "physical measurement". The HydroRanger will now calculate the correct sound velocity to be used in future level measurements.The new sound velocity will automatically be entered into P-63 and P-64, and can now be viewed.

to re-enter run mode.

DIFFERENTIAL LEVEL
APPLICATION PARAMETERS

General		Relays		Pump Control		Vol. & Disp. Conversion		OCM		Totalizer		Custom		Filter	
P-1	**units**	P-8	1 function	P-23	submers.	P-34	tank	P-40	primary	P-51	OCM sim.	P-60	full	P-68	fill damp
P-2	**mode**	P-9	1 on	P-24	1 hrs.	P-35	dim. A	P-41	time	P-52	factor	P-61	empty	P-69	empty damp
P-3	**empty dist.**	P-10	1 off	P-25	2 hrs.	P-36	dim. L	P-42	expon.	P-53	decimal	P-62	offset	P-70	rate disp.
P-4	**span**	P-11	2 function	P-26	3 hrs.	P-37	convert	P-43	flume dim.	P-54	low tot.	P-63	vel. 20 °C	P-71	rate avg.
P-5	near blank	P-12	2 on	P-27	4 hrs.	P-38	disp. offset	P-44	spare	P-55	high tot.	P-64	vel. P-65	P-72	fuzz filter
P-6	mA out	P-13	2 off	P-28	5 hrs.	P-39	disp. opt'n	P-45	max. head	P-56	remote tot.	P-65	temp.	P-73	agitator
P-7	decimal	P-14	3 function	P-29	run-on			P-46	max. flow	P-57	flow samp.	P-66	max. temp	P-74	f-s mode
		P-15	3 on	P-30	run-on			P-47	auto zero	P-58	flow samp.	P-67	min. temp	P-75	f-s timer
		P-16	3 off	P-31	spare			P-48	cutoff	P-59	time samp.				
		P-17	4 function	P-32	DLD mA out			P-49	decimal						
		P-18	4 on	P-33	totaling			P-50	mA out						
		P-19	4 off												
		P-20	**5 function**												
		P-21	5 on												
		P-22	5 off												

P-# required parameters

P-# optional parameters

P-# parameters not required

DIFFERENTIAL LEVEL APPLICATION

This type of application monitors the difference between two liquid levels, hence two transducers are required. The HydroRanger monitors the two levels, calculates the difference and displays the differential as the reading. The following parameters should be left at their factory setting:

- volume conversion (P-34)
- display conversion (p-37)
- offset (P-62)
- velocity compensation (P-63)
- temperature compensation (P-65)

In the run mode, the reading display will show the absolute difference between the levels, hence there are no negative readings. The level at transducer 1 or 2 may be viewed individually by pressing "PT1" or "PT2" respectively.

When programming as a differential level detector

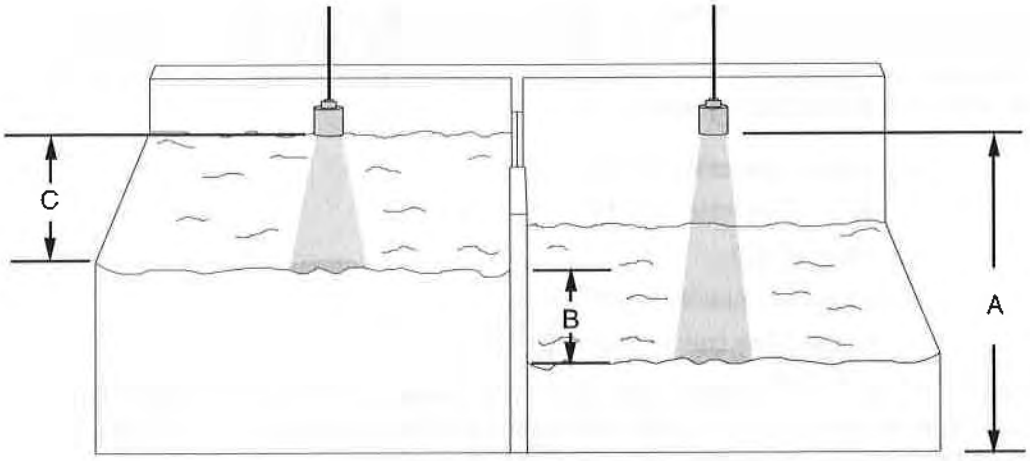
- P-2, mode: option 3 must be selected for DLD operation
- P-3, empty distance to transducer: represents the lowest or common level
- P-4, span: represents differential level corresponding to the 20 mA value
- P-6, ma output: select range
- P-20, function: option 14 must be selected for relay 5 to operate as scanner
- P-32, mA output: may be dedicated to correspond to differential or level under transducer #1

On alarm and pump relay functions with setpoints referenced to zero, the setpoints are common to both levels. The in bounds, out of bounds, rate of change and sequential relay functions are not allowed.

In the event that the echo on either transducer is lost:

- If set for fail-safe high: the differential reading will display the maximum differential level(P- 4)
- if set for fail-safe low: the differential reading will display zero
- If set for fail-safe hold: the display will hold its present reading after the fail-safe timer has expired

In order to use the HydroRanger as a differential level detector TB-1 must be wired as in Installation \ Installing the Transducer and both transducers must be installed at the same level.



A = transducers must be at the same elevation (P-3).

B = maximum differential (Span, P-4)

C = transducer should be mounted at least 0.3 m above the highest liquid level and 0.3 m away from the wall for every 3 m / ST-25 or 6 m / ST-50 of measurement.

Differential Level Example

The application is to monitor the differential level across a sewage bar screen. When a differential level of greater than 12" is obtained, it is required that a rake be started. If the water level on either side rises above 20", a high level alarm is required.

The height from the common (low) level to the transducer face is 4 ft . A 4 - 20 mA output corresponding to the differential is required, and the 20 mA has been arbitrarily set to correspond to a 24" differential (span). In the event of a loss of echo, the HydroRanger should go into a fail-safe high after 5 minutes.

select:

P-1	enter option "4",	units in inches
P-2	enter option "3",	differential level
P-3	enter "48",	empty distance to transducer
P-4	enter "24",	span
P-5	enter "11.81",	blanking distance, (use factory setting)
P-6	enter option "24",	4 - 20 mA output
P-7	enter "1",	display max 1 digit after decimal
P-8	enter option "4",	relay 1 - differential alarm
P-9	enter "12",	relay 1 - rake on This would be used only to initiate the rake control circuitry.

P-10	enter "6",	relay 1 - reset this value can be arbitrarily set
P-11	enter option "1",	relay 2 - alarm function
P-12	enter "20",	relay 2 - alarm ON
P-13	enter "19",	relay 2 - alarm OFF
P-20	enter option "14",	relay 5 - scanner
P-32	enter option "1",	mA output on differential
P-68	enter "393.7",	fill damping 393.7 in / min. Normally this level would rise over a period of days or weeks, therefore damping requirements would be fairly slow. Typically, the factory set damping of 32.81 can be used.
P-69	enter "393.7",	empty damping - same as fill damping
P-74	enter option "1,	fail-safe high
P-75	enter "5",	fail-safe timer

to re-enter run mode

OPEN CHANNEL MEASUREMENT
APPLICATION PARAMETERS

General		Relays		Pump Control		Vol. & Disp. Conversion		OCM		Totalizer		Custom		Filter	
P-1	**units**	P-8	1 function	P-23	submers.	P-34	tank	**P-40**	**primary**	P-51	OCM sim.	P-60	full	P-68	fill damp
P-2	**mode**	P-9	1 on	P-24	1 hrs.	P-35	dim. A	**P-41**	**time**	P-52	factor	P-61	empty	P-69	empty damp
P-3	**empty dist.**	P-10	1 off	P-25	2 hrs.	P-36	dim. L	***P-42**	**expon.**	P-53	decimal	P-62	offset	P-70	rate disp.
◊**P-4**	**span**	P-11	2 function	P-26	3 hrs.	P-37	convert	***P-43**	**flume dim.**	P-54	low tot.	P-63	vel. 20 °C	P-71	rate avg.
P-5	near blank	P-12	2 on	P-27	4 hrs.	P-38	disp. offset	P-44	spare	P-55	high tot.	P-64	vel. P-65	P-72	fuzz filter
P-6	mA out	P-13	2 off	P-28	5 hrs.	P-39	disp. opt'n	◊**P-45**	**max. head**	P-56	remote tot.	P-65	temp.	P-73	agitator
P-7	decimal	P-14	3 function	P-29	run-on			**P-46**	**max. flow**	P-57	flow samp.	P-66	max. temp	P-74	f-s mode
		P-15	3 on	P-30	run-on			P-47	auto zero	P-58	flow samp.	P-67	min. temp	P-75	f-s timer
		P-16	3 off	P-31	spare			P-48	cutoff	P-59	time samp.				
		P-17	4 function	P-32	DLD mA out			P-49	decimal						
		P-18	4 on	P-33	totaling			P-50	mA out						
		P-19	4 off												
		P-20	5 function												
		P-21	5 on												
		P-22	5 off												

P-# required parameters

P-# optional parameters

P-# parameters not required

* either parameter, depending on P-40

◊ same

OCM APPLICATION

This application is specific to monitoring the flowrate in one of the four following categories of primary measuring devices. Refer to the respective drawings at the end of this section for weir and flume outlines and transducer location.

Single Exponential, these are flumes and weirs that can be characterized by a single exponential term (P-40 = 1) i.e. $Q = K H^X$.

where : Q = flow
K = constant
H = head
x = exponent, characteristic to the primary measuring device (flume or weir)

Examples :

Primary measuring device	***exponent***
Suppressed rectangular, Cipolletti weir, or Venturi flume	1.50
Parshall Flume, or Leopold Lagco	1.55
V-notch weir	2.50
etc	

Refer to manufacturer's specifications for the exact exponent.
The exponents listed above are for reference only.

Palmer-Bowlus flumes : **typically those manufactured by Plasti-Fab or Warminster Fiberglass (P-40 = 2)**

H-flumes : **excluding HS and HL sizes, as developed by the U.S. Department of Agriculture, Soil Conservation (P-40=3)**

Other : **these are primary measuring devices that do not fit the first three categories (P-40 = 4)**

As most OCM applications are outdoors, the use of a temperature sensor is strongly recommended for optimum accuracy. Refer to Functional \ Temperature.

Flow readings are calculated by the HydroRanger as a function of the head under the transducer, installed upstream from the primary measuring device (P-40). The flows are then accumulated in the arbitrary volume units chosen per the time units of P-41 in an 8 digit totalizer. In the event of a loss of echo, the totalizer will continue being incremented by the flowrate established from the last valid echo. The totalizer will stop being incremented and hold its last updated value when in the program mode or if the fail-safe timer expires ("LOE" is displayed).

The totalizer contents are stored in RAM and will be lost in the event of a power failure. However, after every 1 hour of continuous operation, the totalizer contents are stored in the EEPROM. Thus, after a power failure, the totalizer will be loaded with the last value stored. Once the totalizer has been filled (99999999) it will automatically reset itself to zero and resume totalling.

The MulitRanger Plus can be programmed (P-39) to normally display one of the following readings :

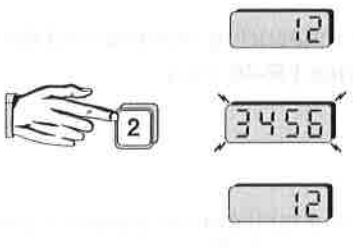
- » enter option "0", hold last reading selected in run mode
- » enter option "1", high total: 4 highest digits of the 8 digit totalizer
- » enter option "2", low total: 4 lowest digits of the 8 digit totalizer
- » enter option "3", head
- » enter option "4", flow

It must be noted that only half of the totalizer digits can be accessed or viewed at one time.

e.g.	***high total***	***low total***
	P-54	P-55
8 digit total	1325	4769

To momentarily view an alternate reading while in run mode and P-39 ≠ 0, press the desired programmer key ("READ" is not applicable to OCM).

e.g.



normal display is high total, P-39 = 1

low total is momentarily displayed

normal display of the high total returns

If P-39 = 0, alternate readings cannot be momentarily displayed. Pressing the desired key will change the display and hold it there until the next alternate reading is selected.

In the program mode, the high and low totals can be viewed or preset to any value by P-54 and P-55 respectively.

The flow readings (high and low total) may be scaled down by factors of 10 (P-52) to slow down the totalizer's rate of fill and its decimal point (P-53) positioned for the resolution required. To change the scaling factor or decimal point location after totaling has begun, record the high and low totals and reset the totalizer to zero.

The HydroRanger can be programmed to ignore low head, i.e. flows for heads less than that set in P-48 will not be accumulated in the totalizer. The low head cutoff is measured in % of maximum head (P-45).

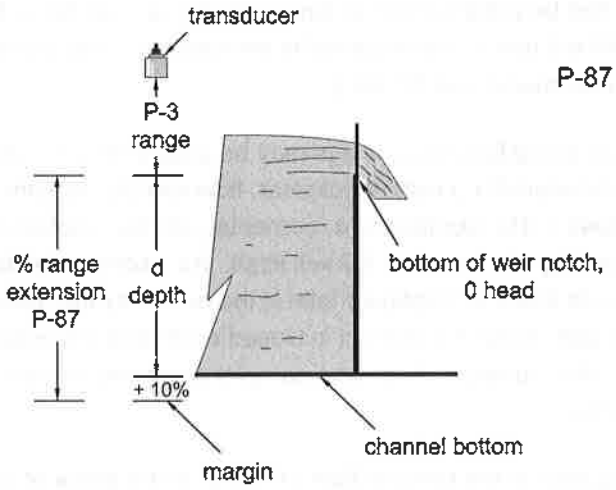
Further to alarm and pump functions, relays may be programmed to act as a momentary contact closure for a remote totalizer, flow sampler or time sampler (refer to Application \ Relays). The duration of a momentary contact closure is 200 msec for which the corresponding relay status LED will flash. As a remote totalizer relay, the contact is closed each time the displayed total is increased by the amount entered into P-56. As a flow sampler relay, the contact is closed each time the volume of liquid as set by P-57 and P-58 is pumped. As a time sampler relay, the contact is closed at the rate of the time period.

The mA output responds to the head or flow (P-50). In the event of fail-safe due to loss of echo, the mA output will respond as programmed by P-6 and P-74.

When programming the HydroRanger for the OCM function, the empty distance to transducer (P-3) may be considered and entered as the distance from the transducer face to the 0 head or no flow reference level. If this measurement is not easily obtained, P-3 can be estimated and corrected via P-47. This is referred to as the Auto Zero calibration and requires the HydroRanger to compare a physical measurement (from wall gauge, dipstick or stilling well) to the ultrasonic measurement via P-47. Refer to OCM Auto Zero Example.

It should also be noted that when operating in the OCM function: percent display, volume conversion (P-34) and convert display (P-37) are inoperative. Empty calibration (P-61) must be clear, i.e. 4 hyphens in the display.

An important consideration in OCM applications is that many primary measuring devices have the potential of running dry. In such cases, it must be insured that the range extension (P-87) is sufficient so that the floor of the channel or of the converging section of the flume can be read. Otherwise, false readings may be obtained indicating flow.



$$P\text{-}87 = \frac{d}{P\text{-}3} \times 110$$

OCM Example

9" Parshall Flume

$$Q = 1.98\ H^{1.53}$$

where Q = flow rate, MGD (million gallons per day),

H = head, feet

» max flow rate - Q max = 4.112 MGD
= 4,112,000 gal. / day

» max head - H max = 1.61

» transducer is mounted 3 ft above the zero flow level

» max flow rate display = 4,112
i.e. one count = 1000 gal.

select:

P-1	enter option "3",	units in feet
P-2	enter option "5",	OCM
P-3	enter "3",	zero level distance to transducer
P-4	enter "1.61",	max head
P-5	enter "1",	near blanking distance, minimum allowable
P-39	enter option "4",	display flowrate in units per day
P-40	enter option "1",	primary measuring device - exponential
P-41	enter option "4",	flowrate time units - per day
P-42	enter "1.53"	exponent from manufacturer's specs. for 9" Parshall Flume
P-46	enter "4112",	max flow in thousand gal / day
P-49	enter option "3",	flowrate decimal point display max 3 digits after decimal
P-52	enter option "0",	totalizer convert display total is divided by 1 before being displayed or 1 count per thousand gallons.
P-53	enter option "2",	totalizer decimal point display 2 digits after decimal or resolution equals 1/100th of a count.
P-68	enter "32.81",	fill damping 32.81 ft / min. As the head would fluctuate over a period of hours, damping requirements would be fairly low. Typically, the factory set damping of 32.81 can be used.
P-69	enter "32.81",	empty damping - same as fill damping

to re-enter run mode

OCM Auto Zero Example

Further to OCM Example, the following is required :

- alarm at 10% overflow (approx. = 1.8 ft) and 0 head
- in the event of loss of echo, the HydroRanger is to go into low alarm after 45 sec.
- head to read to 1 decimal place
- sampler contact every day
- head under "1" (40 thousand gal / day) not be totalized
- 4 - 20 mA output to respond to flow

select :

P-3	enter "3.33"	estimated empty distance to transducer
P-6	enter option "2",	4 to 20 mA
P-7	enter option "1",	decimal location for head display max 1 digit after decimal
P-8	enter option "1",	relay 1 - alarm function
P-9	enter option"1.8",	relay 1 - alarm ON
P-10	enter "1.5",	relay 1 - alarm OFF
P-11	enter option "1",	relay 2 - alarm function
P-12	enter "0",	relay 2 - alarm ON
P-13	enter ".3",	relay 2 - alarm OFF
P-14	enter option "13",	relay 3 - time sampler contact
P-47		Auto Zero

Press  and then  4 hyphens must appear in the display.

Press  at least 5 times to insure that the HydroRanger will obtain a stable ultrasonic measurement. The resultant reading will be the apparent head with respect to the estimated P- 3 = 3.33 ft . Enter "physical head measurement", over the displayed value previously obtained. This is the true head measurement from wall gauge, dipstick or stilling well, taken at the same time as the ultrasonic measurement and representing the same head measurement point as seen by the transducer. The physical head measurement must not be in the near blanking zone. An offset value, which is the apparent head minus the true head, is automatically calculated and entered into P-62. P-62 can only be cleared by P-47.

P-48	enter "5.2",	low head cutoff is 5.2% of P-45 flow for head below "1" (40 thousand gal. / day) will not be totalized

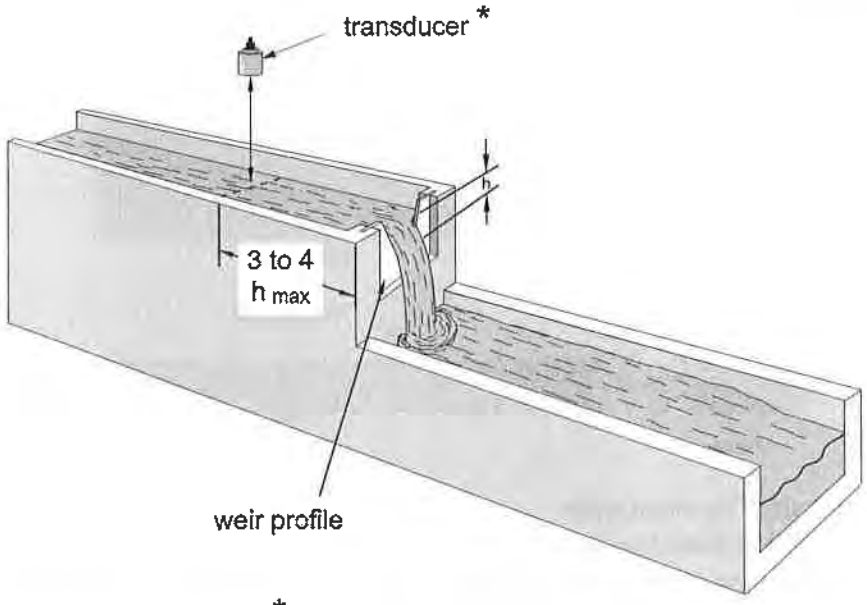
$$\frac{1"}{12" / ft \times 1.61\ ft} = 0.052 = 5.2\%$$

P-50	enter option "2",	mA output responds to flow
P-59	enter "1",	time sampler control closure once every hour
P-74	enter option "2",	fail-safe low
P-75	enter option ".75",	fail-safe timer, 45 sec.

 to re-enter run mode

Single Exponential, P-40 = 1

Weirs



* The transducer must be above the maximum head by at least the blanking value, P-5.

Applicable Weir Profiles

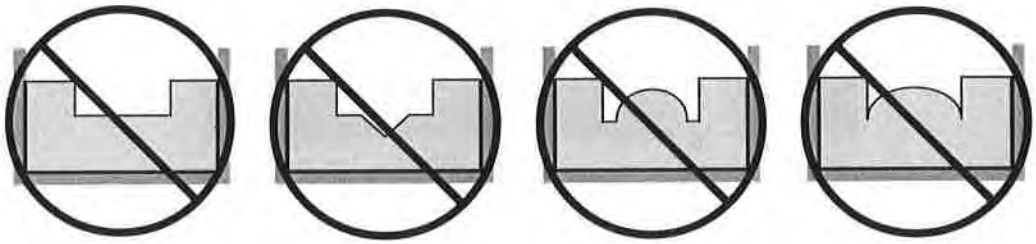
V - notch or triangular

suppressed rectangular

cipolleti or trapezoidal

sutro or proportional

Non-Applicable Weir Profiles



contracted rectangular

compound

Poebing

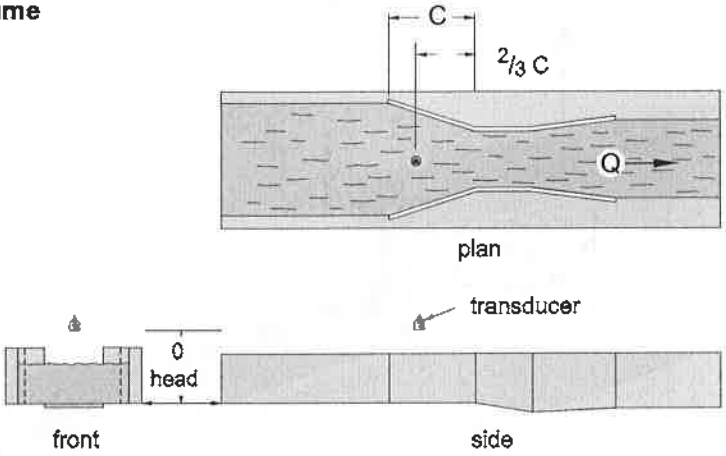
approximate exponential

Flows through these weirs may be measured using the universal head vs flow characterization, P-40 = 4.

Single Exponential P-40 = 1 (cont'd)

FLUMES

Parshall Flume



» sized by throat width

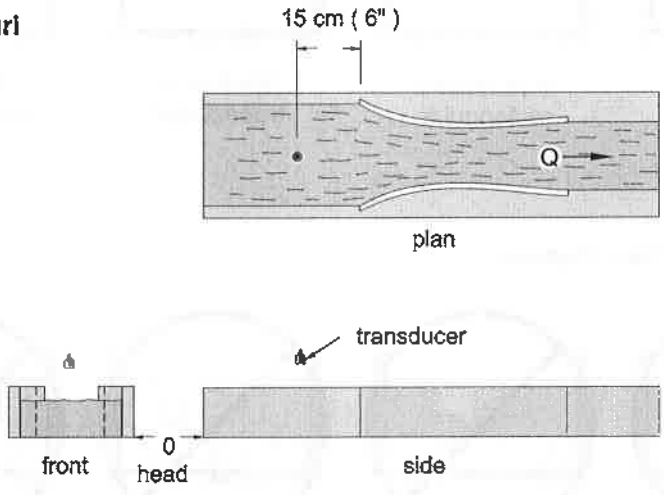
» set on solid foundation

» general free flow equation is $Q = K H^x$ where: Q = flow rate
K = constant
H = head
x = exponent

» For rated flows under free flow conditions, the head is measured at 2 / 3 the length of the converging section from the beginning of the throat section.

» Position the transducer such that it is centered over the flow at a minimum head.

Khafagi Venturi



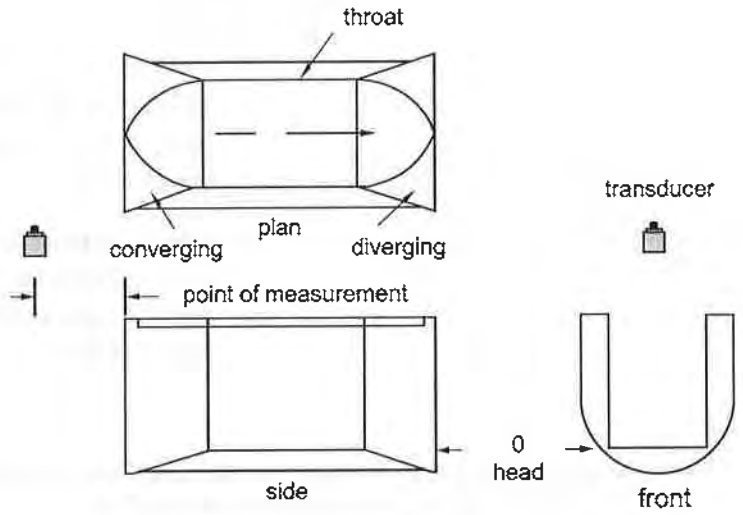
» for rated flows under free flow conditions, the head is measured 15 cm (6") upstream from the beginning of the converging section.

» position the transducer such that it is centered over the flow at a minimum height of 30 cm (12") above the maximum head.

Single Exponential, P- 40 = 1 (cont'd)

FLUMES (cont'd)

Leopold Lagco (as manufactured by Leopold Co., Inc.)



» designed to be installed directly into pipelines and manholes

» Leopold Lagco may be classed as a rectangle Palmer-Bowlus flume

» sized by pipe (sewer) diameter

» for rated flows under free flow conditions, the head is measured at a point upstream referenced to the beginning of the converging section. Refer to the following table:

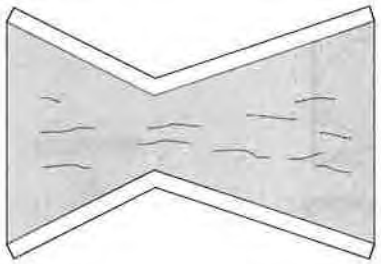
Flume Size (pipe dia. in inches)	Point of Measurement	
	cm	inches
4 - 12	2.5	1
15	3.2	1 1/4
18	4.4	1 3/4
21	5.1	2
24	6.4	2 1/2
30	7.6	3
42	8.9	3 1/2
48	10.2	4
54	11.4	4 1/2
60	12.7	5
66	14.0	5 1/2
72	15.2	6

» general free flow equation is $Q = K H^x$, where: Q = flow rate
K = constant
H = head
x = exponent

» position the transducer such that it is centered over the flow at a minimum height of 30 cm (12") above the maximum head.

Single Exponential, P-40 = 1 (cont'd)
FLUMES (cont'd)

Cutthroat Flume



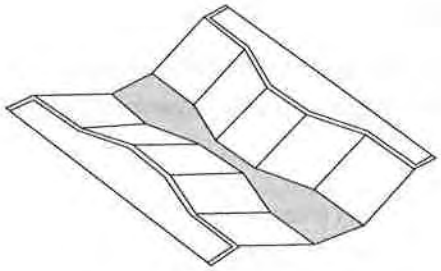
plan

» similar to Parshall flume except that the floor is flat bottomed and throat has no virtual length

» refer to manufacturer's specifications for flow equation and point of head measurement.

Flow through the following flumes may be measured using the universal head vs flow characterization, P-40 = 4.

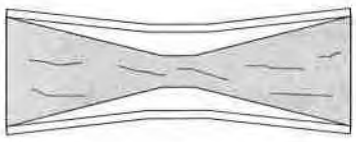
Trapezoidal Flume



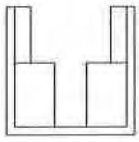
isometric

» similar to Parshall flume except that the floor is flat bottomed and walls are sloped.

Dual Range (nested) Parshall Flume



plan

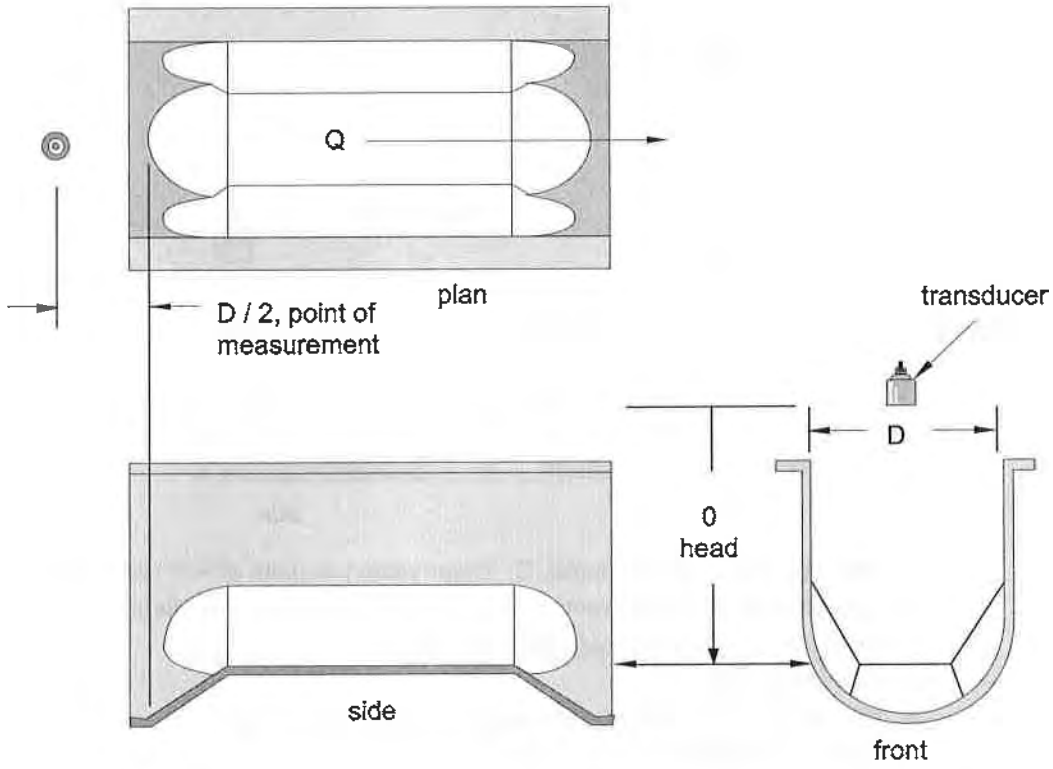


front

» two flumes, a larger on top of the smaller, in order to handle a larger range of flows.

Palmer-Bowlus Flume, P-40 = 2

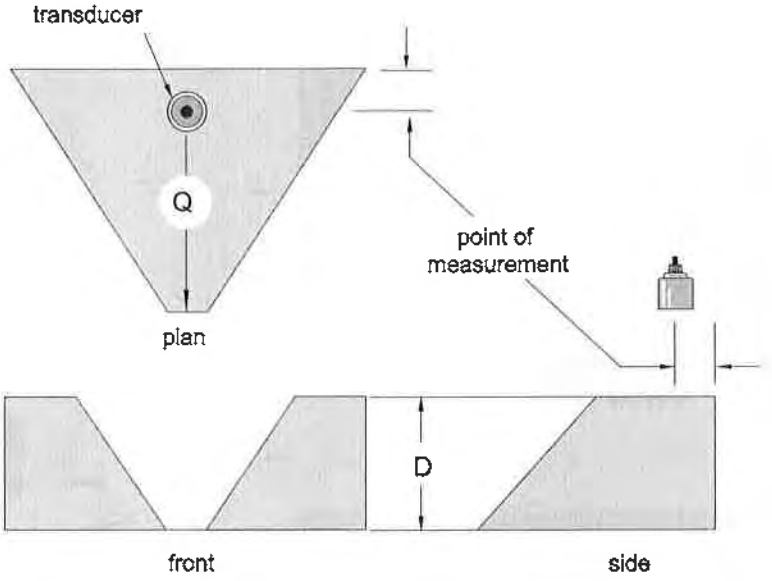
(typically those manufactured by Warminster Fiberglass or Plasti-Fab)



- » sized by pipe diameter, D. Enter value (in units of P-1) into P-43.
- » flume relief is trapezoidal
- » designed to install directly into pipelines and manholes
- » head is referenced to bottom of the throat not to bottom of pipes
- » for rated flows under free flow conditions, the head is measured at a distance of D / 2 upstream from the beginning of the converging section
- » position the transducer such that it is centered over the flow at a minimum height 30 cm (12") above the maximum head

H Flumes, P-40 = 3

(as developed by the U.S.Department of Agriculture, Soil Conservation Service)



» sized by max depth of flume, D. Enter value (in units of P-1) into P-43.
» approach is preferably rectangular, matching width and depth for distance 3 to 5 times the depth of the flume
» flow range 100 : 1
» may be installed in channels under partial submergence (ratio of downstream level to head).

Typically: » 1% error @ 30% submergence
» 3% error @ 50% submergence

» for rated flows under free flow conditions, the head is measured at a point downstream for the flume entrance.

Flume Size (D ft)	Point of Measurement	
	cm	Inches
0.5	5	1 3/4
0.75	7	2 3/4
1.0	9	3 3/4
1.5	14	5 1/2
2.0	18	7 1/4
2.5	23	9
3.0	28	10 3/4
4.5	41	16 1/4

» H flumes come with a flat or sloping floor.
The same flow table can be used as error is less than 1%.

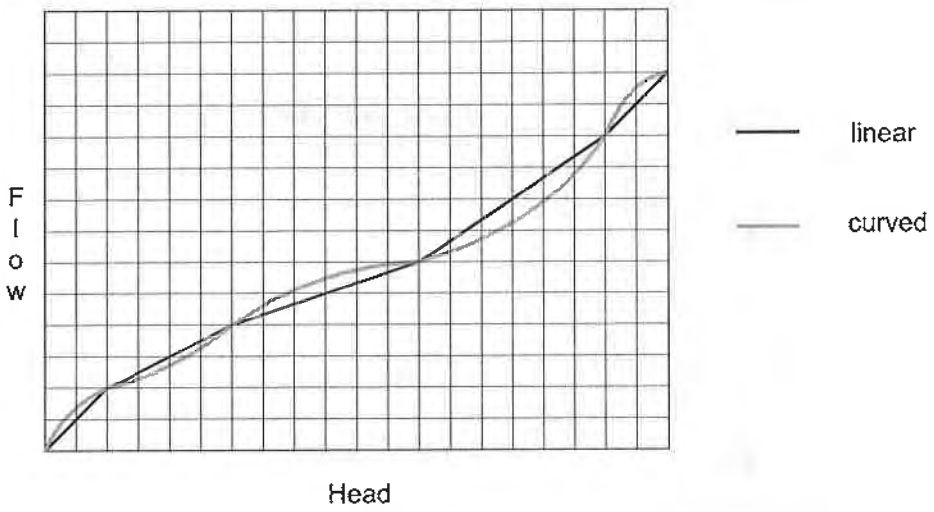
» position the transducer such that it is centered over the flow at a minimum height of 30 cm (12") above the maximum head.

Other, P- 40 = 4

Where the primary measuring device does not fit one of the three other categories, P-40 may be programmed for one or two head versus flow characterizations:

» P-40 = 4 : curved
» P-40 = 5 : linear

Select the characterization which most closely fits the flow characteristics of the primary measuring element.



Characterization is achieved by entering the head (H parameter) and corresponding flow (F parameter) either from emperical measurement or from the manufacturer's specification. The more breakpoints that are defined, the more accurate will be the flow measurement. Breakpoints should be concentrated in areas exhibiting the higher degrees of non linear flow. A maximum of eleven breakpoints can be defined.

Head data is entered in the linear units selected (P-1) and flow data is entered in the desired units of flowrate.

Other Flumes Example

The application is to measure the flow across a 4 ft rectangular weir with end contractions. The flow is characterized by the following formula:

$$cfs = 3.33 (L-0.2H) H^{1.5}$$

where: cfs = flow in cu ft / sec
L = length of crest
H = head

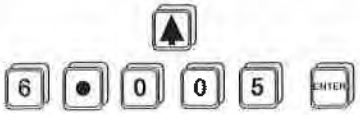
select :

P-1	enter option "3",	units in feet

advance to:

P-2	enter option "5",	OCM
P-3	enter "4",	empty distance to transducer
P-4	enter "3",	span
P-5	enter "1",	near blanking distance
P-39	enter option "4",	display flowrate
P-40	enter option "4",	universal head vs flow

press	***display will show***
	H - 1
	- - - -
	0.0 0 0
	H - 2 *(then)* - - - -
	0.3 0 0
	H - 3 *(then)* - - - -
	0.6 0 0
	
	H - 10 *(then)* - - - -
	2.7 0 0
	H - 11 *(then)* - - - -
	3.0 0 0
	F - 11 *(then)* - - - -
	F - 11
	F - 1
	- - - -

press	*display will show*
	0.0 0 0
	F - 2 *(then)* - - - - 2.1 5 6
	F - 3 *(then)* - - - - 6.0 0 5
	
	F - 10 *(then)* - - - - 5 1.1 2
	F - 11 *(then)* - - - - 5 8.8 3
	F - 11 P - 4 0

P-41	enter option "1",	flowrate time units per sec
P-46	enter "58.83",	maximum flowrate in cu ft / sec
P-49	enter option "3",	flowrate decimal point display max 3 digits after decimal
P-52	enter option "0",	totalizer convert display is divided by 1 before being displayed or 1 count per thousand cu ft
P-53	enter option "2",	totalizer decimal point display 2 digits after decimal or resolution equals 1/100th of a count

 to re-enter run mode

APPLICATIONS WITH STANDPIPES

In many liquid applications, access to the vessel must be made via a standpipe. In such cases, Milltronics can provide flange mounted transducers that will readily mate to the standpipe.

The maximum standpipe length that can be used without additional near blanking (P-5 not greater than 0.3 m) is 200 mm (8"). For greater standpipe lengths, up to 30" long, near blanking must be extended to 150 mm (6") beyond the end of the pipe.

The preferred dimension when selecting a standpipe arrangement is a 100 mm (4") diameter pipe, 300 mm (12") long. Near blanking would be set at 460 mm (18").

Standpipe Example

Referring to Volume Application \ Volume Example, if the transducer were mounted to a 150 mm diameter flanged standpipe 0.5 m long, instead of a 1 m diameter manhole, the following will be required :

select :

P-5	enter ".65",	near blanking
		0.50 m (standpipe length)
		+0.15 m (blanking past pipe)
		0.65 total blanking distance

to re-enter run mode.

PARAMETER DESCRIPTION

**(F) indicates the parameter's factory setting, where applicable.
For reference only, factory set values
may change with software revisions.**

(V) indicates that parameter can be viewed only, not entered.

P-0 security

This parameter can be used to lock out the programmer such that the content of parameters P-1 through P-99 can not be changed. This however does not prevent the parameters from being selected and viewed. The programmer is locked out if the content of P-0 is of any value other than 1954. P-0 can only be direct accessed.

content = 1954, programmer functional (F)
≠ 1954, programmer locked out
= -1, pumps active during simulation

P-1 units of calibration and display

enter:	1 = meters (F)	1 • = calibrate in meters, display in %
	2 = centimeters	2 • = calibrate in centimeters, display in %
	3 = feet	3 • = calibrate in feet, display in %
	4 = inches	4 • = calibrate in inches, display in %

**For % display, entry must be made as # •
and will be displayed as " # P "**

e.g. Press [3] and then [★], the display will show " 3 P ".

P-2 mode of measurement

enter: 1 = material level
2 = space (F)
3 = differential level
4 = volume totalizer (pump totalizer)
5 = OCM (open channel measurement)

P-3 empty distance to transducer

enter desired amount (F = 10.00 m)

P-4 span

» distance between full (high) and empty (low) levels
» maximum level differential if DLD (P-2 = 3) is selected
» maximum head if OCM (P-2 = 5) is selected

enter desired amount (F = 10.00 m)

P-5 near blanking

normally leave at factory setting. However for blanking extension, entry must be slightly larger than distance to end of standpipe or far side of obstruction. Blanking should not extend all the way into span level. Some margin of material span should be allowed to avoid loss of echo.

enter distance required, in units as set in P-1 (F = 0.300 m)

P-6 milliamp output

enter: 0 = off
1 = 0 to 20 mA
2 = 4 to 20 mA
3 = 20 to 0 mA
4 = 20 to 4 mA

P-7 decimal point location

Sets the maximum number of digits after the decimal. The number of digits after the decimal will automatically reduce to avoid display overflow.

enter: 0 = no digits after decimal
1 = one digit after decimal
2 = two digits after decimal (F)
3 = three digits after decimal

P-8 relay 1 function

Refer to Functional \ Relays.

enter desired option (F = 0)

P-9 / 10 relay 1- ON / OFF setpoints

enter level in units as selected in P-1 or °C (F = - - - -)

P-11 relay 2 function

Refer to Functional \ Relays.

enter desired option (F = 0)

P-12 / 13 relay 2 - ON / OFF setpoints

enter level in units as selected in P-1 or °C (F = - - - -)

P-14 relay 3 function

Refer to Functional \ Relays.

enter desired option (F = 0)

P-15 / 16 relay 3 - ON / OFF setpoints

enter level in units as selected in P-1 or °C (F = - - - -)

P-17 relay 4 function

Refer to Function \ Relays.

enter desired option (F = 0)

P-18 / 19 relay 4 - ON / OFF setpoints

enter level in units as selected in P-1 or °C (F = - - - -)

P-20 relay 5 function

Refer to Functional \ Relays.

enter desired option (F = 0)

P-21 / 22 relay 5 - ON / OFF setpoints

enter level in units as selected in P-1 or °C (F = - - - -)

Parameters P-23 through P-33 are used specifically for pump applications. Refer to Applications \ Pump Control Applications.

P-23 submersible transducer

enter: 0 = normal ST- series transducer (F)
1 = submersible transducer

P-24 relay 1 pump log *

P-25 relay 2 pump log *

P-26 relay 3 pump log *

P-27 relay 4 pump log *

P-28 relay 5 pump log *

* **These parameters are divided into three levels of subparameters:**

» **" service hours " log**
» **" pump starts " log**
» **" ratio " setpoint**

Access is made by scrolling through the levels.

press	***display will show***	
	P-24	initial access (service hours)
★	C-24	" pump starts "
★	R-24	" ratio " setpoints
★	P-24	" service hours "

press	*display will show*	
To view the service hours		
	P-24	at the 'P' parameter
ALT DISP	1234	e.g. 1,234 hours of service (F = 0.000)
To view the number of starts		
★	C-24	at the 'C' parameter
ALT DISP	321	e.g. 321 pump starts (F = 0)
To view the ratio setpoint		
★	A-24	at the 'A' parameter
ALT DISP	20.00	factory setting
To reset or preset the " service hours " or " pump starts" log		
	P-24	e.g. " service hours " selected
ALT DISP	1234	e.g. 1,234 hours
0	0	e.g. reset to zero
ENTER	0.000	e.g. 0 " service hours "
To set the service " ratio "		
	A-24	" ratio " setpoint
ALT DISP	20.00	e.g. 20
1 5	15	e.g. 15
ENTER	15.00	" ratio " setpoint is now 15

P-29 pump run-on interval

the cyclical period in hours, in which a pump run-on duration may occur. The initial interval begins upon return to the run mode or resumption of power to the HydroRanger. Subsequent intervals begin at the end of the previous interval. Intervals end after the time entered has expired or when the power or run mode is interrupted.

enter interval in hours (F = - - - -)

P-30 pump run-on duration

the amount of time which the lead pump will continue pumping after it has reached its OFF setpoint.

enter duration in seconds (F = 0)

P-31 spare

P-32 DLD milliamp output

when operating on the DLD mode, the milliamp output can be set to correspond either to the differential or to the level under transducer #1

enter: 1 = differential (F)
2 = level

P-33 inflow / discharge totaling

refer to Applications \ Pump Totalizer Application

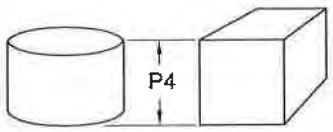
enter: 1 = estimated inflow or discharge volume as added to the pumped volume total (F)
2 = estimated inflow or discharge volume is omitted from the pumped volume total.

Parameters P-34 through P-39 are used for volume and display conversion.

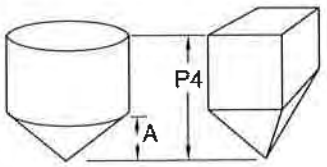
P-34 tank shape for volumetric conversion

enter: 0 = non volume - linear level measurement (F)

1 = flat bottom



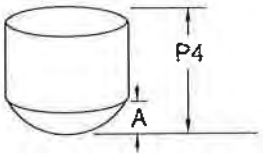
2 = conic or pyramidic bottom



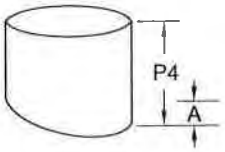
3 = parabolic bottom

or

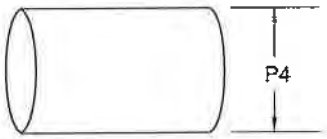
4 = half sphere bottom



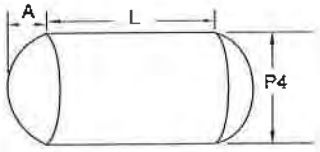
5 = flat slope bottom



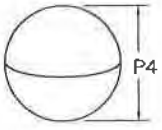
6 = horizontal cylinder, flat ends



7 = horizontal cylinder, parabolic ends



8 = sphere



(cont'd)

9 = custom tank design *
(refer to Applications \ Volume Application)

* This option is divided into two levels of subparameters:

H - # where: H = level coordinate
F - # F = volume coordinate
= breakpoint 1 to 11

Access is made by scrolling through the levels.

press	***display will show***
	P-34
ALT DISP	0
9	9
ENTER	9
★	H-1
★	F-1
★	H-1

Setting of the subparameters is done in the same way as with the 'P' parameters.

To exit the " H " and " F " subparameters:

H-1	select any 'H' or 'F' parameter
CLR P-34	return to 'P' parameters

If P-34 ≠ 0, reading will be in percent of full volume. For volumetric reading, set conversion factoring by using P-37.

P-35 tank dimension 'A'

the height of the bottom section of tank shapes 2, 3, 4, 5 or
the length of one end section in tank shape 7.
(not required for other tank shapes)

enter " dimension A ", in units selected per P-1 (F = 0000)

P-36 tank dimension 'L'

horizontal length of tank shape excluding parabolic ends
(not required for other tank shapes).

enter " dimension L ", in units selected per P-1 (F = 0.0 0 0)

P-37 convert display

parameter value is the factor by which the measurement is to be multiplied by before being displayed. Range is 0.001 to 9999.
enter desired factor (F = 1)

P-38 display offset

this value is added to material space, volume or ullage measurement before being displayed (P-39, P-76 or " * " key). The mA output and alarms are not affected by the offset. The display offset is entered in the units programmed, subject to P-1, P-34 and P-37.
enter offset required (F = 0.000)

P-39 display reading options

enter : 0 = hold last alternate reading selected (F) 

1 = high total: 4 highest digits of the 8 digit totalizer (pumped volume and OCM only) = point 1: DLD level / transducer #1 

2 = low total: 4 lowest digits of the 8 digit totalizer (pumped volume and OCM only) = point 2: DLD level / transducer #2 

3 = head (OCM only) 

4 = flow rate (OCM only) 

5 = reading level, space, differential, volume or ullage 

In the run mode, the programmer keys illustrated can be pressed to view alternate readings. The display will return to the reading option selected (except option 0) after momentarily displaying alternate reading.

Parameters P-40 through P-50 used specifically for OCM applications. Refer to Applications.

P-40 primary measuring device

enter option:
1 = exponential (F)
2 = Palmer-Bowlus
3 = H-flume
4 = universal head vs flow - curve *
5 = universal head vs flow - linear *

* these options are divided into 2 levels of subparameters:

H - # where: H = level coordinate
F - # F = flow coordinate
= breakpoint 1 to 11

Access is made by scrolling through the levels.

press	*display will show*
	P-40
ALT DISP	1
4	4
ENTER	4
★	H-1
★	F-1
★	H-1

Setting of the subparameters is done in the same way as with the ' P ' parameters.

To exit the ' H ' and ' F ' subparameters

H-1	select any ' H ' or ' F ' parameter
CLR	
P-40	return to ' P ' parameters

P-41 flow rate time units

enter option: 1 = per second
2 = per minute
3 = per hour
4 = per day (F)

P-42 OCM exponent

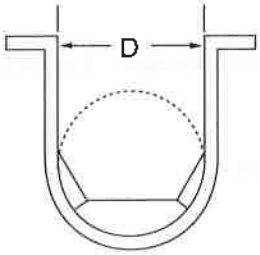
exponent for primary measuring devices, P-40 = 1 where $Q = K H^x$
Obtain from manufacturer's specifications.

enter " exponent " (F = 1.550)

P-43 flume dimension (P-40 = 2 or 3)

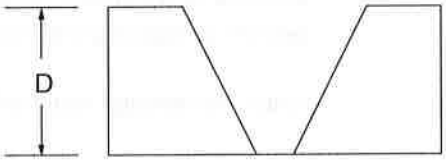
enter ' D ', flume size in units of P-1 (F = 1.000)

P-40 = 2



Palmer Bowlus
D = pipe or sewer dia.

P-40 = 3



H Flume

P-44 spare

P-45 maximum head

this is the head corresponding to the max flow rate. This parameter is identical to P-4, span. A change to either parameter will simultaneously change the other. (F = 10.00)

P-46 maximum flow rate

this is the flow rate which occurs at maximum head and determines the mA output span (refer to Functions \ Analog Output).
Obtain from manufacturer's specifications.

enter " maximum flow rate ", volume units are arbitrary (F = 1000)

P-47 Auto zero

this parameter allows automatic zero calibration for the empty distance to transducer parameter (P-3) when the physical measurement is not obtainable.

P-3 is the estimated empty distance to the transducer face with the transducer aimed at the proper portion of the crest in the open channel and at a height of at least 1 ft above maximum head.

Press  at least five times and until a stable reading is obtained on the display. The reading, regardless of the height of the transducer, will be the apparent head with respect to the estimated empty distance, P-3. Enter the actual physical measurement of head at a point beneath the transducer.

Press  , the HydroRanger will then calculate the correct zero reference level. The offset will be automatically entered into P-62.

P-48 OCM low head cutoff

flows for head below this level will not be totalled. Unit of cutoff is percent of maximum head (P-45)

enter "percentage required" (F=5.000)

P-49 OCM decimal point

sets the maximum number of digits after the decimal for display of flow rate (P-39 = 4). The number of digits after the decimal will automatically reduce to avoid display overflow.

enter: 0 = no digits after decimal
1 = one digit after decimal
2 = two digits after decimal (F)
3 = three digits after decimal

P-50 OCM mA output

refer to Functional \ Analog Output

enter: 1 = mA responds to head (F)
2 = mA responds to flow

P-51 OCM simulation

press  , display will show previous flow

enter head in units programmed, display will show head

press  , display will show corresponding flow

Parameters P-52 through P-59 are used specifically for OCM and pump totalizer applications. Refer to Applications.

P-52 totalizer display factor

totalizer display of flow or volume pumped is factored by a power of 10 to determine the count per flow. The factor is selected as follows:

enter: – 3 = multiply by 1000
– 2 = 100
– 1 = 10
0 = divide by 1 (F)
1 = 10
2 = 100
3 = 1,000
4 = 10,000
5 = 100,000
6 = 1,000,000
7 = 10,000,000

e.g. present flow rate is 450 gal / sec

if P-52 = 0, totalizer is incremented at a rate of 1 count per gallon
if P-52 = 3, totalizer is incremented at a rate of 1 count per thousand gallons

P-53 totalizer decimal point location

sets the number of digits after the decimal point for the low total only. The decimal point will not float.

enter: 0 = no digit after decimal
1 = one digit after decimal
2 = two digits after decimal (F)
3 = three digits after decimal

P-54 low total

this parameter will display the 4 lowest digits of the 8 digit totalizer used in pump totalizer or OCM application. The parameter will also allow the display to be reset to any value. (F = 00.00)

P-55 high total

the parameter will display the 4 highest digits of the 8 digit totalizer used in pump totalizer or OCM applications. The parameter will also allow the display to be reset to any value. (F = 0000)

P-56 remote totalizer contact control.

a momentary closure of the remote totalizer contact occurs once each time the entered flow or pumped volume has passed.

enter option: – 3 = 0.001
– 2 = 0.01
– 1 = 0.1
0 = 1(F)
1 = 10
2 = 100
3 = 1,000
4 = 10,000
5 = 100,000
6 = 1,000,000
7 = 10,000,000

P-57 & P-58 flow sampler control

a momentary closure of the flow sampler contact occurs once each time a volume of $y \times 10^x$, as defined by P-57 (x) and P-58 (y), flows or is pumped.

enter P-57 (x) = base 10 exponent, – 3 to 7 (F = 0)

enter P-58 (y) = mantissa, 0.001 to 9999 (F = 1.000)

e.g. if P-57 = 3 and P-58 = 5, then a sampler contact closure will occur each time $5 \times 10^3 = 5000$ units of volume has passed

P-59 time sampler control

a momentary closure of the time sampler contact occurs each time the entered amount of time in hours has elapsed (F = - - - -)

Parameters P-60 through P-67 are used to achieve specialized or custom calibration.

P-60 full calibration

this provides a measurement offset compensation on a full tank. A measurement offset might occur when parameters 3 and 4 do not exactly match the tank dimensions referenced for volume conversion. (F = - - - -)

Fill tank as much a permissible, but without going into the blanking zone.

Press  , the HydroRanger will take a measurement and display the space or level (P-2) in the linear units chosen (P-1) regardless if percent, volume or convert display is used. Press  at least 5 times and insure that a stable reading is being obtained.

Enter the actual space or level (P-2).

Press  , the HydroRanger will now calculate the correct measurement offset to be used in future measurements and automatically enter it into P-62.

P-61 empty calibration

this provides sound velocity compensation on an empty tank. This is required on a volume application where the atmosphere in the tank is other than air or the atmospheric temperature is constant but other than 20 °C and no temperature sensor is being used. (F = - - - -)

Empty tank is much as permissible. Leave filled with normal vapour and at normal operating temperature.

Press  , the HydroRanger will take a measurement and display the space or level (P-2) in the linear units chosen (P-1) regardless if percent, volume or convert display is used. Press  at least 5 times and insure that a stable reading is being obtained.

Enter the actual space or level (P-2).

Press  , the HydroRanger will now calculate in correct sound velocity to be used in future measurements and automatically enters it into P-63 and P-64.

P-62 measurement offset

this displays the measurement offset: used in conjunction with a full tank calibration, P-60, or an offset value may be entered directly. The offset is added to the ultrasonic measurement such that its effect will be carried through the reading (P-39, P-76 or ), mA output and relay setpoints. (F = 0.000)

P-63 sound velocity at 20 °C

can be used to enter the known velocity, at 20 °C, of sound in a particular gas or vapour or to view the resultant velocity of an empty calibration (P-61), normalized to 20 °C. (F = 344.1)

the units of velocity are assumed to be:

meter / sec	if P-1 = 1 (meters), 2 (centimeters)
feet / sec	if P-1 = 3 (feet), 4 (inches)

P-64 velocity at P-65

can be used to enter the known velocity, at the temperature of P- 65, of sound in a particular gas or vapour or to view the resultant velocity of an empty calibration, at the temperature of P- 65. (F = 344.1)

the units of velocity are assumed to be:

meters / sec	if P-1 = 1 (meters), 2 (centimeters)
feet / sec	if P-1 = 3 (feet), 4 (inches)

P-65 air temperature in °C, as measured by temperature sensor or programmed transducer operating temperature, if sensor is not used, enter temperature required in °C (F = 20 °C)

P-66 maximum air temperature in °C

records maximum air temperature measured by temperature sensor.
Press  then  to reset (F = – 99 °C)

P-67 minimum air temperature in °C

records the minimum air temperature measured by temperature sensor.
Press  then  to reset (F = 150 °C)

Parameters in P-68 through P-75 are used to stabilize the reading. These are general purpose parameters, suitable for all applications.

P-68 fill damping

is the maximum rate at which the display reading and analog output will change under filling conditions. The damping rate is measured in P-1 units per minute and has a range of 0.001 to 9999. Thus the smaller the number entered, the greater the damping.

enter desired amount (F = 10.00 m / min).

In pump up applications, for safe operation it is suggested that the damping value allow for level changes at the pumps maximum operating capacity, rather than the process design value.

P-69 empty damping

is the maximum rate at which the display reading and analog output will change under emptying conditions. The damping rate is measured in P-1 units per minute and has a range of 0.001 to 9999. Thus the smaller the number entered, the greater the damping.

enter desired amount (F = 10.00 m / min).

In pump down applications, for safe operation it is suggested that the damping value allow for level changes at the pumps maximum operating capacity, rather than the process design value.

P-70 process rate display (V)

display the rate of filling (+) or emptying (–) in P-1 units / minute

P-71 process rate filter

controls the response of the rate display

enter option: 0 = continually averaged rate
1 = update rate every minute or 50 mm (F)
2 = update rate every 5 minutes or 100 mm
3 = update rate every 10 minutes or 300 mm
99 = programmable *

***this option is divided into two levels of subparameters:**

» S-71: time in seconds

» D-71: distance in linear units as set in P-1

Access is made by scrolling through the levels.

press	*display will show*
	P-71
ALT DISP	
9 9	99
ENTER	99
★	S-71
★	d-71
★	P-71

Setting the subparameters is done the same way as with the ' P ' parameters.

P-72 fuzz filter

the fuzz filter is designed to keep the display constant when minor changes on the surface of the liquid (ripples), electrical noise or air movements in the vessel occur.

enter: 0 = off
1 = on (F)

P-73 agitator discrimination

enter: 0 = off
1 = on (F)

P-74 fail-safe mode

in the event of a loss of echo, the HydroRanger will flash " LOE " and go into one of the following fail-safe modes after the timer (P-75) expires

enter: 1 = high
2 = low
3 = hold last entry (F)

P-75 fail-safe timer

the amount of time delay before going into fail-safe mode enter " desired amount of time ", in minutes (F = 15.00)

e.g. for 30 sec. time delay, enter " 0.5 "

Parameter P-76 through P-78 are used for measurement and simulation.

DISPLAY:

select desired parameter

P-76, 77 or 78 press 

, the display will show the reading of the last ultrasonic measurement

press 

to update ultrasonic measurement

SIMULATION:

select desired parameter

P-76, 77 or 78 press 

, the display will show the simulated rise and fall of the material level

The simulation will raise and lower the material level through the calibrated span, P-4, at a rate of 1% of the span per second. On the DLD application, one side (relay / LED 5 ON) is kept at a constant level, while the other side (relay / LED 5 OFF) is varied. The DLD simulation will alternate every 6 seconds.

Pressing  during simulation causes the apparent level to rise. Holding in  , increases the rate of filling. Pressing  causes the level to fall. Holding in  , increases the rate of emptying. During simulation, relay LED's, alarm relays and mA output are all enabled to allow full response of the HydroRanger. Pump relays are maintained in a de-energized state throughout simulation (unless P-0 = – 1), however the corresponding relay LED's will respond. Relay LED's for pumps will not be illuminated within 1 second, simulating the 10 second start delay under actual operation. As damping, fuzz filtering and agitator discrimination are not required, they are turned off.

To end simulation program, press  twice.

P-76 reading

this is one of the optional displays selected in the display options parameter, P-39. It can also be obtained by pressing  .
This reading incorporates both the measurement and display offsets.

MODE (P-2)	READING (linear, %, volume)
material	material
space	space
DLD	differential
volume total	material
OCM	head

P-77 material level

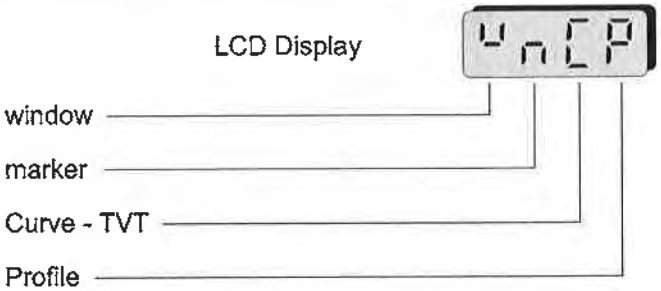
this is the actual material level referenced to zero or empty level in m, cm, ft or in.

P-78 space or distance

this is the actual distance from the transducer face to the material level in m, cm, ft. or in.

Parameters P-79 through P-88 are used for echo processing and analysis.

P-79 scope displays



select any combination of scope displays
0 = scope display off (display ' _ ') (F = _ _ _ _)
1 = scope display on (display ' **u , n, C or P')**

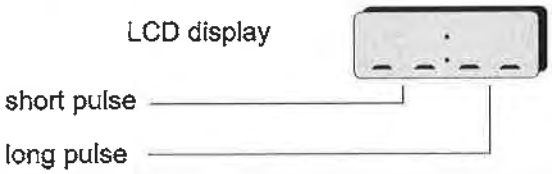
press ENTER

e.g. to display the curve and the profile on the oscilloscope:

press ALT DISP , enter " 0110 "
press ENTER , display will show

P-80 echo confidence (V)

a measure of echo reliability. Press MEAS to make an ultrasonic measurement and the updated echo confidence will be displayed. This feature is useful when aiming the transducer.



display:

e.g. short pulse confidence of '11' / long pulse confidence of '2' (dB)

e.g. short pulse confidence of '19' / no long pulses transmitted

pulses transmitted, but no echo
(check for faulty transducer or wiring)

submersible transducer submerged (P-23 = 1)

P-81 confidence threshold for short measurement

minimum echo confidence for echoes within 1 meter of transducer. If echoes are beyond 1 meter or have a confidence under the threshold level, the short measurement will be ignored and the long measurements will become valid.

Enter threshold. (F = 10)

Typical usage; if transducer were picking up small unwanted echoes from close in, increase threshold to a value above that of the echo confidence (P-80) so that close in echoes are no longer detected.

P-82 confidence threshold for long measurement

minimum echo confidence for long measurements. If no echo confidences meet this threshold, a loss of echo condition will prevail.

Enter threshold. (F = 5)

Typical usage; during filling of vessel, material intersects beam path. Instead of displaying wrong level, increasing threshold to a value above that of the echo confidence (P-80) will force the HydroRanger into fail-safe.

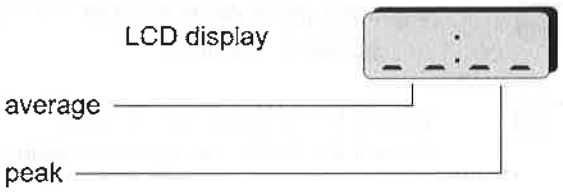
P-83 echo strength (v)

displays the absolute strength of the selected echo in dB above 1 uV rms

P-84 noise

average and peak ambient noise, in dB above 1 uV rms

Ambient noise includes acoustical and electrical noise being picked up by the transducer / receiver circuit when the transmit / receive cycles have been disabled during the program mode.



P-85 echo processing algorithms for long pulses
(for short pulses, a fixed algorithm is automatically selected)

enter: 1 = best echo of first and largest (F)
2 = first echo
3 = largest echo

P-86 TVT curve

enter: 1 = standard (F)
2 = flat

P-87 range extension

used to extend the measurement range into the far end blanking.

In applications where the zero level does not correspond to the bottom of the vessel and it is desired to monitor this zone, the far end blanking may need to be reduced. This is accomplished by entering a range extension value as the percentage of P-3 which equals the extra distance required. If it found that false echoes are appearing ahead of the far end blanking zone, the range extension should be decreased by reducing the factory set value of 20%.

enter, as percent of P-3, distance below 0 not blanked (F = 20)

P-88 number of transmit pulses

this parameter is used to select the number and duration of the pulses to be transmitted per measurement.

enter: 1 = one short pulse only *
2 = one long pulse only **
3 = two long pulses and one short pulse
4 = one short pulse if target is within 1 m, or
one short pulse and two long pulses if target
is beyond 1 m (F)

* CAbL LOE message inactive
** submergence detection inactive

Parameters P-89 through P-98 are used for testing.

P-89 software revision number (V)

P-90 memory test (V)

press  the display will show

' PASS ' » memory test passed
' 1 ' » RAM failure
' 2 ' » EPROM failure
' 3 ' » EEPROM failure

P-91 LCD, LED and relay test (V)

This test will cause the relays to change state.
Be sure to lock out all applicable alarms,
pumps and machinery before pressing " Enter "

press  » LCD characters should flash sequentially
» all relays should turn on and off sequentially
» all LED's should flash sequentially
» press any key to stop

P-92 mA output test

used to display the last mA output (in the RUN mode, press 5)

A test value may be entered with the keypad or obtained by pressing  . The value displayed is transmitted via TB1. Upon returning to the RUN mode, the parameter value will assume the actual mA output level. (F = 0.000)

P-93 temperature sensor resistance in K ohms (V)

P-94 transmitter test (V)

press  , the transmitter will fire at a regular rate and the transmit neon LI will flash correspondingly.
Press any other key to stop. (F = - - - -)

P-95 programmer test (V)

press ENTER , then press each key from left to right starting with the top row. The display will acknowledge each key pressed:

Key	Display	Key	Display
1	1	•	10
2	2	−	11
3	3	CLR	12
4	4	★	13
5	5	RUN CAL	14
6	6	MEAS	15
7	7	▲	16
8	8	▼	17
9	9	ALT DISP	18
0	0	ENTER	PASS

if any key is pushed out of sequence or malfunctions, the display will show ' FAIL '. Press ALT DISP to return to the parameter mode.

P-96 watchdog reset test (V)

press ENTER , hyphens will flash for 5 seconds or less and then the HydroRanger goes into the run mode. Should the test fail, the HydroRanger will not go back into the run mode.

P-97 trim for 4 mA

when this parameter is selected, the mA output goes to 4 mA. This display however, will show a typical value of 200. The value can be increased or decreased by pressing • or − respectively, or by entering a value. This will proportionally change the mA output value so that remote equipment will read 4 mA. This parameter is not reset by P-99.

e.g. select P-97

press	*display will show*	*meter will show*
	P-97	
ALT DISP	200	3.8 mA
•	201	3.9 mA
•	202	4.0 mA

P-98 trim for 20 mA

When this parameter is selected, the mA output goes to 20 mA. The display however, will show a typical value of 3490. The value can be increased or decreased by pressing • or − respectively or by entering a value. This will proportionally change the mA output value so that remote equipment will read 20 mA. This parameter is not reset by P-99.

e.g. select P-98

press	*display will show*	*meter will show*
	P-98	
ALT DISP	3490	20.1 mA
3 4 8 0	3480	20.0 mA

P-99 master reset

used to reset ALL parameters to their factory setting.

press	*display will show*
	P-99
ALT DISP	- - - -
CLR	
ENTER	CALL
	- - - -

All parameters have now been returned to their factory settings.

TROUBLESHOOTING

GENERAL

There are a few adjustments for echo processing and they should be used judiciously. ***Transducer location and aiming are the most important factors affecting the reliability of the HydroRanger.*** Refer to the associated transducer manual.

OSCILLOSCOPE

An oscilloscope can be used to view the transmit, receive and processed echo signals.

Connect as follows:

oscilloscope	***location***	***description***
probe	J1,RCVR,board A	amplified receiver signal
	J2,SCOPE,board A	processed echo
	TB1-8,board B	raw transmit/receive signal
external trigger	J3,SYNC,board A	oscilloscope synchronization
ground	J4,COM,board A	ground

The transmit and receive signals are best viewed while in the run mode or with P-94, transmitter test, set to fire automatically in the program mode.

To view the processed echo, P-79 must be set for the desired display. If the PROGRAM mode is exited for more than 10 minutes, P-79 will have to be reset to view the displays on the oscilloscope.

The processed echo can be viewed and updated by pressing 

. This must be done while in the program mode, but can be done while viewing any parameter. For example, echo analysis parameters 79 - 84 or echo processing parameters 85 - 87 can be viewed or changed while monitoring results on both the HydroRanger display and on the oscilloscope.

The processed echo display (P-79) can be made to show not only the processed echo profile, but also the:

- echo marker
- window
- TVT curve or auxiliary window

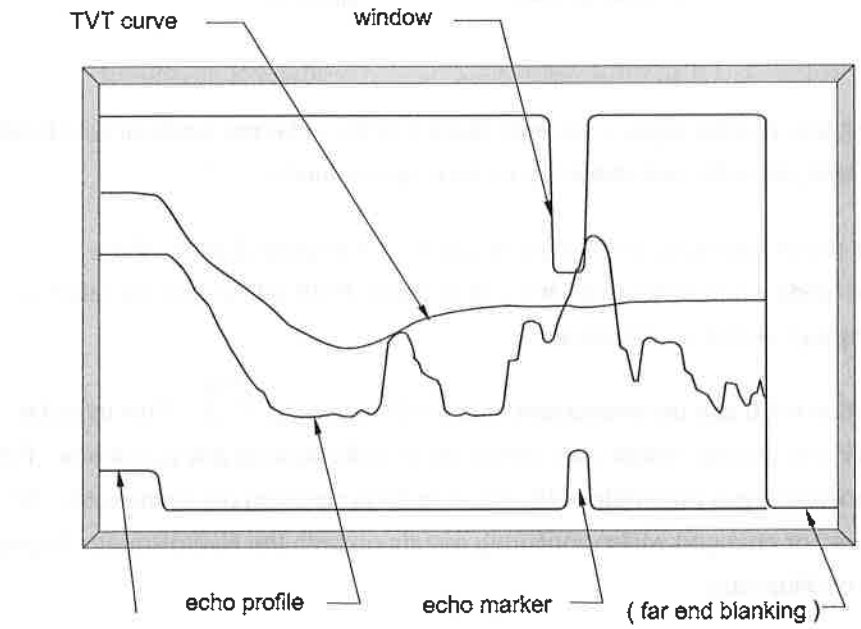
Typical scope settings for viewing the processed echo are:

- gain - 1 v / d
- sweep - 1 msec / div

The following are restricted to transmission in air at 20 °C.

- to obtain a time measurement of the processed echo, the sweep time must be multiplied by a factor of 10
- to obtain a time measurement of the transmit or receive signal, use the actual sweep setting
- to obtain a distance measurement of either of the above types of echoes, divide the respective time measurement by 1.8 msec / ft or 5.9 msec / m

Typical Scope Display



Scope Display	*LCD display (P-79)*
Window	u
Marker	n
Curve - TVT	c
Profile	P

TROUBLESHOOTING GUIDE

The following is a list of operating symptoms, their probable causes and the actions to resolve them.

SYMPTOM	CAUSE	ACTION
Loss of Echo (LOE)		
display will flash CAbL / LOE, neon L1 will flash but no pulsing is felt on the transducer face	open circuit	check transducer wiring *
	defective transducer	check maximum temperature P-66 against transducer rating * try a substitute
display will flash CAbL / LOE, neon L1 remains off and no pulsing is felt on the transducer face	short circuit	check transducer wiring *
	defective transducer or circuit board	check maximum temp. P-66 against transducer rating * try a substitute
display will flash LOE, neon L1 will flash, pulsing is felt on transducer face	level or target is out of range. Under optimum conditions maximum range is 15 m plus 20% of P-3	check transducer specifications * check calibration parameters
	application too steamy. Under these conditions range may be adversely affected	try using a longer range transducer
	if condition occurs only during filling, the transducer face may be covered. Shipping cardboard or material build-up on transducer face	increase fail-safe timer, P-75 clean move transducer to better location * mount in standpipe *

* refer to associated transducer manual

SYMPTOM	CAUSE	ACTION
. . . continued	transducer location or aiming : - poor installation - moved by material or vibration - flanging not level	re-locate or re-aim transducer for maximum echo confidence, P-80 *
	transducer malfunction - temperature too high or low - physical damage - excessive foam on liquid face	check P-65, 66 & 67 inspect use foam deflector or stilling well
Reading does not change, but the level does	HydroRanger processing wrong echo, i.e. vessel wall, structural member, stationary agitator	relocate transducer * check echoes with oscilloscope
	transducer ringing, reading high level	increase blanking, P-5 check echoes with oscilloscope raise short measurement confidence threshold, P-81
Measurement is consistently off by a constant amount	measurement offset	refer to P-60 & 62 and the volume application example
Reading error progressively worsens with distance	temperature compensation sound velocity compensation	insure that 'SW 2' is properly set, refer to Installation \ Selecting Temperature Sensor P-61 & 63, and the volume application example
Screen blank, neon L1 not flashing	loss of power	check power wiring and switch voltage

* refer to associated transducer manual

SYMPTOM	CAUSE	ACTION
HydroRanger will not respond to programmer	programmer improperly positioned	refer to installation
	infrared window obstructed	clean
	programmer battery low	test programmer P-95
Reading erratic	echo confidence weak	refer to P-85, 86 87 & 88
	liquid surface agitated	increase damping, P-68 & 69, turn on fuzz filter P-72
	material filling	relocate transducer *
		increase damping, P-68 & 69
	electrical noise	check P-84 under quiescent conditions, noise should be under 15 dB
		transducer cable must be in grounded metal conduit and cable grounded only at TB-1 *
		increase damping, P-68 & 69
	agitator blades	set P-73 to 1
Reading 'EEEE'	reading to large	re-calibrate,
		i.e. P-3, 4, 37, 52 & 53
Reading response slow	damping to high	increase P-68 & 69
	agitator on	turn off P-73
	fuzz filter on	turn off P-72
Reads correctly but occasionally reads high when vessel is not full	detecting close range echo or ringing	increase blanking
		increase short measurement threshold, P-81
		transducer mounting *
High level reading lower than material level	material is within near blanking zone (P-5).	decrease blanking limit material high
	Echo multiple being level processed	

* refer to associated transducer manual

MAINTENANCE

The HydroRanger requires no maintenance, however a program of periodic checks would be beneficial.

The enclosure and circuit boards should be cleaned if necessary, but only when the power is disconnected at the main breaker and using a vacuum cleaner and a clean, dry paint brush. Check all electrical contacts for corrosion and arcing.

If the HydroRanger is mounted in a dusty or oily environment, make sure that the programmer and front cover are kept clean, otherwise it may impede the infrared signal transmission required for programming.

It is also a good idea to periodically check the face of the transducer. It should be free of material build-up, corrosion or deformation.

SOUND VELOCITIES

GASES (0 °C)	*m/sec*	*ft/sec*
air, dry	331	1086
ammonia	415	1362
argon	308	1010
carbon dioxide	259	850
carbon monoxide	338	1109
chlorine	206	676
deuterium	890	2920
ethane (10 °C)	308	1010
ethylene	317	1040
helium	965	3166
hydrogen	1284	4213
hydrogen bromide	200	656
hydrogen chloride	206	676
hydrogen iodide	157	515
hydrogen sulfide	289	948
illuminating (coal gas)	453	1486
methane	430	1411
neon	435	1427
nitric oxide (10 °C)	324	1063
nitrogen	334	1096
nitrous oxide	263	863
oxygen	316	1037
sulfur dioxide	213	699

VAPOURS (97 °C)		
acetone	230	755
benzene	202	663
carbon tetrachloride	145	476
chloroform	171	561
ethanol	269	883
ethyl ether	206	676
methanol	335	1099
water vapour (134 °C)	494	1621

GLOSSARY

Aeration:	air gap between nappe and weir.
Beam angle:	angle between the opposing one-half power limits (–3 dB) of the sound beam
Blanking:	zone in which received echoes are ignored.
Crest:	the edge (sharp-crested weir) or surface (broad crested weir) over which the flow passes.
EEPROM:	electrically erasable programmable read only memory.
EPROM:	erasable programmable read only memory.
Flume:	a 3 part hydraulic structure, consisting of converging, throat and diverging sections, to constrict the flow through the throat, thereby increasing the head in the converging section. The change in head is proportional to the change in flow.
Free flow:	downstream liquid level is low enough or the discharge flow is fast enough, so as not to impede flow through the flume or weir.
Gauge well:	same as stilling well.
Head:	liquid level above zero (static) reference level.
LCD:	liquid crystal display.
Max head:	head at maximum flow rate.
Measurement:	each time a transmit pulse or set number of pulses is sent to the transducer.
Nappe:	the jet of liquid leaving the weir crest.
OCM:	open channel measurement
Primary measuring device:	hydraulic structure of an open channel for measuring liquid flow. e.g. weirs and flumes.
Ringing:	the inherent nature of the transducer to continue vibrating after the transmit pulse has ceased.
Secondary measuring device:	any instrument for measuring the head or flow related to the primary measuring device.

Stilling well:	a well separate from but adjacent to the primary measuring device and interconnected by a small duct to provide an ideal point of head measurement.
Subcritical flow:	same as submerged flow.
Submerged flow:	when the downstream level rises or the discharge flow is so slow that it impedes the free flow of liquid through the primary measuring device.
Ullage:	the remaining spatial volume of a vessel or the volume required to fill a vessel.
Weir:	a dam with or without flow notch across an open channel to produce a crest in the liquid upstream. The head of the crest is proportional to the flow.

ALPHABETICAL PARAMETER LISTING

■

MYERS® SRM4 SERIES

The Myers® SRM4 series residential sewage pumps are considered by industry pros to be extremely reliable. The specially designed recessed impeller allows 2" solids to easily pass through without jamming. The cast iron housing and volute case handle the harshest conditions and will provide years of service. Automatic and manual operation models available.

APPLICATIONS

Sewage, high-capacity sump, effluent

SPECIFICATIONS

Capacities – 95 GPM (360 LPM)
Shut-off Head – 19' (5.8 m)
Solids Handling – 2" (50.8 mm)
Liquids Handling – Septic effluent and sewage
Intermittent Liquid Temperature – Up to 140°F (60°C)
Motor/Electrical Data – 4/10 HP, permanent split capacitor type, 115V, 12A, 1Ø, 60Hz; 230V, 6A, 1Ø, 60Hz
Acceptable pH Range – 5-9
Discharge, NPT – 2" (50.8 mm)
Housing – Heavy cast iron
Power Cord – 10' (20' optional)
Impeller – Recessed, thermoplastic
Volute Case – Cast iron
Shaft Seal – Type 11A, carbon and ceramic

FEATURES

Versatile Applications
Effective and efficient performance in septic tank sewage, effluent and high-capacity sump applications

Handles the Heat
High-endurance, oil-cooled motor for continuous bearing lubrication and critical heat dissipation

Powerful Torque
High-torque, permanent split capacitor (PSC) motor; no starting switches or relays to wear out

Motor Protection
Long-life carbon/ceramic seal provides extra protection against water leaks

Excess Heat Detection
Internal heat sensor provides overload protection; automatically resets when motor cools to a safe operating temperature

Free-flow Design
Recessed impeller design also improves the free flow of solids up to 2"

Longer Bearing Life
Recessed impeller reduces radial bearing loads, increasing bearing life

Automatic and Manual
Automatic tethered or vertical switch models (with piggyback plug), or manual operation models

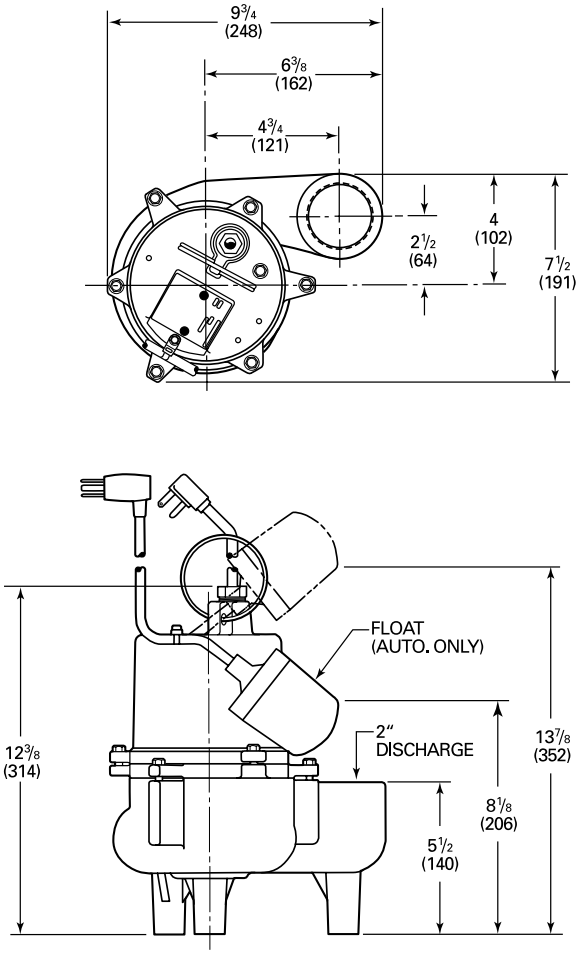
MYERS® SRM4 SERIES

ORDERING INFORMATION

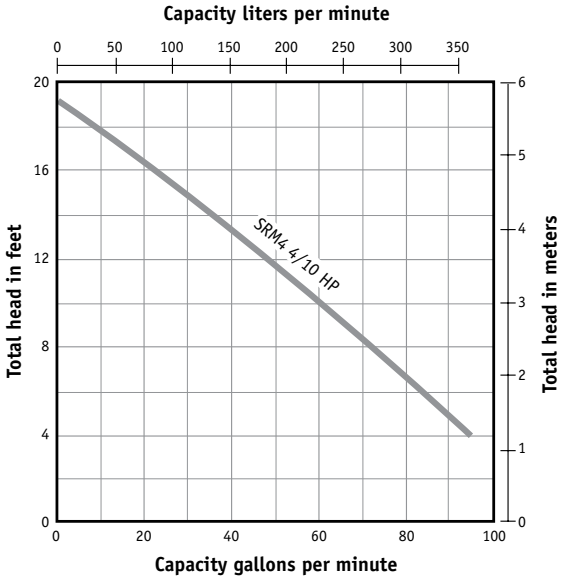
Catalog Number	HP	Volts	Phase/ Cycles	Amps	Discharge Size	Switch Type	Cord Length	Approx. Wt. Lbs.
SRM4P-1	4/10	115	1/60	12	2"	Tethered Automatic*	10'	40
SRM4PC-1	4/10	115	1/60	12	2"	Tethered Automatic*	20'	40
SRM4M1C	4/10	115	1/60	12	2"	Manual	20'	39
SRM4PC-2	4/10	230	1/60	6	2"	Tethered Automatic*	20'	40
SRM4M2C	4/10	230	1/60	6	2"	Manual	20'	39
SRM4V-1	4/10	115	1/60	12	2"	Vertical Automatic*	20'	40
SRM4V-2	4/10	230	1/60	6	2"	Vertical Automatic*	20'	40

*Piggyback

DIMENSIONS



PUMP PERFORMANCE



MYERS® SRM4 SERIES

SPECIFICATIONS

Sewage Pumps – Pump(s) shall be Myers SRM4 series sewage pumps selected in accordance with the following design criteria:

Number of Pumps:	_____
Primary Design Flow:	_____
Primary Design Head:	_____
Minimum Shut-off Head:	19
Motor Horsepower:	4/10
Motor Speed:	1650 RPM
Electrical:	115 Volts, 1Ø, 60 Hz or 230 Volts, 1Ø, 60 Hz

Pump – The pump shall be designed to handle raw sewage and be capable of passing 2 inch spherical solids. The pump shall be capable of handling liquids with temperatures to 140°F intermittent.

Motor – The pump motor shall be of the submersible type rated 4/10 hp at 1650 RPM and shall be for _____ 115 volts or _____230 volts single phase, 60 cycles. Stator winding shall be of the open type with Class A insulation rated for 105°C maximum operating temperature. The winding housing shall be filled with clean dielectric oil to lubricate bearings and seals, and transfer heat from the windings to the outer shell. The motor winding assembly shall be pressed into the stator housing for best alignment and heat transfer.

The motor shall be capable of operating over the full range of the performance curve without overloading the motor and causing any objectionable noise or vibration. The motor shall have two bearings to support the rotor; an upper sleeve bearing to accommodate radial loads and a lower sleeve bearing with thrust pad to take thrust and radial loads.

A heat sensor thermostat and overload shall be attached to the top end of the motor windings and shall be wired in series with the windings to stop the motor if the motor winding temperature reaches 221°F. The overload thermostat shall reset automatically when the motor cools to a safe operating temperature.

Power Cord – The motor power cord shall be _____10 or _____20 feet SJTW/SJTW-A type. The cord shall have a molded compression grommet to insulate electrical connections. The grommet shall thread into the motor housing to provide a positive seal and to prevent leaking of liquid into the motor housing. The sealing grommet shall provide strain relief for the power cord assembly.

Optional Control Switch – The sewage pump shall be controlled by an optional piggyback float switch. The float switch shall be of a non-mercury type and be capable of directly controlling the pump motor without the need for an external control panel.

Shaft Seal – The motor shall be protected by a rotating mechanical shaft seal. The seals shall have carbon and ceramic seal faces lapped to a tolerance of one light band. Metal parts and springs for seals shall be stainless steel.

Pump Impeller – The pump impeller shall be of the non-clog type. The impeller shall be constructed of engineered thermoplastic.

Motor Castings – The motor housing castings shall be of high tensile strength Class 30 gray cast iron. Castings shall be treated with phosphate and chromate rinse and painted with a high quality air dry alkyd enamel for corrosion protection.

Pump Case – The pump case shall be a high efficiency volute design capable of passing 2 inch spherical solids. The pump volute shall be constructed of Class 30 gray cast iron.

Fasteners – All exposed fasteners shall be of stainless steel.

MYERS® SRM4 SERIES

PENTAIR

USA
293 WRIGHT STREET, DELAVAN, WI 53115 WWW.FEMEYERS.COM
PH: 888-987-8677 ORDERS FAX: 800-426-9446

CANADA
269 TRILLIUM DRIVE, KITCHENER, ONTARIO, CANADA N2G 4W5
PH: 519-606-5484 ORDERS FAX: 800-426-9446

Because we are continuously improving our products and services, Pentair reserves the right to change specifications without prior notice.

M9029SSE (12/19/12)

PENTAIR

MYERS®

OWNER'S MANUAL

Submersible Sump Effluent

SSM33I
SUMP/EFFLUENT PUMPS
(115 Volt-Single Phase Only)

SRM4
SUMP/EFFLUENT/SEWAGE PUMPS
(115 or 230 Volt-Single Phase)

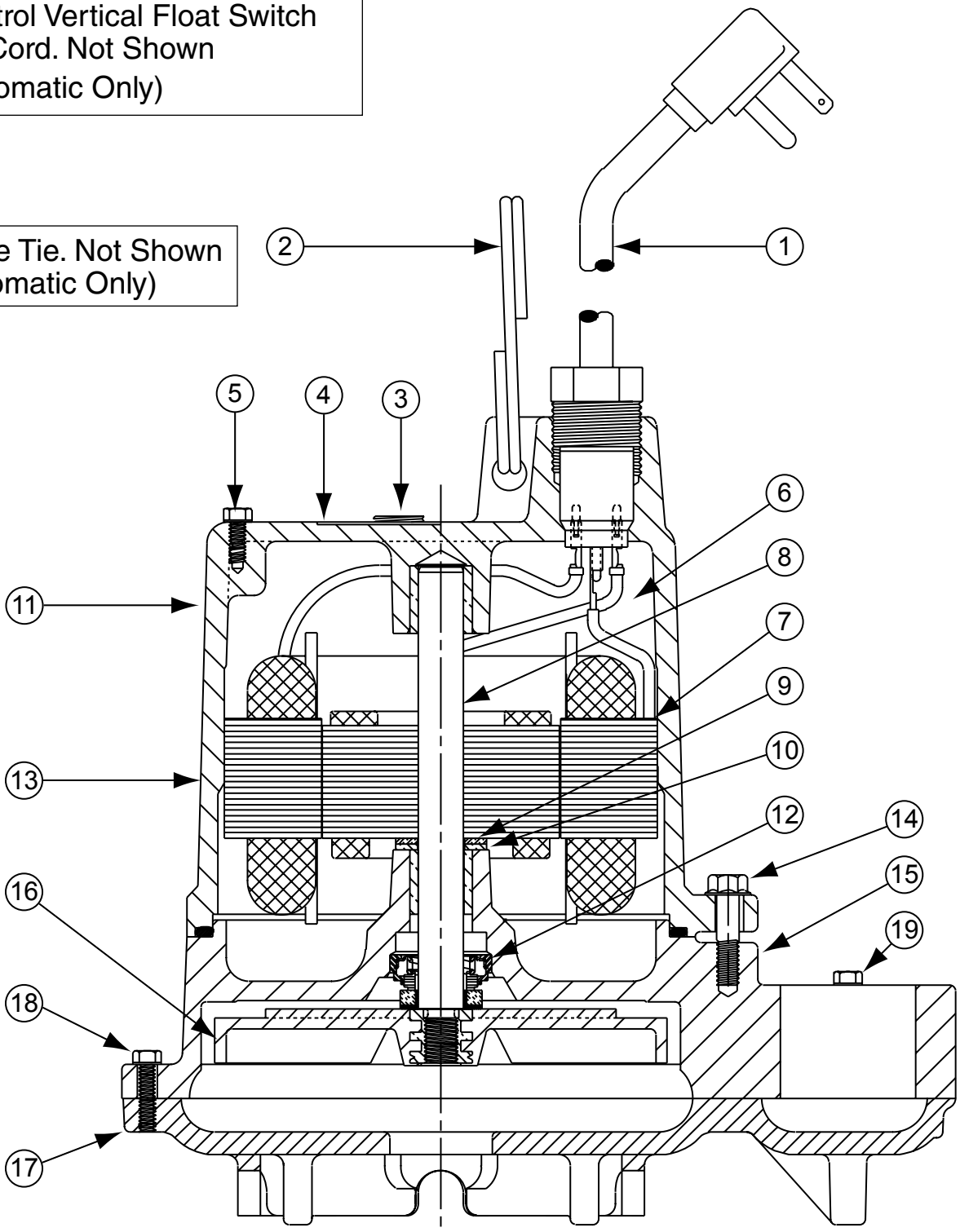
293 WRIGHT STREET, DELAVAN, WI 53115 WWW.FEMYERS.COM
PH: 1-888-987-8677

13800A991 (03/20/14)

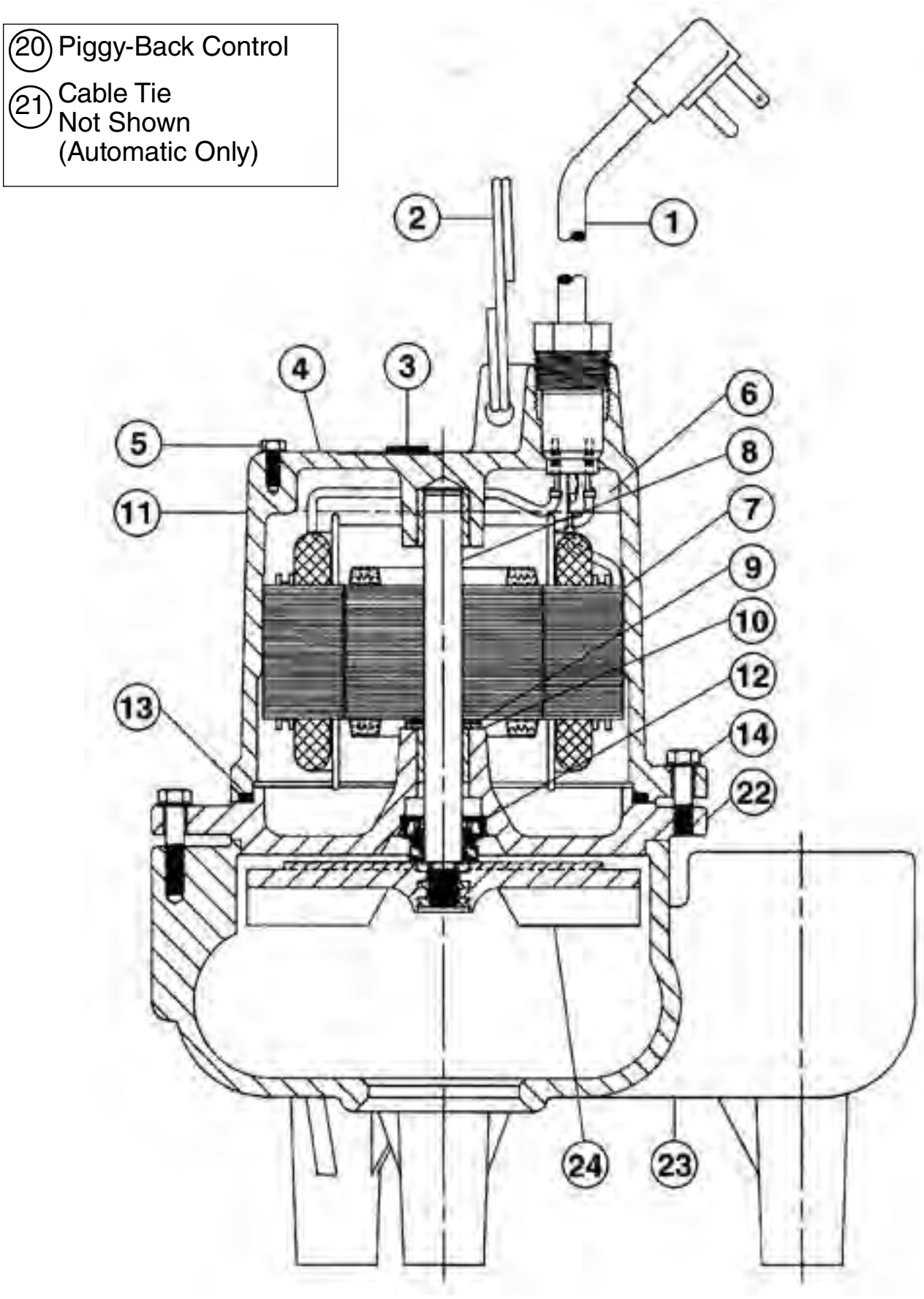
TYPICAL SECTION DRAWING FOR SSM33/SSM33I SERIES

20 Piggy-Back Control
Control Vertical Float Switch 10' Cord
Control Vertical Float Switch 20' Cord. Not Shown
(Automatic Only)

21 Cable Tie. Not Shown (Automatic Only)



TYPICAL SECTION DRAWING FOR SRM4 SERIES



PARTS LIST SSM33/SSM33I AND SRM4

Ref No.	No. Description	Part Req'd	Numbers
2	Ring, Lift	1	26230A000
3	Plug, 1/4" NPT	1	05022A056
4	Plate, Name (Not Stamped)	1	23780A000
5	Tapping, Screw (SSM33/SSM33I)	1	09822A032
5	Tapping, Screw (SRM4P Auto.)	1	09822A006
5A	Screw, Cap #10 x ¾ Vertical Float Switch	2	18475A004
6	Oil, Transformer (1 Qt. In Can)	1	11009A002
8	Rotor with Shaft (SSM33/SSM33I)	1	22821A010
8	Rotor with Shaft (SRM4)	1	22821A000
9	Washer, Thrust, SST	1	05030A243
10	Washer, Thrust, Graphite	1	05030A244
11	Housing, Motor	1	23770D002
	Housing w/Stator 115V (SRM4P) 230V (SRM4P) 115V (SSM33/SSM33I)		 23770D060K 23770D061K 23770D062K
12	Seal, ½" Shaft	1	21607A001
13	Gasket, Rubber	1	05014A172
14	Screw, Cap, 1/4-20 x 7/8 Lg. (SSM33/SSM33I) (SRM4)	 3 6	 18475A003 18475A003
15	Case, Volute (SSM33)	1	23771D001
15	Case, Volute (SSM33I)	1	23771D101
16	Impeller (SSM33)	1	22370B000
16	Impeller (SSM33I)	1	084980031

Ref No.	No. Description	Part Req'd	Numbers
17	Plate, Bottom, with Volute Case	1	27005D000
18	Screw, Tapping, #10 x 1" Lg. (SSM33, SRM4)	3	09822A036
18	Screw, Tapping, #10 x ¾" Lg. (SSM33I)	3	18475A008
19	Screw, Tapping, #10 x 1¾" Lg. (SSM33, SRM4)	3	09822A040
19	Screw, Tapping, #10 x 1-5/8" Lg. (SSM33I)	3	18475A009
20	Control, Level, 115V, 10' Piggy-Back Float Switch	1	21813B130
20	Control, Level, 115V, 20' Piggy-Back Float Switch	1	21813B131
20	Control, Level, 230V, 10' Piggy-Back Float Switch	1	21813B132
20	Control, Level, 230V, 20' Piggy-Back Float Switch	1	21813B133
20	Vertical Control Switch - 10' Cord	1	26292B140
20	Vertical Control Switch - 20' Cord	1	26292B141
20A	Mounting Bracket, Control Switch	1	26291B010
21	Tie, Cable	1	17190A008
22	Plate, Seal (SRM4)	1	23773D002
23	Case, Volute (SRM4)	1	21612D000
24	Impeller (SRM4)	1	21610B000
Not Shown	Bracket, Float (SSM33/SSM33I)	1	24003A000

CHART

Pump Catalog Number	Pump Engineering Number	Pump Type	HP	V	Ph	① Cord, Electric	Cord Length	⑦ Stator Only	Winding Resistance in Ohms	Max. Amps	Locked Rotor Amps
SSM33M1C*	26235D000	Manual	1/3	115	1	21628B048	20'	25757B010	1.3	8.0	12.5
SSM33P-1*	26235D010	Automatic	1/3	115	1	21628B046	10'	25757B010	1.3	8.0	12.5
SSM33PC-1*	26235D011	Automatic	1/3	115	1	2128B048	20'	25757B010	1.3	8.0	12.5
SSM33PV1*	26235D020	Automatic	1/3	115	1	21628B046	10'	25757B010	1.3	8.0	12.5
SSM33PV1C*	26235D021	Automatic	1/3	15	1	21628B048	20'	25757B010	1.3	8.0	12.5
SSM33IM1C*	26235D100	Manual	1/3	115	1	21628B048	20'	25757B010	1.3	9.0	12.5
SSM33IP-1*	26235D110	Automatic	1/3	115	1	21628B046	10'	25757B010	1.3	9.0	12.5
SSM33IPC-1*	26235D111	Automatic	1/3	115	1	2128B048	20'	25757B010	1.3	9.0	12.5
SSM33IPV1*	26235D120	Automatic	1/3	115	1	21628B046	10'	25757B010	1.3	9.0	12.5
SSM33IPV1C*	26235D121	Automatic	1/3	115	1	21628B048	20'	25757B010	1.3	9.0	12.5
SRM4M-1	26236D000	Manual	4/10	115	1	21628B046	10'	21599B026	1.2	12.0	16.0
SRM4M1C	26236D001	Manual	4/10	115	1	21628B048	20'	21599B026	1.2	12.0	16.0
SRM4M-2	26236D002	Manual	4/10	230	1	21628b047	10'	21599B027	4.3	6.0	8.2
SRM4M-2L/P	26236D004	Manual	4/10	230	1	21628B047	10'	21599B027	4.3	6.0	8.2
SRM4M2C	26236D003	Manual	4/10	230	1	21628B049	20'	21599B027	4.3	6.0	8.2
SRM4M-2CL/P	26236D005	Manual	4/10	230	1	21628B049	20'	21599B027	4.3	6.0	8.2
SRM4P-1	26236D010	Automatic	4/10	115	1	21628B046	10'	21599B026	1.2	12.0	16.0
SRM4PC-1	26236D011	Automatic	4/10	115	1	21628B048	20'	21599B026	1.2	12.0	16.0
SRM4P-2	26236D012	Automatic	4/10	230	1	21628B047	10'	21599B027	4.3	6.0	8.2
SRM4PC-2	26236D013	Automatic	4/10	230	1	21628B049	20'	21599B027	4.3	6.0	8.2

NOTE: READ THESE INSTRUCTIONS CAREFULLY BEFORE ATTEMPTING TO INSTALL PUMP.

DESCRIPTION AND APPLICATION

SSM33, SSM33I and SRM4

Myers SSM33, SSM33I and SRM4 Series Pumps are single seal units, available in automatic or manual. The SSM33 and SSM33I series pumps are designed for normal sump and dewatering, and can also be used in effluent applications. When used in effluent dosing or S.T.E.P. applications,the pump must be installed in a separate tank or compartment at the discharge side of the septic tank. **NEVER INSTALL PUMP IN MAIN TANK WHERE SLUDGE COLLECTS. DO NOT USE THE SSM33 OR SSM33I PUMP SERIES FOR RAW SEWAGE**. The SRM4 series pumps are designed for residential sewage and dewatering applications where a larger solid size is required.

General

The SSM33, SSM33I and SRM4 pumps use shaded pole, 1550 RPM motors. SSM33 and SSM33I are available in 115 volt only and the SRM4 is available in 115 or 230 volt and all are single phase only. Both the manual and automatic models come standard with a 10 ft. power cord. A 20 ft. cord and switch length are optionally available. All automatic models come with a mechanical (mercury free) piggy-back float switch or a vertical float switch. The SSM33 and SSM33I pumps are designed to handle 1/2" spherical solids and have a 1-1/2" NPT discharge threading. The SRM4 pumps are designed to handle 2" spherical solids and have a 2" NPT discharge threading. The SSM33, SSM33I and the SRM4 use an engineered thermoplastic vortex impeller designed to efficiently produce the required pressures and flows.

WARNING! THESE PUMPS ARE NOT APPROVED FOR, AND SHOULD NOT BE USED IN SWIMMING POOLS, FOUNTAINS OR PUMPING POTABLE (DRINKING) WATER.

AIR LOCKING

A pump is said to be air locked if water traps air in the pump and it cannot get out, thus preventing the pump from operating.

The SSM33, SSM33I and SRM4 sump pumps have a 1/16" air vent hole in the impeller chamber to let out trapped air. If this hole becomes plugged, pump may air lock. As a secondary precaution a 1/8" hole should be drilled in the discharge pipe below the check valve. The check valve should be 12 to 18 inches above pump discharge. Do not put check valve directly into pump discharge opening.

PACKAGING

Each pump is packaged separately in a carton marked with a catalog number and Myers engineering number. The pumps are carefully packaged to prevent damage in shipping. However, occasionally damage may result due to rough handling. Carefully go over the pump and check for damage that could cause the pump to fail.

LEVEL CONTROLS

The automatic models come with 10' or 20' power cord and mechanical (mercury free), piggy-back float switch. The 115 or 230 volt piggy-back switch is tethered directly to the pump. The switch can optionally be mounted to the discharge pipe using a minimum 3-5/8" tether length. The switch must float free from pump and basin wall. Plug the switch cord plug into a properly grounded, rated voltage receptacle. Plug the power cord into the back of the switch cord and tape the cords to the discharge pipe every 12". The power receptacle must be located outside the wet sump or basin due to the DANGER of current leakage.

On all duplex units or simplex installations with additional options like high water alarm, the power cord plug must be cut off and wired into a control panel or into a sealed junction box if used in wet sump or basin. The AWS-1 control also acts as a sealed junction box for connecting power cord to pump cord.

DESIGN OF PRESSURE SEWER SYSTEMS

Myers has available complete computer SOFTWARE for designing PRESSURE SEWER SYSTEMS. This gives pipe sizes to use and gives exact flow from any pump or group of pumps in the system when operating simultaneously.

This design DISK for IBM® or COMPATIBLE computers is available to engineers on request.

MOTOR TYPE

The motors used in these pumps are pressed into the cast iron housings and surrounded by dielectric oil for superior heat transfer. Both models use a shaded pole, 1550 RPM motor. The SSM33 and SSM33I are rated at 1/3 HP and the SRM4 is rated at 4/10 HP. All units have class A motor insulation. SSM33 and SSM33I are available in 115 volt, single phase only and SRM4 is available in 115 or 230 volt, single phase. All have overload protection, and use a double sleeve bearing design. These pumps have no starting switches and do not require a control panel for simplex installation.

SAFETY WARNINGS

WARNING: Risk of electric shock. Pumps are supplied with a grounding conductor and grounding-type attachment plug on the power cord. To reduce the risk of electric shock, be certain that it is connected only to a properly grounded, grounding-type receptacle. DO NOT cut off ground pin or use an adapter fitting. DO NOT use an extension cord with this pump.

All pumps have a GROUND WIRE that is connected to the motor. This wire goes to the receptacle or control panel which must be connected to a good outside GROUND.

When wiring this pump follow all local electrical and safety codes and ordinances as well as the most recent National Electric Code (NEC-ANSI/NFPA 70).

UL AND CSA APPROVAL

All pumps have UL and CSA approval pending. Myers is a SSPMA certified pump member.

INSTALLATION

WARNING: Basin or tank must be vented in accordance with local plumbing codes. These pumps are not designed for and CANNOT be installed in locations classified as hazardous in accordance with the National Electric Code ANSI/NFPA 70.

CAUTION: Never enter pump chamber after sewage or effluent has been in basin. Sewage water can give off methane, hydrogen sulfide and other gasses which are highly poisonous. For this reason, Myers recommends installing effluent pumps with a quick removal system. The quick removal system may be a union or Cam-lok® coupling if the pipe or discharge hose is within reach from the surface, or a rail system type quick disconnect on deeper installations. See installation drawings for suggested installation.

The dosing tank or pumping chamber must be constructed of corrosion resistant materials and must be capable of withstanding all anticipated internal and external loads. It also must not allow infiltration or exfiltration. The tank must have provisions for anti-buoyancy. Access holes or covers must be adequate size and be accessible from the surface to allow for installation and maintenance of the system. Access covers must be lockable or heavy enough to prevent easy access by unauthorized personnel. The pumping chamber holding capacity should be selected to allow for emergency conditions.

The discharge pipe must be the same size as the pump discharge 1-1/2" for SSM33 and SSM33I, 2" for SRM4 or larger. In order to insure sufficient fluid velocity to prevent any residual solids from collecting in the discharge pipe, it is recommended that a minimum flow of 2' per second be maintained. (12 GPM through 1-1/2" pipe, 21 GPM through 2" pipe and 46 GPM through 3" pipe). It is recommended that PVC or equal pipe is used for corrosion resistance. A full flow (ball or gate) shut off valve must be installed to prevent back flow of effluent if the pump must be removed for service. A check valve must be installed on pressure sewer systems and on other systems where conditions allow to prevent backflow and to reduce wear on the pump system.

A high water alarm must be installed on a separate circuit from the pump circuit. The alarm should have the ability to be tested for proper operation.

POINTS TO CHECK IF PUMP DOES NOT RUN OR DOES NOT RUN PROPERLY

(1) Pump does not run or start when water is up in tank.

(a) Check for blown fuse or tripped circuit breaker.
(b) Check for defective level switch
(c) Where control panel is used be sure H-O-A switch is in the AUTO position. If it does not run, turn switch to the HAND position and if the pump runs then the trouble is in the automatic electrical system. Have ELECTRICIAN make electrical checks.
(d) Check for burned out motor. Occasionally lightning can damage a motor even with lightning protection.
(e) Where plug-in cords are used be sure contact blades are clean and making good contact. DO NOT USE PLUG-IN CORDS INSIDE A SUMP OR WET WELL.
(f) Level control ball or weight may be stuck on side of basin. Be sure it floats freely.

(2) Pump runs but does not deliver flow.

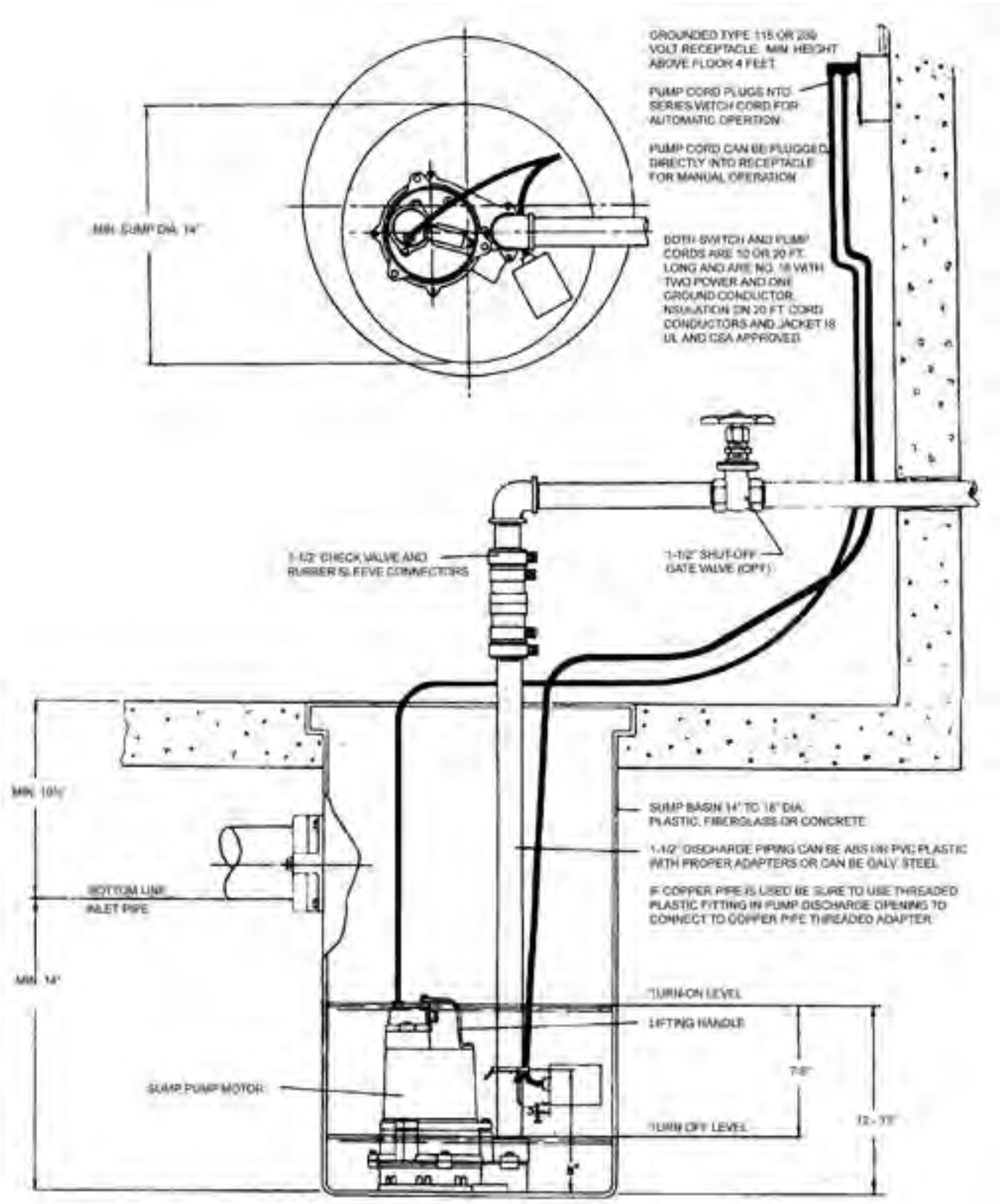
(a) Check for airlock. Start and stop pump several times, if this does not help it may be necessary to loosen a union in the discharge line to relieve airlock.
(b) Check valve may be installed backwards. Check flow arrow on valve body. Check shut-off valve. It may be closed.
(c) Check vertical elevation. It may be higher than pump can develop. (See pump curve).
(d) Pump inlet may be plugged. Remove pump to check.

CAUTION: ALWAYS UNPLUG POWER CORDS OR TURN OFF ALL MAIN AND BRANCH CIRCUIT BREAKERS BEFORE DOING ANY WORK ON THE PUMP. If control panel is remote from pump, disconnect lead wires to motor so that no one can turn the circuit breaker back on.

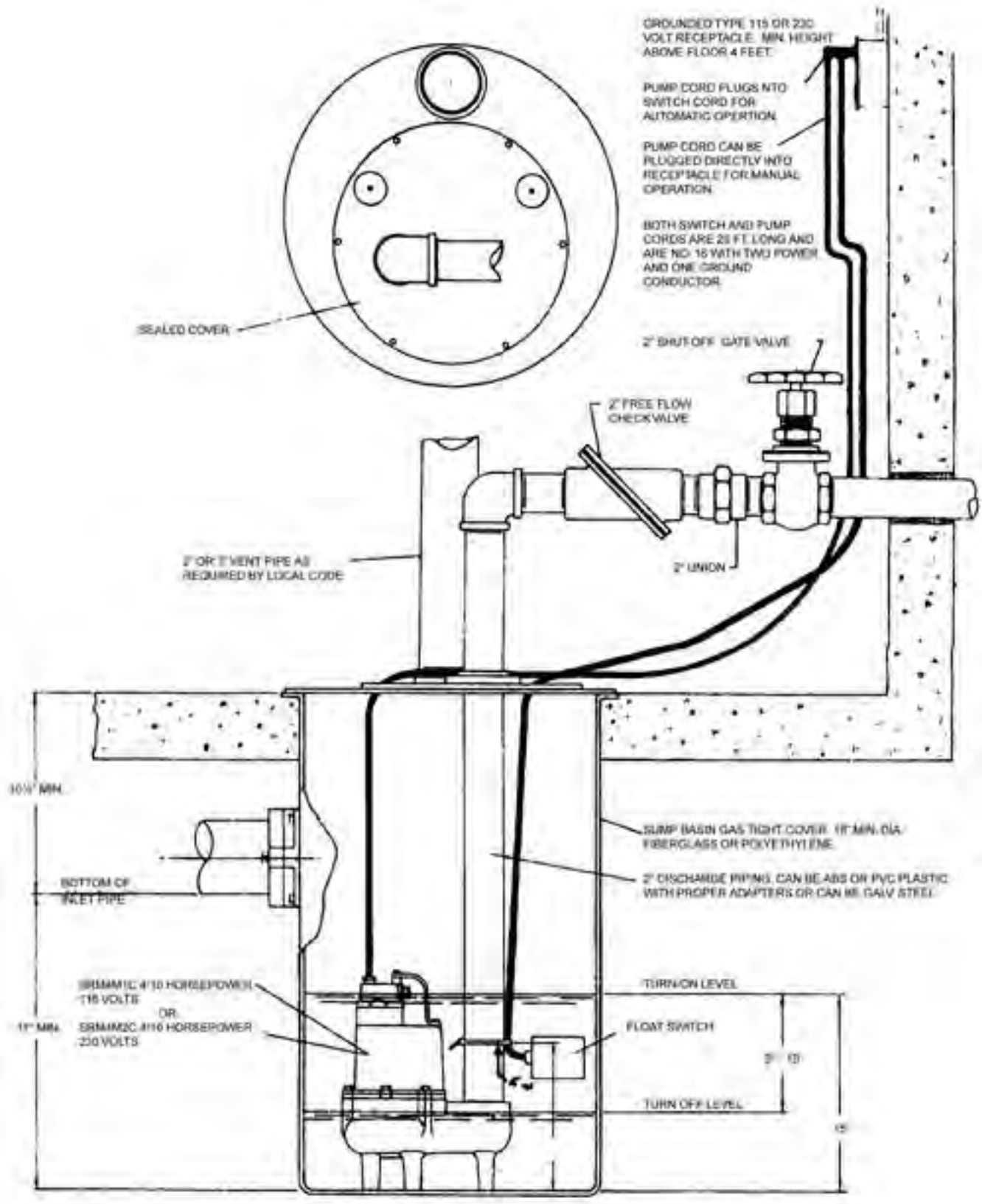
BEFORE DISMANTLING PUMP FOR REPLACEMENT OF PARTS

Clean pump thoroughly. Knock off all scale and deposits. Submerge complete unit on Clorox solution for one hour before taking apart.

TYPICAL SUMP INSTALLATION FOR SSM33/SSM33I Series



TYPICAL SUMP INSTALLATION FOR SRM4 SERIES



CAUTION: FOR ANY WORK ON PUMP OR SWITCH, ALWAYS UNPLUG POWER CORD. DO NOT JUST TURN OFF CIRCUIT BREAKER OR UNSCREW FUSE.

TO REPLACE AUTOMATIC FLOAT

(1) Unplug the pump power cord from the back of the piggyback float plug.
(2) Unplug the piggy-back float plug from the power receptacle.
(3) Remove the pump from the sump if access to the tether point is inaccessible.
(4) Disconnect the switch from its tether point and remove from the discharge piping.
(5) Re-tether the new cord to the pump or discharge piping.
(6) Cable tie or tape the power and switch cords to the discharge piping.
(7) Plug the switch into the power receptacle.
(8) Plug the power cord into the switch plug.
(9) Fill basin and test switch operation.

ALL PUMP REPAIRS SHOULD BE DONE AT AN AUTHORIZED MYERS SERVICE CENTER.

TO REPLACE THE AUTOMATIC VERTICAL FLOAT SWITCH

(1) Unplug the pump power cord from the back of the piggy-back plug.
(2) Unplug the piggy-back plug from the power receptacle.
(3) Remove the two mounting screws in the switch bracket that attached the switch assembly to the pump and remove from the discharge piping.
(4) Mount new switch assembly to pump. Be sure to install plastic tie provided and re-tether to mounting screw.
(5) Cable tie or tape the power and switch cords to the discharge piping.
(6) Plug the piggy-back switch in the power receptacle.
(7) Plug power cord into the piggy-back switch plug.
(8) Fill basin and test switch operation.

SSM33/SSM33I SHAFT SEAL REPLACEMENT

(1) Remove the oil fill plug located on the top of the motor housing and drain the oil in the housing. Properly dispose of the used oil. Do not reuse old oil since it may contain water from seal failure.
(2) Lay the pump on its side. Remove the six screws holding the suction bottom onto the volute case. Remove the suction bottom.
(3) Insert a slotted screwdriver through the center of the impeller hub into the slot in the shaft. With a rubber mallet, carefully tap the impeller in a counter rotating direction while holding the shaft with the screwdriver.
(4) Remove the rotating portion (ceramic) of the seal with fingers. Pry on the stationary portion (carbon) with a pair of slotted screwdrivers to remove from volute casing. Discard the old seal assembly parts. NEVER USE OLD SEAL PARTS, REBUILD PUMP WITH ONLY NEW SEAL ASSEMBLY.
(5) Thoroughly clean the shaft and volute casing with a clean cloth. If the drained oil showed signs of water, then the motor should be air dried for several days to remove any remaining moisture.
(6) Carefully remove the new seal assembly from the package. Add a film of new oil to the rubber O.D. on the stationary portion (carbon), and insert into the seal cavity on the volute casing. Using a pushing tool (a piece of PVC pipe works well), push on the rubber portion of the stationary seal until it is evenly seated into the seal cavity. With a clean cloth, carefully wipe the seal face.
(7) Remove the rotating portion (ceramic) from the package and carefully wipe with a clean cloth. Add a film of new oil onto the motor shaft. Slide the rotating portion over the shaft with the rubber surface of the seal facing away from the stationary seal face. Center the seal on the shaft.
(8) Place the impeller onto the shaft. Screw the impeller clockwise onto the shaft using a screwdriver to hold the shaft from turning and tighten impeller. Check to see that the impeller spins freely after tightening.
(9) Replace the suction bottom onto the volute casing and retain with the six screws. Evenly tighten screws.
(10) Replace oil in the motor housing using only Myers submersible transformer oil. The level should be 3/4" below the top of the motor housing. Check with dip stick to assure that the pump is properly filled.
(11) Plug pump into grounded receptacle to test operation. Pump must run quiet and free of vibration.

SRM4 SHAFT SEAL REPLACEMENT

(1) Remove the oil fill plug located on the top of the motor housing and drain the oil in the housing. Properly dispose of the used oil. Do not reuse old oil since it may contain water from seal failure.
(2) Remove the three cap screws holding the volute case onto the seal plate. Lift the motor assembly up and out of the volute case.
(3) Lay the motor assembly on its side. Insert a slotted screwdriver into the slot in the center of the shaft. With\ a rubber mallet, carefully tap the impeller in a counter rotating direction while holding the shaft with the screwdriver.
(4) Remove the rotating portion (ceramic) of the seal with fingers. Pry on the stationary portion (carbon) with a pair of slotted screwdrivers to remove from volute casing. Discard the old seal assembly parts. **NEVER USE OLD SEAL PARTS. REBUILD PUMP WITH ONLY NEW SEAL ASSEMBLY.**
(5) Thoroughly clean the shaft and volute casing with a clean cloth. If the drained oil showed signs of water, then the motor should be air dried for several days to remove any remaining moisture.
(6) Carefully remove the new seal assembly from the package. Add a film of new oil to the rubber O.D. on the stationary portion (carbon), and insert into the seal cavity on the volute casing. Using a pushing tool (a piece of PVC pipe works well), push on the rubber portion of the stationary seal until it is evenly seated into the seal cavity. With a clean cloth, carefully wipe the seal face.
(7) Remove the rotating portion (ceramic) from the package and carefully wipe with a clean cloth. Add a film of new oil into the motor shaft. Slide the rotating portion over the shaft with the rubber surface of the seal facing away from the stationary seal face. Center the seal on the shaft.
(8) Place the impeller onto the shaft. Screw the impeller clockwise onto the shaft using a screwdriver to hold the shaft from turning and tighten impeller. Check to see that the impeller spins freely after tightening.

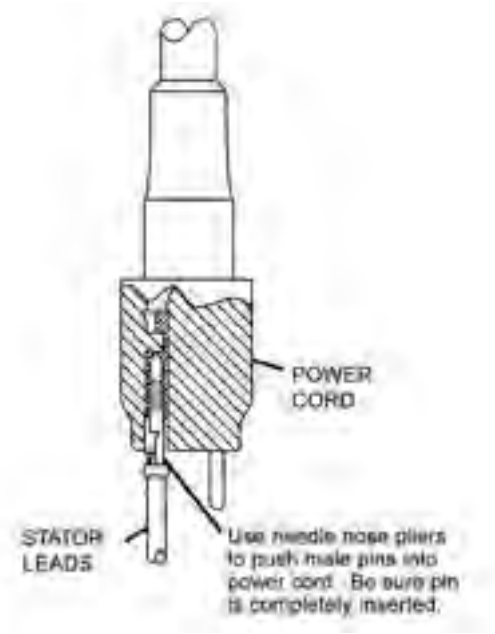
(9) Place the pump motor assembly upright and set it into the volute case. Replace the four cap screws and tighten.
(10) Replace oil in the motor housing using only Myers submersible transformer oil. The level should be 3/4" below the top of the motor housing. Check with dip stick to assure that the pump is properly filled.
(11) Plug pump into grounded receptacle to test operation.

POWER CORD REPLACEMENT

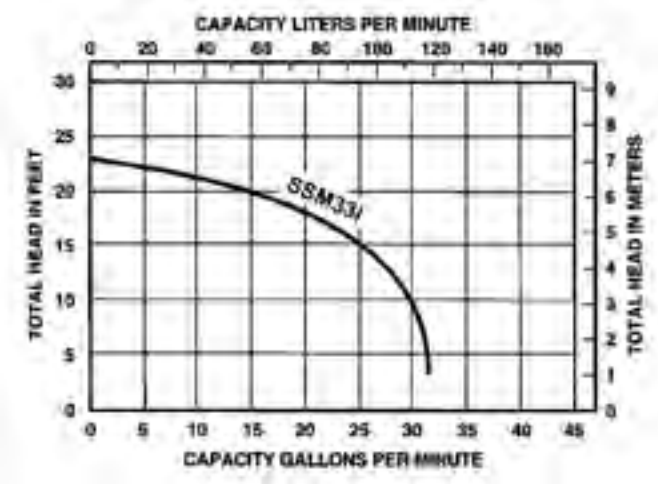
(1) Loosen the plastic compression nut that retains the power cord. Slide nut out of the motor housing.
(2) Pull the power cord from the motor housing by hand. The cord may need to be wiggled back and forth several times to loosen from the housing. Pull the power cord out until the connecting wires are fully exposed. Disconnect the motor power and ground leads with a pair of pliers.
(3) Reconnect the motor power leads and ground to the new power cord. The ground terminal on the power cord has a male connector, and the power terminals on the new power cord are female.
(4) Carefully push the connected wires into the motor housing until the molded body of the power cord seats. Make sure that the wires stay away from the rotor and shaft. Slide the nut into place and hand tighten. Tighten the nut with 13/16" wrench until snug, but do not over tighten.
(5) Plug pump into grounded receptacle to test operation. Pump must run quiet, free of vibration, without tripping out breaker.

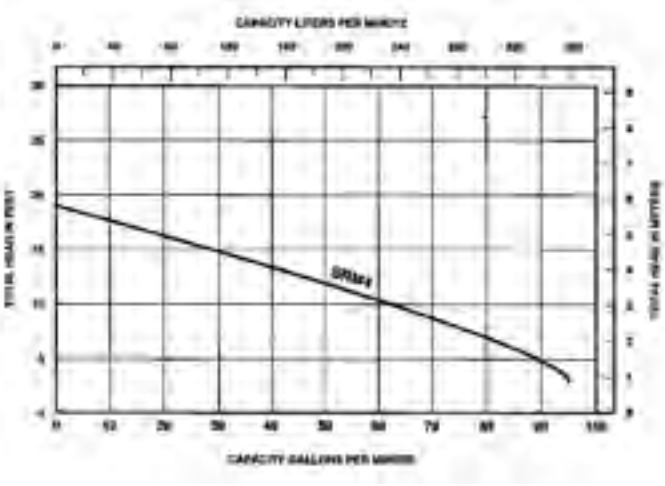
MOTOR REPLACEMENT

(1) Disconnect the power cord and drain the oil as noted in the previous sections. If the oil shows signs of water or other contamination, it may be necessary to replace the seal assembly as noted in a previous section.
(2) Loosen and remove the three cap screws retaining the motor housing. Lift the motor housing off of the pump assembly.
(3) Remove the O-ring from the remaining pump assembly. Clean surface area and place new o-ring into position. Be careful not to cut o-ring when installing.
(4) Position new motor housing (with new stator), onto the pump assembly. Align the screw bosses, and insert the three cap screws. Evenly tighten the cap screws.
(5) Reinstall the power cord as noted in the previous section.
(6) Replace oil in the motor housing using only Myers submersible transformer oil. The level should be 3/4" below the top of the motor housing. Check with dip stick to assure that the pump is properly filled.
(7) Plug pump into grounded receptacle to test operation. Pump must run quiet, free of vibration, without tripping out breaker.

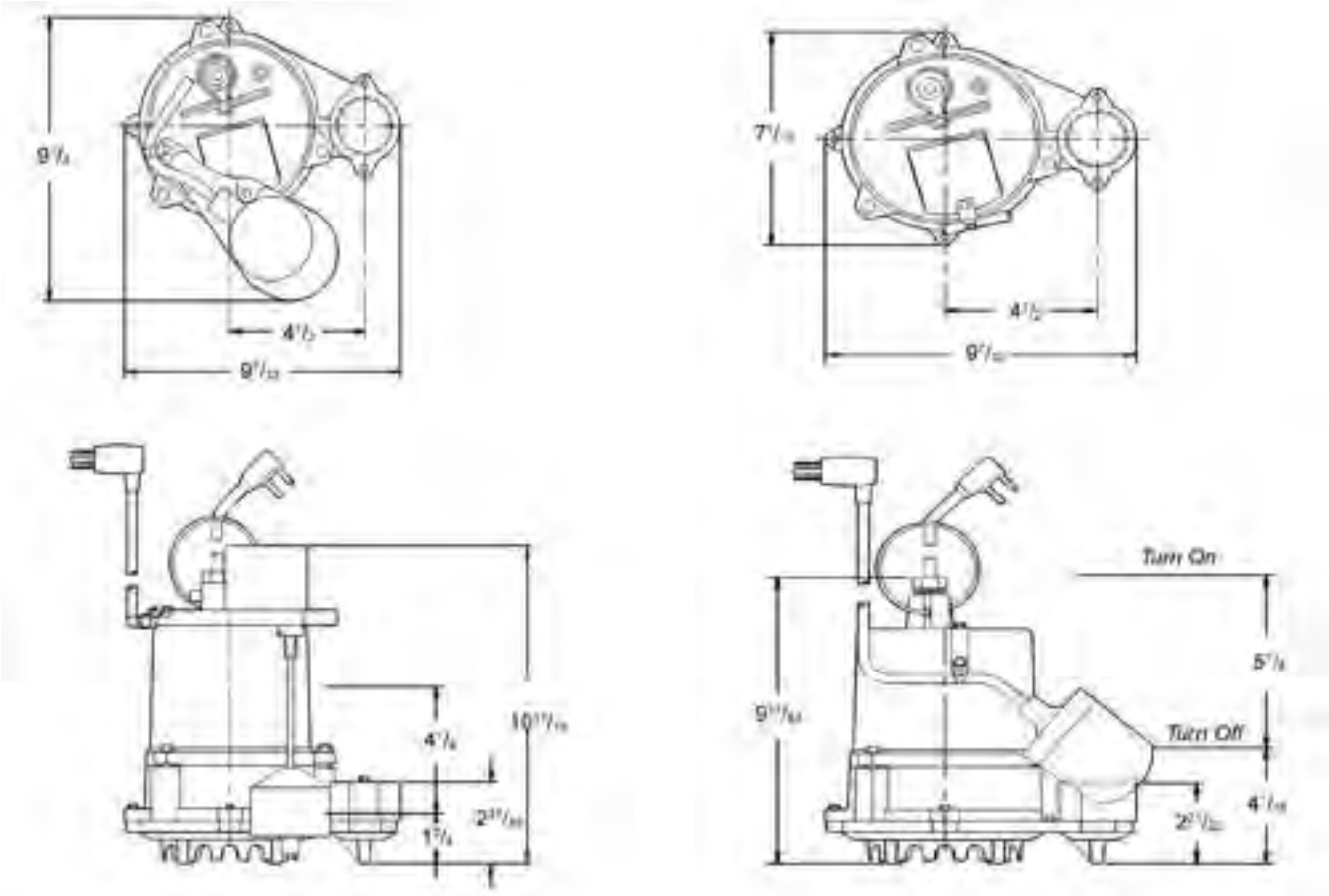


PERFORMANCE CURVES

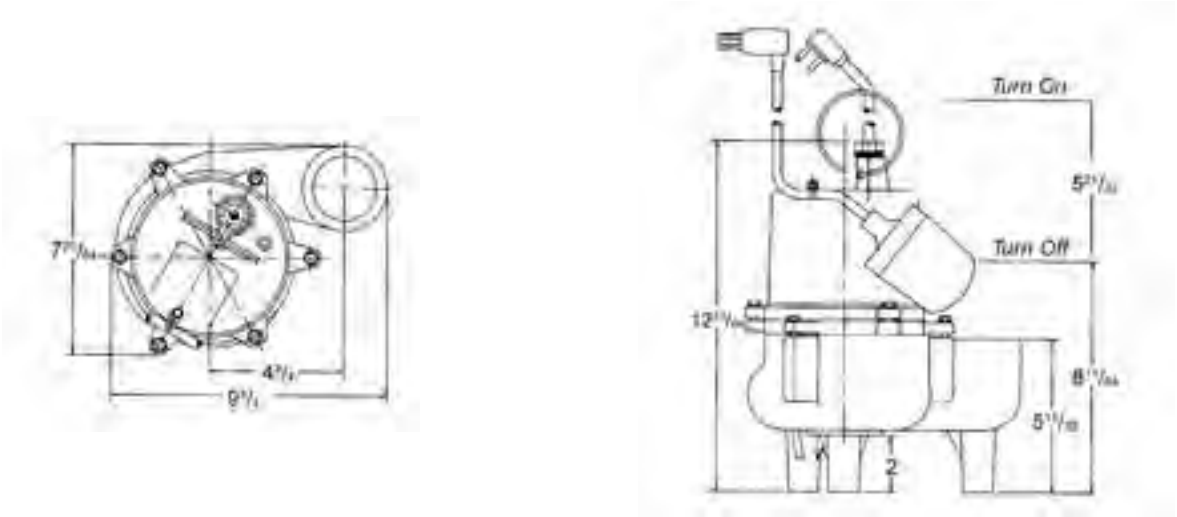




SSM33I SERIES DIMENSIONAL DRAWINGS



SRM4 DIMENSIONAL DRAWING



Limited Warranty

Myers® warrants to the original consumer purchaser ("Purchaser" or "You") of the products listed below, that they will be free from defects in material and workmanship for the Warranty Period shown below.

Product	Warranty Period
Jet pumps, small centrifugal pumps, submersible pumps and related accessories	whichever occurs first: 12 months from date of original installation, or 18 months from date of manufacture
Fibrewound Tanks	5 years from date of original installation
Steel Pressure Tanks	5 years from date of original installation
Sump/Sewage/Effluent Products	12 months from date of original installation, or 36 months from date of manufacture
Wastewater Solids Handling Pumps	12 months from date of shipment from factory or 18 months from date of manufacture

Our warranty applies only where such products are used in compliance with the requirements of the applicable product catalog and/or manuals. For additional information, please refer to the applicable standard limited warranty featured in the product manual.

Our warranty will not apply to any product that, in our sole judgement, has been subject to negligence, misapplication, improper installation, or improper maintenance. Without limiting the foregoing, operating a three phase motor with single phase power through a phase converter will void the warranty. Note also that three phase motors must be protected by three-leg, ambient compensated, extra-quick trip overload relays of the recommended size or the warranty is void.

Your only remedy, and MYERS's only duty, is that MYERS repair or replace defective products (at MYERS's choice). You must pay all labor and shipping charges associated with this warranty and must request warranty service through the installing dealer as soon as a problem is discovered. No request for service will be accepted if received after the Warranty Period has expired. This warranty is not transferable.

MYERS SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL, OR CONTINGENT DAMAGES WHATSOEVER.

THE FOREGOING LIMITED WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS AND IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE FOREGOING LIMITED WARRANTIES SHALL NOT EXTEND BEYOND THE DURATION PROVIDED HEREIN.

Some states do not allow the exclusion or limitation of incidental or consequential damages or limitations on the duration of an implied warranty, so the above limitations or exclusions may not apply to You. This warranty gives You specific legal rights and You may also have other rights which vary from state to state.

This Limited Warranty is effective February 7, 2014 and replaces all undated warranties and warranties dated after February 7, 2014.

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SENTRY INSTALLATION & OPERATION INSTRUCTIONS
ADJUSTABLE MODEL

S/N:_____ MODEL #:_____ DATE OF PURCHASE_____

MATERIALS OF CONSTRUCTION: BODY_____ BLADDER_____

PUMP AREA & NUMBER_____

SUPPLIER: COMPANY _____ CONTACT_____

PHONE _____ FAX_____ E-MAIL_____

INSTALLATION NOTES *READ BEFORE INSTALLATION*

- **ADJUSTABLE SENTRY MODELS ARE NOT RECOMMENDED FOR WATER HAMMER APPLICATIONS. CONSULT FACTORY FOR OPTIONS.**
- Blacoh recommends installing a pressure relief valve in all pump systems to ensure compliance with pressure limits on system equipment.
- Mount SENTRY as close to pump discharge, inlet and/or quick closing valve as possible.
- **If a system pressure test is to be performed, SENTRY must be charged with 80% of the system test pressure, prior to test.** This will avoid possible bladder damage.
- Temperature and pressure affect the strength and chemical resistance of plastic and rubber. Please consult factory for additional information.
- Remove all pressure from SENTRY unit AND pumping system before attempting maintenance.
- Do not exceed 150 PSI with Adjustable models. **Check pressure rating shown on serial tag.**
- Always wear safety glasses when installing, charging or repairing SENTRY units.
- Do not operate a SENTRY that is leaking, damaged, corroded or unable to hold internal fluid, air or gas pressure.
- Pre-charge SENTRY with compressed air or nitrogen only. **DO NOT USE OXYGEN**

INSTALLATION FOR PUMP DISCHARGE PULSATION *READ BEFORE INSTALLATION*

Step 1 – Installation Position

Install the dampener in-line, as close to the pump discharge as possible to absorb the pulse at its source. Install ahead of any downstream equipment such as risers, valves, elbows, meters, or filters. Dampener installation should be no more than ten pipe diameters from pump discharge. If using a flexible connector from pump to system piping, dampener should be installed at the pump discharge manifold. The flexible connector should be attached to the dampener's tee and system piping (see Figure 1). Since pressure is equal in all directions, SENTRY can be installed in a vertical, horizontal, or upside-down position. Blacoh recommends a vertical installation for better draining of the unit. Limitations for horizontal and upside-down mounting include high specific gravity, high viscosity, settling of solid material, or possible air entrapment, which could result in shortened bladder life and/or reduced dampening performance.

Step 2 – Air Line Connection

Using a ¼" flexible air hose, run an air-line to the top of SENTRY and connect it to the brass, one-way check valve on top of the regulator. Do not remove one-way check valve. The check valve prevents fluid back flow through the air hose in case of bladder failure. Air supply to the SENTRY must be greater than the pump discharge and/or system pressure. If the SENTRY is being used in conjunction with a pneumatically operated pump, a tee can be used to run the air-line to SENTRY from the existing pump air supply line (See Figure 1). The tee should be placed before any in-line pump instrumentation, such as a filter, regulator, lubricator or other pump control valve.

Step 3 – Charging and Start Up – see *PRE-CHARGE NOTES* on next page.

Prior to starting the pump, adjust regulator to fill SENTRY with compressed air to approximately 2 to 7 psi LOWER than expected system pressure. The air charge must always be lower than pump discharge pressure. Generally, pulsation is most effectively minimized when the air charge is 2 to 7 psi lower than system pressure. Start the pump to generate system pressure. NOTE: Once system pressure is in contact with the bladder, the gas charge will be compressed to the system pressure and the dampener gauge will read the system pressure, not the initial charge pressure. Once working pressure is achieved, adjustment may be necessary. Gradually increase or decrease the gas charge in the dampener by bleeding or filling through the self-relieving pressure regulator. Allow the system to respond to each adjustment (this may take a minute or two) before making further adjustments.

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DAMPENER INSTALLATION FOR PUMP INLET *READ BEFORE INSTALLATION*

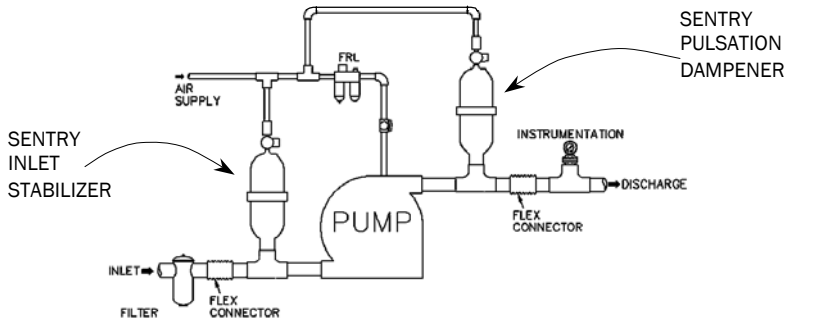
Step 1 – Installation Position
Install SENTRY as close to the pump inlet as possible. Install after any upstream equipment such as risers, valves, elbows, meters, or filters. If using a flexible connector from system piping to pump, SENTRY should be installed to the pump inlet manifold. The flexible connector should be attached to the SENTRY tee and system piping (see Figure 1).

Step 2 – Air Line Connection
Using a ¼" flexible air hose, run an airline to the top of SENTRY and connect it to the brass one-way check valve on top of the regulator. Do not remove one-way check valve. The check valve prevents fluid back flow through the air hose in case of bladder failure. The air supply to SENTRY must be greater than the pump discharge and/or system pressure. If the SENTRY is being used in conjunction with a pneumatically operated pump, a tee can be used to run the air-line to SENTRY from the existing pump air supply line (See Figure 1). The tee should be placed before any in-line pump instrumentation, such as a filter, regulator, lubricator or other pump control valve.

Step 3 – Charging and Start Up – see *PRE-CHARGE NOTES*.
A. Suctions Lift/Accumulator: No pre-charge is required in a lift/accumulator installation. Start the pump to generate working pressure. As system pressure and vacuum is created, the acceleration head created with each suction stroke will compress the air trapped in the bladder. For better inlet stabilization, a SENTRY "J" Model is recommended.

B. Positive Inlet Pressure: Pre-charge SENTRY with 50% of the static pressure realized at the pump inlet. Start the pump to generate working pressure. Minor pressure adjustments may be required. Allow the system to respond to each adjustment (this may take a minute or two) before making further adjustments.

FIGURE 1



PRE-CHARGE NOTES *READ BEFORE INSTALLATION*

Gas molecules will diffuse through elastomer membranes, the speed of which depends on elastomer material, temperature and pressure. As a rule of thumb, the air supply should be checked every month. Verification of proper vessel pressure must occur when no system pressure is present or inaccurate readings will be recorded. If temperature is above ambient, checks should be performed more frequently. **Adjustable SENTRY products should NEVER be used in applications where pressures greater than 150 psi are present.** A proper air charge is the key to dampener effectiveness and bladder life.

MAINTENANCE

SENTRY Pulsation Dampeners require very little maintenance. There is only ONE wear part – the elastomeric bladder or the PTFE bellow. There is no need for lubrication. Elastomeric bladder replacement should be put on a preventive maintenance program. Dampeners used in conjunction with diaphragm pumps should have the bladders replaced, at least every second time the diaphragms in the pump are replaced. As with any pumping system, wear is dependent upon many factors, including material, temperature, chemicals, fluid abrasiveness and system design. This suggested maintenance program may need to be adjusted according to specific applications. Periodic inspection of the dampener and fasteners should be conducted to visually check for signs of over-pressurization, fatigue, stress, or corrosion. Body housings and fasteners must be replaced at first indication of deterioration.

SENTRY PULSATION DAMPENERS

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MAINTENANCE & TROUBLESHOOTING GUIDE

SENTRY PULSATION DAMPENERS

PREVENTATIVE MAINTENANCE

SENTRY Pulsation Dampeners require very little maintenance. The rubber bladder or PTFE bellows is the only wear part of the unit.

Bladder replacement should be part of the system preventive maintenance program. Bladder life is a function of many variables. Normal life can be from a few months to several years depending upon usage, proper charge and dampener size, system design, and/or the harshness of the process fluid and application temperature.

SENTRY units used in conjunction with diaphragm pumps should have the rubber bladders replaced at least every second time the diaphragms in the pump are replaced. This does not apply to PTFE bellows. As with any pumping system, component wear is dependent upon many factors; therefore, this suggested maintenance program might need to be adjusted based upon specific applications.

Periodic inspection of units should be as follows:

1. SENTRY housings and fasteners should be inspected for signs of over pressurization, stress, fatigue, corrosion, or UV attack. Housings and fasteners must be replaced at the first indication of deterioration.

2. Fastener tightness should be checked before initial start-up. Consult factory for torque specifications.

3. Fasteners on metal units should be replaced at each re-assembly.

4. Check the gas pre-charge in the unit while no system pressure is present. If system pressure is present, the gauge will display system pressure, NOT the pre-charge pressure.

5. Check the unit pressure gauge during operation. If the dampener is properly charged, the gauge needle should be fluctuating with each pump discharge stroke. Replace the gauge if needed.

6. Adjust the regulator on adjustable models to insure maximum dampening. Replace the self-relieving regulator if needed.

EFFECTIVE DAMPENING TIPS

The primary factors that determine the level of dampening obtained with a SENTRY dampener are capacity, location, and the pressure charge.

CAPACITY: The dampener must be properly sized so that the volume of compressed gas inside is enough to absorb fluid shock, and also enough liquid volume capacity to accumulate the fluid pulse. A key element of effective dampening is the relationship of the gas charge to the fluid volume necessary for the pressure range required. An undersized dampener will result in insufficient dampening and can lead to excessive bladder wear and early failure.

The capacity of a pulsation dampener must be in the correct ratio to the volume per stroke of the pump and the number of pump heads. The larger the ratio is, the higher the level of dampening will be. For an Air Operated Diaphragm Pump the ratio between the dampener capacity and the pump stroke volume should be from 1.5:1 to 5:1, based upon the level of dampening required. For a metering pump the ratio is 10:1 to 30:1, based upon the level of dampening required.

LOCATION: Location is important because of wave frequency and fluid dynamics. Location directly effects dampener performance. The pulsation dampener should be installed as close as possible to the pump discharge and no further away than 10 pipe diameters. Installation should be on a tee in the fluid flow path. Do not install the dampener on a branch or riser. The farther away the dampener inlet is from the pump discharge, the less effective the unit will be.

A dampener installed on a riser or dead-end leg of pipe can actually increase pulsation. A pulse traveling toward the dampener has another pulse directly behind it. When the first pulse is reversed after contact with the dampener, it crashes into the next pulse disrupting the entire wave sequence. This action can change the system's fluid harmonics, which may lead to increased pulsation.

CHARGE: The compressed gas charge applied to any dampener will vary with each application and can have a significant effect on performance. To properly charge the unit, an accurate reading of the system fluid pressure is required. A pressure gauge should be installed on the system piping downstream from the unit. Any time the gas charge is equal to or greater than the system pressure, the dampener will not function properly. An over charged unit will force the internal bladder down, covering the inlet port – shutting off the dampener.

TROUBLESHOOTING

NO DAMPENING OR INSUFFICIENT DAMPENING EFFECT

1. Check the location of the dampener. Dampeners should be mounted within 10 pipe diameters of the pump discharge on a tee in the fluid flow path. The use of elbows and risers will decrease dampener performance.

2. Check the capacity of the dampener in relation to the pump stroke volume. An undersized dampener will decrease dampener performance and shorten bladder life.

3. Check the discharge head. Dampeners do perform better under a little discharge pressure (at least 5 psi). A slow stroking pump may not be filling the discharge pipe completely, creating zero discharge head between strokes. A slight discharge head can be created with a ball valve or back pressure valve.

4. Check for bladder failure. Replace bladder.

5. Check the dampener inlet fluid port for any blockage or restriction.

LEAKING FLUID OR AIR

1. All plastic and PTFE components take an initial set after manufacture. The fasteners may need tightening. Consult factory for torque specifications.

2. Check the air controls and gauge threads for an airtight seal. Tighten if needed. Consult factory for torque specifications.

3. Check the ring flange or clamp band bolts for proper torque. Tighten if needed. Consult factory for torque specifications.

4. Check for a bladder rupture. Replace the bladder if it has failed.

BLADDER RUPTURE OR FAILURE

CAUTION: IF A SYSTEM PRESSURE TEST IS TO BE PERFORMED, THE UNIT MUST BE CHARGED WITH 80% OF THE SYSTEM TEST PRESSURE PRIOR TO THE TEST. FAILURE TO CHARGE THE DAMPENER CAN CAUSE BLADDER FAILURE.

1. Chemical Attack
   Swelling, hardening, and distortion are some of the indications of chemical attack. Check the chemical compatibility charts. Consult factory for assistance.

2. Cut Bladder
   Check for a sharp object that may have been introduced into the dampener through the pumped fluid.

3. Torn Bladder
   - Check for an insufficient air charge in the dampener. Properly charge the unit for the application.
   - Check for a transient high-pressure spike created by pump start up, pump shut down, vertical pipe runs, or a quick closing valve, all of which can destroy a bladder. A Surge Suppressor should be installed at the location where a pressure spike originates.

4. Excessive Bladder Wear
   - Check the size of the unit. An undersized unit does not have the capacity to absorb the volume of the pump stroke, forcing the bladder to be overworked.
   - Check the air charge in the unit. An undercharged unit will cause the bladder to rub excessively and wear against the body housing.

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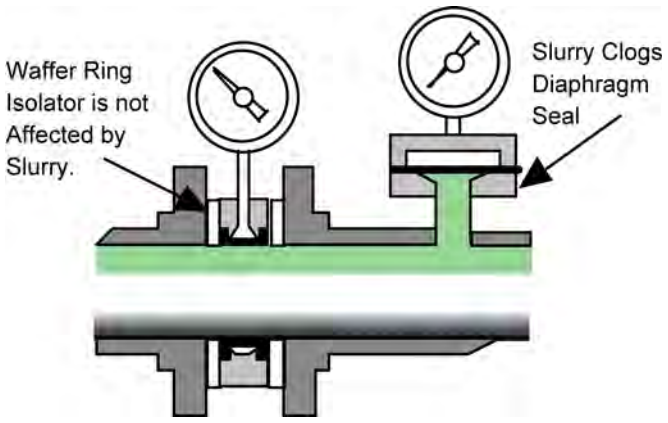
D81 Installation and Maintenance

Principle of Operation

Obtaining accurate pressure readings on waste water treatment and slurry lines is difficult because the solids present in the process media can block pressure elements such as gauges, switches and transmitters.

Isolation rings consist of a "rubber inner tube" captured in a steel ring. The assembly is installed between flanges in the process pipe. The space between this rubber membrane, housing ring and pressure instrument is vacuum filled with clear silicone oil as standard (other fluids are available on special order). As the process media flows past the isolation ring it presses against the rubber membrane causing it to bend in slightly. This pressure input is subsequently transferred via the fill fluid to the pressure instrument. The isolation ring is rated up to 1,000 psi input pressure.



The inside diameter of the ring assembly is based on ASME B36.10 pipe specifications and is sized so that it matches the adjacent pipe. This enables the isolation ring to be continually cleaned by the motion of the process fluid without any resultant build-up caused by step changes in pipe inner diameter.

Maintenance

The isolation ring is fitted with pressure instrumentation such as gauges, transducers/transmitters and pressure switches. Please refer to Winters' specification literature and pressure instruments installation, operation and maintenance guide found on www.winters.com for these accessories. The isolation ring also has a "module seal" which prevents the fill fluid from leaking out, even when the fitted pressure instruments are removed. The pressure instruments are fitted into module seal and held in place through tightening a locking ring. There should be no trace of silicone liquid present in

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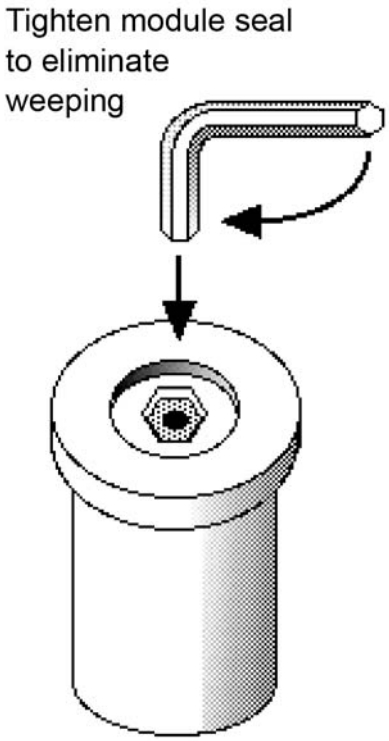
the area of the module seal However, if fill fluid is seen to be weeping from under the lock ring, then the module seal may require further adjustment. To adjust the module seal:



1. **Loosen the lock ring and carefully remove the pressure measuring instruments.**

2. **Insert a 1/4" Allen key into the module seal set screw and turn clockwise 1/8 revolution.**

3. **Reinstall the pressure measuring instruments and tighten the locking ring.**

Turning the set screw clockwise eliminates weeping but makes the fit around the needle tighter. If the module seal is too tight to reinstall the pressure measuring instrument, do not force the needle in or you risk bending/breaking the needle. Instead, loosen the set screw until the needle can be inserted easily. If fluid weeping persists, it may be necessary to tighten the set screw further. When tightening the set screw, try 1/8 turn at a time.

Storage

Correct storage of the isolation ring extends the service life. Rubber membranes are perishable if the following precautions are not taken prior to installation.

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1. **Keep isolation rings cool. They can be stored in an unheated area, but allow maximum ventilation in storage areas subject to high ambient temperatures. Trailers and storage sheds can become very hot during summer months. Avoid these locations where possible.**

2. **Avoid sunlight. UV light deteriorates rubber. Leave the isolation ring in its box.**

3. **Avoid ozone. DO NOT STORE isolation rings near electrical equipment.**

4. **If the isolation ring already has instrumentation fitted then be careful where the assembly is stored so these external devices are not physically damaged.**

5. **These separate instruments may be fitted with a "STINGER" fitting attached. DO NOT REMOVE THE RUBBER TIP PROTECTOR FROM THE "STINGER" FITTING NEEDLE UNTIL ATTACHING THEV FITTING TO THE ISOLATION RING.**

Installation

1. **Safety Considerations :**

   a. **Pressure isolation rings often handle chemically reactive (eg chlorine) and abrasive fluids. Applications such as these can result in the elastomer sleeve wearing out over time.**
   b. **Make sure that the fitted pressure instruments (gauges, switches, transmitters etc) have pressure & temperature ratings suitable for actual operating conditions. Note that isolation ring's maximum pressure rating is 1,000psi, so the pressure instruments can only be used up to this maximum rating. Process fluid that exceeds these design pressures may result in equipment damage or personal injury.**
   c. **The rubber sleeve elastomer must be chemically compatible and temperature compatible with the process fluid.**

2. **Inspect isolation ring prior to installation. Do not install if it is has been damaged in shipment. The isolation ring should not show any indication of leakage and the elastomer should be free from cuts or puncture holes.**

3. **The isolation ring can be installed at any altitude with liquid flow in either direction. Install in a straight pipe run at least 5 pipe diameters from "tees" and elbows where possible.**

4. **To install, sandwich the isolation ring between two flanges in the process pipe line. Center as carefully as possible. Install gaskets on both sides of the isolation ring. Insert the flange bolts. Tighten these bolts in criss-cross pattern.**

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Operating Instructions

1. **The isolation rings are vacuum filled at the factory.**

   a. **Do not disassemble the ring except to replace the rubber membrane.**
   b. **Do not break connections between the "Stinger" fitting and pressure instruments.**
   c. **Do not remove the rubber protector from the "Stinger" needle until ready to attach the instrument to the isolation ring.**

2. **To attach a pressure instrument (with a "Stinger" fitting) to the Isolation ring:**
   NOTE: Pressure measuring element and "Stinger" fitting must be pre-assembled and vacuum filled prior to attaching to the isolation ring.

   a. **Instruments can be attached to an isolation ring installed in the pipe line while the system is pressurised.**
   b. **Hold the pressure instrument and "Stinger" fitting assembly upright above the installation ring.**
   c. **Remove the rubber tip protector from the "Stinger" needle (see drawing below, item #5D)…. Save the rubber tip protector for future use.**
   d. **Gently push the needle (item #5D) through the rubber module seal (item #5) until it hits bottom.**
   e. **Thread the coupling ring (item #5C) onto the "stinger" fitting (item #5E). HAND TIGHTEN.**
   f. **The gauges can be rotated to face any direction by loosening the coupling ring, turning the gauge and then re-tightening the ring.**

3. **To remove pressure instruments from the isolation ring:**

   a. **It is not necessary to remove the isolation ring from the process pipe.**
   b. **In order to minimize fill fluid loss, reduce process pressure as low as possible or turn the system off before removing gauges or other instruments from the isolation ring. Turn off process fluid upstream pump prior to removing instrument from the isolation ring. The interruption will be brief, instruments can be removed in a few seconds.**
   c. **Loosen knurled coupling ring (item #5C).**
   d. **Gently lift the gauge and "Stinger" assembly out of the module seal.**
   e. **Immediately attach a rubber tip protector to the end of the "Stinger" needle.**
   f. **Tighten module seal to eliminate weeping (maintenance section).**
   g. **The pump can be switched back on and the pipe re-pressurized without losing fluid from the isolation ring.**

4. **Elastomer Sleeve and module seal replacement:**

   a. **Remove isolation ring from process line.**

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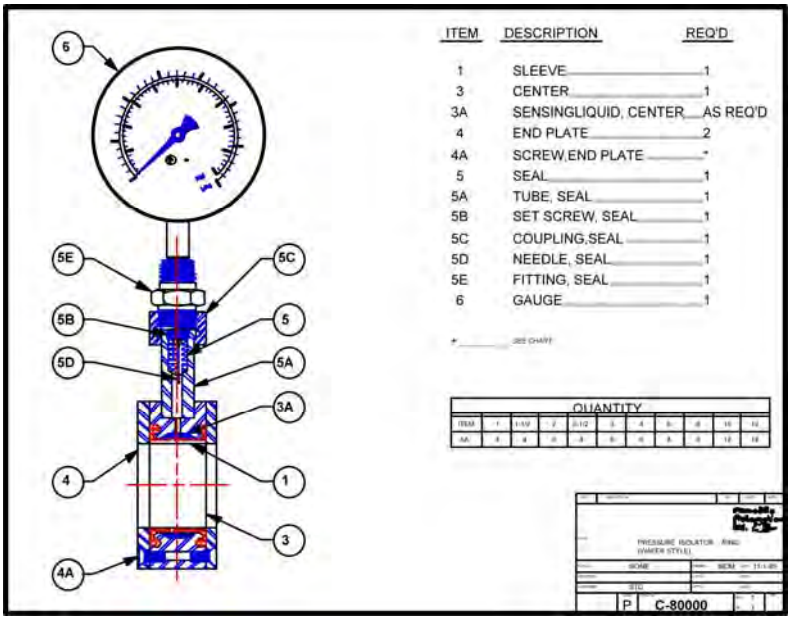
b. **Remove gauge and/or auxiliary equipment accessory (items #6, 5E).**
c. **Remove screws, end plate (item #4A).**
d. **Remove end plate (item #4).**
e. **Remove old sleeve (item #1).**
f. **Use 1/4” hex (Allen) key to remove the seal screw (item #5B).**
g. **Use a packing extractor to remove the old rubber seal (item #5).**
h. **Clean all components thoroughly.**
i. **Press new rubber seal (item #5) into the stem (item #5A). Drive all the way to bottom of bore. Replace seal screw (item #5). Do not over tighten.**
j. **Collapse new sleeve (item #1), push through housing (item #3) and work seal lips into housing grooves.**
k. **Reinstall end plates (item #4).**
l. **Replace end plate screws (item #4A).**
m. **Connect a separate “stinger” fitting (items #5E) to vacuum filling system, evacuate air from the ring assembly, and refill with fresh instrument fill fluid (silicone).**
n. **The isolation ring can now be refitted into the pipe for service.**

5. **To attach “Stinger” fitting to pressure instruments:**

a. **Attach gauge or other instrument to the “Stinger” fitting (item 5E).**
b. **Connect module seal adaptor to the vacuum filling system.**
c. **Attach the instrument assembly to the adaptor fitting.**
d. **Evacuate all the air from the instrument and fill with silicone fill fluid.**
e. **Detach the instrument from the filling system. Protect the “stinger” needle with a rubber tip protector.**
f. **The instruments can now be attached to an isolation ring or stored for future use.**



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Corporate Engineering Manager

Winters Instruments, September 2013

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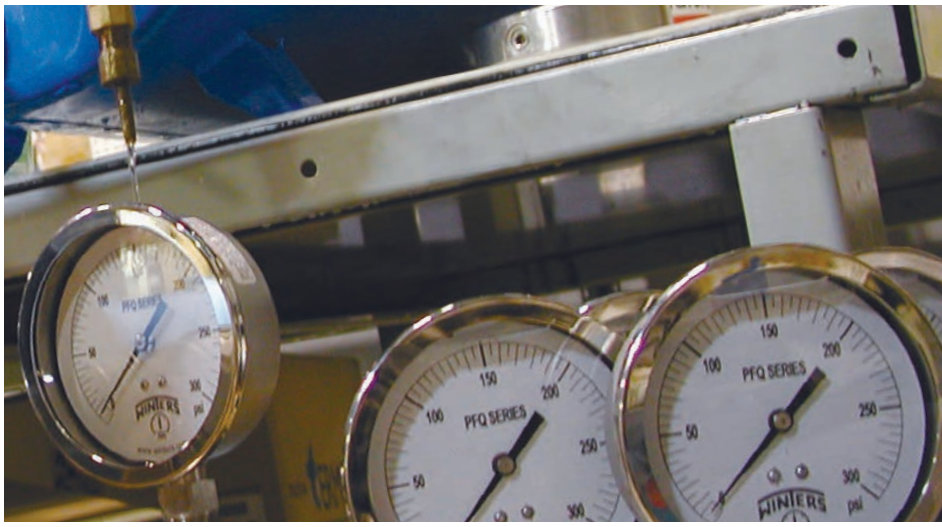

PRESSURE GAUGE INSTALLATION, OPERATION AND MAINTENANCE

WINTERS INSTRUMENTS
MANUFACTURER OF INDUSTRIAL INSTRUMENTATION

www.winters.com

Operation and Maintenance of a Pressure Gauge

Inspection Frequency

The frequency of inspection is dependent on the severity of service and how critical the accuracy of the indicating pressure is. The inspection frequency can range from monthly to annual basis. To ensure the accuracy of your pressure readings **it is strongly recommended that all pressure gauges be recalibrated and certified each year. Winters provides test certification that are traceable to the National Institute of Standards and Technology (NIST).**

Isolating Valves

It is recommended that isolating valves be fitted with the gauge. This enables the gauge to be removed at any time for checking, recalibration or replacing without interruption to the process. The valves should be opened or closed slowly to avoid sudden changes to pressure being applied to the gauge. It is recommended for systems that have an abrupt pressure surge at start-up to close the valves during initial start-up. Winters carries various types of valves.

Materials

Brass wetted parts are suitable for use on the following types of media: air, oil, water and other non-corrosive fluids. For corrosive fluids, stainless steel should be specified. For special applications, other materials such as Monel® can be used as well. Diaphragm seals may also be considered. Please consult Winters Instruments for assistance.

Pulsation

If pressures are expected to pulsate violently, oscillate with high frequency or occur with sudden shock, a snubber should be considered. Winters' snubbers incorporate sintered porous 316 stainless steel snubbing element with a large surface area to ensure long term effectiveness on most pressure media. Snubbers are available in three viscosity classifications: heavy oil, water and air. Brass, stainless steel or Monel® housing can be specified depending upon the media used.

Storage

All pressure gauges should be placed in dry storage under ambient room temperatures. It is recommended to store pressure gauges in their original packing boxes.

Temperatures

Dry gauge ambient temp.
-40°C to 70°C
-40°F to 158°F

Filled gauge ambient temp.
-25°C to 65°C
-13°F to 149°F

The normal ambient temperature ranges are -40°C to 70°C (-40°F to 158°F) for dry gauges and -25°C to 65°C (-13°F to 149°F) for glycerin filled gauges. Process temperature up to 400°C (752°F) can be accommodated when gauge is dry AND appropriate external cooling is applied. In situations where the process temperature is extreme, utilizing a syphon or remote mounting the pressure gauge with a capillary and diaphragm seal are reasonable alternatives. In general, a gauge is unduly hot if it cannot be grasped by hand without discomfort. It should be noted that gauges used on water might burst if exposed to frost.

Vibration

Vibration can affect the dial reading of pressure gauges. These areas should be avoided as much as possible. Vibration effects can be minimized by the use of a dampening liquid such as glycerin or silicone. If vibration is extreme, then a flexible tube connected to an appropriate diaphragm seal should be considered. A Winters StabiliZR™ movement can also be used to improve dial reading.

Installation of a Pressure Gauge

Location
Vibration and extreme ambient temperatures can affect the dial reading of the pressure gauge. These areas should be avoided as much as possible.

Mounting
A suitable thread sealant is required for NPT threads such as pipe dope or Teflon® tape. Never use any part of the pressure gauge other than the wrench flats that is on the gauge socket. Always tighten with an open end or adjustable wrench on the wrench flats. Failure to do so will severely damage the pressure gauge.

Venting Procedures
Due to pressure build up, some gauges (usually lower pressure ranges such as vacuum, up to 100 psi) may reflect a reading that is slightly "off zero". To properly "vent" the pressure gauge, cut off the tip of the fill plug after you have installed the instrument. This allows the gauge to be equal to the atmospheric pressure.

Recalibration Procedures

Inspect the pressure gauge for "zero reading" when there is no applied pressure. In many cases, the gauge pointer can simply be adjusted for the gauge to work within specifications. However, if the gauge requires calibration, then follow the procedures below*.

1. Remove the ring and lens
2. Slowly pressurize the gauge to its full scale and slowly release the pressure back down to zero
3. Check the gauge at a minimum of four equal pressure intervals against a certified test gauge*
4. Adjust the movement accordingly by removing the pointer with a pointer extractor. Be careful not to bend the pointer shaft
5. Remove the dial plate by loosening the holding screws
6. When adjustments are completed, replace the dial plate and pointer
7. Re-check the gauge for accuracy
8. Check lens assembly gasket for any deformation, tears or cracks. If there are any visual defects, contact Winters to get a replacement gasket
9. Re-assemble the lens assembly

*Winters can recalibrate and provide test certificates that are traceable to NIST

Replacing the lens
To replace a broken lens, check to see if the lens is held on by a bayonet or snap-on ring. To remove a bayonet ring, unscrew using a rubber belt wrench. To remove a snap-on ring, remove any screws holding the ring in place. Then pry off the ring with a small screwdriver. Remove all glass chips, insert new lens and re-insert the bayonet or snap-on ring. With snap-on rings, locate the ring joint at the bottom of the gauge. Crimp-on rings cannot be replaced once removed. If you would like to replace the lens or remove/replace crimp-on rings, please contact Winters.

Replacing the pointer
Remove bayonet or snap-on ring as previously described above. Remove old pointer with pointer extractor or two small screwdrivers opposite each other under pointer hub. Pry off evenly, being careful not to bend the pointer shaft. Install new pointer on zero. NOTE: Gauges with a zero stop pin must have the pointer set at a reference pressure (preferable mid-scale) to offset the preload against the stop pin. Re-install the lens.

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04/13

APPENDIX K

HMI / PLC PROGRAMMING

Event Manager

Project Name : C:¥Documents and Settings¥staff.DAYOFFICE¥Desktop¥rocity_rfa_090215.eap
Total No. Of Events Defined : 23
No. Of Tag Events : 23
No. Of Day & Time Events : 0
No. Of Screen Events : 0

Event No1
Event Type : Tag
Event Name : FEED_TANK_LAH
Tag Name : *FEED_TANK_LAH*
Event State : ON
[Alarm]
Text : 1 - FEED TANK HIGH LEVEL ALARM
Show in Alarm History : True
Confirmation : False
Save File : False
Display : True
Text Color (Blink) : 14(False)
Back Color (Blink) : 16(True)

Event No2
Event Type : Tag
Event Name : STRIP_SUMP_LAH
Tag Name : *STRIP_SUMP_LAH*
Event State : ON
[Alarm]
Text : 1 - AIR STRIPPER SUMP HIGH LEVEL ALARM
Show in Alarm History : True
Confirmation : False
Save File : False
Display : True
Text Color (Blink) : 15(False)
Back Color (Blink) : 16(True)

Event No3
Event Type : Tag
Event Name : DISCHARGE_TANK_LAH
Tag Name : *DISCHARGE_TANK_LAH*
Event State : ON
[Alarm]
Text : 1 - DISCHARGE TANK HIGH LEVEL ALARM
Show in Alarm History : True
Confirmation : False
Save File : False
Display : True
Text Color (Blink) : 15(False)
Back Color (Blink) : 16(True)

Event No4
Event Type : Tag
Event Name : FLOOR_SUMP_LAH
Tag Name : *FLOOR_SUMP_LAH*
Event State : ON
[Alarm]
Text : 1 - FLOOR SUMP HIGH LEVEL ALARM
Show in Alarm History : True
Confirmation : False
Save File : False
Display : True
Text Color (Blink) : 15(False)
Back Color (Blink) : 16(True)

Event No5
Event Type : Tag
Event Name : GW_P1_FAIL
Tag Name : *GW_P1_FAIL*
Event State : ON
[Alarm]
Text : 1 - GROUNDWATER PUMP 1 FAIL ALARM
Show in Alarm History : True
Confirmation : False
Save File : False
Display : True
Text Color (Blink) : 15(False)
Back Color (Blink) : 16(True)

Event No6
Event Type : Tag

Event Name : GW_P2_FAIL
Tag Name : *GW_P2_FAIL*
Event State : ON
[Alarm]
Text : 1 - GROUNDWATER PUMP 2 FAIL ALARM
Show in Alarm History : True
Confirmation : False
Save File : False
Display : True
Text Color (Blink) : 15(False)
Back Color (Blink) : 16(True)

Event No7
Event Type : Tag
Event Name : FEED_P1_FAIL
Tag Name : *FEED_P1_FAIL*
Event State : ON
[Alarm]
Text : 1 - FEED TANK PUMP 1 FAIL ALARM
Show in Alarm History : True
Confirmation : False
Save File : False
Display : True
Text Color (Blink) : 15(False)
Back Color (Blink) : 16(True)

Event No8
Event Type : Tag
Event Name : FEED_P2_FAIL
Tag Name : *FEED_P2_FAIL*
Event State : ON
[Alarm]
Text : 1 - FEED TANK PUMP 2 FAIL ALARM
Show in Alarm History : True
Confirmation : False
Save File : False
Display : True
Text Color (Blink) : 15(False)
Back Color (Blink) : 16(True)

Event No9
Event Type : Tag
Event Name : DISCHARGE_P1_FAIL
Tag Name : *DISCHARGE_P1_FAIL*
Event State : ON
[Alarm]
Text : 1 - DISCHARGE TANK PUMP 1 FAIL ALARM
Show in Alarm History : True
Confirmation : False
Save File : False
Display : True
Text Color (Blink) : 15(False)
Back Color (Blink) : 16(True)

Event No10
Event Type : Tag
Event Name : DISCHARGE_P2_FAIL
Tag Name : *DISCHARGE_P2_FAIL*
Event State : ON
[Alarm]
Text : 1 - DISCHARGE PUMP 2 FAIL ALARM
Show in Alarm History : True
Confirmation : False
Save File : False
Display : True
Text Color (Blink) : 15(False)
Back Color (Blink) : 16(True)

Event No11
Event Type : Tag
Event Name : SUMP_P1_FAIL
Tag Name : *SUMP_P1_FAIL*
Event State : ON
[Alarm]
Text : 1 - FLOOR SUMP PUMP 1 FAIL ALARM
Show in Alarm History : True
Confirmation : False
Save File : False
Display : True

Text Color (Blink) : 15(False)
Back Color (Blink) : 16(True)

Event No12
Event Type : Tag
Event Name : SUMP_P2_FAIL
Tag Name : *SUMP_P2_FAIL*
Event State : ON
[Alarm]
Text : 1 - FLOOR SUMP PUMP 2 FAIL ALARM
Show in Alarm History : True
Confirmation : False
Save File : False
Display : True
Text Color (Blink) : 15(False)
Back Color (Blink) : 16(True)

Event No13
Event Type : Tag
Event Name : STRIP_P1_FAIL
Tag Name : *STRIP_P1_FAIL*
Event State : ON
[Alarm]
Text : 1 - AIR STRIPPER PUMP 1 FAIL ALARM
Show in Alarm History : True
Confirmation : False
Save File : False
Display : True
Text Color (Blink) : 15(False)
Back Color (Blink) : 16(True)

Event No14
Event Type : Tag
Event Name : STRIP_P2_FAIL
Tag Name : *STRIP_P2_FAIL*
Event State : ON
[Alarm]
Text : 1 - AIR STRIPPER PUMP 2 FAIL ALARM
Show in Alarm History : True
Confirmation : False
Save File : False
Display : True
Text Color (Blink) : 15(False)
Back Color (Blink) : 16(True)

Event No15
Event Type : Tag
Event Name : STRIP_B1_FAIL
Tag Name : *STRIP_B1_FAIL*
Event State : ON
[Alarm]
Text : 1 - AIR STRIPPER BLOWER 1 FAIL ALARM
Show in Alarm History : True
Confirmation : False
Save File : False
Display : True
Text Color (Blink) : 15(False)
Back Color (Blink) : 16(True)

Event No16
Event Type : Tag
Event Name : STRIP_B2_FAIL
Tag Name : *STRIP_B2_FAIL*
Event State : ON
[Alarm]
Text : 1 - AIR STRIPPER BLOWER 2 FAIL ALARM
Show in Alarm History : True
Confirmation : False
Save File : False
Display : True
Text Color (Blink) : 15(False)
Back Color (Blink) : 16(True)

Event No17
Event Type : Tag
Event Name : 24V_POWER_FAIL
Tag Name : *24V_POWER_FAIL*
Event State : ON
[Alarm]

Text : 1 - 24-VOLT POWER SUPPLY FAIL ALARM
Show in Alarm History : True
Confirmation : False
Save File : False
Display : True
Text Color (Blink) : 15(False)
Back Color (Blink) : 16(True)

Event No18
Event Type : Tag
Event Name : INFLOW_METER_FAIL
Tag Name : *FLOW_IN_ANALOG_FAIL*
Event State : ON
[Alarm]
Text : 1 - INFLUENT FLOWMETER FAILURE ALARM
Show in Alarm History : True
Confirmation : False
Save File : False
Display : True
Text Color (Blink) : 15(False)
Back Color (Blink) : 16(True)

Event No19
Event Type : Tag
Event Name : OUTFLO_METER_FAIL
Tag Name : *FLOW_OUT_ANALOG_FAIL*
Event State : ON
[Alarm]
Text : 1 - EFFLUENT FLOWMETER FAILURE ALARM
Show in Alarm History : True
Confirmation : False
Save File : False
Display : True
Text Color (Blink) : 15(False)
Back Color (Blink) : 16(True)

Event No20
Event Type : Tag
Event Name : FEED_ANALOG_FAIL
Tag Name : *FEED_TANK_LEVEL_ANALOG_FAIL*
Event State : ON
[Alarm]
Text : 1 - FEED TANK ANALOG LEVEL SENSOR FAIL
Show in Alarm History : True
Confirmation : False
Save File : False
Display : True
Text Color (Blink) : 15(False)
Back Color (Blink) : 16(True)

Event No21
Event Type : Tag
Event Name : DISCH_ANALOG_FAIL
Tag Name : *DISCH_TANK_LEVEL_FT*100*
Condition : Outside Range
Limit Min : 0
Limit Max : 65535
[Alarm]
Text : 1 - DISCHARGE TANK ANALOG LEVEL SENSOR FAIL
Show in Alarm History : True
Confirmation : False
Save File : False
Display : True
Text Color (Blink) : 15(False)
Back Color (Blink) : 16(True)

Event No22
Event Type : Tag
Event Name : GWT_ANALOG_FAIL
Tag Name : *GW_TRENCH_LEVEL_ANALOG_FAIL*
Event State : ON
[Alarm]
Text : 1 - GROUNDWATER TRENCH ANALOG LEVEL SENSOR FAIL
Show in Alarm History : True
Confirmation : False
Save File : False
Display : True
Text Color (Blink) : 15(False)
Back Color (Blink) : 16(True)

Event No23

Event Type : Tag
Event Name : FIRE_STA_ALARM
Tag Name : *FIRE_STA_ALARM*
Event State : ON

[Alarm]

Text : 1 - TRAINING GROUNDS PUMP STATION ALARM
Show in Alarm History : True
Confirmation : False
Save File : False
Display : True
Text Color (Blink) : 15(False)
Back Color (Blink) : 16(True)

Message Database

Project Name	: C:¥Documents and Settings¥staff.DAYOFFICE¥Desktop¥rocity_rfa_090215.eap
Total No Of Message	: 0

Address Book

Project Name	: C:¥Documents and Settings¥staff.DAYOFFICE¥Desktop¥rocity_rfa_090215.eap
Total No Of Mail Address	: 0
Total No Of FTP Address	: 0

Tag Database

Project Name : C:¥Documents and Settings¥staff.DAYOFFICE¥Desktop¥rocity_rfa_090215.eap
No Of Internal Tags : 0
No Of PLC Tags : 204
PLC Protocol : DEV001: Allen-Bradley DF1 Full Duplex (SLC500)

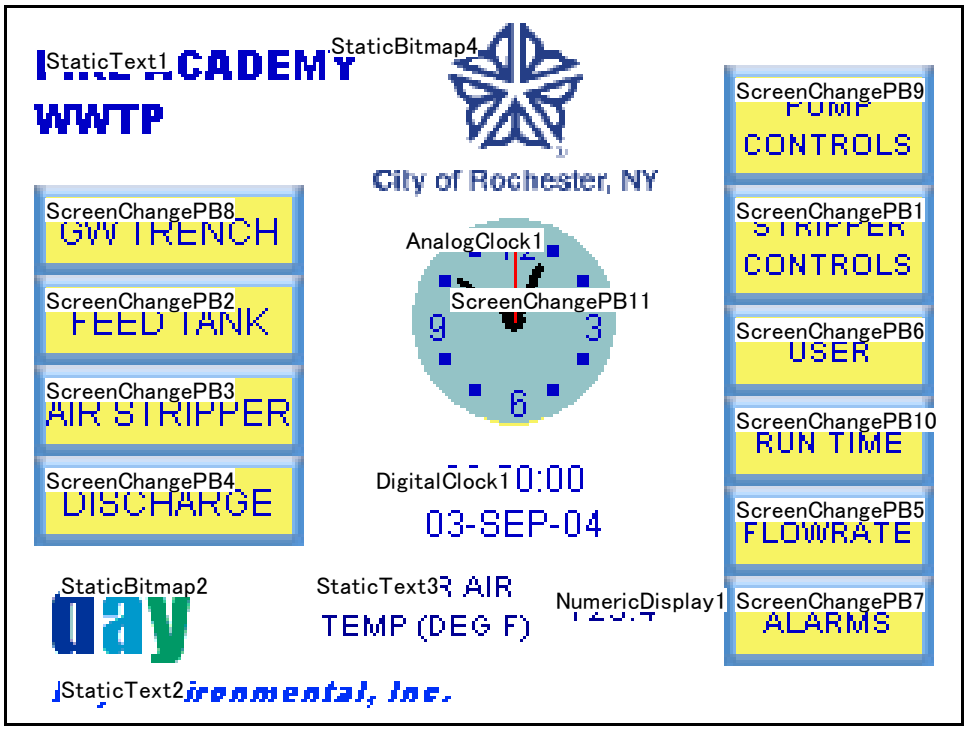
DEV001

Tag No	Tag Name	Data Type	Data Count	Retentive	Address	Array Start	Array End
1	24V_POWER_FAIL	Discrete	1	False	B3:4/12	0	0
2	ALARM_RESET	Discrete	1	False	B3:0/07	0	0
3	C_BLOW1RUN_HR	Unsigned int 16	1	False	C5:42.ACC	0	0
4	C_BLOW1RUN_MIN	Unsigned int 16	1	False	C5:41.ACC	0	0
5	C_BLOW2RUN_HR	Unsigned int 16	1	False	C5:45.ACC	0	0
6	C_BLOW2RUN_MIN	Unsigned int 16	1	False	C5:44.ACC	0	0
7	C_DISCP1RUN_HR	Unsigned int 16	1	False	C5:30.ACC	0	0
8	C_DISCP1RUN_MIN	Unsigned int 16	1	False	C5:29.ACC	0	0
9	C_DISCP2RUN_HR	Unsigned int 16	1	False	C5:33.ACC	0	0
10	C_DISCP2RUN_MIN	Unsigned int 16	1	False	C5:32.ACC	0	0
11	C_FEEDP1RUN_HR	Unsigned int 16	1	False	C5:18.ACC	0	0
12	C_FEEDP1RUN_MIN	Unsigned int 16	1	False	C5:17.ACC	0	0
13	C_FEEDP2RUN_HR	Unsigned int 16	1	False	C5:21.ACC	0	0
14	C_FEEDP2RUN_MIN	Unsigned int 16	1	False	C5:20.ACC	0	0
15	C_GWP1RUN_HR	Unsigned int 16	1	False	C5:12.ACC	0	0
16	C_GWP1RUN_MIN	Unsigned int 16	1	False	C5:11.ACC	0	0
17	C_GWP2RUN_HR	Unsigned int 16	1	False	C5:15.ACC	0	0
18	C_GWP2RUN_MIN	Unsigned int 16	1	False	C5:14.ACC	0	0
19	C_STRIPP1RUN_HR	Unsigned int 16	1	False	C5:24.ACC	0	0
20	C_STRIPP1RUN_MIN	Unsigned int 16	1	False	C5:23.ACC	0	0
21	C_STRIPP2RUN_HR	Unsigned int 16	1	False	C5:27.ACC	0	0
22	C_STRIPP2RUN_MIN	Unsigned int 16	1	False	C5:26.ACC	0	0
23	C_SUMPP1RUN_HR	Unsigned int 16	1	False	C5:36.ACC	0	0
24	C_SUMPP1RUN_MIN	Unsigned int 16	1	False	C5:35.ACC	0	0
25	C_SUMPP2RUN_HR	Unsigned int 16	1	False	C5:39.ACC	0	0
26	C_SUMPP2RUN_MIN	Unsigned int 16	1	False	C5:38.ACC	0	0
27	CLOCKSET_DAY	Unsigned int 16	1	False	N10:6	0	0
28	CLOCKSET_HR	Unsigned int 16	1	False	N10:0	0	0
29	CLOCKSET_MIN	Unsigned int 16	1	False	N10:2	0	0
30	CLOCKSET_MONTH	Unsigned int 16	1	False	N10:4	0	0
31	CLOCKSET_YR	Unsigned int 16	1	False	N10:8	0	0
32	DAY1_DAY	Unsigned int 16	1	False	N11:2	0	0
33	DAY1_FLOW	Unsigned int 16	1	False	N11:0	0	0
34	DAY1_MONTH	Unsigned int 16	1	False	N11:1	0	0
35	DAY1_TOTAL1	Unsigned int 16	1	False	N11:3	0	0
36	DAY1_TOTAL2	Unsigned int 16	1	False	N11:4	0	0
37	DAY10_DAY	Unsigned int 16	1	False	N11:47	0	0
38	DAY10_FLOW	Unsigned int 16	1	False	N11:45	0	0
39	DAY10_MONTH	Unsigned int 16	1	False	N11:46	0	0
40	DAY10_TOTAL1	Unsigned int 16	1	False	N11:48	0	0
41	DAY10_TOTAL2	Unsigned int 16	1	False	N11:49	0	0
42	DAY11_DAY	Unsigned int 16	1	False	N11:52	0	0
43	DAY11_FLOW	Unsigned int 16	1	False	N11:50	0	0
44	DAY11_MONTH	Unsigned int 16	1	False	N11:51	0	0
45	DAY11_TOTAL1	Unsigned int 16	1	False	N11:53	0	0
46	DAY11_TOTAL2	Unsigned int 16	1	False	N11:54	0	0
47	DAY12_DAY	Unsigned int 16	1	False	N11:57	0	0
48	DAY12_FLOW	Unsigned int 16	1	False	N11:55	0	0
49	DAY12_MONTH	Unsigned int 16	1	False	N11:56	0	0
50	DAY12_TOTAL1	Unsigned int 16	1	False	N11:58	0	0
51	DAY12_TOTAL2	Unsigned int 16	1	False	N11:59	0	0
52	DAY13_DAY	Unsigned int 16	1	False	N11:62	0	0
53	DAY13_FLOW	Unsigned int 16	1	False	N11:60	0	0
54	DAY13_MONTH	Unsigned int 16	1	False	N11:61	0	0
55	DAY13_TOTAL1	Unsigned int 16	1	False	N11:63	0	0
56	DAY13_TOTAL2	Unsigned int 16	1	False	N11:64	0	0
57	DAY14_DAY	Unsigned int 16	1	False	N11:67	0	0
58	DAY14_FLOW	Unsigned int 16	1	False	N11:65	0	0
59	DAY14_MONTH	Unsigned int 16	1	False	N11:66	0	0
60	DAY14_TOTAL1	Unsigned int 16	1	False	N11:68	0	0
61	DAY14_TOTAL2	Unsigned int 16	1	False	N11:69	0	0
62	DAY2_DAY	Unsigned int 16	1	False	N11:7	0	0
63	DAY2_FLOW	Unsigned int 16	1	False	N11:5	0	0
64	DAY2_MONTH	Unsigned int 16	1	False	N11:6	0	0
65	DAY2_TOTAL1	Unsigned int 16	1	False	N11:8	0	0
66	DAY2_TOTAL2	Unsigned int 16	1	False	N11:9	0	0
67	DAY3_DAY	Unsigned int 16	1	False	N11:12	0	0
68	DAY3_FLOW	Unsigned int 16	1	False	N11:10	0	0
69	DAY3_MONTH	Unsigned int 16	1	False	N11:11	0	0
70	DAY3_TOTAL1	Unsigned int 16	1	False	N11:13	0	0
71	DAY3_TOTAL2	Unsigned int 16	1	False	N11:14	0	0
72	DAY4_DAY	Unsigned int 16	1	False	N11:17	0	0

Tag No	Tag Name	Data Type	Data Count	Retentive	Address	Array Start	Array End
73	DAY4_FLOW	Unsigned int 16	1	False	N11:15	0	0
74	DAY4_MONTH	Unsigned int 16	1	False	N11:16	0	0
75	DAY4_TOTAL1	Unsigned int 16	1	False	N11:18	0	0
76	DAY4_TOTAL2	Unsigned int 16	1	False	N11:19	0	0
77	DAY5_DAY	Unsigned int 16	1	False	N11:22	0	0
78	DAY5_FLOW	Unsigned int 16	1	False	N11:20	0	0
79	DAY5_MONTH	Unsigned int 16	1	False	N11:21	0	0
80	DAY5_TOTAL1	Unsigned int 16	1	False	N11:23	0	0
81	DAY5_TOTAL2	Unsigned int 16	1	False	N11:24	0	0
82	DAY6_DAY	Unsigned int 16	1	False	N11:27	0	0
83	DAY6_FLOW	Unsigned int 16	1	False	N11:25	0	0
84	DAY6_MONTH	Unsigned int 16	1	False	N11:26	0	0
85	DAY6_TOTAL1	Unsigned int 16	1	False	N11:28	0	0
86	DAY6_TOTAL2	Unsigned int 16	1	False	N11:29	0	0
87	DAY7_DAY	Unsigned int 16	1	False	N11:32	0	0
88	DAY7_FLOW	Unsigned int 16	1	False	N11:30	0	0
89	DAY7_MONTH	Unsigned int 16	1	False	N11:31	0	0
90	DAY7_TOTAL1	Unsigned int 16	1	False	N11:33	0	0
91	DAY7_TOTAL2	Unsigned int 16	1	False	N11:34	0	0
92	DAY8_DAY	Unsigned int 16	1	False	N11:37	0	0
93	DAY8_FLOW	Unsigned int 16	1	False	N11:35	0	0
94	DAY8_MONTH	Unsigned int 16	1	False	N11:36	0	0
95	DAY8_TOTAL1	Unsigned int 16	1	False	N11:38	0	0
96	DAY8_TOTAL2	Unsigned int 16	1	False	N11:39	0	0
97	DAY9_DAY	Unsigned int 16	1	False	N11:42	0	0
98	DAY9_FLOW	Unsigned int 16	1	False	N11:40	0	0
99	DAY9_MONTH	Unsigned int 16	1	False	N11:41	0	0
100	DAY9_TOTAL1	Unsigned int 16	1	False	N11:43	0	0
101	DAY9_TOTAL2	Unsigned int 16	1	False	N11:44	0	0
102	DISCH_P1_GPM	Unsigned int 16	1	False	N9:36	0	0
103	DISCH_P2_GPM	Unsigned int 16	1	False	N9:37	0	0
104	DISCH_TANK_LEVEL_ANALOG_FAIL	Discrete	1	False	B3:3/11	0	0
105	DISCH_TANK_LEVEL_FT*100	Unsigned int 16	1	False	N7:6	0	0
106	DISCHARGE_P1/2_RUNNING	Discrete	1	False	B3:0/10	0	0
107	DISCHARGE_P1_AUTO	Discrete	1	False	B3:2/04	0	0
108	DISCHARGE_P1_FAIL	Discrete	1	False	B3:4/04	0	0
109	DISCHARGE_P1_HAND	Discrete	1	False	B3:1/04	0	0
110	DISCHARGE_P1_RUNNING	Discrete	1	False	I:2/12	0	0
111	DISCHARGE_P2_AUTO	Discrete	1	False	B3:2/05	0	0
112	DISCHARGE_P2_FAIL	Discrete	1	False	B3:4/05	0	0
113	DISCHARGE_P2_HAND	Discrete	1	False	B3:1/05	0	0
114	DISCHARGE_P2_RUNNING	Discrete	1	False	I:2/13	0	0
115	DISCHARGE_TANK_LAH	Discrete	1	False	B3:3/02	0	0
116	DISCHARGE_TANK_LSHH	Discrete	1	False	I:2/04	0	0
117	FEED_P1/2_RUNNING	Discrete	1	False	B3:0/09	0	0
118	FEED_P1_AUTO	Discrete	1	False	B3:2/02	0	0
119	FEED_P1_FAIL	Discrete	1	False	B3:4/02	0	0
120	FEED_P1_GPM	Unsigned int 16	1	False	N9:32	0	0
121	FEED_P1_HAND	Discrete	1	False	B3:1/02	0	0
122	FEED_P1_RUNNING	Discrete	1	False	I:2/10	0	0
123	FEED_P2_AUTO	Discrete	1	False	B3:2/03	0	0
124	FEED_P2_FAIL	Discrete	1	False	B3:4/03	0	0
125	FEED_P2_GPM	Unsigned int 16	1	False	N9:33	0	0
126	FEED_P2_HAND	Discrete	1	False	B3:1/03	0	0
127	FEED_P2_RUNNING	Discrete	1	False	I:2/11	0	0
128	FEED_TANK_LAH	Discrete	1	False	B3:3/00	0	0
129	FEED_TANK_LEVEL_ANALOG_FAIL	Discrete	1	False	B3:3/10	0	0
130	FEED_TANK_LEVEL_FT*100	Unsigned int 16	1	False	N7:5	0	0
131	FEED_TANK_LSHH	Discrete	1	False	I:2/00	0	0
132	FIRE_STA_ALARM	Discrete	1	False	B3:3/04	0	0
133	FIRE_STA_ALARM_DISABLE_PB	Discrete	1	False	B3:5/06	0	0
134	FIRE_STA_ALARM_ENABLE_PB	Discrete	1	False	B3:5/05	0	0
135	FIRE_STA_ALARM_ENABLED	Discrete	1	False	B3:0/14	0	0
136	FLOOR_SUMP_LAH	Discrete	1	False	B3:3/03	0	0
137	FLOOR_SUMP_LSH	Discrete	1	False	I:2/06	0	0
138	FLOOR_SUMP_LSHH	Discrete	1	False	I:3/06	0	0
139	FLOOR_SUMP_LSL	Discrete	1	False	I:2/05	0	0
140	FLOW_IN_ANALOG_FAIL	Discrete	1	False	B3:3/08	0	0
141	FLOW_IN_GPM*10	Unsigned int 16	1	False	N7:0	0	0
142	FLOW_OUT_ANALOG_FAIL	Discrete	1	False	B3:3/09	0	0
143	FLOW_OUT_GPM*10	Unsigned int 16	1	False	N7:1	0	0
144	GW_LEVEL_FEET	Unsigned int 16	1	False	N7:4	0	0
145	GW_LEVEL_PUMP_OFF	Unsigned int 16	1	False	N7:31	0	0
146	GW_LEVEL_PUMP_ON	Unsigned int 16	1	False	N7:30	0	0
147	GW_P1/2_RUNNING	Discrete	1	False	B3:0/08	0	0
148	GW_P1_AUTO	Discrete	1	False	B3:2/00	0	0
149	GW_P1_FAIL	Discrete	1	False	B3:4/00	0	0
150	GW_P1_GPM	Unsigned int 16	1	False	N9:30	0	0
151	GW_P1_HAND	Discrete	1	False	B3:1/00	0	0
152	GW_P1_RUNNING	Discrete	1	False	I:2/08	0	0

Tag No	Tag Name	Data Type	Data Count	Retentive	Address	Array Start	Array End
153	GW_P2_AUTO	Discrete	1	False	B3:2/01	0	0
154	GW_P2_FAIL	Discrete	1	False	B3:4/01	0	0
155	GW_P2_GPM	Unsigned int 16	1	False	N9:31	0	0
156	GW_P2_HAND	Discrete	1	False	B3:1/01	0	0
157	GW_P2_RUNNING	Discrete	1	False	I:2/09	0	0
158	GW_TRENCH_LEVEL_ANALOG_FAIL	Discrete	1	False	B3:3/12	0	0
159	INDOOR AIR TEMP DEG F	Unsigned int 16	1	False	N7:7	0	0
160	INFLOW_TOTAL_HUNDREDS	Unsigned int 16	1	False	N7:2	0	0
161	INFLOW_TOTAL_RESET	Discrete	1	False	B3:5/03	0	0
162	INFLOW_TOTAL_THOUSANDS	Unsigned int 16	1	False	C5:0.ACC	0	0
163	OUTFLOW_TOTAL_HUNDREDS	Unsigned int 16	1	False	N7:3	0	0
164	OUTFLOW_TOTAL_RESET	Discrete	1	False	B3:5/04	0	0
165	OUTFLOW_TOTAL_THOUSANDS	Unsigned int 16	1	False	C5:2.ACC	0	0
166	RTC_DAY	Unsigned int 16	1	False	S:39	0	0
167	RTC_HOUR	Unsigned int 16	1	False	S:40	0	0
168	RTC_MIN	Unsigned int 16	1	False	S:41	0	0
169	RTC_MONTH	Unsigned int 16	1	False	S:38	0	0
170	RTC_SEC	Unsigned int 16	1	False	S:42	0	0
171	RTC_YEAR	Unsigned int 16	1	False	S:37	0	0
172	STRIP_B1/2_RUNNING	Discrete	1	False	B3:0/13	0	0
173	STRIP_B1_AUTO	Discrete	1	False	B3:2/10	0	0
174	STRIP_B1_FAIL	Discrete	1	False	B3:4/10	0	0
175	STRIP_B1_HAND	Discrete	1	False	B3:1/10	0	0
176	STRIP_B1_RUNNING	Discrete	1	False	I:3/00	0	0
177	STRIP_B2_AUTO	Discrete	1	False	B3:2/11	0	0
178	STRIP_B2_FAIL	Discrete	1	False	B3:4/11	0	0
179	STRIP_B2_HAND	Discrete	1	False	B3:1/11	0	0
180	STRIP_B2_RUNNING	Discrete	1	False	I:3/01	0	0
181	STRIP_P1/2_RUNNING	Discrete	1	False	B3:0/12	0	0
182	STRIP_P1_AUTO	Discrete	1	False	B3:2/08	0	0
183	STRIP_P1_FAIL	Discrete	1	False	B3:4/08	0	0
184	STRIP_P1_GPM	Unsigned int 16	1	False	N9:34	0	0
185	STRIP_P1_HAND	Discrete	1	False	B3:1/08	0	0
186	STRIP_P1_RUNNING	Discrete	1	False	I:3/02	0	0
187	STRIP_P2_AUTO	Discrete	1	False	B3:2/09	0	0
188	STRIP_P2_FAIL	Discrete	1	False	B3:4/09	0	0
189	STRIP_P2_GPM	Unsigned int 16	1	False	N9:35	0	0
190	STRIP_P2_HAND	Discrete	1	False	B3:1/09	0	0
191	STRIP_P2_RUNNING	Discrete	1	False	I:3/03	0	0
192	STRIP_SUMP_LAH	Discrete	1	False	B3:3/01	0	0
193	STRIP_SUMP_LSH	Discrete	1	False	I:2/02	0	0
194	STRIP_SUMP_LSHH	Discrete	1	False	I:2/03	0	0
195	STRIP_SUMP_LSL	Discrete	1	False	I:2/01	0	0
196	SUMP_P1/2_RUNNING	Discrete	1	False	B3:0/11	0	0
197	SUMP_P1_AUTO	Discrete	1	False	B3:2/06	0	0
198	SUMP_P1_FAIL	Discrete	1	False	B3:4/06	0	0
199	SUMP_P1_HAND	Discrete	1	False	B3:1/06	0	0
200	SUMP_P1_RUNNING	Discrete	1	False	I:2/14	0	0
201	SUMP_P2_AUTO	Discrete	1	False	B3:2/07	0	0
202	SUMP_P2_FAIL	Discrete	1	False	B3:4/07	0	0
203	SUMP_P2_HAND	Discrete	1	False	B3:1/07	0	0
204	SUMP_P2_RUNNING	Discrete	1	False	I:2/15	0	0

1 - MAIN MENU



Project Name		: C:¥Documents and Settings¥staff.DAYOFFICE¥Desktop¥rocity_rfa_090215.eap
Screen Description		:

[Main]	Name	: ScreenChangePB1
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 60,240 100,310 70 40
[General]	Label	: False
	Text	: 1 - STRIPPER CONTROLS
		: 2 - Screen
	Text Color (Blink)	: 51(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 7/STRIPPER CONTROLS
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: ScreenChangePB2
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 90,10 120,100 90 30
[General]	Label	: False
	Text	: 1 - FEED TANK
		: 2 - Screen
	Text Color (Blink)	: 51(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 3/FEED TANK
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: ScreenChangePB3
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 120,10 150,100 90 30
[General]	Label	: False
	Text	: 1 - AIR STRIPPER
		: 2 - Screen
	Text Color (Blink)	: 51(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 4/AIR STRIPPER
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: ScreenChangePB4
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 150,10 180,100 90 30
[General]	Label	: False
	Text	: 1 - DISCHARGE
		: 2 - Screen
	Text Color (Blink)	: 51(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 5/DISCHARGE
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: ScreenChangePB6
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 100,240 130,310 70 30
[General]	Label	: False
	Text	: 1 - USER
		: 2 - Screen
	Text Color (Blink)	: 51(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 8/SETPOINTS
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: ScreenChangePB7
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 190,240 220,310 70 30
[General]	Label	: False
	Text	: 1 - ALARMS
		: 2 - Screen
	Text Color (Blink)	: 51(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 11/ALARMS
[Visibility]	Object Visibility Option	: False

[Password]	Password Option	: False

[Main]	Name	: StaticBitmap2
	Top-Left/Bottom-Right/Width/Height	: 185,15 225,65 50 40
[General]	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
	Angle (in Degree)	: 0

[Main]	Name	: StaticBitmap4
	Top-Left/Bottom-Right/Width/Height	: 5,105 65,235 130 60
[General]	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
	Angle (in Degree)	: 0

[Main]	Name	: ScreenChangePB8
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 60,10 90,100 90 30
[General]	Label	: False
	Text	: 1 - GW TRENCH
		: 2 - Screen
	Text Color (Blink)	: 51(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 2/GW TRENCH
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: DigitalClock1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 150,120 180,220 100 30
[General]	Label	: False
	Object Style	: Time and Date
	24 Hour Mode	: True
	Show Second	: True
	Date Format	: dd-mmm-yy
	Digits Color	: 51(False)
	Back Color	: 15(False)
	Back Effect	: None
	Font	: Arial - Default
	Text Size	: 9
[Visibility]	Object Visibility Option	: False

[Main]	Name	: ScreenChangePB5
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 160,240 190,310 70 30
[General]	Label	: False
	Text	: 1 - FLOWRATES
		: 2 - Screen
	Text Color (Blink)	: 51(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8
	Object Style	: Style 1

	Go to	: Other Screen
	Screen Number/Name	: 10/FLOWRATE
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: ScreenChangePB9
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 20,240 60,310 70 40
[General]	Label	: False
	Text	: 1 - PUMP CONTROLS : 2 - Screen
	Text Color (Blink)	: 51(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 6/PUMP CONTROLS
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: ScreenChangePB10
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 130,240 160,310 70 30
[General]	Label	: False
	Text	: 1 - RUN TIME : 2 - Screen
	Text Color (Blink)	: 51(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 9/RUN TIME
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: StaticText1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 10,10 50,140 130 40
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - FIRE ACADEMY WWTP : 2 - STATIC TEXT
	Text Color	: 51
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Top-Left(Arial Black)
	Text Size	: 10

[Main]	Name	: ScreenChangePB11
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 90,145 140,195 50 50
[General]	Label	: False
	Text	: 1 - CLOCK SET : 2 - Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 6
	Object Style	: Style 2
	Go to	: Other Screen
	Screen Number/Name	: 15/CLOCK SET

[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

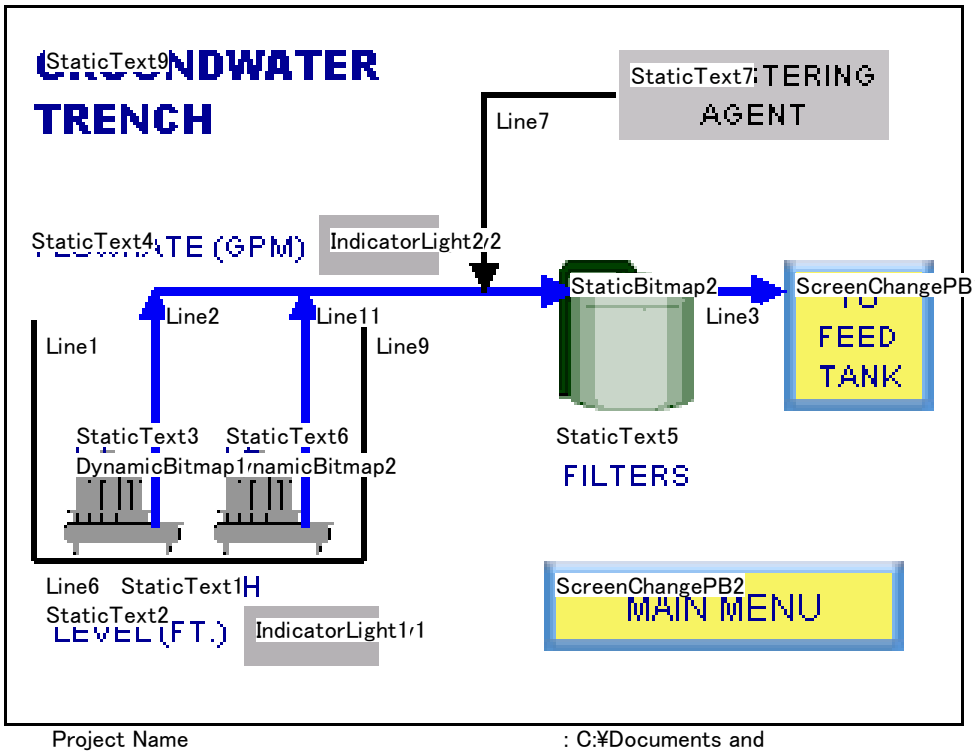
[Main]	Name	: StaticText2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 220,15 240,165 150 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - Day Environmental, Inc. : 2 - STATIC TEXT
	Text Color	: 113
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Top-Left(Arial Black)
	Text Size	: 8

[Main]	Name	: AnalogClock1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,130 140,210 80 70
[General]	Label	: False
	Back Color	: 100
	Back Effect	: None
	Digits Color	: 51
	Hour/Minute Hand Color	: 0
	Display Second Hand	: True
	Second Hand Color	: 16
[Visibility]	Object Visibility Option	: False

[Main]	Name	: StaticText3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 185,100 215,180 80 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - INDOOR AIR TEMP (DEG F) : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: NumericDisplay1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 190,180 210,225 45 20
[General]	Label	: False
	Tag Name	: *INDOOR AIR TEMP DEG F*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 15(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/1
	Prefix/Suffix	: / DEG F
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

2 - GW TRENCH



Project Name : C:¥Documents and Settings¥staff.DAYOFFICE¥Desktop¥rocity_rfa_090215.eap

Screen Description :

[Main]	Name	: DynamicBitmap2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 145,70 185,110 40 40
[General]	Label	: False
	Tag Name	: *GW_P2_RUNNING*
OnBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
OffBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
[Visibility]	Object Visibility Option	: False

[Main]	Name	: StaticText9
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 10,10 50,140 130 40
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - GROUNDWATER TRENCH : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Top-Left(Arial Black)
	Text Size	: 10

[Main]	Name	: ScreenChangePB2
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 185,180 215,300 120 30
[General]	Label	: False
	Text	: 1 - MAIN MENU
		: 2 - Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 1/MAIN MENU
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: StaticBitmap2
	Top-Left/Bottom-Right/Width/Height	: 85,185 135,230 45 50
[General]	Lock Aspect Ratio	: False
	Stretch to Fit	: True
	Transparent/Color	: False
	Back Color	: 255
	Back Effect	: None
	Angle (in Degree)	: 0

[Main]	Name	: Line4
	Top-Left/Bottom-Right/Width/Height	: 95,100 96,190 90 1
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *GW_P1/2_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: StaticText1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 185,35 200,95 60 15
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - TRENCH
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: Line6
	Top-Left/Bottom-Right/Width/Height	: 185,10 186,120 110 1
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False

	Object Style	: No Arrow – Style1

[Main]	Name	: Line9
	Top-Left/Bottom-Right/Width/Height	: 105,120 185,121 1 80
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Object Style	: No Arrow – Style1

[Main]	Name	: StaticText5
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 135,180 165,235 55 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 – BAG FILTERS : 2 – STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: Line1
	Top-Left/Bottom-Right/Width/Height	: 105,10 185,11 1 80
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Object Style	: No Arrow – Style1

[Main]	Name	: DynamicBitmap1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 145,20 185,60 40 40
[General]	Label	: False
	Tag Name	: *GW_P1_RUNNING*
OnBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
OffBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
[Visibility]	Object Visibility Option	: False

[Main]	Name	: ScreenChangePB1
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 85,260 135,310 50 50
[General]	Label	: False
	Text	: 1 – TO FEED TANK : 2 – Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8
	Object Style	: Style 1

	Go to	: Other Screen
	Screen Number/Name	: 3/FEED TANK
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: StaticText2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 195,10 220,80 70 25
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - LEVEL (FT.)
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: NumericDisplay1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 200,80 220,125 45 20
[General]	Label	: False
	Tag Name	: *GW_LEVEL_FEET*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/2
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

P1

[Main]	Name	: StaticText3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 135,20 155,40 20 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - P1
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

P2

[Main]	Name	: StaticText6
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 135,70 155,90 20 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - P2
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: Line3
	Top-Left/Bottom-Right/Width/Height	: 95,230 96,260 30 1
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *GW_P1/2_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 10
	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: Line5
	Top-Left/Bottom-Right/Width/Height	: 30,160 96,161 1 66
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Object Style	: Right Arrow - Style2

[Main]	Name	: Line7
	Top-Left/Bottom-Right/Width/Height	: 30,160 31,205 45 1
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Object Style	: No Arrow - Style1

[Main]	Name	: StaticText7
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 15,205 45,295 90 30
[General]	Transparent	: False
	Advanced	: False
	Text	: 1 - SEQUESTERING AGENT : 2 - STATIC TEXT
	Text Color	: 0
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText4
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,5 90,105 100 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - FLOWRATE (GPM) : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: NumericDisplay2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,105 90,145 40 20
[General]	Label	: False
	Tag Name	: *FLOW_IN_GPM*10*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/1
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: Line8
	Top-Left/Bottom-Right/Width/Height	: 95,50 96,100 50 1
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *GW_P1_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: No Arrow - Style1
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

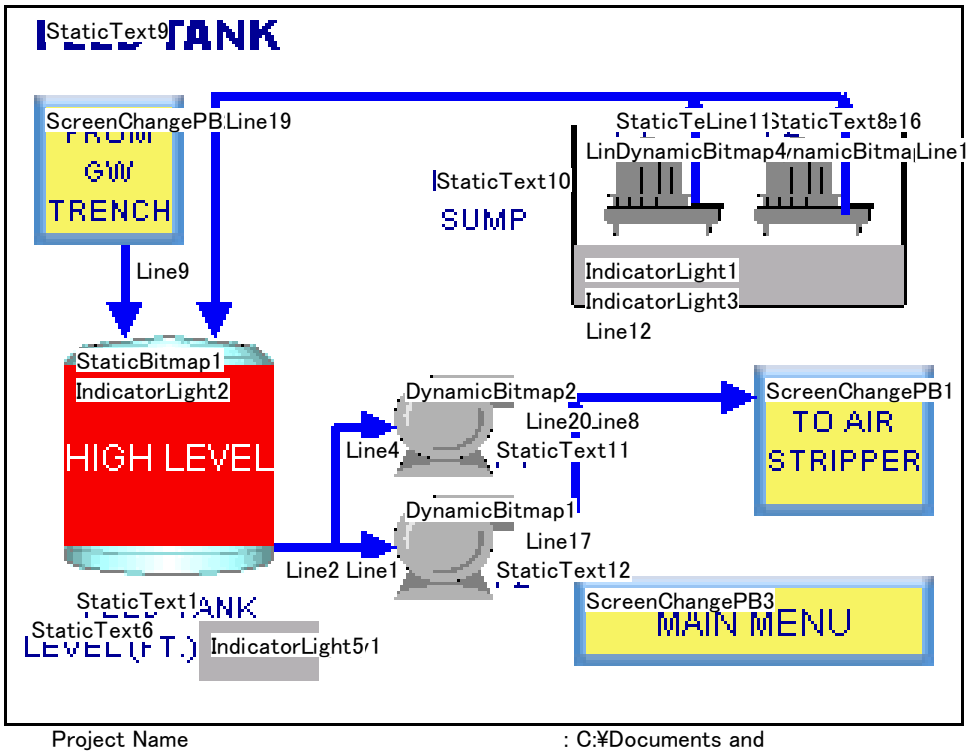
[Main]	Name	: Line11
	Top-Left/Bottom-Right/Width/Height	: 95,100 175,101 1 80
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *GW_P2_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: Line2
	Top-Left/Bottom-Right/Width/Height	: 95,50 175,51 1 80
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *GW_P1_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: IndicatorLight1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 200,80 220,125 45 20
[General]	Label	: False
	Tag Name	: *GW_TRENCH_LEVEL_ANALOG_FAIL*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 - FAIL
		: 2 - On
	ON Text Color	: 15(False)
	ON Text Back Color	: 16(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 -
		: 2 -
		: 3 -
		: 4 -
		: 5 -
		: 6 -
		: 7 -
		: 8 -
		: 9 -
	OFF Text Color	: 0(False)
	OFF Text Back Color	: 11(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: True
	Tag Name	: *GW_TRENCH_LEVEL_ANALOG_FAIL*
	Condition	: When address value is ON
	Value	: ON

[Main]	Name	: IndicatorLight2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,105 90,145 40 20
[General]	Label	: False
	Tag Name	: *FLOW_IN_ANALOG_FAIL*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 - FAIL
		: 2 - On
	ON Text Color	: 15(False)
	ON Text Back Color	: 16(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 -
		: 2 -
		: 3 -
		: 4 -
		: 5 -
		: 6 -
		: 7 -
		: 8 -
		: 9 -
	OFF Text Color	: 0(False)
	OFF Text Back Color	: 11(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: True
	Tag Name	: *FLOW_IN_ANALOG_FAIL*
	Condition	: When address value is ON
	Value	: ON

3 - FEED TANK



Project Name : C:¥Documents and Settings¥staff.DAYOFFICE¥Desktop¥rocity_rfa_090215.eap

Screen Description :

[Main]	Name	: IndicatorLight4
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 80,190 90,300 110 10
[General]	Label	: False
	Tag Name	: *FLOOR_SUMP_LSH*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 - : 2 - : 3 - : 4 - : 5 - : 6 - : 7 - : 8 - : 9 -
	ON Text Color	: 0(True)
	ON Text Back Color	: 50(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 - : 2 - : 3 - : 4 - : 5 - : 6 - : 7 - : 8 - : 9 -
	OFF Text Color	: 0(False)
	OFF Text Back Color	: 11(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: False

[Main]	Name	: IndicatorLight3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 90,190 100,300 110 10
[General]	Label	: False
	Tag Name	: *FLOOR_SUMP_LSL*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 -
		: 2 -
		: 3 -
		: 4 -
		: 5 -
		: 6 -
		: 7 -
		: 8 -
		: 9 -
	ON Text Color	: 0(True)
	ON Text Back Color	: 50(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 -
		: 2 -
		: 3 -
		: 4 -
		: 5 -
		: 6 -
		: 7 -
		: 8 -
		: 9 -
	OFF Text Color	: 0(False)
	OFF Text Back Color	: 11(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: False

[Main]	Name	: StaticBitmap1
	Top-Left/Bottom-Right/Width/Height	: 110,20 190,90 70 80
[General]	Lock Aspect Ratio	: False
	Stretch to Fit	: True
	Transparent/Color	: False
	Back Color	: 255
	Back Effect	: None
	Angle (in Degree)	: 0

[Main]	Name	: StaticText9
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 0,10 20,100 90 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - FEED TANK
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Top-Left(Arial Black)
	Text Size	: 10

[Main]	Name	: ScreenChangePB1
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 120,250 170,310 60 50
[General]	Label	: False
	Text	: 1 - TO AIR STRIPPER
		: 2 - Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)

	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 4/AIR STRIPPER
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: ScreenChangePB2
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 30,10 80,60 50 50
[General]	Label	: False
	Text	: 1 - FROM GW TRENCH
		: 2 - Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 2/GW TRENCH
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: Line9
	Top-Left/Bottom-Right/Width/Height	: 80,40 110,41 1 30
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *GW_P1/2_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: ScreenChangePB3
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 190,190 220,310 120 30
[General]	Label	: False
	Text	: 1 - MAIN MENU
		: 2 - Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 1/MAIN MENU
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: DynamicBitmap1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 160,130 200,170 40 40
[General]	Label	: False
	Tag Name	: *FEED_P2_RUNNING*
OnBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255

	Back Effect	: None
OffBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
[Visibility]	Object Visibility Option	: False

[Main]	Name	: Line1
	Top-Left/Bottom-Right/Width/Height	: 180,110 181,130 20 1
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *FEED_P2_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: Line3
	Top-Left/Bottom-Right/Width/Height	: 130,190 170,191 1 40
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *FEED_P2_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: Line7
	Top-Left/Bottom-Right/Width/Height	: 140,110 180,111 1 40
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *FEED_P1_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: No Arrow - Style1
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: DynamicBitmap2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 120,130 160,170 40 40
[General]	Label	: False
	Tag Name	: *FEED_P1_RUNNING*
OnBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
OffBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255

	Back Effect	: None
[Visibility]	Object Visibility Option	: False

[Main]	Name	: DynamicBitmap3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 40,250 80,290 40 40
[General]	Label	: False
	Tag Name	: *SUMP_P2_RUNNING*
OnBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
OffBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
[Visibility]	Object Visibility Option	: False

[Main]	Name	: StaticText1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 190,20 210,90 70 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - FEED TANK : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: Line12
	Top-Left/Bottom-Right/Width/Height	: 100,190 101,300 110 1
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Object Style	: No Arrow - Style1

[Main]	Name	: Line13
	Top-Left/Bottom-Right/Width/Height	: 40,300 100,301 1 60
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Object Style	: No Arrow - Style1

[Main]	Name	: Line14
	Top-Left/Bottom-Right/Width/Height	: 30,230 70,231 1 40
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *SUMP_P1_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: Left Arrow - Style3
[Visibility]	Object Visibility Option	: False

[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: Line15
	Top-Left/Bottom-Right/Width/Height	: 40,190 100,191 1 60
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Object Style	: No Arrow - Style1

[Main]	Name	: DynamicBitmap4
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 40,200 80,240 40 40
[General]	Label	: False
	Tag Name	: *SUMP_P1_RUNNING*
OnBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
OffBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
[Visibility]	Object Visibility Option	: False

[Main]	Name	: Line16
	Top-Left/Bottom-Right/Width/Height	: 30,280 70,281 1 40
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *SUMP_P2_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: Left Arrow - Style3
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: StaticText6
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 200,5 225,65 60 25
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - LEVEL (FT.) : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: NumericDisplay1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 205,65 225,105 40 20
[General]	Label	: False
	Tag Name	: *FEED_TANK_LEVEL_FT*100*

	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/2
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

P1

[Main]	Name	: StaticText7
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 30,200 50,220 20 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - P1
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

P2

[Main]	Name	: StaticText8
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 30,250 50,270 20 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - P2
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: Line8
	Top-Left/Bottom-Right/Width/Height	: 130,190 131,250 60 1
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *FEED_P1/2_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: Line17
	Top-Left/Bottom-Right/Width/Height	: 170,170 171,191 21 1
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *FEED_P2_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: No Arrow - Style1
[Visibility]	Object Visibility Option	: False

[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: Line18
	Top-Left/Bottom-Right/Width/Height	: 30,70 110,71 1 80
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *SUMP_P1/2_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: Line19
	Top-Left/Bottom-Right/Width/Height	: 30,70 31,230 160 1
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *SUMP_P1/2_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: No Arrow - Style1
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: StaticText10
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 50,140 80,180 40 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - FLOOR SUMP
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

P1

[Main]	Name	: StaticText11
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 140,160 160,180 20 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - P1
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

P2

[Main]	Name	: StaticText12
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 180,160 200,180 20 20
[General]	Transparent	: True

	Advanced	: False
	Text	: 1 - P2
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: Line11
	Top-Left/Bottom-Right/Width/Height	: 30,230 31,280 50 1
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *SUMP_P2_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: No Arrow - Style1
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: Line20
	Top-Left/Bottom-Right/Width/Height	: 130,170 131,191 21 1
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *FEED_P1_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: No Arrow - Style1
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: Line4
	Top-Left/Bottom-Right/Width/Height	: 140,110 141,130 20 1
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *FEED_P1_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: IndicatorLight2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 120,20 180,90 70 60
[General]	Label	: False
	Tag Name	: *FEED_TANK_LSHH*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 -
		: 2 -
		: 3 -
		: 4 -
		: 5 -
		: 6 -
		: 7 -

		: 8 -
		: 9 -
	ON Text Color	: 0(False)
	ON Text Back Color	: 13(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 - HIGH LEVEL
		: 2 - Off
	OFF Text Color	: 15(False)
	OFF Text Back Color	: 16(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: True
	Tag Name	: *FEED_TANK_LSHH*
	Condition	: When address value is OFF
	Value	: OFF

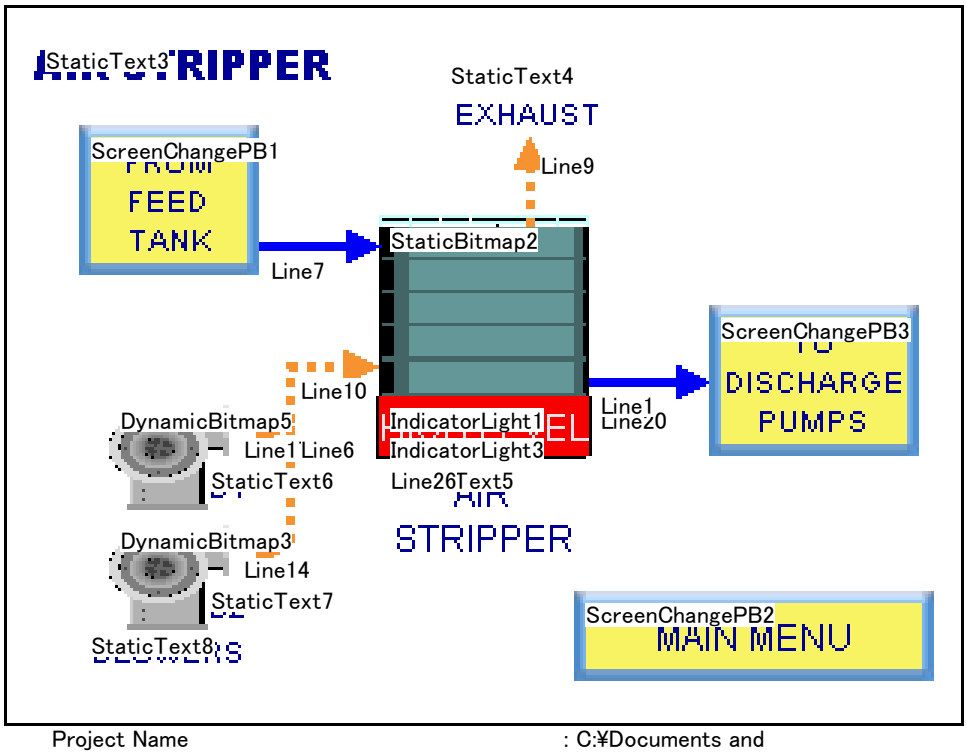
[Main]	Name	: Line2
	Top-Left/Bottom-Right/Width/Height	: 180,90 181,111 21 1
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *FEED_P1/2_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: No Arrow - Style1
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: IndicatorLight1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 80,190 100,300 110 20
[General]	Label	: False
	Tag Name	: *FLOOR_SUMP_LSHH*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 - HIGH LEVEL
		: 2 - On
	ON Text Color	: 15(False)
	ON Text Back Color	: 16(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 -
		: 2 -
		: 3 -
		: 4 -
		: 5 -
		: 6 -
		: 7 -
		: 8 -
		: 9 -
	OFF Text Color	: 0(False)
	OFF Text Back Color	: 11(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: True
	Tag Name	: *FLOOR_SUMP_LSH*
	Condition	: When address value is ON
	Value	: ON

[Main]	Name	: IndicatorLight5
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 205,65 225,105 40 20
[General]	Label	: False

	Tag Name	: *FEED_TANK_LEVEL_ANALOG_FAIL*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 - FAIL
		: 2 - On
	ON Text Color	: 15(False)
	ON Text Back Color	: 16(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 -
		: 2 -
		: 3 -
		: 4 -
		: 5 -
		: 6 -
		: 7 -
		: 8 -
		: 9 -
	OFF Text Color	: 0(False)
	OFF Text Back Color	: 11(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: True
	Tag Name	: *FEED_TANK_LEVEL_ANALOG_FAIL*
	Condition	: When address value is ON
	Value	: ON

4 - AIR STRIPPER



Project Name : C:¥Documents and Settings¥staff.DAYOFFICE¥Desktop¥rocity_rfa_090215.eap

Screen Description :

[Main]	Name	: IndicatorLight3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 140,125 150,195 70 10
[General]	Label	: False
	Tag Name	: *STRIP_SUMP_LSL*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 - : 2 - : 3 - : 4 - : 5 - : 6 - : 7 - : 8 - : 9 -
	ON Text Color	: 0(True)
	ON Text Back Color	: 50(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 - : 2 - : 3 - : 4 - : 5 - : 6 - : 7 - : 8 - : 9 -
	OFF Text Color	: 0(False)
	OFF Text Back Color	: 11(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: False

[Main]	Name	: IndicatorLight4
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 130,125 140,195 70 10
[General]	Label	: False
	Tag Name	: *STRIP_SUMP_LSH*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 -
		: 2 -
		: 3 -
		: 4 -
		: 5 -
		: 6 -
		: 7 -
		: 8 -
		: 9 -
	ON Text Color	: 0(True)
	ON Text Back Color	: 50(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 -
		: 2 -
		: 3 -
		: 4 -
		: 5 -
		: 6 -
		: 7 -
		: 8 -
		: 9 -
	OFF Text Color	: 0(False)
	OFF Text Back Color	: 11(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: False

[Main]	Name	: StaticText3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 10,10 30,120 110 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - AIR STRIPPER
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Top-Left(Arial Black)
	Text Size	: 10

[Main]	Name	: ScreenChangePB1
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 40,25 90,85 60 50
[General]	Label	: False
	Text	: 1 - FROM FEED TANK
		: 2 - Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 3/FEED TANK
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: ScreenChangePB2
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 195,190 225,310 120 30
[General]	Label	: False
	Text	: 1 - MAIN MENU
		: 2 - Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 1/MAIN MENU
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: StaticText4
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 15,145 45,205 60 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - AIR EXHAUST
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticBitmap2
	Top-Left/Bottom-Right/Width/Height	: 70,125 130,195 70 60
[General]	Lock Aspect Ratio	: False
	Stretch to Fit	: True
	Transparent/Color	: True/ 65535
	Back Color	: 255
	Back Effect	: None
	Angle (in Degree)	: 0

[Main]	Name	: StaticText5
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 150,125 190,195 70 40
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - AIR STRIPPER
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: Line7
	Top-Left/Bottom-Right/Width/Height	: 80,85 81,125 40 1
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *FEED_P1/2_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: Right Arrow - Style2

[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: DynamicBitmap3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 170,35 210,75 40 40
[General]	Label	: False
	Tag Name	: *STRIP_B2_RUNNING*
OnBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
OffBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
[Visibility]	Object Visibility Option	: False

[Main]	Name	: Line9
	Top-Left/Bottom-Right/Width/Height	: 45,175 75,176 1 30
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Dotted Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *STRIP_B1/2_RUNNING*
	ON Fill Color/OFF Fill Color	: 27/ 11
	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

B1

[Main]	Name	: StaticText6
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 150,65 170,85 20 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - B1 : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

B2

[Main]	Name	: StaticText7
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 190,65 210,85 20 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - B2 : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText8
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 205,25 225,85 60 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - BLOWERS
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: DynamicBitmap5
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 130,35 170,75 40 40
[General]	Label	: False
	Tag Name	: *STRIP_B1_RUNNING*
OnBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
OffBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
[Visibility]	Object Visibility Option	: False

[Main]	Name	: Line16
	Top-Left/Bottom-Right/Width/Height	: 120,95 121,124 29 1
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Dotted Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *STRIP_B1/2_RUNNING*
	ON Fill Color/OFF Fill Color	: 27/ 11
	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: Line14
	Top-Left/Bottom-Right/Width/Height	: 180,76 181,95 19 1
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Dotted Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *STRIP_B2_RUNNING*
	ON Fill Color/OFF Fill Color	: 27/ 11
	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: Line17
	Top-Left/Bottom-Right/Width/Height	: 140,76 141,95 19 1
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Dotted Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *STRIP_B1_RUNNING*
	ON Fill Color/OFF Fill Color	: 27/ 11
	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: Line6
	Top-Left/Bottom-Right/Width/Height	: 140,95 180,96 1 40
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Dotted Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *STRIP_B2_RUNNING*
	ON Fill Color/OFF Fill Color	: 27/ 11
	Object Style	: No Arrow - Style1
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: Line10
	Top-Left/Bottom-Right/Width/Height	: 120,95 140,96 1 20
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Dotted Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *STRIP_B1/2_RUNNING*
	ON Fill Color/OFF Fill Color	: 27/ 11
	Object Style	: No Arrow - Style1
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: Line20
	Top-Left/Bottom-Right/Width/Height	: 130,195 150,196 1 20
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Object Style	: No Arrow - Style1

[Main]	Name	: Line25
	Top-Left/Bottom-Right/Width/Height	: 130,125 150,126 1 20
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0

	Fix Horizontal or Vertical	: False
	Object Style	: No Arrow - Style1

[Main]	Name	: Line26
	Top-Left/Bottom-Right/Width/Height	: 150,125 151,195 70 1
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Object Style	: No Arrow - Style1

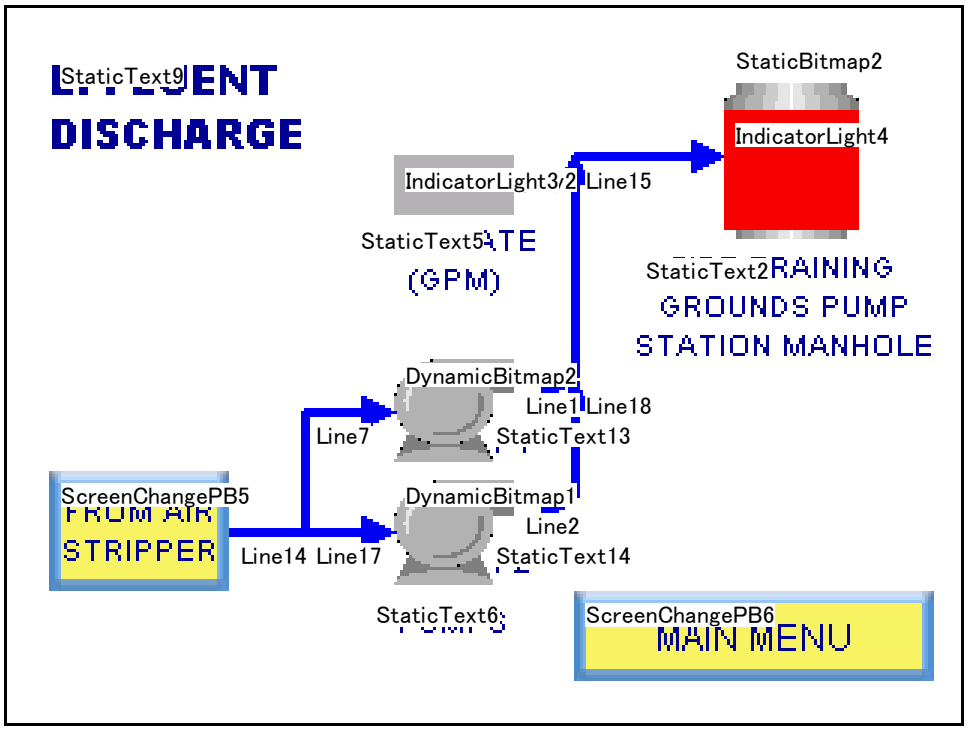
[Main]	Name	: IndicatorLight1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 130,125 150,195 70 20
[General]	Label	: False
	Tag Name	: *STRIP_SUMP_LSHH*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 - : 2 - : 3 - : 4 - : 5 - : 6 - : 7 - : 8 - : 9 -
	ON Text Color	: 0(False)
	ON Text Back Color	: 12(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial)
	ON Text Size	: 8
	OFF Text	: 1 - HIGH LEVEL : 2 - Off
	OFF Text Color	: 14(False)
	OFF Text Back Color	: 16(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: True
	Tag Name	: *STRIP_SUMP_LSHH*
	Condition	: When address value is OFF
	Value	: OFF

[Main]	Name	: Line1
	Top-Left/Bottom-Right/Width/Height	: 125,195 126,235 40 1
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *DISCHARGE_P2_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: ScreenChangePB3
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 100,235 150,305 70 50
[General]	Label	: False
	Text	: 1 - TO DISCHARGE PUMPS : 2 - Screen
	Text Color (Blink)	: 52(False)

	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 5/DISCHARGE
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

5 – DISCHARGE



Project Name : C:¥Documents and Settings¥staff.DAYOFFICE¥Desktop¥rocity_rfa_090215.eap

Screen Description :

[Main]

	Name	: StaticBitmap2
	Top-Left/Bottom-Right/Width/Height	: 10,240 95,285 45 85
[General]	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
	Angle (in Degree)	: 0

[Main]

	Name	: StaticText9
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 15,15 55,105 90 40
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 – EFFLUENT DISCHARGE
		: 2 – STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Top-Left(Arial Black)
	Text Size	: 10

[Main]

	Name	: ScreenChangePB5
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 155,15 195,75 60 40
[General]	Label	: False
	Text	: 1 – FROM AIR STRIPPER
		: 2 – Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)

	Text Size	: 8
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 4/AIR STRIPPER
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: ScreenChangePB6
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 195,190 225,310 120 30
[General]	Label	: False
	Text	: 1 - MAIN MENU
		: 2 - Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 1/MAIN MENU
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: DynamicBitmap1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 155,130 195,170 40 40
[General]	Label	: False
	Tag Name	: *DISCHARGE_P2_RUNNING*
OnBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
OffBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
[Visibility]	Object Visibility Option	: False

[Main]	Name	: Line17
	Top-Left/Bottom-Right/Width/Height	: 175,100 176,130 30 1
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *DISCHARGE_P2_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: Line18
	Top-Left/Bottom-Right/Width/Height	: 125,190 165,191 1 40
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *DISCHARGE_P2_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False

[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: DynamicBitmap2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 115,130 155,170 40 40
[General]	Label	: False
	Tag Name	: *DISCHARGE_P1_RUNNING*
OnBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
OffBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
[Visibility]	Object Visibility Option	: False

[Main]	Name	: StaticText7
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 340,370 360,470 100 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - DISCHARGE TANK
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText8
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 355,370 375,430 60 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - LEVEL (FT.)
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: NumericDisplay1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 355,430 375,470 40 20
[General]	Label	: False
	Tag Name	: *DISCH_TANK_LEVEL_FT*100*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/2
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: Line27
	Top-Left/Bottom-Right/Width/Height	: 50,190 51,240 50 1
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *DISCHARGE_P1/2_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

P1

[Main]	Name	: StaticText13
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 135,160 155,180 20 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - P1 : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

P2

[Main]	Name	: StaticText14
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 175,160 195,180 20 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - P2 : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 80,210 120,310 100 40
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - FIRE TRAINING GROUNDS PUMP STATION MANHOLE : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: Line5
	Top-Left/Bottom-Right/Width/Height	: 330,450 331,470 20 1
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False

	Fill Color Tag Name	: *DISCHARGE_P1/2_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: No Arrow - Style1
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: Line6
	Top-Left/Bottom-Right/Width/Height	: 135,100 136,130 30 1
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *DISCHARGE_P1_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: Line7
	Top-Left/Bottom-Right/Width/Height	: 135,100 175,101 1 40
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *DISCHARGE_P1_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: No Arrow - Style1
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: Line8
	Top-Left/Bottom-Right/Width/Height	: 230,415 260,416 1 30
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *STRIP_P1/2_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: StaticBitmap1
	Top-Left/Bottom-Right/Width/Height	: 260,380 340,450 70 80
[General]	Lock Aspect Ratio	: False
	Stretch to Fit	: True
	Transparent/Color	: False
	Back Color	: 255
	Back Effect	: None
	Angle (in Degree)	: 0

[Main]	Name	: IndicatorLight1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 270,380 330,450 70 60
[General]	Label	: False
	Tag Name	: *DISCHARGE_TANK_LSHH*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 -
		: 2 -
		: 3 -
		: 4 -
		: 5 -
		: 6 -
		: 7 -
		: 8 -
		: 9 -
	ON Text Color	: 0(False)
	ON Text Back Color	: 12(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 - HIGH LEVEL
		: 2 - Off
	OFF Text Color	: 15(False)
	OFF Text Back Color	: 16(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: True
	Tag Name	: *DISCHARGE_TANK_LSHH*
	Condition	: When address value is OFF
	Value	: OFF

[Main]	Name	: IndicatorLight2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 355,430 375,470 40 20
[General]	Label	: False
	Tag Name	: *DISCH_TANK_LEVEL_ANALOG_FAIL*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 - FAIL
		: 2 - On
	ON Text Color	: 15(False)
	ON Text Back Color	: 16(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 -
		: 2 -
		: 3 -
		: 4 -
		: 5 -
		: 6 -
		: 7 -
		: 8 -
		: 9 -
	OFF Text Color	: 0(False)
	OFF Text Back Color	: 11(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: True
	Tag Name	: *DISCH_TANK_LEVEL_ANALOG_FAIL*
	Condition	: When address value is ON
	Value	: ON

[Main]	Name	: Line1
	Top-Left/Bottom-Right/Width/Height	: 125,170 126,190 20 1
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line

	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *DISCHARGE_P1_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: Line2
	Top-Left/Bottom-Right/Width/Height	: 165,170 166,190 20 1
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *DISCHARGE_P2_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: IndicatorLight4
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 35,240 75,285 45 40
[General]	Label	: False
	Tag Name	: *FIRE_STA_ALARM*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 - ALARM
		: 2 - On
	ON Text Color	: 15(False)
	ON Text Back Color	: 16(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 -
		: 2 -
		: 3 -
		: 4 -
		: 5 -
		: 6 -
		: 7 -
		: 8 -
		: 9 -
	OFF Text Color	: 15(False)
	OFF Text Back Color	: 16(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: True
	Tag Name	: *FIRE_STA_ALARM*
	Condition	: When address value is ON
	Value	: ON

[Main]	Name	: ScreenChangePB1
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 35,435 85,505 70 50
[General]	Label	: False
	Text	: 1 - TO DISCHARGE TANK
		: 2 - Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8
	Object Style	: Style 1
	Go to	: Other Screen

	Screen Number/Name	: 5/DISCHARGE
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: DynamicBitmap3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 150,415 190,455 40 40
[General]	Label	: False
	Tag Name	: *STRIP_P2_RUNNING*
OnBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
OffBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
[Visibility]	Object Visibility Option	: False

P1

[Main]	Name	: StaticText1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 130,445 150,465 20 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - P1 : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

P2

[Main]	Name	: StaticText3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 170,445 190,465 20 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - P2 : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText4
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 190,405 210,465 60 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - PUMPS : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: DynamicBitmap4
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 110,415 150,455 40 40
[General]	Label	: False

	Tag Name	: *STRIP_P1_RUNNING*
OnBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
OffBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
[Visibility]	Object Visibility Option	: False

[Main]	Name	: Line3
	Top-Left/Bottom-Right/Width/Height	: 170,395 171,415 20 1
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *STRIP_P2_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: Line4
	Top-Left/Bottom-Right/Width/Height	: 130,395 131,415 20 1
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *STRIP_P1_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: Line9
	Top-Left/Bottom-Right/Width/Height	: 120,455 121,475 20 1
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *STRIP_P1_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: Line10
	Top-Left/Bottom-Right/Width/Height	: 160,455 161,475 20 1
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *STRIP_P2_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11

	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: Line11
	Top-Left/Bottom-Right/Width/Height	: 120,475 160,476 1 40
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *STRIP_P2_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: No Arrow - Style1
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: Line12
	Top-Left/Bottom-Right/Width/Height	: 85,475 120,476 1 35
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *STRIP_P1/2_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: Line13
	Top-Left/Bottom-Right/Width/Height	: 130,395 170,396 1 40
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *STRIP_P1_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: No Arrow - Style1
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: Line14
	Top-Left/Bottom-Right/Width/Height	: 175,75 176,100 25 1
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *DISCHARGE_P1/2_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: No Arrow - Style1
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

[Main]	Name	: StaticText5
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,115 100,185 70 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - FLOWRATE (GPM)
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

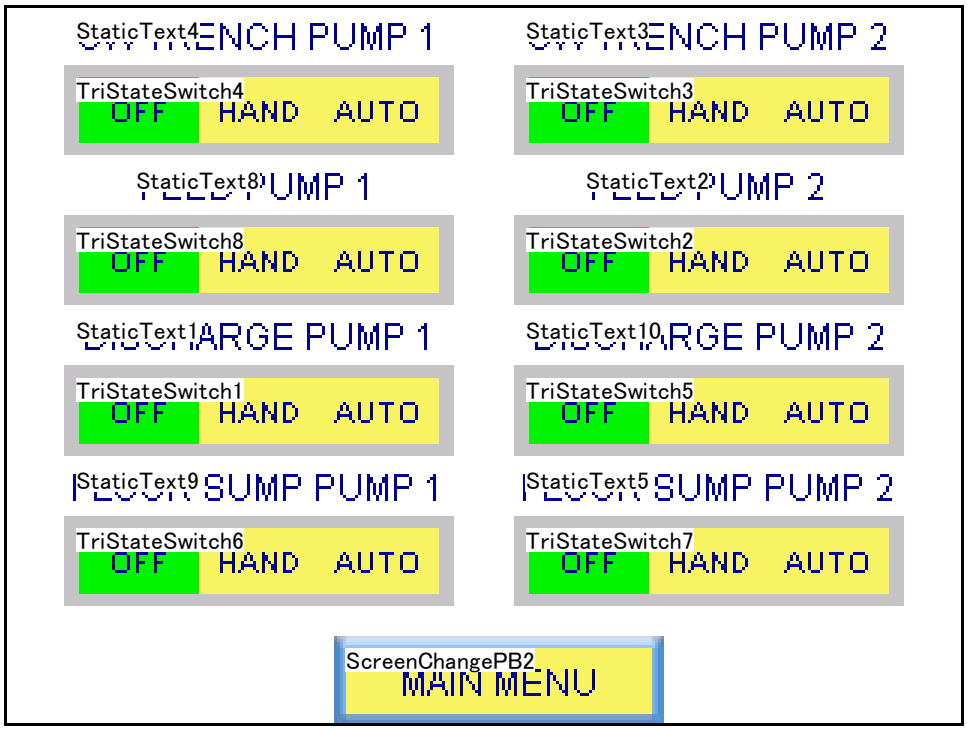
[Main]	Name	: NumericDisplay2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 50,130 70,170 40 20
[General]	Label	: False
	Tag Name	: *FLOW_OUT_GPM*10*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/1
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: IndicatorLight3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 50,130 70,170 40 20
[General]	Label	: False
	Tag Name	: *FLOW_OUT_ANALOG_FAIL*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 - FAIL
		: 2 - On
	ON Text Color	: 15(False)
	ON Text Back Color	: 16(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 -
		: 2 -
		: 3 -
		: 4 -
		: 5 -
		: 6 -
		: 7 -
		: 8 -
		: 9 -
	OFF Text Color	: 0(False)
	OFF Text Back Color	: 11(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: True
	Tag Name	: *FLOW_OUT_ANALOG_FAIL*
	Condition	: When address value is ON
	Value	: ON

[Main]	Name	: StaticText6
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 195,120 215,180 60 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - PUMPS
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: Line15
	Top-Left/Bottom-Right/Width/Height	: 50,190 125,191 1 75
[General]	Advanced	: True
	Line Width	: 3
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Fill Color Tag Name	: *DISCHARGE_P1/2_RUNNING*
	ON Fill Color/OFF Fill Color	: 50/ 11
	Object Style	: Right Arrow - Style2
[Visibility]	Object Visibility Option	: False
[Move]	Use Moving Animation	: False
[Length]	Use Sizing Animation	: False
[Rotation]	Use Rotation Animation	: False

6 – PUMP CONTROLS



Project Name : C:¥Documents and Settings¥staff.DAYOFFICE¥Desktop¥rocity_rfa_090215.eap

Screen Description :

[Main]	Name	: TriStateSwitch1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 120,20 150,150 130 30
[General]	Label	: False
	Object Style	: Style 1
	Tag2	: *DISCHARGE_P1_HAND*
	Tag3	: *DISCHARGE_P1_AUTO*
	Text1	: 1 – OFF
		: 2 – Button #1
	Text2	: 1 – HAND
		: 2 – Button #2
	Text3	: 1 – AUTO
		: 2 – Button #3
	OFF Text Color	: 52(False)
	OFF Text Back Color	: 82(False)
	OFF Text Back Effect	: None
	ON Text Color	: 52(False)
	ON Text Back Color	: 32(False)
	ON Text Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8
[Visibility]	Object Visibility Option	: False
[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
[Password]	Password Option	: False

[Main]	Name	: StaticText1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 100,20 120,150 130 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 – DISCHARGE PUMP 1
		: 2 – STATIC TEXT
	Text Color	: 52
	Back Color	: 12

	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: TriStateSwitch3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 20,170 50,300 130 30
[General]	Label	: False
	Object Style	: Style 1
	Tag2	: *GW_P2_HAND*
	Tag3	: *GW_P2_AUTO*
	Text1	: 1 - OFF
		: 2 - Button #1
	Text2	: 1 - HAND
		: 2 - Button #2
	Text3	: 1 - AUTO
		: 2 - Button #3
	OFF Text Color	: 52(False)
	OFF Text Back Color	: 82(False)
	OFF Text Back Effect	: None
	ON Text Color	: 52(False)
	ON Text Back Color	: 32(False)
	ON Text Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8
[Visibility]	Object Visibility Option	: False
[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
[Password]	Password Option	: False

[Main]	Name	: TriStateSwitch5
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 120,170 150,300 130 30
[General]	Label	: False
	Object Style	: Style 1
	Tag2	: *DISCHARGE_P2_HAND*
	Tag3	: *DISCHARGE_P2_AUTO*
	Text1	: 1 - OFF
		: 2 - Button #1
	Text2	: 1 - HAND
		: 2 - Button #2
	Text3	: 1 - AUTO
		: 2 - Button #3
	OFF Text Color	: 52(False)
	OFF Text Back Color	: 82(False)
	OFF Text Back Effect	: None
	ON Text Color	: 52(False)
	ON Text Back Color	: 32(False)
	ON Text Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8
[Visibility]	Object Visibility Option	: False
[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
[Password]	Password Option	: False

[Main]	Name	: TriStateSwitch8
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,20 100,150 130 30
[General]	Label	: False
	Object Style	: Style 1
	Tag2	: *FEED_P1_HAND*
	Tag3	: *FEED_P1_AUTO*
	Text1	: 1 - OFF
		: 2 - Button #1
	Text2	: 1 - HAND
		: 2 - Button #2
	Text3	: 1 - AUTO
		: 2 - Button #3
	OFF Text Color	: 52(False)

	OFF Text Back Color	: 82(False)
	OFF Text Back Effect	: None
	ON Text Color	: 52(False)
	ON Text Back Color	: 32(False)
	ON Text Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8
[Visibility]	Object Visibility Option	: False
[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
[Password]	Password Option	: False

[Main]	Name	: StaticText8
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 50,40 70,130 90 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - FEED PUMP 1 : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: TriStateSwitch7
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 170,170 200,300 130 30
[General]	Label	: False
	Object Style	: Style 1
	Tag2	: *SUMP_P2_HAND*
	Tag3	: *SUMP_P2_AUTO*
	Text1	: 1 - OFF : 2 - Button #1
	Text2	: 1 - HAND : 2 - Button #2
	Text3	: 1 - AUTO : 2 - Button #3
	OFF Text Color	: 52(False)
	OFF Text Back Color	: 82(False)
	OFF Text Back Effect	: None
	ON Text Color	: 52(False)
	ON Text Back Color	: 32(False)
	ON Text Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8
[Visibility]	Object Visibility Option	: False
[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
[Password]	Password Option	: False

[Main]	Name	: TriStateSwitch2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,170 100,300 130 30
[General]	Label	: False
	Object Style	: Style 1
	Tag2	: *FEED_P2_HAND*
	Tag3	: *FEED_P2_AUTO*
	Text1	: 1 - OFF : 2 - Button #1
	Text2	: 1 - HAND : 2 - Button #2
	Text3	: 1 - AUTO : 2 - Button #3
	OFF Text Color	: 52(False)
	OFF Text Back Color	: 82(False)
	OFF Text Back Effect	: None
	ON Text Color	: 52(False)
	ON Text Back Color	: 32(False)
	ON Text Back Effect	: None

	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8
[Visibility]	Object Visibility Option	: False
[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
[Password]	Password Option	: False

[Main]	Name	: TriStateSwitch4
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 20,20 50,150 130 30
[General]	Label	: False
	Object Style	: Style 1
	Tag2	: *GW_P1_HAND*
	Tag3	: *GW_P1_AUTO*
	Text1	: 1 - OFF
		: 2 - Button #1
	Text2	: 1 - HAND
		: 2 - Button #2
	Text3	: 1 - AUTO
		: 2 - Button #3
	OFF Text Color	: 52(False)
	OFF Text Back Color	: 82(False)
	OFF Text Back Effect	: None
	ON Text Color	: 52(False)
	ON Text Back Color	: 32(False)
	ON Text Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8
[Visibility]	Object Visibility Option	: False
[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
[Password]	Password Option	: False

[Main]	Name	: StaticText4
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 0,20 20,150 130 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - GW TRENCH PUMP 1
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: ScreenChangePB2
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 210,110 240,220 110 30
[General]	Label	: False
	Text	: 1 - MAIN MENU
		: 2 - Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 1/MAIN MENU
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

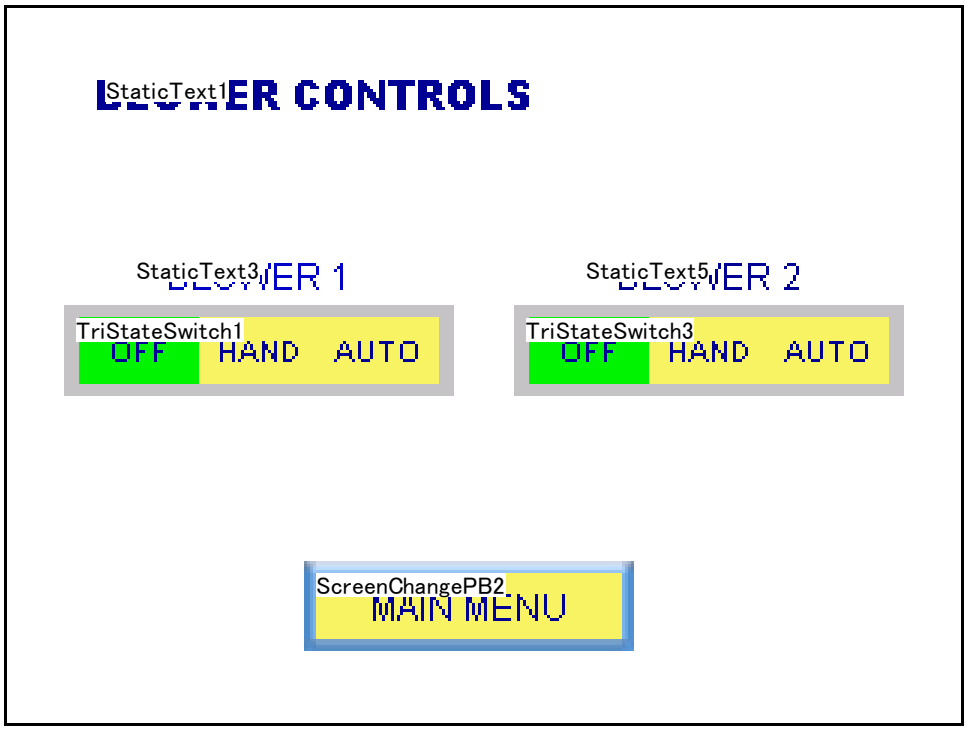
[Main]	Name	: StaticText9
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 150,20 170,150 130 20
[General]	Transparent	: True

	Advanced	: False
	Text	: 1 - FLOOR SUMP PUMP 1
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
[Main]	Name	: TriStateSwitch6
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 170,20 200,150 130 30
[General]	Label	: False
	Object Style	: Style 1
	Tag2	: *SUMP_P1_HAND*
	Tag3	: *SUMP_P1_AUTO*
	Text1	: 1 - OFF
		: 2 - Button #1
	Text2	: 1 - HAND
		: 2 - Button #2
	Text3	: 1 - AUTO
		: 2 - Button #3
	OFF Text Color	: 52(False)
	OFF Text Back Color	: 82(False)
	OFF Text Back Effect	: None
	ON Text Color	: 52(False)
	ON Text Back Color	: 32(False)
	ON Text Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8
[Visibility]	Object Visibility Option	: False
[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
[Password]	Password Option	: False
[Main]	Name	: StaticText3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 0,170 20,300 130 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - GW TRENCH PUMP 2
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
[Main]	Name	: StaticText2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 50,190 70,280 90 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - FEED PUMP 2
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
[Main]	Name	: StaticText10
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 100,170 120,300 130 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - DISCHARGE PUMP 2

		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: StaticText5
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 150,170 170,300 130 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - FLOOR SUMP PUMP 2
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

7 - STRIPPER CONTROLS



Project Name : C:¥Documents and Settings¥staff.DAYOFFICE¥Desktop¥rocity_rfa_090215.eap

Screen Description :

StaticText2 StaticText4

itch2 TriStateSwitch4

[Main]	Name	: TriStateSwitch2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 295,25 325,155 130 30
[General]	Label	: False
	Object Style	: Style 1
	Tag2	: *STRIP_P1_HAND*
	Tag3	: *STRIP_P1_AUTO*
	Text1	: 1 - OFF
		: 2 - Button #1
	Text2	: 1 - HAND
		: 2 - Button #2
	Text3	: 1 - AUTO
		: 2 - Button #3
	OFF Text Color	: 52(False)
	OFF Text Back Color	: 82(False)
	OFF Text Back Effect	: None
	ON Text Color	: 52(False)
	ON Text Back Color	: 32(False)
	ON Text Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8
[Visibility]	Object Visibility Option	: False
[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
[Password]	Password Option	: False

[Main]	Name	: StaticText2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 275,45 295,135 90 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - PUMP 1
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12

	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial – Default)
	Text Size	: 9

[Main]	Name	: TriStateSwitch4
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 295,175 325,305 130 30
[General]	Label	: False
	Object Style	: Style 1
	Tag2	: *STRIP_P2_HAND*
	Tag3	: *STRIP_P2_AUTO*
	Text1	: 1 – OFF
		: 2 – Button #1
	Text2	: 1 – HAND
		: 2 – Button #2
	Text3	: 1 – AUTO
		: 2 – Button #3
	OFF Text Color	: 52(False)
	OFF Text Back Color	: 82(False)
	OFF Text Back Effect	: None
	ON Text Color	: 52(False)
	ON Text Back Color	: 32(False)
	ON Text Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8
[Visibility]	Object Visibility Option	: False
[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
[Password]	Password Option	: False

[Main]	Name	: StaticText4
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 275,195 295,285 90 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 – PUMP 2
		: 2 – STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial – Default)
	Text Size	: 9

[Main]	Name	: StaticText1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 20,30 40,290 260 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 – BLOWER CONTROLS
		: 2 – STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Top-Left(Arial Black)
	Text Size	: 10

[Main]	Name	: ScreenChangePB2
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 185,100 215,210 110 30
[General]	Label	: False
	Text	: 1 – MAIN MENU
		: 2 – Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial – Default)
	Text Size	: 9

	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 1/MAIN MENU
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

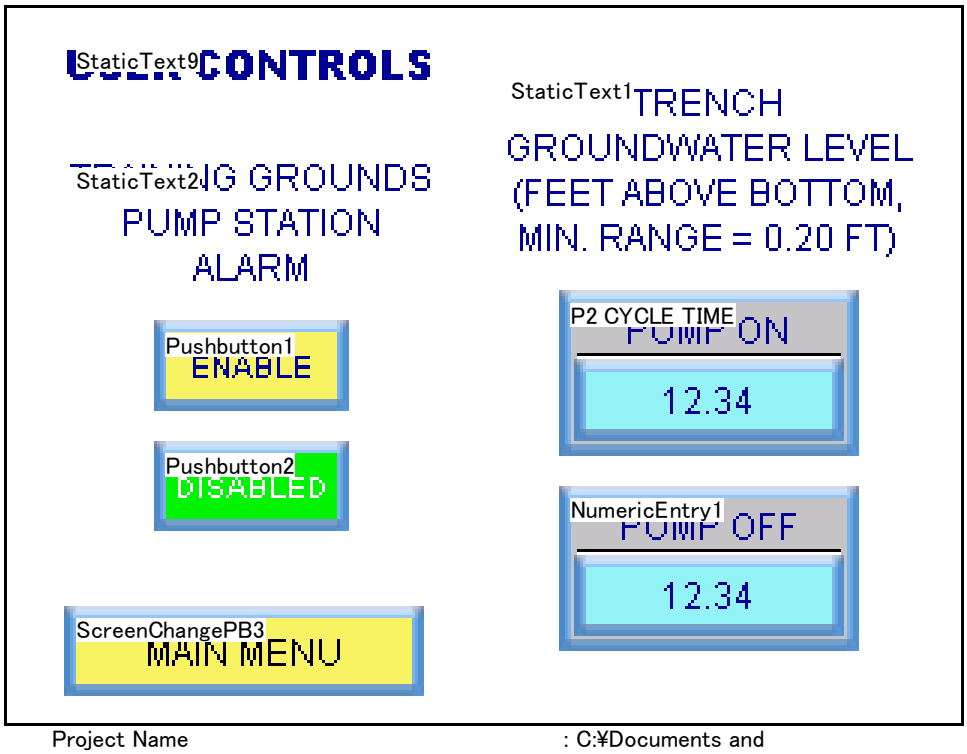
[Main]	Name	: TriStateSwitch1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 100,20 130,150 130 30
[General]	Label	: False
	Object Style	: Style 1
	Tag2	: *STRIP_B1_HAND*
	Tag3	: *STRIP_B1_AUTO*
	Text1	: 1 - OFF
		: 2 - Button #1
	Text2	: 1 - HAND
		: 2 - Button #2
	Text3	: 1 - AUTO
		: 2 - Button #3
	OFF Text Color	: 52(False)
	OFF Text Back Color	: 82(False)
	OFF Text Back Effect	: None
	ON Text Color	: 52(False)
	ON Text Back Color	: 32(False)
	ON Text Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8
[Visibility]	Object Visibility Option	: False
[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
[Password]	Password Option	: False

[Main]	Name	: StaticText3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 80,40 100,130 90 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - BLOWER 1
		: 2 - STATIC TEXT
	Text Color	: 51
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: TriStateSwitch3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 100,170 130,300 130 30
[General]	Label	: False
	Object Style	: Style 1
	Tag2	: *STRIP_B2_HAND*
	Tag3	: *STRIP_B2_AUTO*
	Text1	: 1 - OFF
		: 2 - Button #1
	Text2	: 1 - HAND
		: 2 - Button #2
	Text3	: 1 - AUTO
		: 2 - Button #3
	OFF Text Color	: 52(False)
	OFF Text Back Color	: 82(False)
	OFF Text Back Effect	: None
	ON Text Color	: 52(False)
	ON Text Back Color	: 32(False)
	ON Text Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8
[Visibility]	Object Visibility Option	: False
[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
[Password]	Password Option	: False

[Main]	Name	: StaticText5
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 80,190 100,280 90 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - BLOWER 2
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

8 - SETPOINTS



Project Name : C:¥Documents and Settings¥staff.DAYOFFICE¥Desktop¥rocity_rfa_090215.eap

Screen Description :

[Main]	Name	: StaticText9
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 10,20 30,160 140 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - USER CONTROLS
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Top-Left(Arial Black)
	Text Size	: 10

[Main]	Name	: ScreenChangePB3
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 200,20 230,140 120 30
[General]	Label	: False
	Text	: 1 - MAIN MENU
		: 2 - Screen
	Text Color (Blink)	: 0(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 1/MAIN MENU
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: P2 CYCLE TIME
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 95,185 150,285 100 55
[General]	Label	: True
	Label Text	: 1 - PUMP ON : 2 - NUMERIC ENTRY
	Label Text Color	: 52
	Label Back Color	: 12
	Label Back Effect	: None
	Label Position/Label Align	: Top/Middle
	Label Text size(Font)	: 9 (Arial - Default)
	Tag Name	: *GW_LEVEL_PUMP_ON*
	Use Display Tag	: False
	Use Tag For Decimal Point	: False
	Object Style	: Style 1
	Range	: True
	Min / Max	: 0/2400
	Keypad	: System Default
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/2
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Control]	Notification and Handshake	: False
[Visibility]	Object Visibility Option	: False
[Scaling]	Scaling Option	: False
[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
[Password]	Password Option	: False

[Main]	Name	: StaticText1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 20,165 90,305 140 70
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - TRENCH GROUNDWATER LEVEL (FEET ABOVE BOTTOM, MIN. RANGE = 0.20 FT) : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: NumericEntry1
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 160,185 215,285 100 55
[General]	Label	: True
	Label Text	: 1 - PUMP OFF : 2 - NUMERIC ENTRY
	Label Text Color	: 52
	Label Back Color	: 12
	Label Back Effect	: None
	Label Position/Label Align	: Top/Middle
	Label Text size(Font)	: 9 (Arial - Default)
	Tag Name	: *GW_LEVEL_PUMP_OFF*
	Use Display Tag	: False
	Use Tag For Decimal Point	: False
	Object Style	: Style 1
	Range	: True
	Min / Max	: 0/2400
	Keypad	: System Default
	Font	: Arial - Default
	Text Size	: 9

	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/2
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Control]	Notification and Handshake	: False
[Visibility]	Object Visibility Option	: False
[Scaling]	Scaling Option	: False
[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
[Password]	Password Option	: False

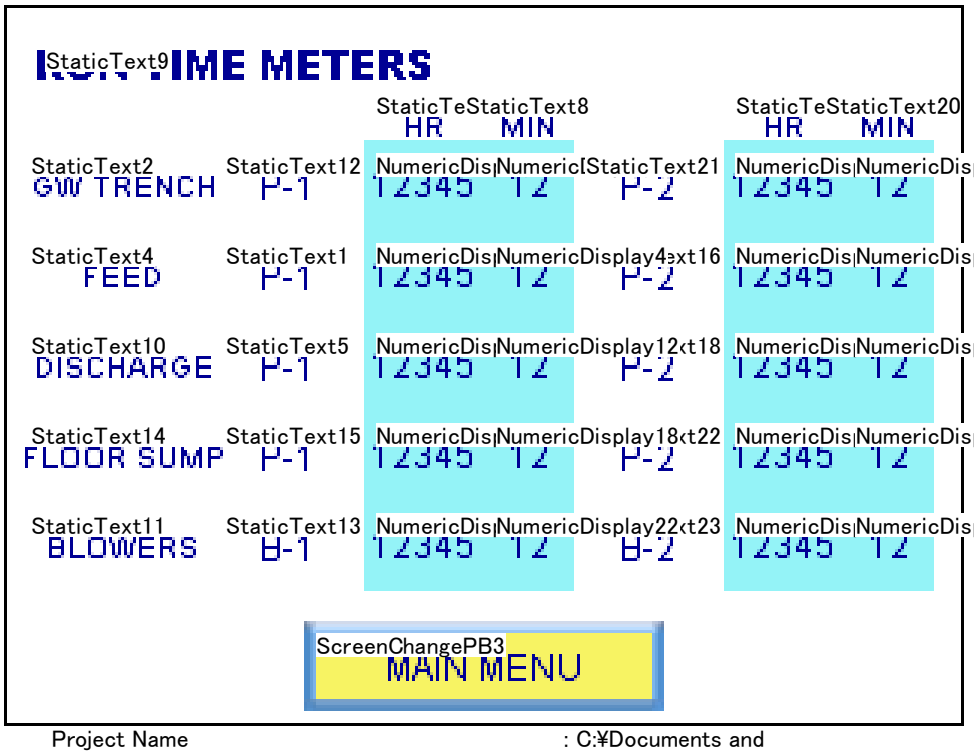
[Main]	Name	: StaticText2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 50,20 95,145 125 45
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - TRAINING GROUNDS PUMP STATION ALARM : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: Pushbutton1
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 105,50 135,115 65 30
[General]	Label	: False
	Tag Name	: *FIRE_STA_ALARM_ENABLED*
	Object Style/Object Type	: Style-1(Rectangular)/Set On
	ON Text	: 1 - ENABLED : 2 - On
	ON Text Color	: 15(False)
	ON Text Back Color	: 32(False)
	ON Text Back Effect	: Diagonal Up Top-Left
	ON Text Alignment(Font)	: Middle(Arial)
	ON Text Size	: 8
	OFF Text	: 1 - ENABLE : 2 - Off
	OFF Text Color	: 52(False)
	OFF Text Back Color	: 82(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial)
	OFF Text Size	: 8
[Visibility]	Object Visibility Option	: False
[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
[Password]	Password Option	: False

[Main]	Name	: Pushbutton2
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 145,50 175,115 65 30
[General]	Label	: False
	Tag Name	: *FIRE_STA_ALARM_ENABLED*
	Object Style/Object Type	: Style-1(Rectangular)/Set Off
	ON Text	: 1 - DISABLE : 2 - On
	ON Text Color	: 53(False)
	ON Text Back Color	: 82(False)
	ON Text Back Effect	: Diagonal Up Top-Left
	ON Text Alignment(Font)	: Middle(Arial)
	ON Text Size	: 8
	OFF Text	: 1 - DISABLED : 2 - Off
	OFF Text Color	: 15(False)

	OFF Text Back Color	: 32(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial)
	OFF Text Size	: 8
[Visibility]	Object Visibility Option	: False
[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
[Password]	Password Option	: False

9 - RUN TIME



Project Name : C:¥Documents and Settings¥staff.DAYOFFICE¥Desktop¥rocity_rfa_090215.eap

Screen Description :

StaticText6 StaticText3 NumericDis NumericDisplay8 xt17 NumericDis NumericDisplay10

[Main]	Name	: StaticText9
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 10,10 30,150 140 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - RUN TIME METERS
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Top-Left(Arial Black)
	Text Size	: 10

[Main]	Name	: ScreenChangePB3
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 205,100 235,220 120 30
[General]	Label	: False
	Text	: 1 - MAIN MENU
		: 2 - Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 1/MAIN MENU
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: StaticText1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 75,70 105,120 50 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - P-1
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: StaticText3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 265,70 295,120 50 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - P-1
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: StaticText5
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,70 135,120 50 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - P-1
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: StaticText7
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 25,120 55,160 40 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - HR
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText8
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 25,150 55,200 50 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - MIN
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None

	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText12
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 45,70 75,120 50 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - P-1
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: NumericDisplay13
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 45,120 75,160 40 30
[General]	Label	: False
	Tag Name	: *C_GWP1RUN_HR*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 5/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay14
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 45,160 75,190 30 30
[General]	Label	: False
	Tag Name	: *C_GWP1RUN_MIN*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: StaticText15
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 135,70 165,120 50 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - P-1
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)

	Text Size	: 9

[Main]	Name	: StaticText2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 45,5 75,75 70 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - GW TRENCH
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText4
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 75,5 105,75 70 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - FEED
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText6
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 265,5 295,75 70 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - STRIPPER
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText10
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,5 135,75 70 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - DISCHARGE
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText11
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 165,5 195,75 70 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - BLOWERS
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None

	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText13
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 165,70 195,120 50 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - B-1
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: StaticText14
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 135,5 165,75 70 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - FLOOR SUMP
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText16
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 75,190 105,240 50 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - P-2
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: StaticText17
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 265,190 295,240 50 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - P-2
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: StaticText18
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,190 135,240 50 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - P-2
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12

	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: StaticText21
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 45,190 75,240 50 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - P-2
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: StaticText22
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 135,190 165,240 50 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - P-2
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: StaticText23
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 165,190 195,240 50 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - B-2
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: NumericDisplay1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 45,240 75,280 40 30
[General]	Label	: False
	Tag Name	: *C_GWP2RUN_HR*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 5/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 45,280 75,310 30 30
[General]	Label	: False
	Tag Name	: *C_GWP2RUN_MIN*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 75,120 105,160 40 30
[General]	Label	: False
	Tag Name	: *C_FEEDP1RUN_HR*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 5/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay4
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 75,160 105,190 30 30
[General]	Label	: False
	Tag Name	: *C_FEEDP1RUN_MIN*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay5
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 75,240 105,280 40 30
[General]	Label	: False
	Tag Name	: *C_FEEDP2RUN_HR*
	Use Tag For Decimal Point	: False

	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 5/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay6
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 75,280 105,310 30 30
[General]	Label	: False
	Tag Name	: *C_FEEDP2RUN_MIN*
	Use Tag For Decimal Point	: False
	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay7
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 265,120 295,160 40 30
[General]	Label	: False
	Tag Name	: *C_STRIPP1RUN_HR*
	Use Tag For Decimal Point	: False
	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 5/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay8
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 265,160 295,190 30 30
[General]	Label	: False
	Tag Name	: *C_STRIPP1RUN_MIN*
	Use Tag For Decimal Point	: False
	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros

[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay9
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 265,240 295,280 40 30
[General]	Label	: False
	Tag Name	: *C_STRIPP2RUN_HR*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 5/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay10
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 265,280 295,310 30 30
[General]	Label	: False
	Tag Name	: *C_STRIPP2RUN_MIN*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay11
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,120 135,160 40 30
[General]	Label	: False
	Tag Name	: *C_DISCP1RUN_HR*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 5/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay12
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,160 135,190 30 30
[General]	Label	: False
	Tag Name	: *C_DISCP1RUN_MIN*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay15
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,240 135,280 40 30
[General]	Label	: False
	Tag Name	: *C_DISCP2RUN_HR*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 5/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay16
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,280 135,310 30 30
[General]	Label	: False
	Tag Name	: *C_DISCP2RUN_MIN*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay17
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 135,120 165,160 40 30
[General]	Label	: False
	Tag Name	: *C_SUMPP1RUN_HR*
	Use Tag For Decimal Point	: False

	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 5/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay18
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 135,160 165,190 30 30
[General]	Label	: False
	Tag Name	: *C_SUMPP1RUN_MIN*
	Use Tag For Decimal Point	: False
	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay19
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 135,240 165,280 40 30
[General]	Label	: False
	Tag Name	: *C_SUMPP2RUN_HR*
	Use Tag For Decimal Point	: False
	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 5/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay20
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 135,280 165,310 30 30
[General]	Label	: False
	Tag Name	: *C_SUMPP2RUN_MIN*
	Use Tag For Decimal Point	: False
	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros

[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay21
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 165,120 195,160 40 30
[General]	Label	: False
	Tag Name	: *C_BLOW1RUN_HR*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 5/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay22
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 165,160 195,190 30 30
[General]	Label	: False
	Tag Name	: *C_BLOW1RUN_MIN*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay23
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 165,240 195,280 40 30
[General]	Label	: False
	Tag Name	: *C_BLOW2RUN_HR*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 5/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

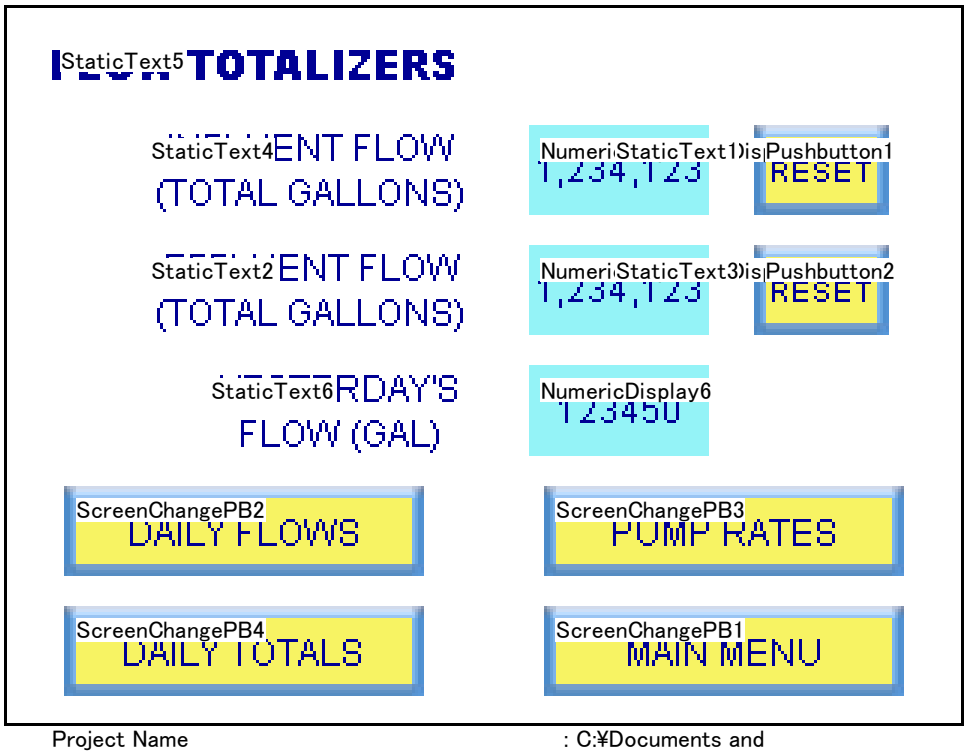
12

[Main]	Name	: NumericDisplay24
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 165,280 195,310 30 30
[General]	Label	: False
	Tag Name	: *C_BLOW2RUN_MIN*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: StaticText19
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 25,240 55,280 40 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - HR : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText20
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 25,270 55,320 50 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - MIN : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

10 - FLOWRATE



Project Name : C:¥Documents and Settings¥staff.DAYOFFICE¥Desktop¥rocity_rfa_090215.eap

Screen Description :

[Main]	Name	: ScreenChangePB1
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 200,180 230,300 120 30
[General]	Label	: False
	Text	: 1 - MAIN MENU
		: 2 - Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 1/MAIN MENU
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: NumericDisplay1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 40,175 70,210 35 30
[General]	Label	: False
	Tag Name	: *INFLOW_TOTAL_THOUSANDS*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/0
	Prefix/Suffix	: /
	Comma Separator	: True
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False

[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 40,210 70,235 25 30
[General]	Label	: False
	Tag Name	: *INFLOW_TOTAL_HUNDREDS*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 3/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: StaticText4
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 40,45 70,160 115 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - INFLUENT FLOW (TOTAL GALLONS) : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: StaticText1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 40,200 65,220 20 25
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - , : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 12

[Main]	Name	: NumericDisplay3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 80,175 110,210 35 30
[General]	Label	: False
	Tag Name	: *OUTFLOW_TOTAL_THOUSANDS*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/0
	Prefix/Suffix	: /
	Comma Separator	: True
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False

[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay4
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 80,210 110,235 25 30
[General]	Label	: False
	Tag Name	: *OUTFLOW_TOTAL_HUNDREDS*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 3/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: StaticText2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 80,45 110,160 115 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - EFFLUENT FLOW (TOTAL GALLONS) : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: StaticText3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 80,200 105,220 20 25
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - , : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 12

[Main]	Name	: StaticText5
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 10,15 30,155 140 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - FLOW TOTALIZERS : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Top-Left(Arial Black)
	Text Size	: 10

[Main]	Name	: StaticText6
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 120,65 150,160 95 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - YESTERDAY'S FLOW (GAL)
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: ScreenChangePB2
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 160,20 190,140 120 30
[General]	Label	: False
	Text	: 1 - DAILY FLOWS
		: 2 - Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 12/DAILY FLOWS #1
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: Pushbutton1
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 40,250 70,295 45 30
[General]	Label	: False
	Tag Name	: *INFLOW_TOTAL_RESET*
	Object Style/Object Type	: Style-1(Rectangular)/Momentary On
	ON Text	: 1 - RESET
		: 2 - On
	ON Text Color	: 15(False)
	ON Text Back Color	: 32(False)
	ON Text Back Effect	: Diagonal Up Top-Left
	ON Text Alignment(Font)	: Middle(Arial)
	ON Text Size	: 8
	OFF Text	: 1 - RESET
		: 2 - Off
	OFF Text Color	: 52(False)
	OFF Text Back Color	: 82(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial)
	OFF Text Size	: 8
[Visibility]	Object Visibility Option	: False
[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
	Release Delay	: False
[Password]	Password Option	: False

[Main]	Name	: Pushbutton2
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 80,250 110,295 45 30
[General]	Label	: False
	Tag Name	: *OUTFLOW_TOTAL_RESET*
	Object Style/Object Type	: Style-1(Rectangular)/Momentary On
	ON Text	: 1 - RESET
		: 2 - On
	ON Text Color	: 15(False)
	ON Text Back Color	: 32(False)

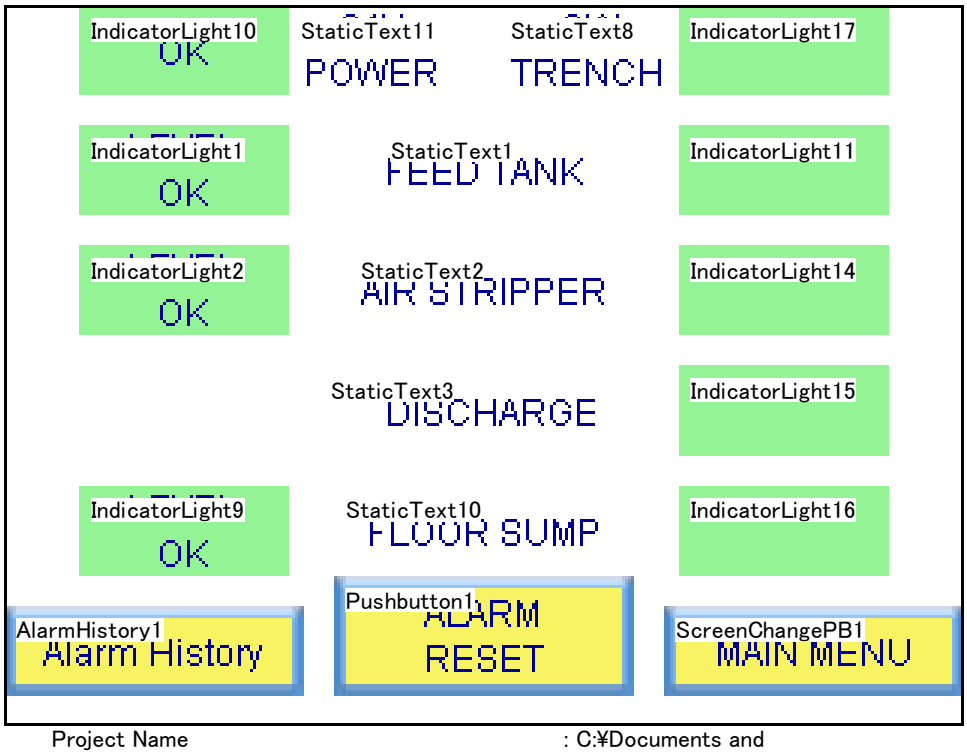
	ON Text Back Effect	: Diagonal Up Top-Left
	ON Text Alignment(Font)	: Middle(Arial)
	ON Text Size	: 8
	OFF Text	: 1 - RESET
		: 2 - Off
	OFF Text Color	: 52(False)
	OFF Text Back Color	: 82(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial)
	OFF Text Size	: 8
[Visibility]	Object Visibility Option	: False
[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
	Release Delay	: False
[Password]	Password Option	: False

[Main]	Name	: NumericDisplay6
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 120,175 150,235 60 30
[General]	Label	: False
	Tag Name	: *DAY1_FLOW*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 5/0
	Prefix/Suffix	: /0
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: ScreenChangePB3
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 160,180 190,300 120 30
[General]	Label	: False
	Text	: 1 - PUMP RATES
		: 2 - Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 14/PUMP FLOWRATES
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: ScreenChangePB4
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 200,20 230,140 120 30
[General]	Label	: False
	Text	: 1 - DAILY TOTALS
		: 2 - Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 17/TOTALIZER FLOWS #1
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

11 - ALARMS



Project Name : C:¥Documents and Settings¥staff.DAYOFFICE¥Desktop¥rocity_rfa_090215.eap

Screen Description : IndicatorLight3

[Main]	Name	: IndicatorLight13
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 80,225 110,295 70 30
[General]	Label	: False
	Tag Name	: *STRIP_B1_FAIL*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 - BLOWER 1 FAILED
		: 2 - On
	ON Text Color	: 15(False)
	ON Text Back Color	: 16(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 - BLOWERS OK
		: 2 - Off
	OFF Text Color	: 52(False)
	OFF Text Back Color	: 43(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: False

[Main]	Name	: IndicatorLight4
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 120,225 150,295 70 30
[General]	Label	: False
	Tag Name	: *DISCHARGE_P1_FAIL*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 - PUMP 1 FAILED
		: 2 - On
	ON Text Color	: 15(False)
	ON Text Back Color	: 16(False)

	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 - PUMPS OK : 2 - Off
	OFF Text Color	: 52(False)
	OFF Text Back Color	: 43(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: False

[Main]	Name	: IndicatorLight7
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 0,225 30,295 70 30
[General]	Label	: False
	Tag Name	: *GW_P1_FAIL*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 - PUMP 1 FAILED : 2 - On
	ON Text Color	: 15(False)
	ON Text Back Color	: 16(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 - PUMPS OK : 2 - Off
	OFF Text Color	: 52(False)
	OFF Text Back Color	: 43(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: False

[Main]	Name	: IndicatorLight5
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 160,225 190,295 70 30
[General]	Label	: False
	Tag Name	: *SUMP_P1_FAIL*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 - PUMP P1 FAILED : 2 - On
	ON Text Color	: 15(False)
	ON Text Back Color	: 16(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 - PUMPS OK : 2 - Off
	OFF Text Color	: 52(False)
	OFF Text Back Color	: 43(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: False

[Main]	Name	: IndicatorLight8
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 40,225 70,295 70 30
[General]	Label	: False
	Tag Name	: *FEED_P1_FAIL*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 - PUMP 1 FAILED : 2 - On

	ON Text Color	: 15(False)
	ON Text Back Color	: 16(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 - PUMPS OK : 2 - Off
	OFF Text Color	: 52(False)
	OFF Text Back Color	: 43(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: False

[Main]	Name	: ScreenChangePB1
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 200,220 230,320 100 30
[General]	Label	: False
	Text	: 1 - MAIN MENU : 2 - Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 1/MAIN MENU
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: StaticText11
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 0,95 30,150 55 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - 24V POWER : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: IndicatorLight10
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 0,25 30,95 70 30
[General]	Label	: False
	Tag Name	: *24V_POWER_FAIL*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 - FAILED : 2 - On
	ON Text Color	: 15(False)
	ON Text Back Color	: 16(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 - OK : 2 - Off
	OFF Text Color	: 52(False)
	OFF Text Back Color	: 43(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: False

[Main]	Name	: AlarmHistory1
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 200,0 230,100 100 30
[General]	Label	: False
	Text	: 1 - Alarm History
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Display Screen	: Alarm History
	Object Style	: Style 1
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: StaticText1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 40,125 70,195 70 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - FEED TANK : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: IndicatorLight1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 40,25 70,95 70 30
[General]	Label	: False
	Tag Name	: *FEED_TANK_LAH*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 - HIGH LEVEL : 2 - On
	ON Text Color	: 15(False)
	ON Text Back Color	: 16(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 - LEVEL OK : 2 - Off
	OFF Text Color	: 52(False)
	OFF Text Back Color	: 43(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: False

[Main]	Name	: StaticText2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 80,115 110,205 90 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - AIR STRIPPER : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: IndicatorLight2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 80,25 110,95 70 30
[General]	Label	: False
	Tag Name	: *STRIP_SUMP_LAH*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 - HIGH LEVEL : 2 - On
	ON Text Color	: 15(False)
	ON Text Back Color	: 16(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 - LEVEL OK : 2 - Off
	OFF Text Color	: 52(False)
	OFF Text Back Color	: 43(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: False

[Main]	Name	: StaticText3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 120,105 150,220 115 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - DISCHARGE : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: IndicatorLight3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 265,25 295,95 70 30
[General]	Label	: False
	Tag Name	: *DISCHARGE_TANK_LAH*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 - HIGH LEVEL : 2 - On
	ON Text Color	: 15(False)
	ON Text Back Color	: 16(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 - LEVEL OK : 2 - Off
	OFF Text Color	: 52(False)
	OFF Text Back Color	: 43(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: False

[Main]	Name	: StaticText8
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 0,165 30,225 60 30
[General]	Transparent	: True
	Advanced	: False

	Text	: 1 – GW TRENCH : 2 – STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial – Default)
	Text Size	: 9

[Main]	Name	: Pushbutton1
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 190,110 230,210 100 40
[General]	Label	: False
	Tag Name	: *ALARM_RESET*
	Object Style/Object Type	: Style-1(Rectangular)/Momentary On
	ON Text	: 1 – ALARM RESET : 2 – On
	ON Text Color	: 15(False)
	ON Text Back Color	: 32(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial – Default)
	ON Text Size	: 9
	OFF Text	: 1 – ALARM RESET : 2 – Off
	OFF Text Color	: 52(False)
	OFF Text Back Color	: 82(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial – Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: False
[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
	Release Delay	: False
[Password]	Password Option	: False

[Main]	Name	: StaticText10
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 160,110 190,210 100 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 – FLOOR SUMP : 2 – STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial – Default)
	Text Size	: 9

[Main]	Name	: IndicatorLight9
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 160,25 190,95 70 30
[General]	Label	: False
	Tag Name	: *FLOOR_SUMP_LAH*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 – HIGH LEVEL : 2 – On
	ON Text Color	: 15(False)
	ON Text Back Color	: 16(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial – Default)
	ON Text Size	: 9
	OFF Text	: 1 – LEVEL OK : 2 – Off
	OFF Text Color	: 52(False)
	OFF Text Back Color	: 43(False)
	OFF Text Back Effect	: None

	OFF Text Alignment(Font)	: Middle(Arial – Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: False

[Main]	Name	: IndicatorLight11
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 40,225 70,295 70 30
[General]	Label	: False
	Tag Name	: *FEED_P2_FAIL*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 – PUMP 2 FAILED : 2 – On
	ON Text Color	: 15(False)
	ON Text Back Color	: 16(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial – Default)
	ON Text Size	: 9
	OFF Text	: 1 – : 2 – : 3 – : 4 – : 5 – : 6 – : 7 – : 8 – : 9 –
	OFF Text Color	: 0(False)
	OFF Text Back Color	: 43(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial – Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: True
	Tag Name	: *FEED_P2_FAIL*
	Condition	: When address value is ON
	Value	: ON

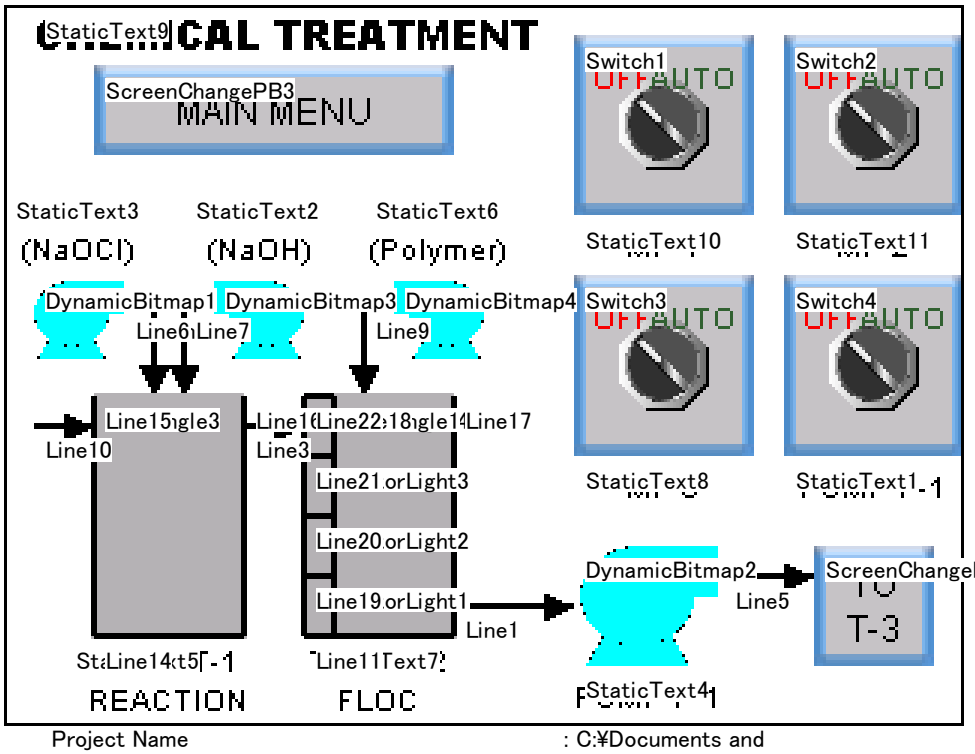
[Main]	Name	: IndicatorLight14
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 80,225 110,295 70 30
[General]	Label	: False
	Tag Name	: *STRIP_B2_FAIL*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 – BLOWER 2 FAILED : 2 – On
	ON Text Color	: 15(False)
	ON Text Back Color	: 16(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial – Default)
	ON Text Size	: 9
	OFF Text	: 1 – : 2 – : 3 – : 4 – : 5 – : 6 – : 7 – : 8 – : 9 –
	OFF Text Color	: 0(False)
	OFF Text Back Color	: 43(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial – Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: True
	Tag Name	: *STRIP_B2_FAIL*
	Condition	: When address value is ON
	Value	: ON

[Main]	Name	: IndicatorLight15
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 120,225 150,295 70 30
[General]	Label	: False
	Tag Name	: *DISCHARGE_P2_FAIL*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 - PUMP 2 FAILED
		: 2 - On
	ON Text Color	: 15(False)
	ON Text Back Color	: 16(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 -
		: 2 -
		: 3 -
		: 4 -
		: 5 -
		: 6 -
		: 7 -
		: 8 -
		: 9 -
	OFF Text Color	: 0(False)
	OFF Text Back Color	: 43(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: True
	Tag Name	: *DISCHARGE_P2_FAIL*
	Condition	: When address value is ON
	Value	: ON

[Main]	Name	: IndicatorLight16
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 160,225 190,295 70 30
[General]	Label	: False
	Tag Name	: *SUMP_P2_FAIL*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 - PUMP 2 FAILED
		: 2 - On
	ON Text Color	: 15(False)
	ON Text Back Color	: 16(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 -
		: 2 -
		: 3 -
		: 4 -
		: 5 -
		: 6 -
		: 7 -
		: 8 -
		: 9 -
	OFF Text Color	: 0(False)
	OFF Text Back Color	: 43(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: True
	Tag Name	: *SUMP_P2_FAIL*
	Condition	: When address value is ON
	Value	: ON

[Main]	Name	: IndicatorLight17
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 0,225 30,295 70 30
[General]	Label	: False
	Tag Name	: *GW_P2_FAIL*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 - PUMP 2 FAILED
		: 2 - On
	ON Text Color	: 15(False)
	ON Text Back Color	: 16(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 -
		: 2 -
		: 3 -
		: 4 -
		: 5 -
		: 6 -
		: 7 -
		: 8 -
		: 9 -
	OFF Text Color	: 0(False)
	OFF Text Back Color	: 43(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: True
	Tag Name	: *GW_P2_FAIL*
	Condition	: When address value is ON
	Value	: ON

16 - REACTION



Project Name : C:¥Documents and Settings¥staff.DAYOFFICE¥Desktop¥rocity_rfa_090215.eap

Screen Description :

[Main]	Name	: DynamicBitmap1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 90,10 120,40 30 30
[General]	Label	: False
	Tag Name	: *FLOOR_SUMP_LSH*
OnBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
OffBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
[Visibility]	Object Visibility Option	: False

[Main]	Name	: DynamicBitmap2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 180,190 220,240 50 40
[General]	Label	: False
	Tag Name	: *STRIP_B1_AUTO*
OnBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
OffBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
[Visibility]	Object Visibility Option	: False

[Main]	Name	: Switch1
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 10,190 70,250 60 60
[General]	Label	: False
	Tag Name	: *SUMP_P1/2_RUNNING*
	Object Type	: Toggle
	Back Color	: 12
	Object Style	: Style 1
	Enhanced	: True
	ON Text	: 1 - AUTO
		: 2 - On
	ON Text Color	: 35(False)
	ON Text Font	: Arial
	ON Text Size	: 8
	OFF Text	: 1 - OFF
		: 2 - Off
	OFF Text Color	: 16(False)
	OFF Text Font	: Arial
	OFF Text Size	: 8
[Visibility]	Object Visibility Option	: False
[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
[Password]	Password Option	: False

[Main]	Name	: StaticText3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 60,0 90,50 50 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - MP-1 (NaOCl)
		: 2 - STATIC TEXT
	Text Color	: 0
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText4
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 220,190 240,240 50 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - PUMP P-1
		: 2 - STATIC TEXT
	Text Color	: 0
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: Line1
	Top-Left/Bottom-Right/Width/Height	: 200,150 201,190 40 1
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Object Style	: Right Arrow - Style2

[Main]	Name	: Line2
	Top-Left/Bottom-Right/Width/Height	: 100,50 130,51 1 30
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Object Style	: Left Arrow - Style3

[Main]	Name	: Line3
	Top-Left/Bottom-Right/Width/Height	: 140,80 141,100 20 1
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Object Style	: Right Arrow - Style2

[Main]	Name	: IndicatorLight1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 190,100 210,110 10 20
[General]	Label	: False
	Tag Name	: *FEED_TANK_LSHH*
	Object Style	: Style-1(Rectangular)
	ON Text	: 1 - : 2 - : 3 - : 4 - : 5 - : 6 - : 7 - : 8 - : 9 -
	ON Text Color	: 0(True)
	ON Text Back Color	: 4(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 - : 2 - : 3 - : 4 - : 5 - : 6 - : 7 - : 8 - : 9 -
	OFF Text Color	: 0(False)
	OFF Text Back Color	: 11(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: False

[Main]	Name	: StaticText5
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 210,20 240,90 70 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - TANK T-1 REACTION : 2 - STATIC TEXT
	Text Color	: 0
	Back Color	: 12

	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText9
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 0,10 20,190 180 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - CHEMICAL TREATMENT
		: 2 - STATIC TEXT
	Text Color	: 0
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Top-Left(Arial Black)
	Text Size	: 10

[Main]	Name	: Line5
	Top-Left/Bottom-Right/Width/Height	: 190,240 191,270 30 1
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Object Style	: Right Arrow - Style2

[Main]	Name	: ScreenChangePB1
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 180,270 220,310 40 40
[General]	Label	: False
	Text	: 1 - TO T-3
		: 2 - Screen
	Text Color (Blink)	: 0(False)
	Back Color (Blink)	: 12(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 2/GW TRENCH
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: ScreenChangePB3
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 20,30 50,150 120 30
[General]	Label	: False
	Text	: 1 - MAIN MENU
		: 2 - Screen
	Text Color (Blink)	: 0(False)
	Back Color (Blink)	: 12(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 1/MAIN MENU
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: DynamicBitmap3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 90,70 120,100 30 30
[General]	Label	: False
	Tag Name	: *STRIP_B1_FAIL*
OnBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
OffBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
[Visibility]	Object Visibility Option	: False

[Main]	Name	: DynamicBitmap4
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 90,130 120,160 30 30
[General]	Label	: False
	Tag Name	: *STRIP_B1_AUTO*
OnBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
OffBitmap	Lock Aspect Ratio	: True
	Stretch to Fit	: True
	Transparent/Color	: True/16777215
	Back Color	: 255
	Back Effect	: None
[Visibility]	Object Visibility Option	: False

[Main]	Name	: StaticText2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 60,60 90,110 50 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - MP-2 (NaOH) : 2 - STATIC TEXT
	Text Color	: 0
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText6
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 60,120 90,170 50 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - MP-3 (Polymer) : 2 - STATIC TEXT
	Text Color	: 0
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]
Name : StaticText7
Display Frame : False
Top-Left/Bottom-Right/Width/Height : 210,100 240,150 50 30

[General]
Transparent : True
Advanced : False
Text : 1 - TANK T-2
FLOC
: 2 - STATIC TEXT
Text Color : 0
Back Color : 12
Back Effect : None
Text Alignment(Font) : Middle(Arial)
Text Size : 8

[Main]
Name : Line4
Top-Left/Bottom-Right/Width/Height : 100,60 130,61 1 30

[General]
Advanced : False
Line Width : 2
Line Color : 0
Line Style : Solid Line
Angle (in Degree) : 0
Fix Horizontal or Vertical : False
Object Style : Left Arrow - Style3

[Main]
Name : IndicatorLight2
Display Frame : False
Top-Left/Bottom-Right/Width/Height : 170,100 190,110 10 20

[General]
Label : False
Tag Name : *STRIP_SUMP_LSL*
Object Style : Style-1(Rectangular)
ON Text : 1 -
: 2 -
: 3 -
: 4 -
: 5 -
: 6 -
: 7 -
: 8 -
: 9 -
ON Text Color : 0(True)
ON Text Back Color : 4(False)
ON Text Back Effect : None
ON Text Alignment(Font) : Middle(Arial - Default)
ON Text Size : 9
OFF Text : 1 -
: 2 -
: 3 -
: 4 -
: 5 -
: 6 -
: 7 -
: 8 -
: 9 -
OFF Text Color : 0(False)
OFF Text Back Color : 11(False)
OFF Text Back Effect : None
OFF Text Alignment(Font) : Middle(Arial - Default)
OFF Text Size : 9

[Visibility]
Object Visibility Option : False

[Main]
Name : IndicatorLight3
Display Frame : False
Top-Left/Bottom-Right/Width/Height : 150,100 170,110 10 20

[General]
Label : False
Tag Name : *STRIP_SUMP_LSH*
Object Style : Style-1(Rectangular)

	ON Text	: 1 - : 2 - : 3 - : 4 - : 5 - : 6 - : 7 - : 8 - : 9 -
	ON Text Color	: 0(True)
	ON Text Back Color	: 4(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 - : 2 - : 3 - : 4 - : 5 - : 6 - : 7 - : 8 - : 9 -
	OFF Text Color	: 0(False)
	OFF Text Back Color	: 11(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: False

[Main]	Name	: Line6
	Top-Left/Bottom-Right/Width/Height	: 100,40 101,50 10 1
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Object Style	: No Arrow - Style1

[Main]	Name	: Line7
	Top-Left/Bottom-Right/Width/Height	: 100,60 101,70 10 1
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Object Style	: No Arrow - Style1

[Main]	Name	: Line8
	Top-Left/Bottom-Right/Width/Height	: 100,120 130,121 1 30
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Object Style	: Left Arrow - Style3

[Main]	Name	: Line9
	Top-Left/Bottom-Right/Width/Height	: 100,120 101,130 10 1
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0

	Fix Horizontal or Vertical	: False
	Object Style	: No Arrow - Style1

[Main]	Name	: Line10
	Top-Left/Bottom-Right/Width/Height	: 140,10 141,30 20 1
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Object Style	: Right Arrow - Style2

[Main]	Name	: Rectangle3
	Top-Left/Bottom-Right/Width/Height	: 130,30 210,80 50 80
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 11
	Object Style	: Rectangle
	Angle (in Degree)	: 0
	Fill Color	: Enabled
	Fill Color	: 11

[Main]	Name	: Switch2
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 10,260 70,320 60 60
[General]	Label	: False
	Tag Name	: *STRIP_B1/2_RUNNING*
	Object Type	: Toggle
	Back Color	: 12
	Object Style	: Style 1
	Enhanced	: True
	ON Text	: 1 - AUTO
		: 2 - On
	ON Text Color	: 35(False)
	ON Text Font	: Arial
	ON Text Size	: 8
	OFF Text	: 1 - OFF
		: 2 - Off
	OFF Text Color	: 16(False)
	OFF Text Font	: Arial
	OFF Text Size	: 8
[Visibility]	Object Visibility Option	: False
[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
[Password]	Password Option	: False

[Main]	Name	: Switch3
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 90,190 150,250 60 60
[General]	Label	: False
	Tag Name	: *GW_P1_FAIL*
	Object Type	: Toggle
	Back Color	: 12
	Object Style	: Style 1
	Enhanced	: True
	ON Text	: 1 - AUTO
		: 2 - On
	ON Text Color	: 35(False)
	ON Text Font	: Arial
	ON Text Size	: 8
	OFF Text	: 1 - OFF
		: 2 - Off
	OFF Text Color	: 16(False)
	OFF Text Font	: Arial
	OFF Text Size	: 8
[Visibility]	Object Visibility Option	: False

[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
[Password]	Password Option	: False

[Main]	Name	: Switch4
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 90,260 150,320 60 60
[General]	Label	: False
	Tag Name	: *SUMP_P1_RUNNING*
	Object Type	: Toggle
	Back Color	: 12
	Object Style	: Style 1
	Enhanced	: True
	ON Text	: 1 - AUTO
		: 2 - On
	ON Text Color	: 35(False)
	ON Text Font	: Arial
	ON Text Size	: 8
	OFF Text	: 1 - OFF
		: 2 - Off
	OFF Text Color	: 16(False)
	OFF Text Font	: Arial
	OFF Text Size	: 8
[Visibility]	Object Visibility Option	: False
[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
[Password]	Password Option	: False

[Main]	Name	: StaticText1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 150,260 170,320 60 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - PUMP P-1
		: 2 - STATIC TEXT
	Text Color	: 0
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText8
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 150,190 170,250 60 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - MP-3
		: 2 - STATIC TEXT
	Text Color	: 0
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText10
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,190 90,250 60 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - MP-1
		: 2 - STATIC TEXT
	Text Color	: 0
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]
Name : StaticText11
Display Frame : False
Top-Left/Bottom-Right/Width/Height : 70,260 90,320 60 20
[General]
Transparent : True
Advanced : False
Text : 1 - MP-2
: 2 - STATIC TEXT
Text Color : 0
Back Color : 12
Back Effect : None
Text Alignment(Font) : Middle(Arial)
Text Size : 8

[Main]
Name : Line13
Top-Left/Bottom-Right/Width/Height : 130,150 210,151 1 80
[General]
Advanced : False
Line Width : 2
Line Color : 0
Line Style : Solid Line
Angle (in Degree) : 0
Fix Horizontal or Vertical : False
Object Style : No Arrow - Style1

[Main]
Name : Line14
Top-Left/Bottom-Right/Width/Height : 210,30 211,80 50 1
[General]
Advanced : False
Line Width : 2
Line Color : 0
Line Style : Solid Line
Angle (in Degree) : 0
Fix Horizontal or Vertical : False
Object Style : No Arrow - Style1

[Main]
Name : Line15
Top-Left/Bottom-Right/Width/Height : 130,30 210,31 1 80
[General]
Advanced : False
Line Width : 2
Line Color : 0
Line Style : Solid Line
Angle (in Degree) : 0
Fix Horizontal or Vertical : False
Object Style : No Arrow - Style1

[Main]
Name : Line16
Top-Left/Bottom-Right/Width/Height : 130,80 210,81 1 80
[General]
Advanced : False
Line Width : 2
Line Color : 0
Line Style : Solid Line
Angle (in Degree) : 0
Fix Horizontal or Vertical : False
Object Style : No Arrow - Style1

[Main]
Name : IndicatorLight4
Display Frame : False
Top-Left/Bottom-Right/Width/Height : 130,100 150,110 10 20
[General]
Label : False
Tag Name : *STRIP_SUMP_LSHH*
Object Style : Style-1(Rectangular)

	ON Text	: 1 - : 2 - : 3 - : 4 - : 5 - : 6 - : 7 - : 8 - : 9 -
	ON Text Color	: 0(True)
	ON Text Back Color	: 4(False)
	ON Text Back Effect	: None
	ON Text Alignment(Font)	: Middle(Arial - Default)
	ON Text Size	: 9
	OFF Text	: 1 - : 2 - : 3 - : 4 - : 5 - : 6 - : 7 - : 8 - : 9 -
	OFF Text Color	: 0(False)
	OFF Text Back Color	: 11(False)
	OFF Text Back Effect	: None
	OFF Text Alignment(Font)	: Middle(Arial - Default)
	OFF Text Size	: 9
[Visibility]	Object Visibility Option	: False

[Main]	Name	: Rectangle1
	Top-Left/Bottom-Right/Width/Height	: 130,110 210,150 40 80
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 11
	Object Style	: Rectangle
	Angle (in Degree)	: 0
	Fill Color	: Enabled
	Fill Color	: 11

[Main]	Name	: Line11
	Top-Left/Bottom-Right/Width/Height	: 210,100 211,150 50 1
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Object Style	: No Arrow - Style1

[Main]	Name	: Line12
	Top-Left/Bottom-Right/Width/Height	: 130,100 210,101 1 80
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Object Style	: No Arrow - Style1

[Main]	Name	: Line17
	Top-Left/Bottom-Right/Width/Height	: 130,150 210,151 1 80
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0

	Fix Horizontal or Vertical	: False
	Object Style	: No Arrow - Style1

[Main]	Name	: Line18
	Top-Left/Bottom-Right/Width/Height	: 130,110 210,111 1 80
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Object Style	: No Arrow - Style1

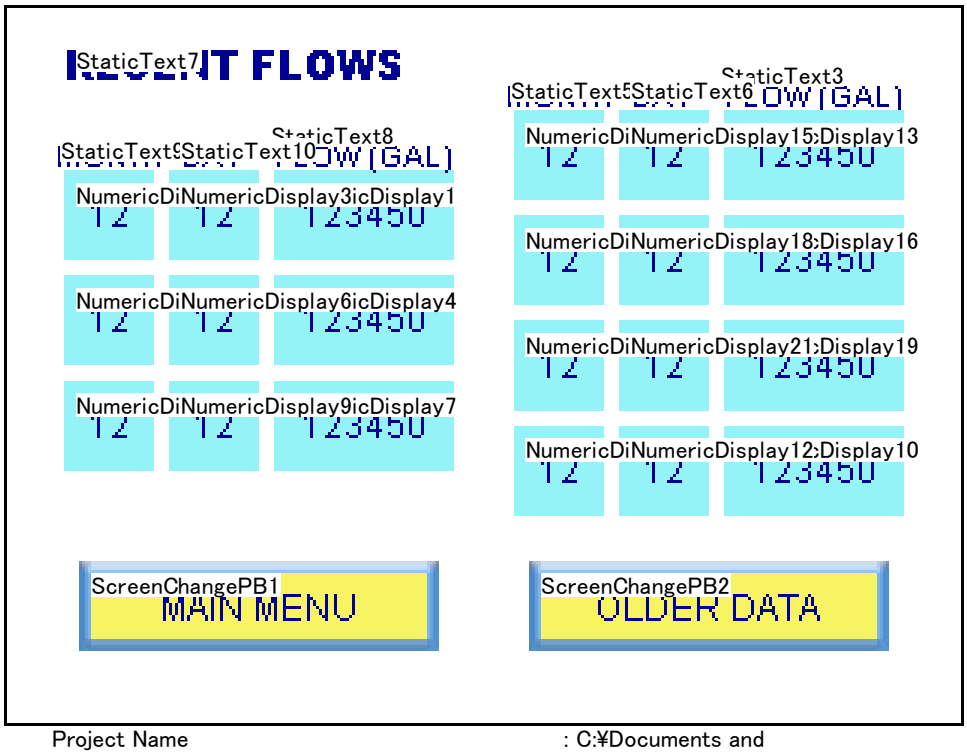
[Main]	Name	: Line19
	Top-Left/Bottom-Right/Width/Height	: 190,100 191,110 10 1
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Object Style	: No Arrow - Style1

[Main]	Name	: Line20
	Top-Left/Bottom-Right/Width/Height	: 170,100 171,110 10 1
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Object Style	: No Arrow - Style1

[Main]	Name	: Line21
	Top-Left/Bottom-Right/Width/Height	: 150,100 151,110 10 1
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Object Style	: No Arrow - Style1

[Main]	Name	: Line22
	Top-Left/Bottom-Right/Width/Height	: 130,100 131,110 10 1
[General]	Advanced	: False
	Line Width	: 2
	Line Color	: 0
	Line Style	: Solid Line
	Angle (in Degree)	: 0
	Fix Horizontal or Vertical	: False
	Object Style	: No Arrow - Style1

12 - DAILY FLOWS #1



Project Name : C:¥Documents and Settings¥staff.DAYOFFICE¥Desktop¥rocity_rfa_090215.eap

Screen Description :

[Main]	Name	: ScreenChangePB1
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 185,25 215,145 120 30
[General]	Label	: False
	Text	: 1 - MAIN MENU
		: 2 - Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 1/MAIN MENU
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: ScreenChangePB2
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 185,175 215,295 120 30
[General]	Label	: False
	Text	: 1 - OLDER DATA
		: 2 - Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 13/DAILY FLOWS #2
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: NumericDisplay1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 55,90 85,150 60 30
[General]	Label	: False
	Tag Name	: *DAY1_FLOW*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 5/0
	Prefix/Suffix	: /0
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 55,20 85,50 30 30
[General]	Label	: False
	Tag Name	: *DAY1_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

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[Main]	Name	: NumericDisplay3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 55,55 85,85 30 30
[General]	Label	: False
	Tag Name	: *DAY1_DAY*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay4
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 90,90 120,150 60 30
[General]	Label	: False
	Tag Name	: *DAY2_FLOW*
	Use Tag For Decimal Point	: False

	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 5/0
	Prefix/Suffix	: /0
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay5
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 90,20 120,50 30 30
[General]	Label	: False
	Tag Name	: *DAY2_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay6
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 90,55 120,85 30 30
[General]	Label	: False
	Tag Name	: *DAY2_DAY*
	Use Tag For Decimal Point	: False
	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay7
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 125,90 155,150 60 30
[General]	Label	: False
	Tag Name	: *DAY3_FLOW*
	Use Tag For Decimal Point	: False
	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 5/0
	Prefix/Suffix	: /0
	Comma Separator	: False
	Justify	: Leading Spaces

[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay8
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 125,20 155,50 30 30
[General]	Label	: False
	Tag Name	: *DAY3_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay9
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 125,55 155,85 30 30
[General]	Label	: False
	Tag Name	: *DAY3_DAY*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay10
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 140,240 170,300 60 30
[General]	Label	: False
	Tag Name	: *DAY7_FLOW*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 5/0
	Prefix/Suffix	: /0
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay11
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 140,170 170,200 30 30
[General]	Label	: False
	Tag Name	: *DAY7_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay12
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 140,205 170,235 30 30
[General]	Label	: False
	Tag Name	: *DAY7_DAY*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: StaticText3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 15,235 45,305 70 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - FLOW (GAL) : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText5
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 20,165 40,205 40 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - MONTH : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: NumericDisplay13
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 35,240 65,300 60 30
[General]	Label	: False
	Tag Name	: *DAY4_FLOW*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 5/0
	Prefix/Suffix	: /0
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay14
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 35,170 65,200 30 30
[General]	Label	: False
	Tag Name	: *DAY4_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: StaticText6
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 20,205 40,235 30 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - DAY : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

12

[Main]	Name	: NumericDisplay15
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 35,205 65,235 30 30
[General]	Label	: False
	Tag Name	: *DAY4_DAY*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0

	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay16
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,240 100,300 60 30
[General]	Label	: False
	Tag Name	: *DAY5_FLOW*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 5/0
	Prefix/Suffix	: /0
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay17
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,170 100,200 30 30
[General]	Label	: False
	Tag Name	: *DAY5_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay18
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,205 100,235 30 30
[General]	Label	: False
	Tag Name	: *DAY5_DAY*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay19
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,240 135,300 60 30
[General]	Label	: False
	Tag Name	: *DAY6_FLOW*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 5/0
	Prefix/Suffix	: /0
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay20
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,170 135,200 30 30
[General]	Label	: False
	Tag Name	: *DAY6_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay21
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,205 135,235 30 30
[General]	Label	: False
	Tag Name	: *DAY6_DAY*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: StaticText7
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 10,20 30,150 130 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - RECENT FLOWS

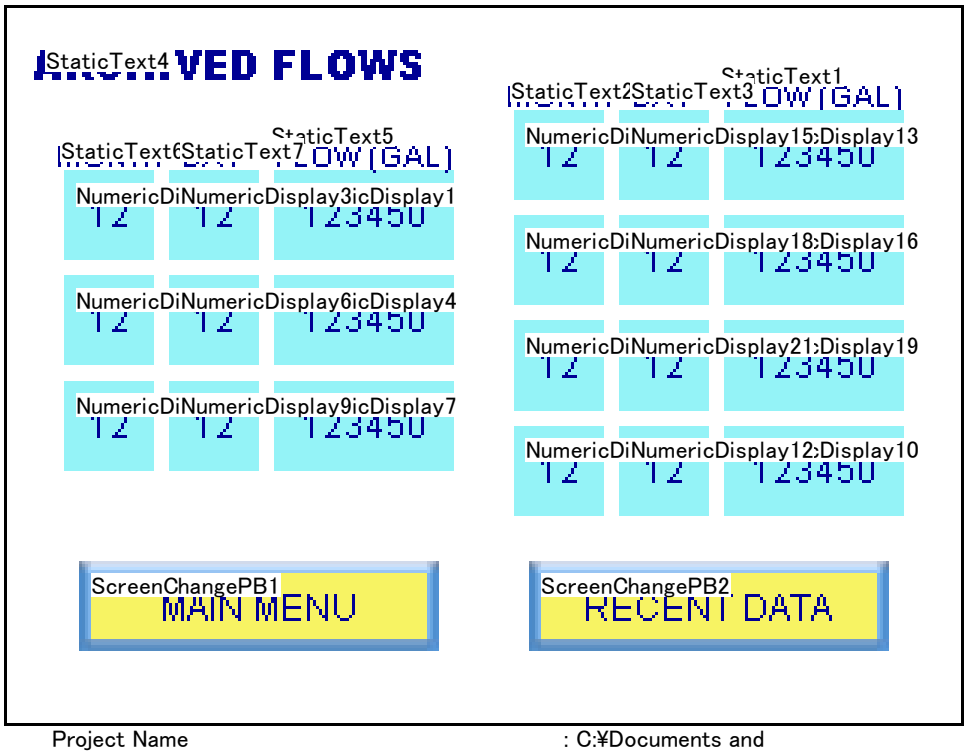
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Top-Left(Arial Black)
	Text Size	: 10

[Main]	Name	: StaticText8
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 35,85 65,155 70 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - FLOW (GAL)
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText9
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 40,15 60,55 40 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - MONTH
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText10
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 40,55 60,85 30 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - DAY
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

13 - DAILY FLOWS #2



Project Name : C:¥Documents and Settings¥staff.DAYOFFICE¥Desktop¥rocity_rfa_090215.eap

Screen Description :

[Main]	Name	: ScreenChangePB1
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 185,25 215,145 120 30
[General]	Label	: False
	Text	: 1 - MAIN MENU
		: 2 - Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 1/MAIN MENU
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: ScreenChangePB2
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 185,175 215,295 120 30
[General]	Label	: False
	Text	: 1 - RECENT DATA
		: 2 - Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 12/DAILY FLOWS #1
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: NumericDisplay1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 55,90 85,150 60 30
[General]	Label	: False
	Tag Name	: *DAY8_FLOW*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 5/0
	Prefix/Suffix	: /0
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 55,20 85,50 30 30
[General]	Label	: False
	Tag Name	: *DAY8_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 55,55 85,85 30 30
[General]	Label	: False
	Tag Name	: *DAY8_DAY*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay4
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 90,90 120,150 60 30
[General]	Label	: False
	Tag Name	: *DAY9_FLOW*
	Use Tag For Decimal Point	: False

	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 5/0
	Prefix/Suffix	: /0
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay5
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 90,20 120,50 30 30
[General]	Label	: False
	Tag Name	: *DAY9_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay6
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 90,55 120,85 30 30
[General]	Label	: False
	Tag Name	: *DAY9_DAY*
	Use Tag For Decimal Point	: False
	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay7
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 125,90 155,150 60 30
[General]	Label	: False
	Tag Name	: *DAY10_FLOW*
	Use Tag For Decimal Point	: False
	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 5/0
	Prefix/Suffix	: /0
	Comma Separator	: False
	Justify	: Leading Spaces

[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay8
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 125,20 155,50 30 30
[General]	Label	: False
	Tag Name	: *DAY10_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay9
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 125,55 155,85 30 30
[General]	Label	: False
	Tag Name	: *DAY10_DAY*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay10
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 140,240 170,300 60 30
[General]	Label	: False
	Tag Name	: *DAY14_FLOW*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 5/0
	Prefix/Suffix	: /0
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay11
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 140,170 170,200 30 30
[General]	Label	: False
	Tag Name	: *DAY14_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay12
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 140,205 170,235 30 30
[General]	Label	: False
	Tag Name	: *DAY14_DAY*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: StaticText1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 15,235 45,305 70 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - FLOW (GAL) : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 20,165 40,205 40 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - MONTH : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: NumericDisplay13
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 35,240 65,300 60 30
[General]	Label	: False
	Tag Name	: *DAY11_FLOW*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 5/0
	Prefix/Suffix	: /0
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay14
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 35,170 65,200 30 30
[General]	Label	: False
	Tag Name	: *DAY11_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: StaticText3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 20,205 40,235 30 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - DAY
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

12

[Main]	Name	: NumericDisplay15
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 35,205 65,235 30 30
[General]	Label	: False
	Tag Name	: *DAY11_DAY*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0

	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay16
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,240 100,300 60 30
[General]	Label	: False
	Tag Name	: *DAY12_FLOW*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 5/0
	Prefix/Suffix	: /0
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay17
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,170 100,200 30 30
[General]	Label	: False
	Tag Name	: *DAY12_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay18
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,205 100,235 30 30
[General]	Label	: False
	Tag Name	: *DAY12_DAY*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay19
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,240 135,300 60 30
[General]	Label	: False
	Tag Name	: *DAY13_FLOW*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 5/0
	Prefix/Suffix	: /0
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay20
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,170 135,200 30 30
[General]	Label	: False
	Tag Name	: *DAY13_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay21
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,205 135,235 30 30
[General]	Label	: False
	Tag Name	: *DAY13_DAY*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: StaticText4
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 10,10 30,145 135 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - ARCHIVED FLOWS

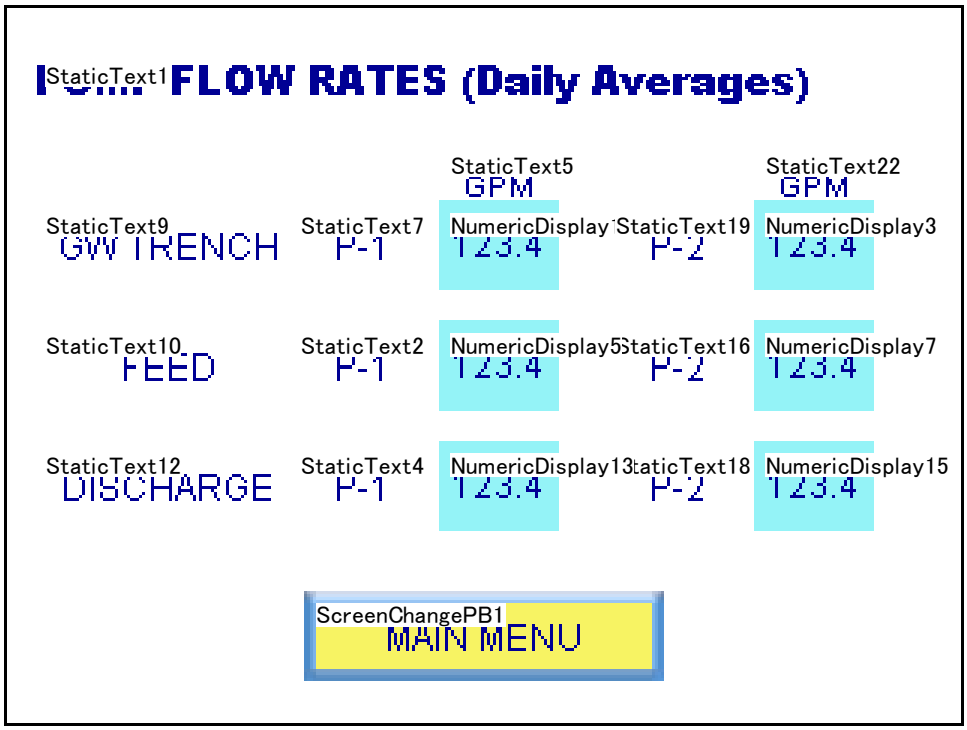
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Top-Left(Arial Black)
	Text Size	: 10

[Main]	Name	: StaticText5
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 35,85 65,155 70 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - FLOW (GAL)
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText6
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 40,15 60,55 40 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - MONTH
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText7
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 40,55 60,85 30 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - DAY
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

14 - PUMP FLOWRATES



Project Name : C:¥Documents and Settings¥staff.DAYOFFICE¥Desktop¥rocity_rfa_090215.eap

Screen Description StaticText3 NumericDisplay9 StaticText17 NumericDisplay11

[Main]	Name	: StaticText1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 15,10 35,275 265 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - PUMP FLOW RATES (Daily Averages)
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Top-Left(Arial Black)
	Text Size	: 10

[Main]	Name	: ScreenChangePB1
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 195,100 225,220 120 30
[General]	Label	: False
	Text	: 1 - MAIN MENU
		: 2 - Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 1/MAIN MENU
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: StaticText2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,95 135,145 50 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - P-1
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: StaticText3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 260,115 290,165 50 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - P-1
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: StaticText4
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 145,95 175,145 50 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - P-1
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: StaticText5
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 45,145 75,185 40 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - GPM
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText7
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 65,95 95,145 50 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - P-1
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None

	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: NumericDisplay1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 65,145 95,185 40 30
[General]	Label	: False
	Tag Name	: *GW_P1_GPM*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/1
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: StaticText9
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 65,10 95,100 90 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - GW TRENCH : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: StaticText10
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,10 135,100 90 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - FEED : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: StaticText11
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 260,30 290,120 90 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - STRIPPER : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: StaticText12
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 145,10 175,100 90 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - DISCHARGE
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: StaticText16
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,200 135,250 50 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - P-2
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: StaticText17
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 260,220 290,270 50 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - P-2
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: StaticText18
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 145,200 175,250 50 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - P-2
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9

[Main]	Name	: StaticText19
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 65,200 95,250 50 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - P-2
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None

	Text Alignment(Font)	: Middle(Arial – Default)
	Text Size	: 9

[Main]	Name	: NumericDisplay3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 65,250 95,290 40 30
[General]	Label	: False
	Tag Name	: *GW_P2_GPM*
	Use Tag For Decimal Point	: False
	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/1
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay5
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,145 135,185 40 30
[General]	Label	: False
	Tag Name	: *FEED_P1_GPM*
	Use Tag For Decimal Point	: False
	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/1
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay7
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,250 135,290 40 30
[General]	Label	: False
	Tag Name	: *FEED_P2_GPM*
	Use Tag For Decimal Point	: False
	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/1
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay9
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 260,165 290,205 40 30
[General]	Label	: False

	Tag Name	: *STRIP_P1_GPM*
	Use Tag For Decimal Point	: False
	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/1
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay11
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 260,270 290,310 40 30
[General]	Label	: False
	Tag Name	: *STRIP_P2_GPM*
	Use Tag For Decimal Point	: False
	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/1
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

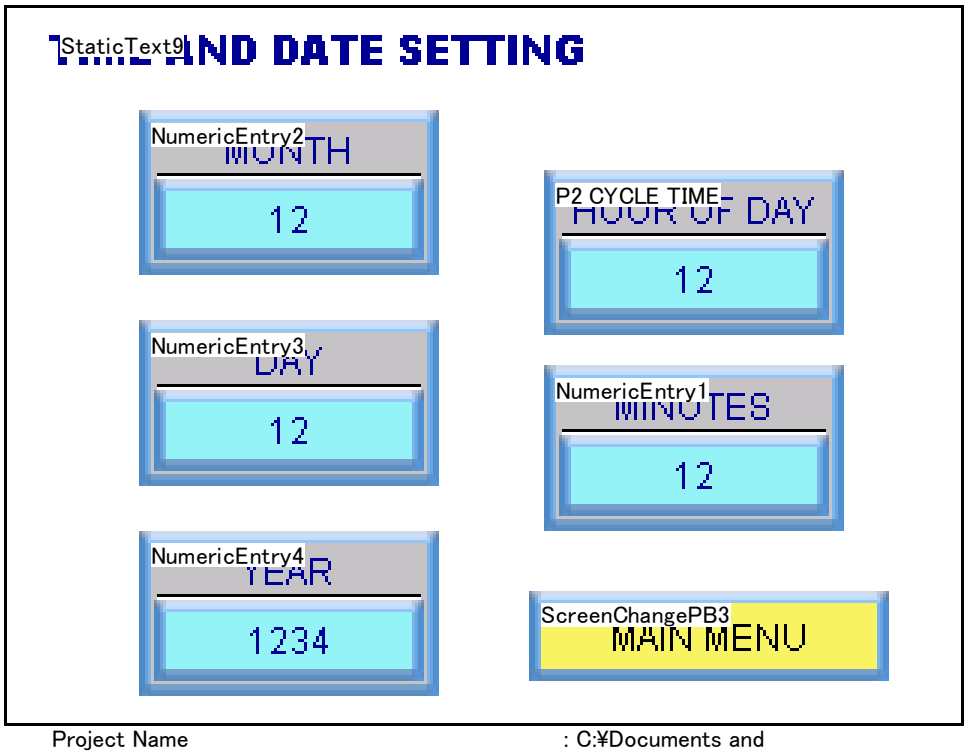
[Main]	Name	: NumericDisplay13
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 145,145 175,185 40 30
[General]	Label	: False
	Tag Name	: *DISCH_P1_GPM*
	Use Tag For Decimal Point	: False
	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/1
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay15
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 145,250 175,290 40 30
[General]	Label	: False
	Tag Name	: *DISCH_P2_GPM*
	Use Tag For Decimal Point	: False
	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/1
	Prefix/Suffix	: /

	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: StaticText22
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 45,250 75,290 40 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - GPM
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

15 - CLOCK SET



Project Name : C:¥Documents and Settings¥staff.DAYOFFICE¥Desktop¥rocity_rfa_090215.eap

Screen Description :

[Main]	Name	: StaticText9
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 5,15 30,215 200 25
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - TIME AND DATE SETTING
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Top-Left(Arial Black)
	Text Size	: 10

[Main]	Name	: ScreenChangePB3
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 195,175 225,295 120 30
[General]	Label	: False
	Text	: 1 - MAIN MENU
		: 2 - Screen
	Text Color (Blink)	: 0(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 1/MAIN MENU
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: P2 CYCLE TIME
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 55,180 110,280 100 55
[General]	Label	: True
	Label Text	: 1 - HOUR OF DAY
		: 2 - NUMERIC ENTRY
	Label Text Color	: 52
	Label Back Color	: 12
	Label Back Effect	: None
	Label Position/Label Align	: Top/Middle
	Label Text size(Font)	: 9 (Arial - Default)
	Tag Name	: *CLOCKSET_HR*
	Use Display Tag	: True
	Display Tag	: *RTC_HOUR*
	Use Tag For Decimal Point	: False
	Object Style	: Style 1
	Range	: True
	Min / Max	: 0/23
	Keypad	: System Default
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Control]	Notification and Handshake	: False
[Visibility]	Object Visibility Option	: False
[Scaling]	Scaling Option	: False
[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
[Password]	Password Option	: False

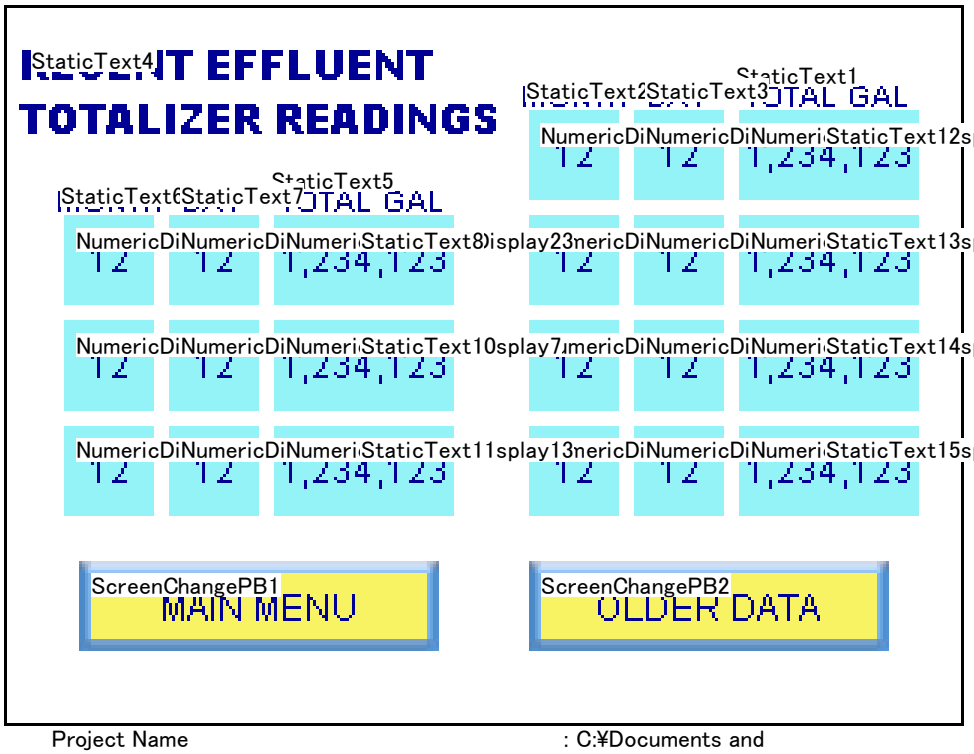
[Main]	Name	: NumericEntry1
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 120,180 175,280 100 55
[General]	Label	: True
	Label Text	: 1 - MINUTES
		: 2 - NUMERIC ENTRY
	Label Text Color	: 52
	Label Back Color	: 12
	Label Back Effect	: None
	Label Position/Label Align	: Top/Middle
	Label Text size(Font)	: 9 (Arial - Default)
	Tag Name	: *CLOCKSET_MIN*
	Use Display Tag	: True
	Display Tag	: *RTC_MIN*
	Use Tag For Decimal Point	: False
	Object Style	: Style 1
	Range	: True
	Min / Max	: 0/59
	Keypad	: System Default
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Control]	Notification and Handshake	: False
[Visibility]	Object Visibility Option	: False
[Scaling]	Scaling Option	: False
[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
[Password]	Password Option	: False

[Main]	Name	: NumericEntry2
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 35,45 90,145 100 55
[General]	Label	: True
	Label Text	: 1 - MONTH
		: 2 - NUMERIC ENTRY
	Label Text Color	: 52
	Label Back Color	: 12
	Label Back Effect	: None
	Label Position/Label Align	: Top/Middle
	Label Text size(Font)	: 9 (Arial - Default)
	Tag Name	: *CLOCKSET_MONTH*
	Use Display Tag	: True
	Display Tag	: *RTC_MONTH*
	Use Tag For Decimal Point	: False
	Object Style	: Style 1
	Range	: True
	Min / Max	: 1/12
	Keypad	: System Default
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Control]	Notification and Handshake	: False
[Visibility]	Object Visibility Option	: False
[Scaling]	Scaling Option	: False
[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
[Password]	Password Option	: False

[Main]	Name	: NumericEntry3
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 105,45 160,145 100 55
[General]	Label	: True
	Label Text	: 1 - DAY
		: 2 - NUMERIC ENTRY
	Label Text Color	: 52
	Label Back Color	: 12
	Label Back Effect	: None
	Label Position/Label Align	: Top/Middle
	Label Text size(Font)	: 9 (Arial - Default)
	Tag Name	: *CLOCKSET_DAY*
	Use Display Tag	: True
	Display Tag	: *RTC_DAY*
	Use Tag For Decimal Point	: False
	Object Style	: Style 1
	Range	: True
	Min / Max	: 1/31
	Keypad	: System Default
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Control]	Notification and Handshake	: False
[Visibility]	Object Visibility Option	: False
[Scaling]	Scaling Option	: False
[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
[Password]	Password Option	: False

[Main]	Name	: NumericEntry4
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 175,45 230,145 100 55
[General]	Label	: True
	Label Text	: 1 - YEAR
		: 2 - NUMERIC ENTRY
	Label Text Color	: 52
	Label Back Color	: 12
	Label Back Effect	: None
	Label Position/Label Align	: Top/Middle
	Label Text size(Font)	: 9 (Arial - Default)
	Tag Name	: *CLOCKSET_YR*
	Use Display Tag	: True
	Display Tag	: *RTC_YEAR*
	Use Tag For Decimal Point	: False
	Object Style	: Style 1
	Range	: True
	Min / Max	: 2014/2100
	Keypad	: System Default
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Control]	Notification and Handshake	: False
[Visibility]	Object Visibility Option	: False
[Scaling]	Scaling Option	: False
[Option]	Sound Library	: Default (Beep)
	Press Delay	: False
[Password]	Password Option	: False

17 - TOTALIZER FLOWS #1



Project Name : C:¥Documents and Settings¥staff.DAYOFFICE¥Desktop¥rocity_rfa_090215.eap

Screen Description : TOTALIZER FLOWS #1

[Main]	Name	: ScreenChangePB1
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 185,25 215,145 120 30
[General]	Label	: False
	Text	: 1 - MAIN MENU
		: 2 - Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 1/MAIN MENU
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: ScreenChangePB2
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 185,175 215,295 120 30
[General]	Label	: False
	Text	: 1 - OLDER DATA
		: 2 - Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 18/TOTALIZER FLOWS #2
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: NumericDisplay2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,20 100,50 30 30
[General]	Label	: False
	Tag Name	: *DAY1_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,55 100,85 30 30
[General]	Label	: False
	Tag Name	: *DAY1_DAY*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay5
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,20 135,50 30 30
[General]	Label	: False
	Tag Name	: *DAY2_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay6
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,55 135,85 30 30
[General]	Label	: False
	Tag Name	: *DAY2_DAY*
	Use Tag For Decimal Point	: False

	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay8
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 140,20 170,50 30 30
[General]	Label	: False
	Tag Name	: *DAY3_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay9
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 140,55 170,85 30 30
[General]	Label	: False
	Tag Name	: *DAY3_DAY*
	Use Tag For Decimal Point	: False
	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay11
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 140,175 170,205 30 30
[General]	Label	: False
	Tag Name	: *DAY7_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces

[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay12
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 140,210 170,240 30 30
[General]	Label	: False
	Tag Name	: *DAY7_DAY*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: StaticText1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 15,240 45,310 70 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - TOTAL GAL
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 20,170 40,210 40 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - MONTH
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: NumericDisplay14
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 35,175 65,205 30 30
[General]	Label	: False
	Tag Name	: *DAY4_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False

[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: StaticText3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 20,210 40,240 30 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - DAY
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: NumericDisplay15
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 35,210 65,240 30 30
[General]	Label	: False
	Tag Name	: *DAY4_DAY*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay17
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,175 100,205 30 30
[General]	Label	: False
	Tag Name	: *DAY5_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay18
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,210 100,240 30 30
[General]	Label	: False
	Tag Name	: *DAY5_DAY*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None

	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay20
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,175 135,205 30 30
[General]	Label	: False
	Tag Name	: *DAY6_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay21
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,210 135,240 30 30
[General]	Label	: False
	Tag Name	: *DAY6_DAY*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: StaticText4
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 10,5 55,165 160 45
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - RECENT EFFLUENT TOTALIZER READINGS : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Top-Left(Arial Black)
	Text Size	: 10

[Main]	Name	: StaticText5
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 50,85 80,155 70 30
[General]	Transparent	: True
	Advanced	: False

	Text	: 1 – TOTAL GAL
		: 2 – STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText6
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 55,15 75,55 40 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 – MONTH
		: 2 – STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText7
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 55,55 75,85 30 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 – DAY
		: 2 – STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: NumericDisplay22
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,90 100,125 35 30
[General]	Label	: False
	Tag Name	: *DAY1_TOTAL1*
	Use Tag For Decimal Point	: False
	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/0
	Prefix/Suffix	: /
	Comma Separator	: True
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

123

[Main]	Name	: NumericDisplay23
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,125 100,150 25 30
[General]	Label	: False
	Tag Name	: *DAY1_TOTAL2*
	Use Tag For Decimal Point	: False
	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 3/0

	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

'

[Main]	Name	: StaticText8
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,115 95,135 20 25
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - , : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 12

[Main]	Name	: NumericDisplay1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 65,375 95,410 35 30
[General]	Label	: False
	Tag Name	: *DAY1_TOTAL1*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/0
	Prefix/Suffix	: /
	Comma Separator	: True
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

123

[Main]	Name	: NumericDisplay24
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 65,410 95,435 25 30
[General]	Label	: False
	Tag Name	: *DAY1_TOTAL2*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 3/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

'

[Main]	Name	: StaticText9
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 65,400 90,420 20 25
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - , : 2 - STATIC TEXT

	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 12

[Main]	Name	: NumericDisplay4
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,90 135,125 35 30
[General]	Label	: False
	Tag Name	: *DAY2_TOTAL1*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/0
	Prefix/Suffix	: /
	Comma Separator	: True
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

123

[Main]	Name	: NumericDisplay7
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,125 135,150 25 30
[General]	Label	: False
	Tag Name	: *DAY2_TOTAL2*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 3/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

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[Main]	Name	: StaticText10
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,115 130,135 20 25
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - , : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 12

[Main]	Name	: NumericDisplay10
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 140,90 170,125 35 30
[General]	Label	: False
	Tag Name	: *DAY3_TOTAL1*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9

	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/0
	Prefix/Suffix	: /
	Comma Separator	: True
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

123

[Main]	Name	: NumericDisplay13
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 140,125 170,150 25 30
[General]	Label	: False
	Tag Name	: *DAY3_TOTAL2*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 3/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

'

[Main]	Name	: StaticText11
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 140,115 165,135 20 25
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - , : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 12

[Main]	Name	: NumericDisplay16
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 35,245 65,280 35 30
[General]	Label	: False
	Tag Name	: *DAY4_TOTAL1*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/0
	Prefix/Suffix	: /
	Comma Separator	: True
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay19
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 35,280 65,305 25 30
[General]	Label	: False
	Tag Name	: *DAY4_TOTAL2*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 3/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

,

[Main]	Name	: StaticText12
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 35,270 60,290 20 25
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - , : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 12

[Main]	Name	: NumericDisplay25
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,245 100,280 35 30
[General]	Label	: False
	Tag Name	: *DAY5_TOTAL1*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/0
	Prefix/Suffix	: /
	Comma Separator	: True
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay26
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,280 100,305 25 30
[General]	Label	: False
	Tag Name	: *DAY5_TOTAL2*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 3/0

	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

'

[Main]	Name	: StaticText13
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,270 95,290 20 25
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - , : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 12

[Main]	Name	: NumericDisplay27
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,245 135,280 35 30
[General]	Label	: False
	Tag Name	: *DAY6_TOTAL1*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/0
	Prefix/Suffix	: /
	Comma Separator	: True
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

123

[Main]	Name	: NumericDisplay28
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,280 135,305 25 30
[General]	Label	: False
	Tag Name	: *DAY6_TOTAL2*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 3/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

'

[Main]	Name	: StaticText14
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,270 130,290 20 25
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - , : 2 - STATIC TEXT

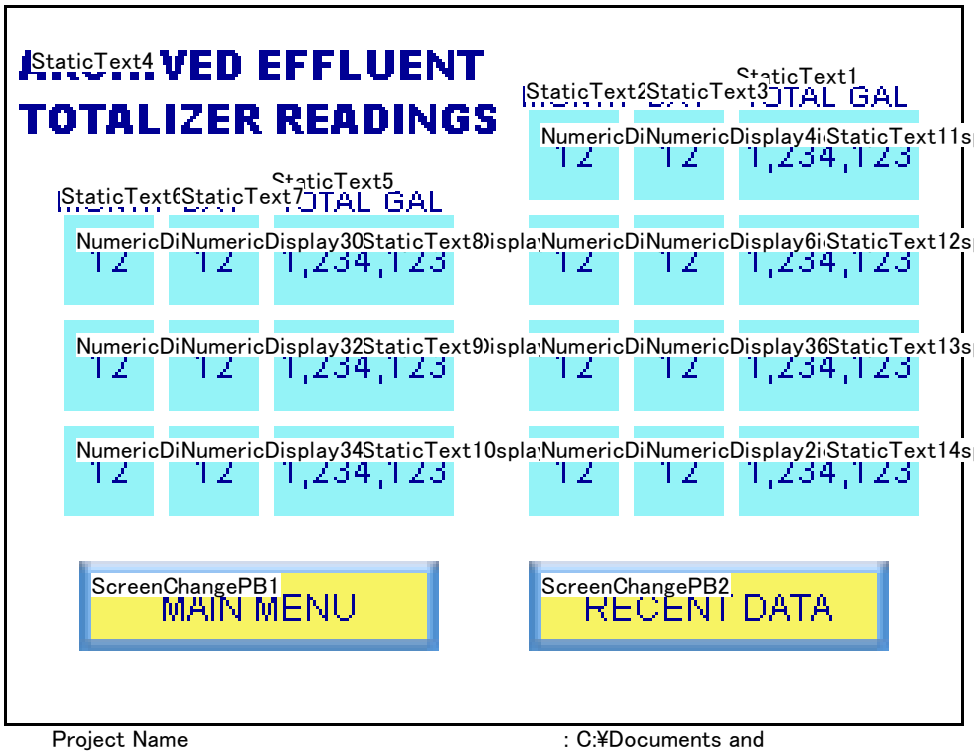
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 12

[Main]	Name	: NumericDisplay29
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 140,245 170,280 35 30
[General]	Label	: False
	Tag Name	: *DAY7_TOTAL1*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/0
	Prefix/Suffix	: /
	Comma Separator	: True
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay30
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 140,280 170,305 25 30
[General]	Label	: False
	Tag Name	: *DAY7_TOTAL2*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 3/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: StaticText15
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 140,270 165,290 20 25
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - , : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 12

18 - TOTALIZER FLOWS #2



Project Name : C:¥Documents and Settings¥staff.DAYOFFICE¥Desktop¥rocity_rfa_090215.eap

Screen Description :

[Main]	Name	: ScreenChangePB1
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 185,25 215,145 120 30
[General]	Label	: False
	Text	: 1 - MAIN MENU
		: 2 - Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 1/MAIN MENU
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: ScreenChangePB2
	Display Frame	: True
	Top-Left/Bottom-Right/Width/Height	: 185,175 215,295 120 30
[General]	Label	: False
	Text	: 1 - RECENT DATA
		: 2 - Screen
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 82(False)
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial - Default)
	Text Size	: 9
	Object Style	: Style 1
	Go to	: Other Screen
	Screen Number/Name	: 17/TOTALIZER FLOWS #1
[Visibility]	Object Visibility Option	: False
[Password]	Password Option	: False

[Main]	Name	: StaticText1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 15,240 45,310 70 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - TOTAL GAL
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 20,170 40,210 40 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - MONTH
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 20,210 40,240 30 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - DAY
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText4
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 10,5 55,165 160 45
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - ARCHIVED EFFLUENT TOTALIZER READINGS
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Top-Left(Arial Black)
	Text Size	: 10

[Main]	Name	: StaticText5
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 50,85 80,155 70 30
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - TOTAL GAL
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None

	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText6
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 55,15 75,55 40 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - MONTH
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: StaticText7
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 55,55 75,85 30 20
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - DAY
		: 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 8

[Main]	Name	: NumericDisplay15
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,90 100,125 35 30
[General]	Label	: False
	Tag Name	: *DAY8_TOTAL1*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/0
	Prefix/Suffix	: /
	Comma Separator	: True
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

123

[Main]	Name	: NumericDisplay16
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,125 100,150 25 30
[General]	Label	: False
	Tag Name	: *DAY8_TOTAL2*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 3/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False

[Option]	Calculation/Display Value	: False

'

[Main]	Name	: StaticText8
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,115 95,135 20 25
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - , : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 12

[Main]	Name	: NumericDisplay17
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,90 135,125 35 30
[General]	Label	: False
	Tag Name	: *DAY9_TOTAL1*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/0
	Prefix/Suffix	: /
	Comma Separator	: True
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

123

[Main]	Name	: NumericDisplay18
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,125 135,150 25 30
[General]	Label	: False
	Tag Name	: *DAY9_TOTAL2*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 3/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

'

[Main]	Name	: StaticText9
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,115 130,135 20 25
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - , : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 12

[Main]	Name	: NumericDisplay19
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 140,90 170,125 35 30
[General]	Label	: False
	Tag Name	: *DAY10_TOTAL1*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/0
	Prefix/Suffix	: /
	Comma Separator	: True
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

123

[Main]	Name	: NumericDisplay20
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 140,125 170,150 25 30
[General]	Label	: False
	Tag Name	: *DAY10_TOTAL2*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 3/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

'

[Main]	Name	: StaticText10
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 140,115 165,135 20 25
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - , : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 12

[Main]	Name	: NumericDisplay21
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 35,245 65,280 35 30
[General]	Label	: False
	Tag Name	: *DAY11_TOTAL1*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/0

	Prefix/Suffix	: /
	Comma Separator	: True
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

123

[Main]	Name	: NumericDisplay22
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 35,280 65,305 25 30
[General]	Label	: False
	Tag Name	: *DAY11_TOTAL2*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 3/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

,

[Main]	Name	: StaticText11
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 35,270 60,290 20 25
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - , : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 12

[Main]	Name	: NumericDisplay23
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,245 100,280 35 30
[General]	Label	: False
	Tag Name	: *DAY12_TOTAL1*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/0
	Prefix/Suffix	: /
	Comma Separator	: True
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

123

[Main]	Name	: NumericDisplay24
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,280 100,305 25 30
[General]	Label	: False
	Tag Name	: *DAY12_TOTAL2*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default

	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 3/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

,

[Main]	Name	: StaticText12
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,270 95,290 20 25
[General]	Transparent	: True
	Advanced	: False
	Text	: 1 - , : 2 - STATIC TEXT
	Text Color	: 52
	Back Color	: 12
	Back Effect	: None
	Text Alignment(Font)	: Middle(Arial)
	Text Size	: 12

[Main]	Name	: NumericDisplay25
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,245 135,280 35 30
[General]	Label	: False
	Tag Name	: *DAY13_TOTAL1*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 4/0
	Prefix/Suffix	: /
	Comma Separator	: True
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

123

[Main]	Name	: NumericDisplay26
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,280 135,305 25 30
[General]	Label	: False
	Tag Name	: *DAY13_TOTAL2*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 3/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Zeros
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main] Name : StaticText13
Display Frame : False
Top-Left/Bottom-Right/Width/Height : 105,270 130,290 20 25
[General] Transparent : True
Advanced : False
Text : 1 - ,
: 2 - STATIC TEXT
Text Color : 52
Back Color : 12
Back Effect : None
Text Alignment(Font) : Middle(Arial)
Text Size : 12

[Main] Name : NumericDisplay27
Display Frame : False
Top-Left/Bottom-Right/Width/Height : 140,245 170,280 35 30
[General] Label : False
Tag Name : *DAY14_TOTAL1*
Use Tag For Decimal Point : False
Font : Arial - Default
Text Size : 9
Text Color (Blink) : 52(False)
Back Color (Blink) : 45(False)
Back Effect : None
Data Type : Unsigned Decimal
Total Digits/Fractional Digits : 4/0
Prefix/Suffix : /
Comma Separator : True
Justify : Leading Spaces
[Scaling] Scaling Option : False
[Visibility] Object Visibility Option : False
[Option] Calculation/Display Value : False

123

[Main] Name : NumericDisplay28
Display Frame : False
Top-Left/Bottom-Right/Width/Height : 140,280 170,305 25 30
[General] Label : False
Tag Name : *DAY14_TOTAL2*
Use Tag For Decimal Point : False
Font : Arial - Default
Text Size : 9
Text Color (Blink) : 52(False)
Back Color (Blink) : 45(False)
Back Effect : None
Data Type : Unsigned Decimal
Total Digits/Fractional Digits : 3/0
Prefix/Suffix : /
Comma Separator : False
Justify : Leading Zeros
[Scaling] Scaling Option : False
[Visibility] Object Visibility Option : False
[Option] Calculation/Display Value : False

[Main] Name : StaticText14
Display Frame : False
Top-Left/Bottom-Right/Width/Height : 140,270 165,290 20 25
[General] Transparent : True
Advanced : False
Text : 1 - ,
: 2 - STATIC TEXT
Text Color : 52
Back Color : 12
Back Effect : None
Text Alignment(Font) : Middle(Arial)
Text Size : 12

[Main]	Name	: NumericDisplay29
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,20 100,50 30 30
[General]	Label	: False
	Tag Name	: *DAY8_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay30
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,55 100,85 30 30
[General]	Label	: False
	Tag Name	: *DAY8_DAY*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay31
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,20 135,50 30 30
[General]	Label	: False
	Tag Name	: *DAY9_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay32
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,55 135,85 30 30
[General]	Label	: False
	Tag Name	: *DAY9_DAY*
	Use Tag For Decimal Point	: False

	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay33
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 140,20 170,50 30 30
[General]	Label	: False
	Tag Name	: *DAY10_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay34
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 140,55 170,85 30 30
[General]	Label	: False
	Tag Name	: *DAY10_DAY*
	Use Tag For Decimal Point	: False
	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay1
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 140,175 170,205 30 30
[General]	Label	: False
	Tag Name	: *DAY14_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial – Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces

[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay2
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 140,210 170,240 30 30
[General]	Label	: False
	Tag Name	: *DAY14_DAY*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay3
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 35,175 65,205 30 30
[General]	Label	: False
	Tag Name	: *DAY11_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

[Main]	Name	: NumericDisplay4
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 35,210 65,240 30 30
[General]	Label	: False
	Tag Name	: *DAY11_DAY*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay5
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,175 100,205 30 30
[General]	Label	: False
	Tag Name	: *DAY12_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay6
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 70,210 100,240 30 30
[General]	Label	: False
	Tag Name	: *DAY12_DAY*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay35
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,175 135,205 30 30
[General]	Label	: False
	Tag Name	: *DAY13_MONTH*
	Use Tag For Decimal Point	: False
	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

12

[Main]	Name	: NumericDisplay36
	Display Frame	: False
	Top-Left/Bottom-Right/Width/Height	: 105,210 135,240 30 30
[General]	Label	: False
	Tag Name	: *DAY13_DAY*
	Use Tag For Decimal Point	: False

	Font	: Arial - Default
	Text Size	: 9
	Text Color (Blink)	: 52(False)
	Back Color (Blink)	: 45(False)
	Back Effect	: None
	Data Type	: Unsigned Decimal
	Total Digits/Fractional Digits	: 2/0
	Prefix/Suffix	: /
	Comma Separator	: False
	Justify	: Leading Spaces
[Scaling]	Scaling Option	: False
[Visibility]	Object Visibility Option	: False
[Option]	Calculation/Display Value	: False

RSLogix 500 Project Report

Table Of Contents

Processor Information

Processor Type: 1747-L532B 5/03 CPU - 16K Mem. OS301

Processor Name: 104902A

Total Memory Used: 1663 Instruction Words Used - 530 Data Table Words Used

Total Memory Left: 10625 Instruction Words Left

Program Files: 16

Data Files: 12

Program ID: cf53

I/O Configuration

0	1747-L532B	5/03 CPU - 16K Mem. OS301
1		
2	1746-IN16	16-Input (SINK) 24VAC/DC
3	1746-IN16	16-Input (SINK) 24VAC/DC
4	1746-OW16	16-Output (RLY) 240 VAC
5	1746-NI4	Analog 4 Channel Input Module
6	1746-NIO4I	Analog 2 Ch In/2 Ch Current Out

Channel Configuration

GENERAL
   Channel 1 Write Protected: No
   Channel 1 Edit Resource/Owner Timeout(x1 sec): 60
   Channel 1 Passthru Link ID(dec): 2

   Channel 0 Write Protected: No
   Channel 0 Edit Resource/Owner Timeout(x1 sec): 60
   Channel 0 Passthru Link ID(dec): 1
   Channel 0 Current Mode: System
   Channel 0 Mode Change Enabled: No
   Channel 0 Mode Change Attention Character: \1b
   Channel 0 Mode Change System Character: S
   Channel 0 Mode Change User Character: U

CHANNEL 1 (SYSTEM) - Driver: DH485
   Node : 1 (decimal)
   Baud: 19200
   Token Hold Factor: 1
   Max Node Address: 31

CHANNEL 0 (SYSTEM) - Driver: DF1 Full Duplex
   Source ID: 9 (decimal)
   Baud: 1200
   Parity: NONE
   Control Line : No Handshaking
   Error Detection: CRC
   Embedded Responses: Enabled
   Duplicate Packet Detect: Yes
   ACK Timeout(x20 ms): 50
   NAK Retries: 3
   ENQ Retries: 3

CHANNEL 0 (USER) - Driver: ASCII
   Baud: 1200
   Parity: NONE
   Control Line : No Handshaking
   Delete mode: Ignore
   Echo: No
   XON/XOFF: No
   Termination Character 1: \d
   Termination Character 2: \ff
   Append Character 1: \d
   Append Character 2: \a

Program File List

Name	Number	Type	Rungs	Debug	Bytes
[SYSTEM]	0	SYS	0	No	0
	1	SYS	0	No	0
MAIN	2	LADDER	4	No	178
ANALOG_IN	3	LADDER	8	No	509
GW_PUMPS	4	LADDER	8	No	391
FEED_PUMPS	5	LADDER	6	No	330
NOT USED	6	LADDER	7	No	326
SUMP_PUMPS	7	LADDER	7	No	306
DISCH_PUMP	8	LADDER	6	No	282
BLOWERS	9	LADDER	8	No	361
ALARMS	10	LADDER	22	No	919
FLOW_TOTAL	11	LADDER	30	No	2272
ALTERNATIN	12	LADDER	3	No	84
RUN-TIME	13	LADDER	72	No	1197
PUMP_GPMS	14	LADDER	9	No	1951
CLOCK_SET	15	LADDER	7	No	242

Data File List

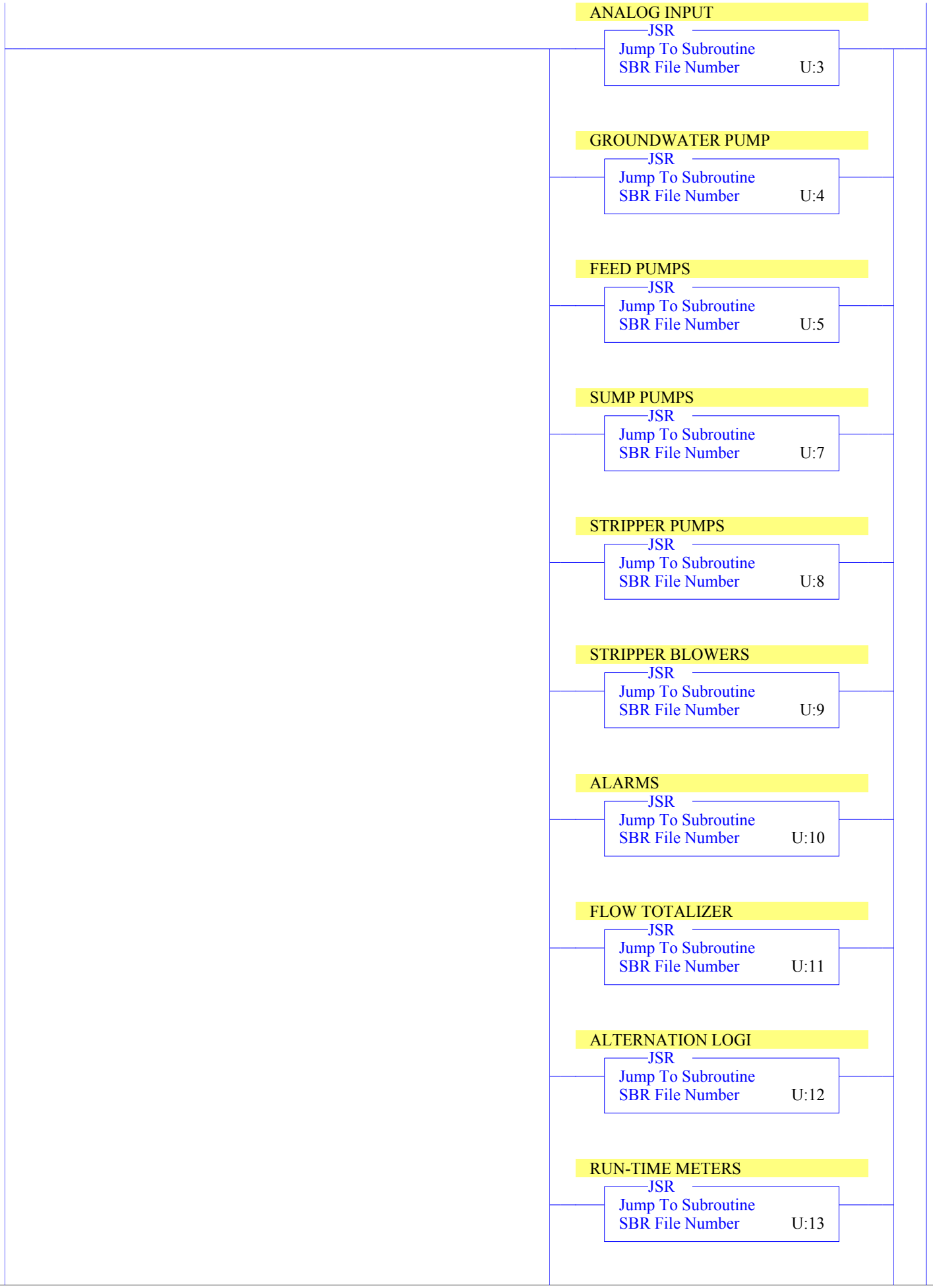
Name	Number	Type	Scope	Debug	Words	Elements	Last
OUTPUT	0	O	Global	No	9	3	O:2
INPUT	1	I	Global	No	24	8	I:7
STATUS	2	S	Global	No	0	83	S:82
BINARY	3	B	Global	No	7	7	B3:6
TIMER	4	T	Global	No	135	45	T4:44
COUNTER	5	C	Global	No	150	50	C5:49
CONTROL	6	R	Global	No	3	1	R6:0
INTEGER	7	N	Global	No	33	33	N7:32
FLOAT	8	F	Global	No	16	8	F8:7
INTEGER	9	N	Global	No	70	70	N9:69
INTEGER	10	N	Global	No	10	10	N10:9
INTEGER	11	N	Global	No	73	73	N11:72

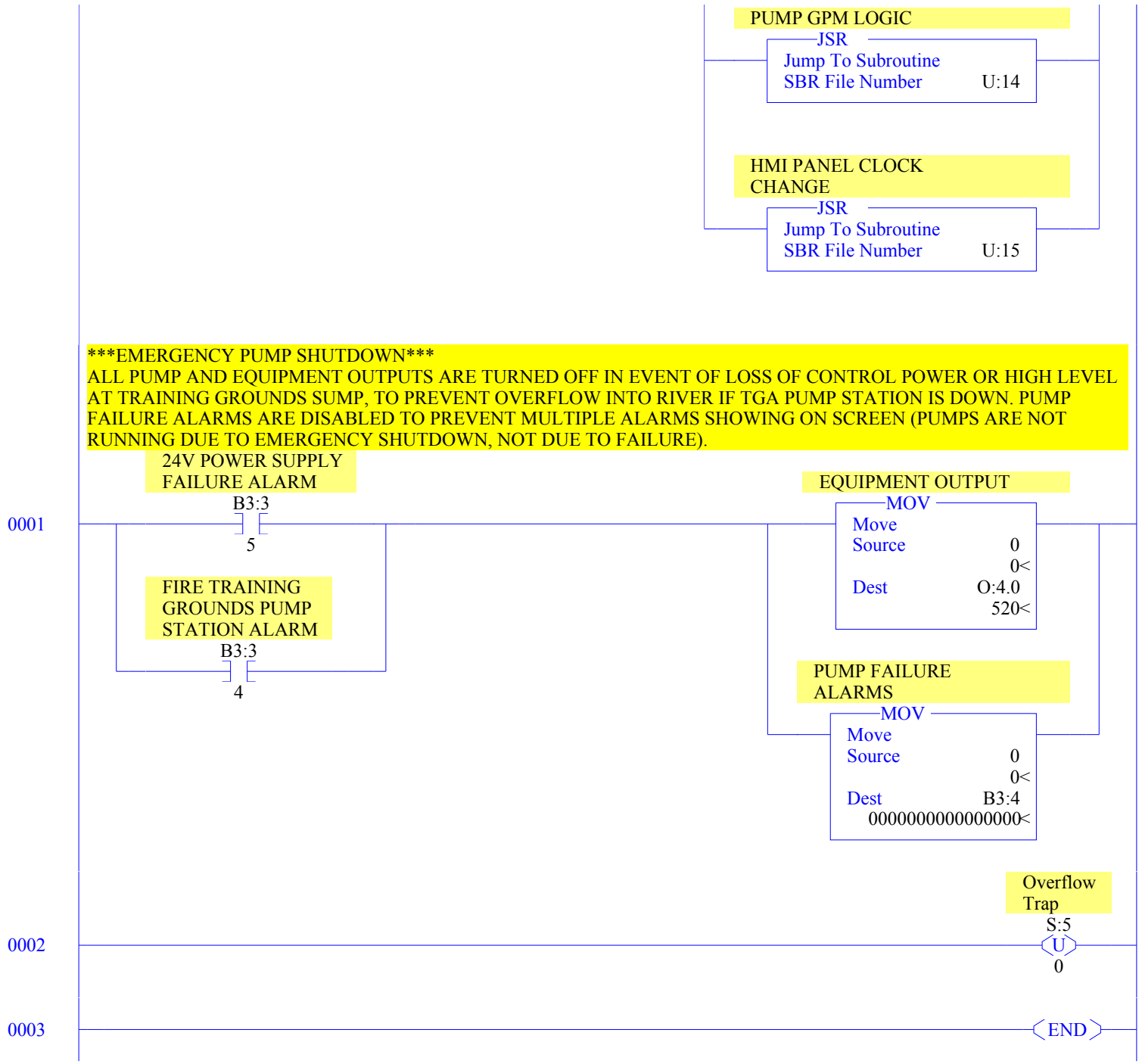
Ladder Table of Contents

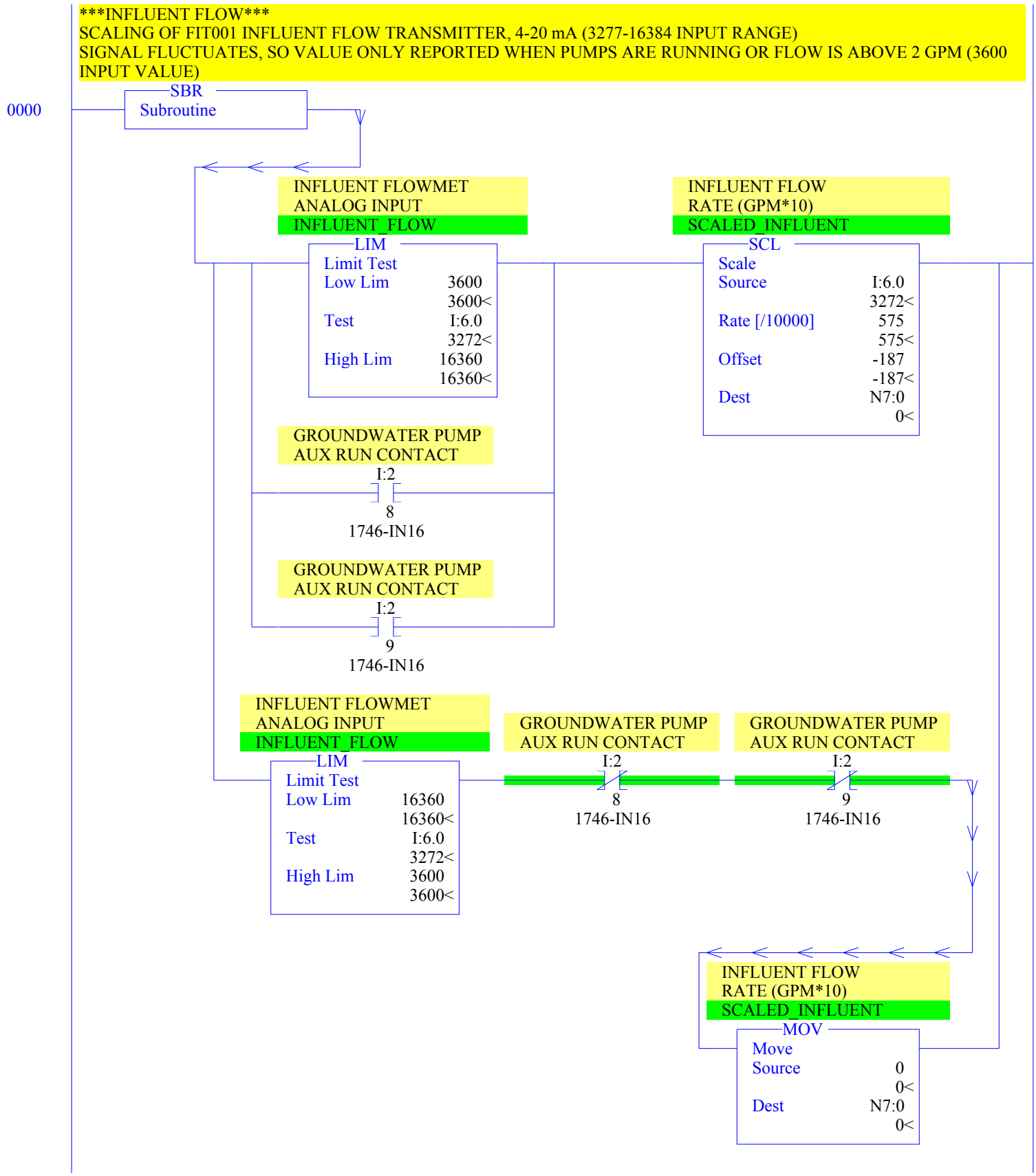
File Rung Page Title

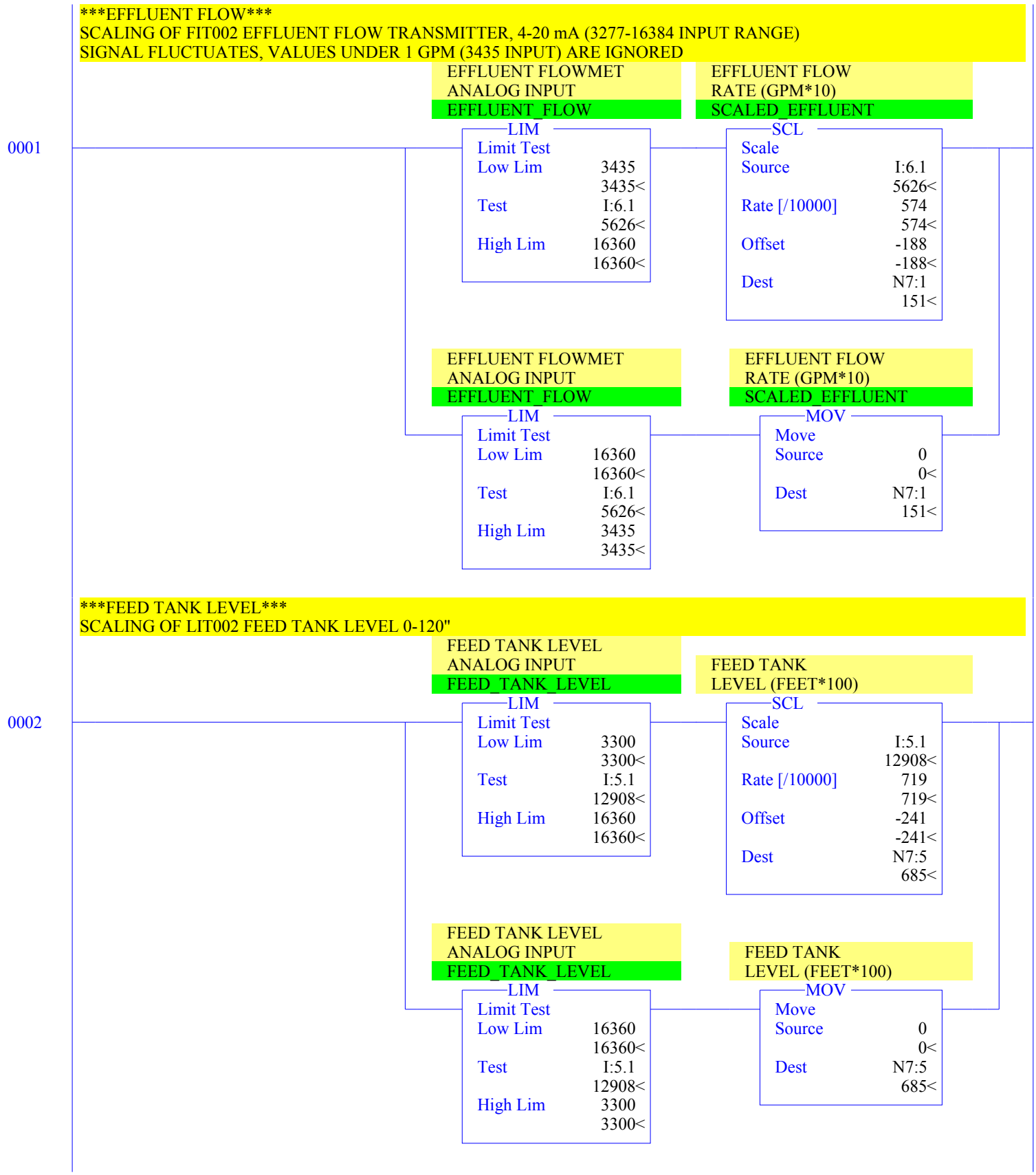
LAD 2 - MAIN --- Total Rungs in File = 4

0000




PUMP GPM LOGIC
JSR
Jump To Subroutine
SBR File Number U:14
HMI PANEL CLOCK CHANGE
JSR
Jump To Subroutine
SBR File Number U:15
EMERGENCY PUMP SHUTDOWN
ALL PUMP AND EQUIPMENT OUTPUTS ARE TURNED OFF IN EVENT OF LOSS OF CONTROL POWER OR HIGH LEVEL AT TRAINING GROUNDS SUMP, TO PREVENT OVERFLOW INTO RIVER IF TGA PUMP STATION IS DOWN. PUMP FAILURE ALARMS ARE DISABLED TO PREVENT MULTIPLE ALARMS SHOWING ON SCREEN (PUMPS ARE NOT RUNNING DUE TO EMERGENCY SHUTDOWN, NOT DUE TO FAILURE).
24V POWER SUPPLY FAILURE ALARM
B3:3
5
FIRE TRAINING GROUNDS PUMP STATION ALARM
B3:3
4
0001
EQUIPMENT OUTPUT
MOV
Move
Source 0
0<
Dest O:4.0
520<
PUMP FAILURE ALARMS
MOV
Move
Source 0
0<
Dest B3:4
0000000000000000<
Overflow Trap
S:5
U
0
0002
END
0003


INFLUENT FLOW
SCALING OF FIT001 INFLUENT FLOW TRANSMITTER, 4-20 mA (3277-16384 INPUT RANGE)
SIGNAL FLUCTUATES, SO VALUE ONLY REPORTED WHEN PUMPS ARE RUNNING OR FLOW IS ABOVE 2 GPM (3600 INPUT VALUE)
0000
SBR
Subroutine
INFLUENT FLOWMET
ANALOG INPUT
INFLUENT_FLOW
LIM
Limit Test
Low Lim 3600
3600<
Test I:6.0
3272<
High Lim 16360
16360<
INFLUENT FLOW
RATE (GPM*10)
SCALED_INFLUENT
SCL
Scale
Source I:6.0
3272<
Rate [/10000] 575
575<
Offset -187
-187<
Dest N7:0
0<
GROUNDWATER PUMP
AUX RUN CONTACT
I:2
8
1746-IN16
GROUNDWATER PUMP
AUX RUN CONTACT
I:2
9
1746-IN16
INFLUENT FLOWMET
ANALOG INPUT
INFLUENT_FLOW
LIM
Limit Test
Low Lim 16360
16360<
Test I:6.0
3272<
High Lim 3600
3600<
GROUNDWATER PUMP
AUX RUN CONTACT
I:2
8
1746-IN16
GROUNDWATER PUMP
AUX RUN CONTACT
I:2
9
1746-IN16
INFLUENT FLOW
RATE (GPM*10)
SCALED_INFLUENT
MOV
Move
Source 0
0<
Dest N7:0
0<


EFFLUENT FLOW
SCALING OF FIT002 EFFLUENT FLOW TRANSMITTER, 4-20 mA (3277-16384 INPUT RANGE)
SIGNAL FLUCTUATES, VALUES UNDER 1 GPM (3435 INPUT) ARE IGNORED
0001
EFFLUENT FLOWMET ANALOG INPUT EFFLUENT_FLOW
LIM
Limit Test
Low Lim 3435 3435<
Test I:6.1 5626<
High Lim 16360 16360<
EFFLUENT FLOW RATE (GPM*10) SCALED_EFFLUENT
SCL
Scale
Source I:6.1 5626<
Rate [/10000] 574 574<
Offset -188 -188<
Dest N7:1 151<
EFFLUENT FLOWMET ANALOG INPUT EFFLUENT_FLOW
LIM
Limit Test
Low Lim 16360 16360<
Test I:6.1 5626<
High Lim 3435 3435<
EFFLUENT FLOW RATE (GPM*10) SCALED_EFFLUENT
MOV
Move
Source 0 0<
Dest N7:1 151<
FEED TANK LEVEL
SCALING OF LIT002 FEED TANK LEVEL 0-120"
0002
FEED TANK LEVEL ANALOG INPUT FEED_TANK_LEVEL
LIM
Limit Test
Low Lim 3300 3300<
Test I:5.1 12908<
High Lim 16360 16360<
FEED TANK LEVEL (FEET*100)
SCL
Scale
Source I:5.1 12908<
Rate [/10000] 719 719<
Offset -241 -241<
Dest N7:5 685<
FEED TANK LEVEL ANALOG INPUT FEED_TANK_LEVEL
LIM
Limit Test
Low Lim 16360 16360<
Test I:5.1 12908<
High Lim 3300 3300<
FEED TANK LEVEL (FEET*100)
MOV
Move
Source 0 0<
Dest N7:5 685<

DISCHARGE TANK LEVEL
SCALING OF LIT004 DISCHARGE TANK 0-120"

0003

DISCHARGE TANK L
ANALOG INPUT
DISCHARGE_TANK

LIM
Limit Test
Low Lim 3300 3300<
Test I:5.3 4428<
High Lim 16360 16360<

DISCHARGE TANK
LEVEL (FT*100)

SCL
Scale
Source I:5.3 4428<
Rate [/10000] 692 692<
Offset -228 -228<
Dest N7:6 78<

DISCHARGE TANK L
ANALOG INPUT
DISCHARGE_TANK

LIM
Limit Test
Low Lim 16360 16360<
Test I:5.3 4428<
High Lim 3300 3300<

DISCHARGE TANK
LEVEL (FT*100)

MOV
Move
Source 0 0<
Dest N7:6 78<

INDOOR AIR TEMPERATURE
SCALING OF AIR TEMPERATURE SENSOR
4-20 mA, 20 DEG F TO 120 DEG F SENSOR

0004

GROUNDWATER
TRENCH LEVEL
ANALOG INPUT
TRENCH_LEVEL

LIM
Limit Test
Low Lim 4400 4400<
Test I:5.0 11092<
High Lim 16360 16360<

GROUNDWATER SUMP
LEVEL (FEET*100)

SCL
Scale
Source I:5.0 11092<
Rate [/10000] 2910 2910<
Offset -2782 -2782<
Dest N7:4 447<

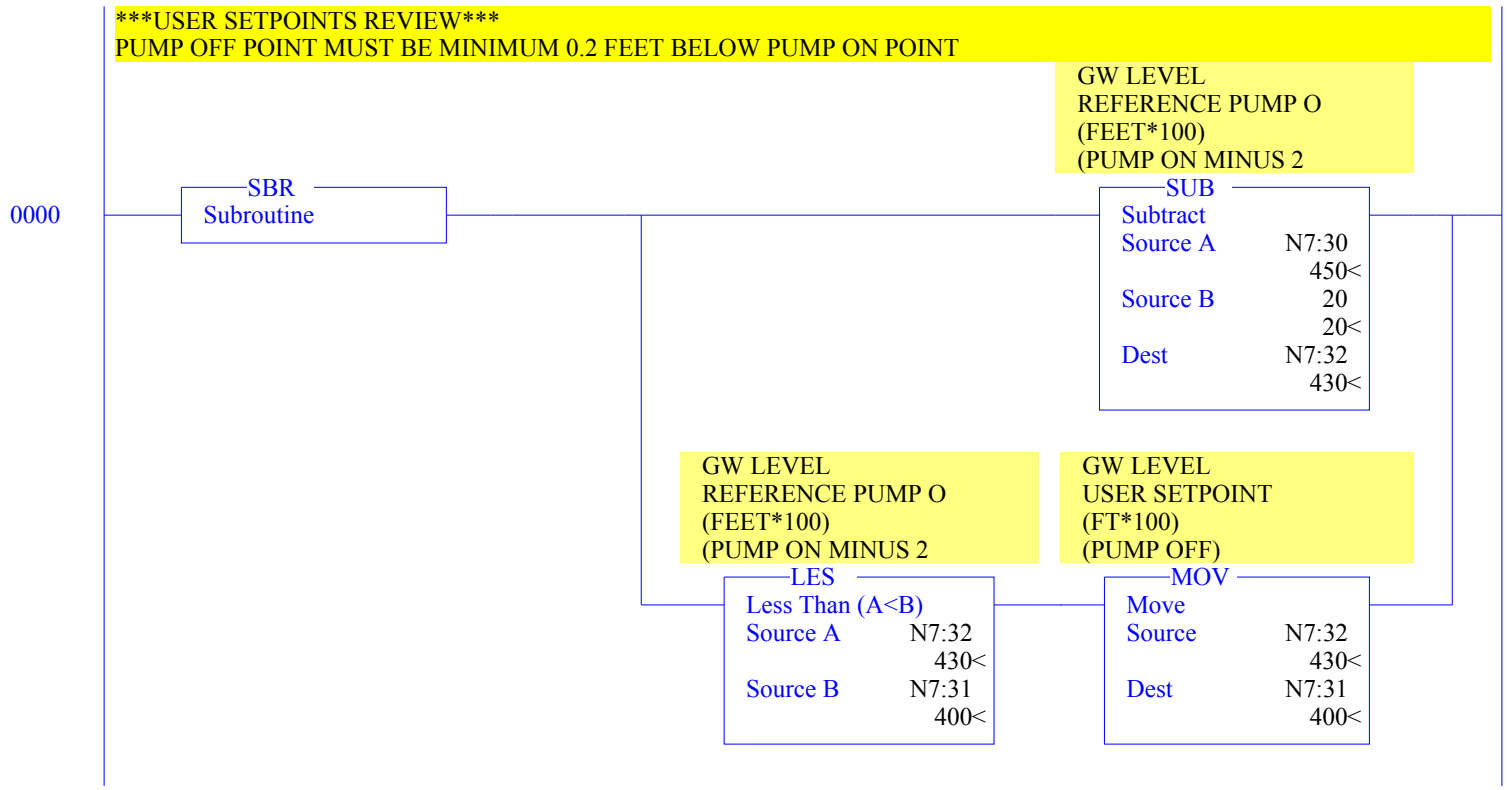
GROUNDWATER
TRENCH LEVEL
ANALOG INPUT
TRENCH_LEVEL

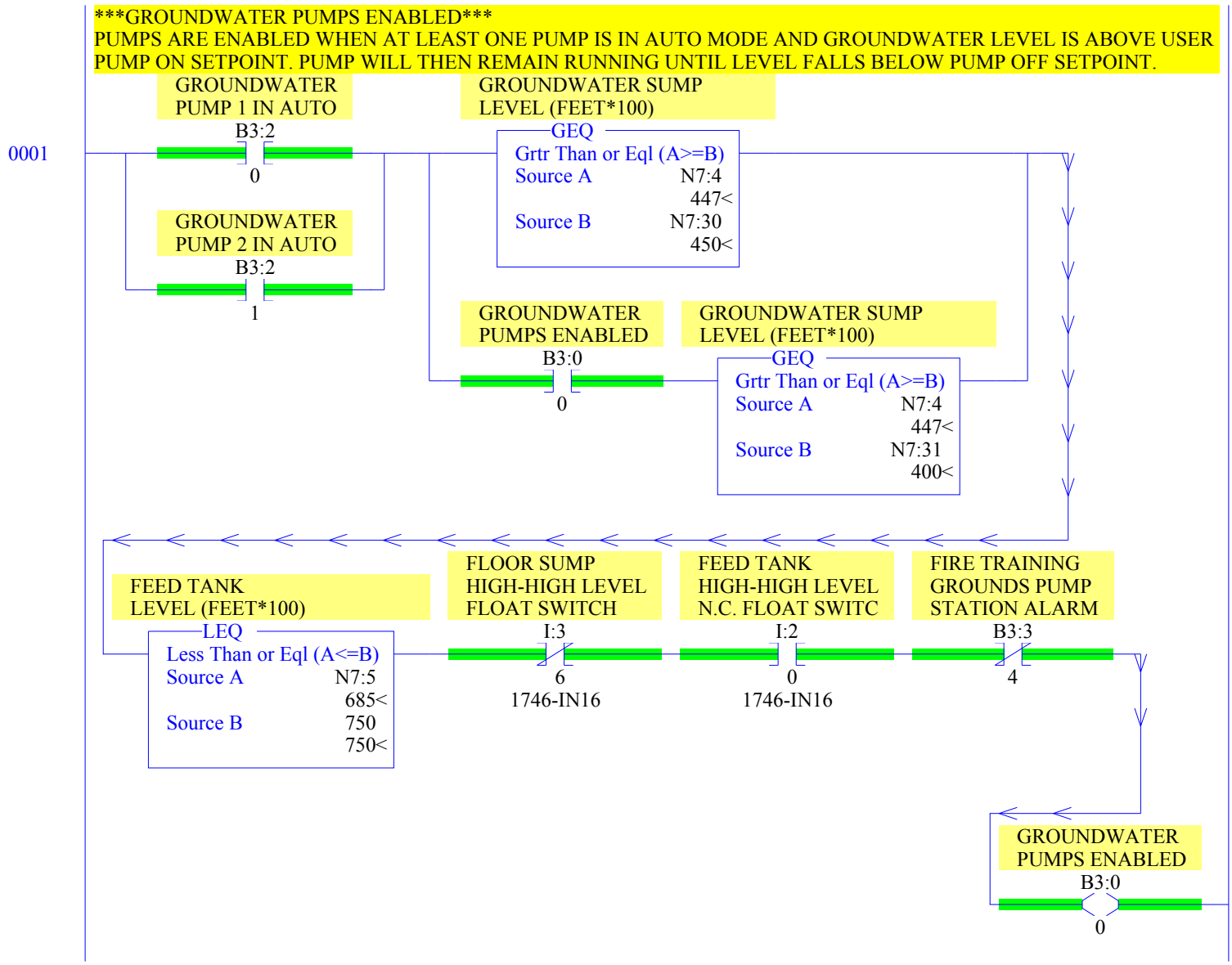
LIM
Limit Test
Low Lim 16360 16360<
Test I:5.0 11092<
High Lim 4400 4400<

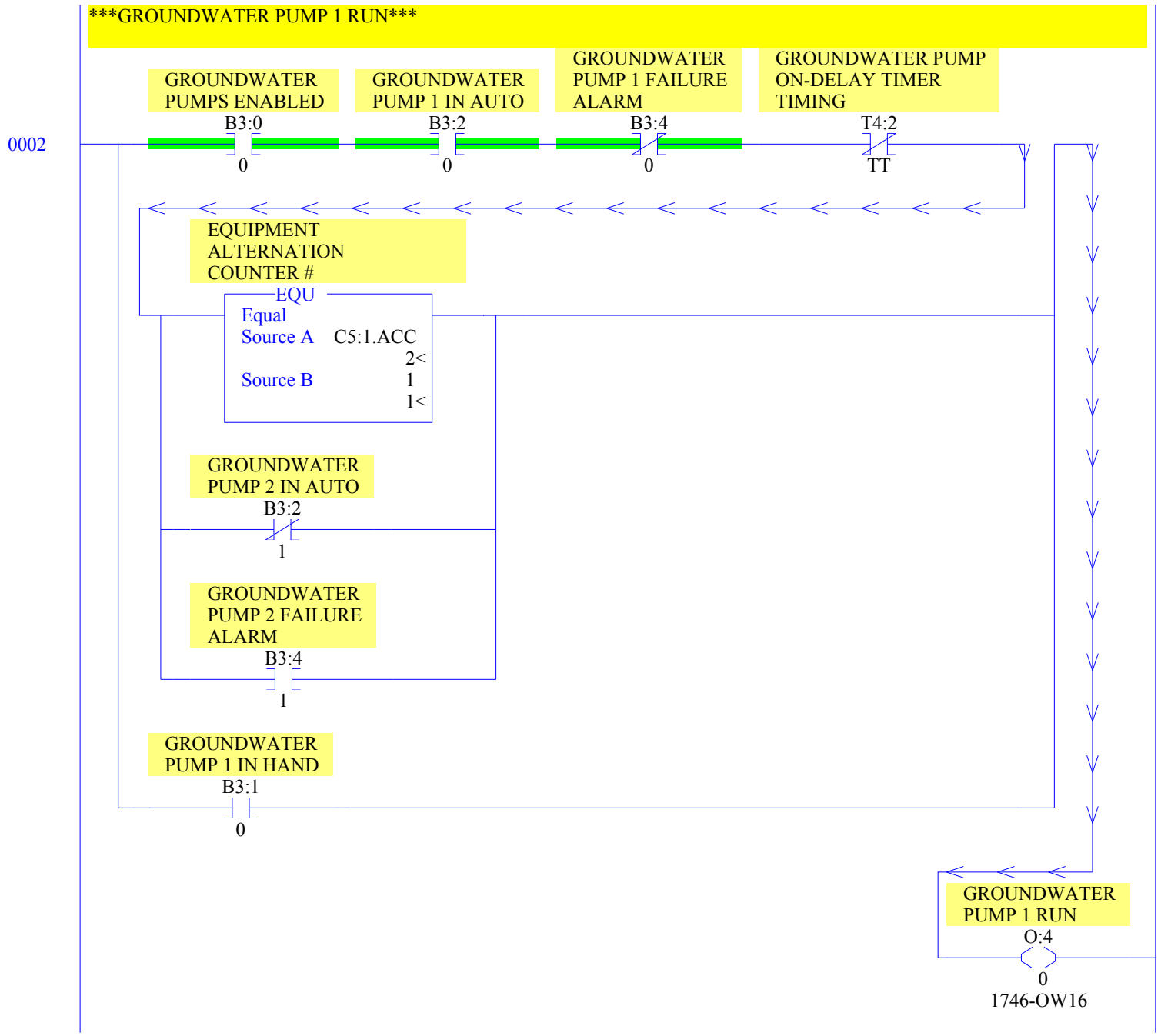
GROUNDWATER SUMP
LEVEL (FEET*100)

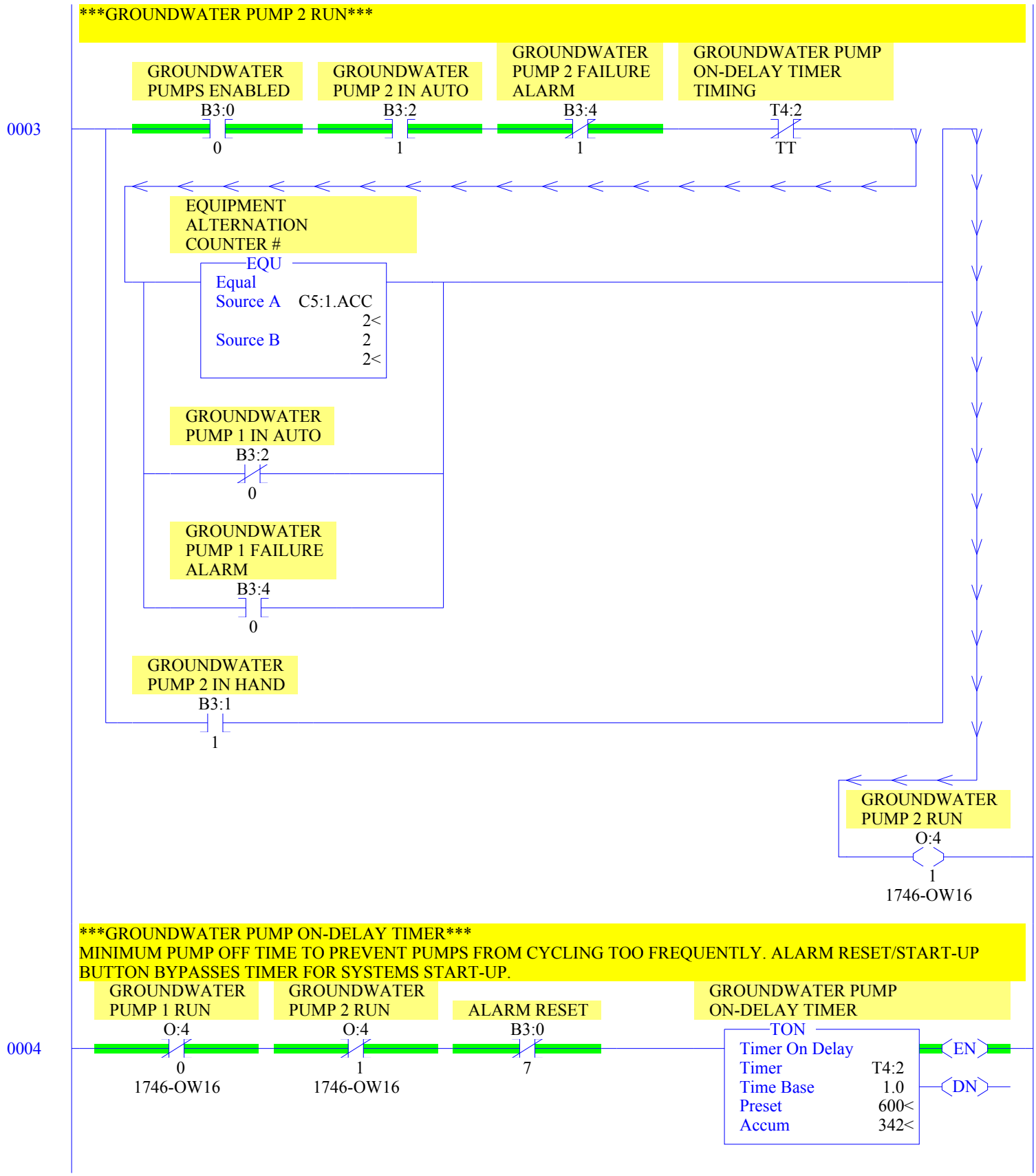
MOV
Move
Source 0 0<
Dest N7:4 447<

LAD 3 - ANALOG_IN --- Total Rungs in File = 8

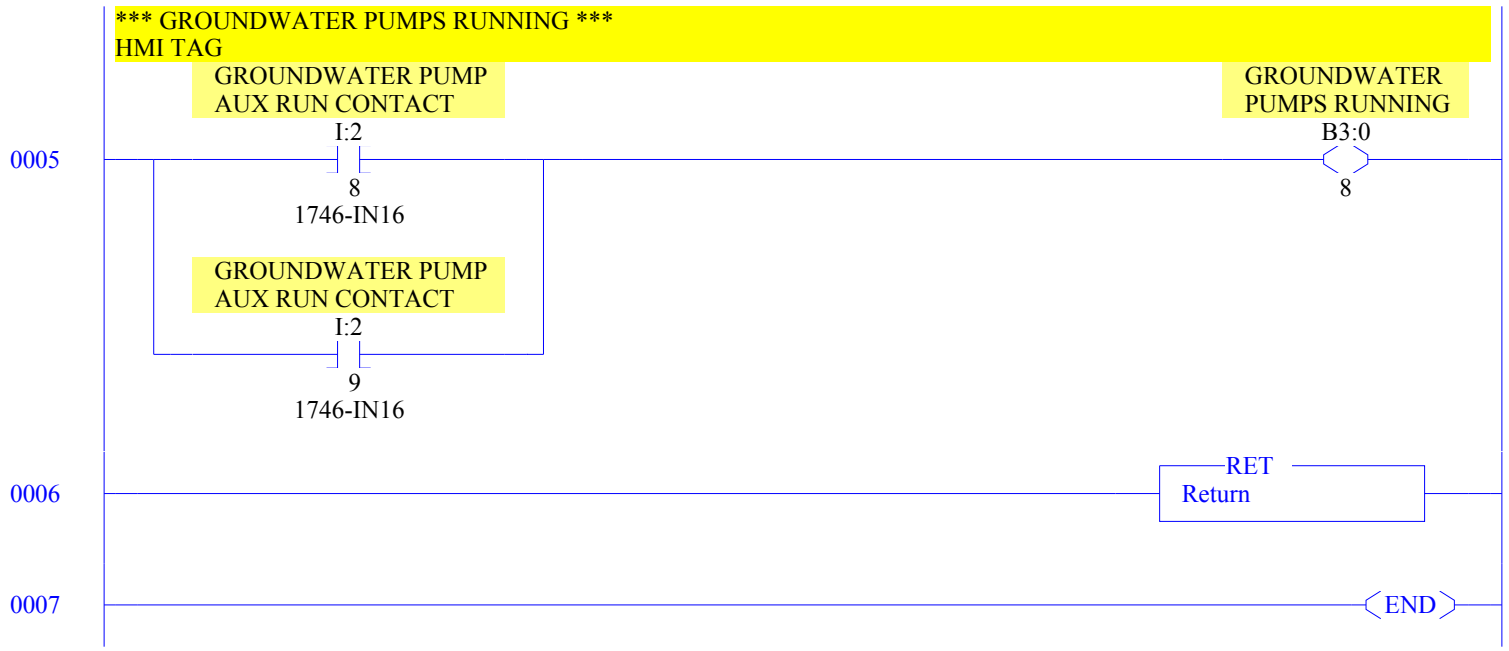

USER SETPOINTS REVIEW
PUMP OFF POINT MUST BE MINIMUM 0.2 FEET BELOW PUMP ON POINT
0000
SBR
Subroutine
GW LEVEL
REFERENCE PUMP O
(FEET*100)
(PUMP ON MINUS 2
SUB
Subtract
Source A N7:30
450<
Source B 20
20<
Dest N7:32
430<
GW LEVEL
REFERENCE PUMP O
(FEET*100)
(PUMP ON MINUS 2
LES
Less Than (A<B)
Source A N7:32
430<
Source B N7:31
400<
GW LEVEL
USER SETPOINT
(FT*100)
(PUMP OFF)
MOV
Move
Source N7:32
430<
Dest N7:31
400<


GROUNDWATER PUMPS ENABLED
PUMPS ARE ENABLED WHEN AT LEAST ONE PUMP IS IN AUTO MODE AND GROUNDWATER LEVEL IS ABOVE USER PUMP ON SETPOINT. PUMP WILL THEN REMAIN RUNNING UNTIL LEVEL FALLS BELOW PUMP OFF SETPOINT.
0001
GROUNDWATER PUMP 1 IN AUTO
B3:2
0
GROUNDWATER PUMP 2 IN AUTO
B3:2
1
GROUNDWATER SUMP LEVEL (FEET*100)
GEQ
Grtr Than or Eql (A>=B)
Source A N7:4 447<
Source B N7:30 450<
GROUNDWATER PUMPS ENABLED
B3:0
0
GROUNDWATER SUMP LEVEL (FEET*100)
GEQ
Grtr Than or Eql (A>=B)
Source A N7:4 447<
Source B N7:31 400<
FEED TANK LEVEL (FEET*100)
LEQ
Less Than or Eql (A<=B)
Source A N7:5 685<
Source B 750 750<
FLOOR SUMP HIGH-HIGH LEVEL FLOAT SWITCH
I:3
6
1746-IN16
FEED TANK HIGH-HIGH LEVEL N.C. FLOAT SWITC
I:2
0
1746-IN16
FIRE TRAINING GROUNDS PUMP STATION ALARM
B3:3
4
GROUNDWATER PUMPS ENABLED
B3:0
0

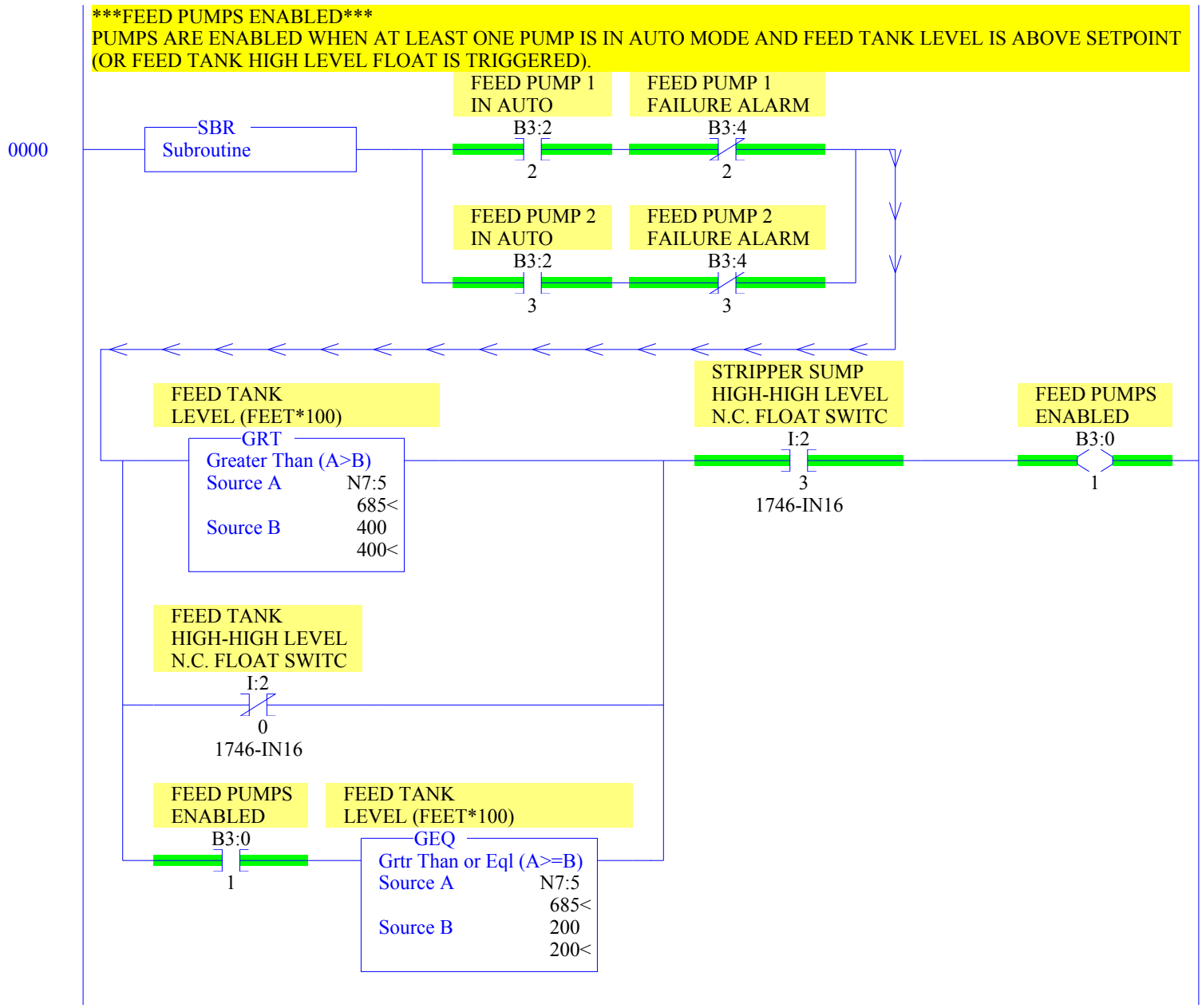

GROUNDWATER PUMP 1 RUN
0002
GROUNDWATER PUMPS ENABLED
B3:0
0
GROUNDWATER PUMP 1 IN AUTO
B3:2
0
GROUNDWATER PUMP 1 FAILURE ALARM
B3:4
0
GROUNDWATER PUMP ON-DELAY TIMER TIMING
T4:2
TT
EQUIPMENT ALTERNATION COUNTER #
EQU
Equal
Source A C5:1.ACC
2<
Source B 1
1<
GROUNDWATER PUMP 2 IN AUTO
B3:2
1
GROUNDWATER PUMP 2 FAILURE ALARM
B3:4
1
GROUNDWATER PUMP 1 IN HAND
B3:1
0
GROUNDWATER PUMP 1 RUN
O:4
0
1746-OW16

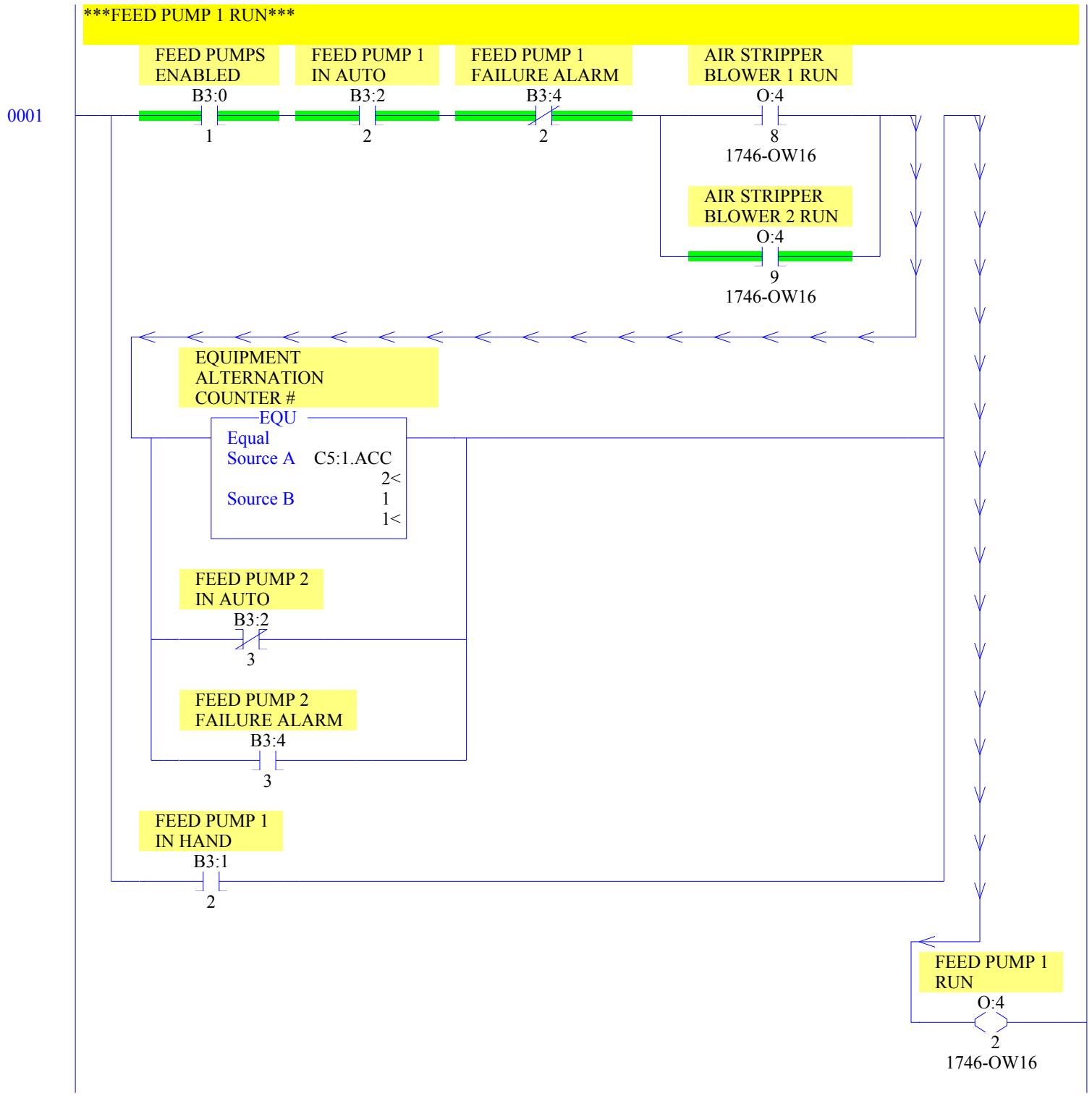

GROUNDWATER PUMP 2 RUN
GROUNDWATER PUMPS ENABLED
B3:0
0
GROUNDWATER PUMP 2 IN AUTO
B3:2
1
GROUNDWATER PUMP 2 FAILURE ALARM
B3:4
1
GROUNDWATER PUMP ON-DELAY TIMER TIMING
T4:2
TT
0003
EQUIPMENT ALTERNATION COUNTER #
EQU
Equal
Source A C5:1.ACC
2<
Source B 2
2<
GROUNDWATER PUMP 1 IN AUTO
B3:2
0
GROUNDWATER PUMP 1 FAILURE ALARM
B3:4
0
GROUNDWATER PUMP 2 IN HAND
B3:1
1
GROUNDWATER PUMP 2 RUN
O:4
1
1746-OW16
GROUNDWATER PUMP ON-DELAY TIMER
MINIMUM PUMP OFF TIME TO PREVENT PUMPS FROM CYCLING TOO FREQUENTLY. ALARM RESET/START-UP BUTTON BYPASSES TIMER FOR SYSTEMS START-UP.
GROUNDWATER PUMP 1 RUN
O:4
0
1746-OW16
GROUNDWATER PUMP 2 RUN
O:4
1
1746-OW16
ALARM RESET
B3:0
7
GROUNDWATER PUMP ON-DELAY TIMER
TON
Timer On Delay
Timer T4:2
Time Base 1.0
Preset 600<
Accum 342<
EN
DN
0004

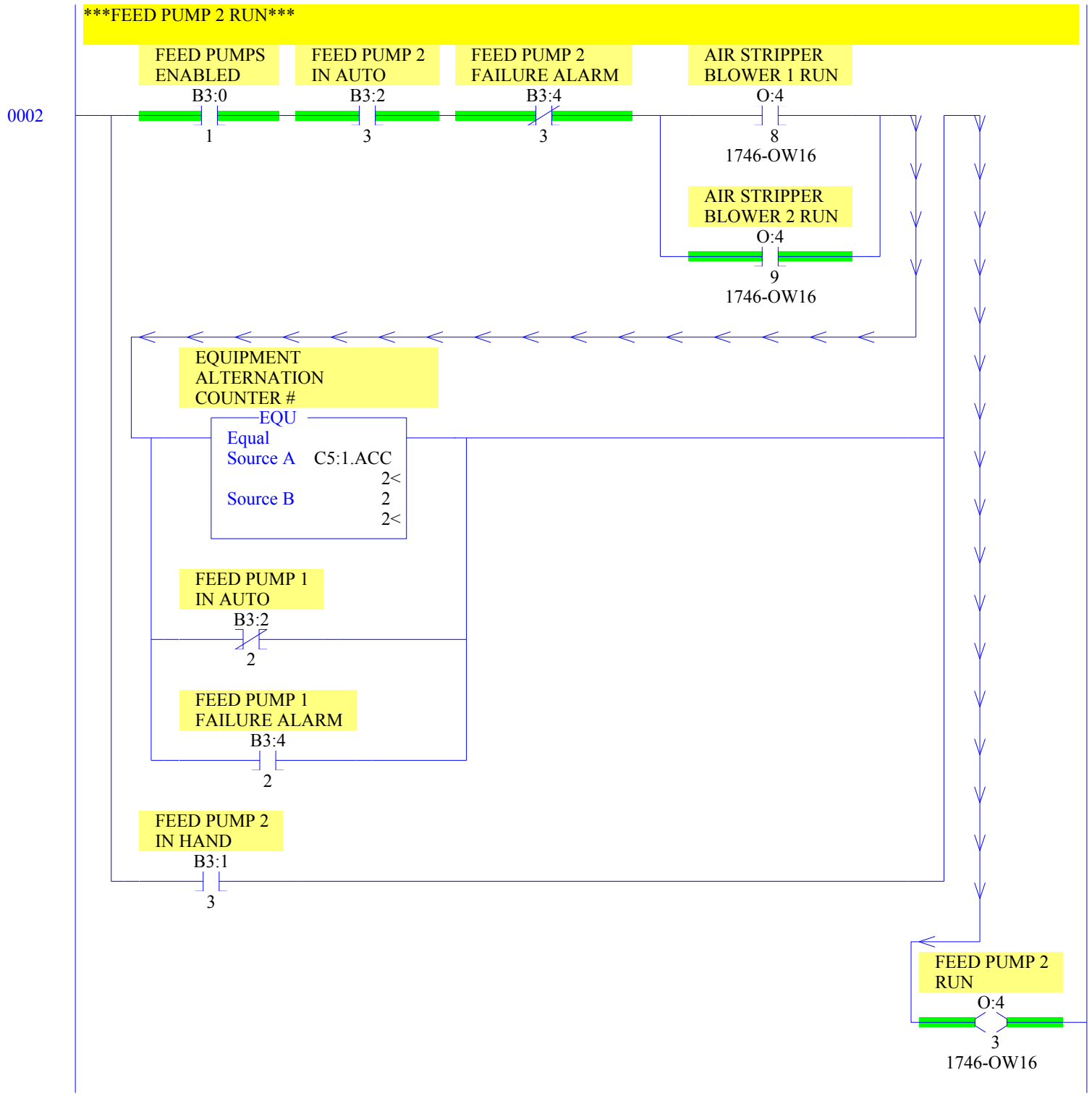
LAD 4 - GW_PUMPS --- Total Rungs in File = 8



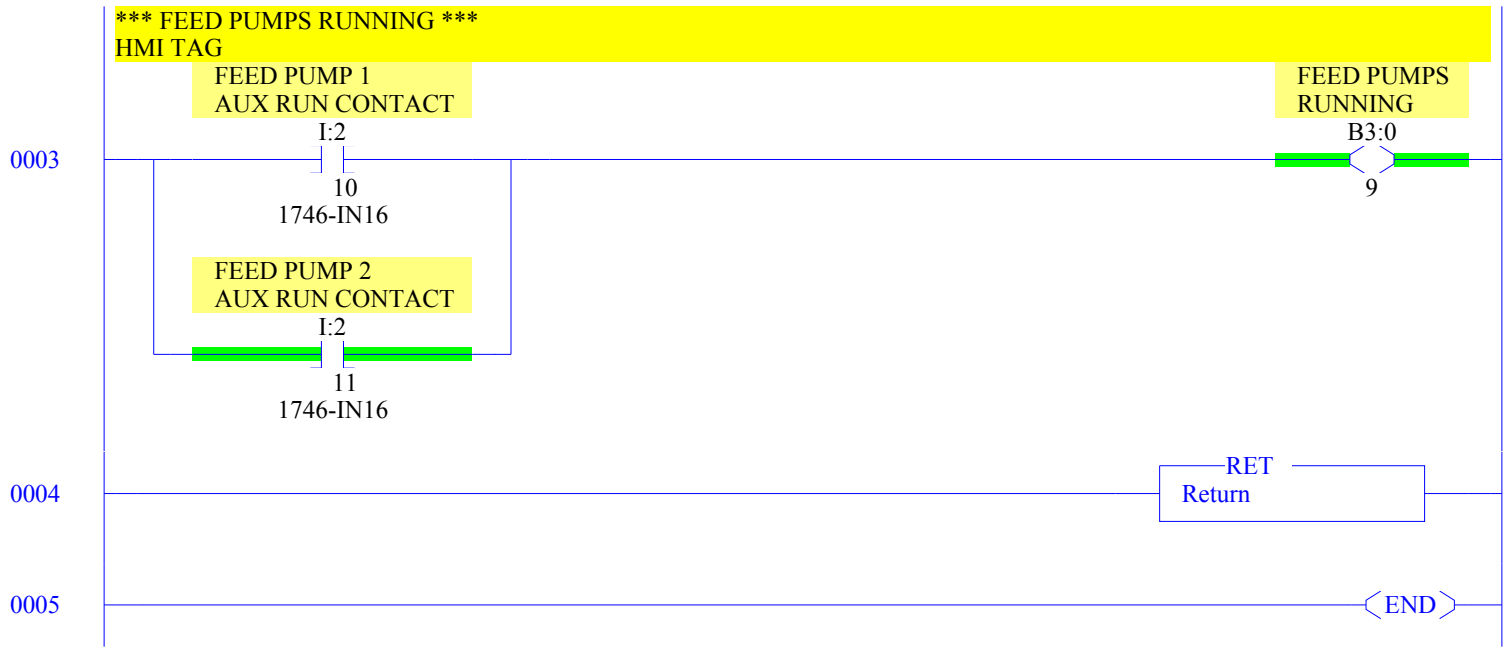
LAD 5 - FEED_PUMPS --- Total Rungs in File = 6

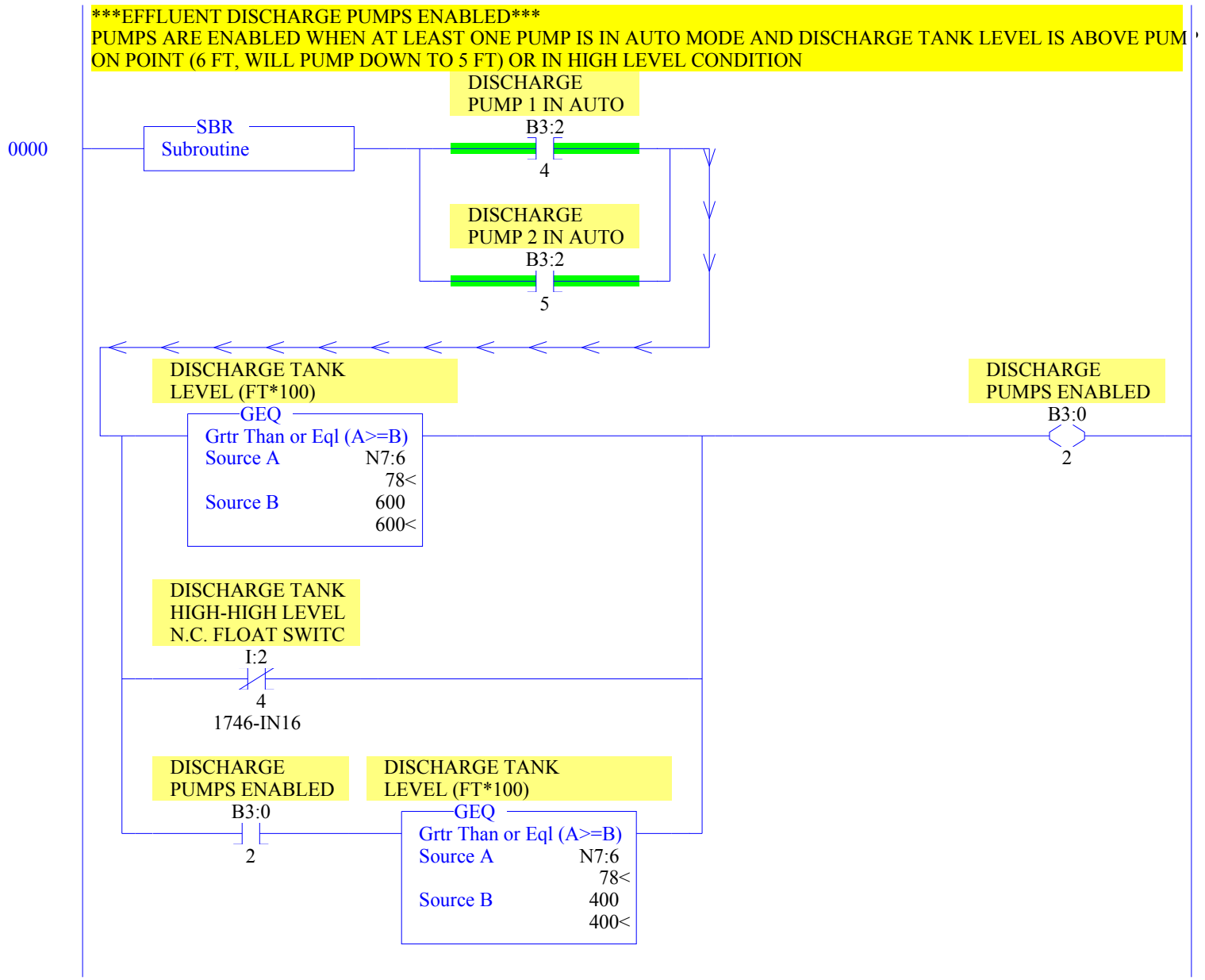


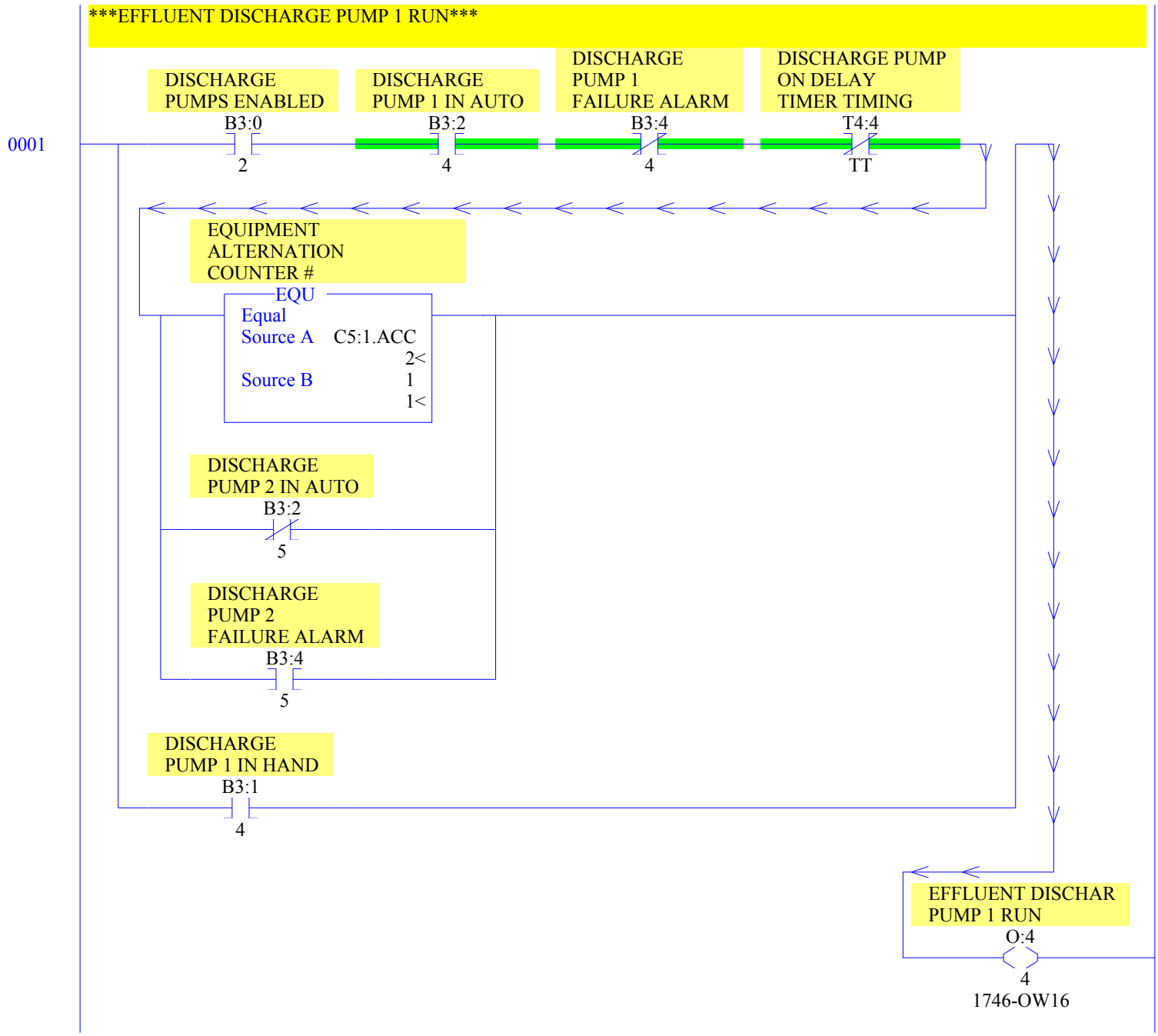

FEED PUMP 1 RUN
0001
FEED PUMPS ENABLED
B3:0
1
FEED PUMP 1 IN AUTO
B3:2
2
FEED PUMP 1 FAILURE ALARM
B3:4
2
AIR STRIPPER BLOWER 1 RUN
O:4
8
1746-OW16
AIR STRIPPER BLOWER 2 RUN
O:4
9
1746-OW16
EQUIPMENT ALTERNATION COUNTER #
EQU
Equal
Source A C5:1.ACC
2<
Source B
1
1<
FEED PUMP 2 IN AUTO
B3:2
3
FEED PUMP 2 FAILURE ALARM
B3:4
3
FEED PUMP 1 IN HAND
B3:1
2
FEED PUMP 1 RUN
O:4
2
1746-OW16

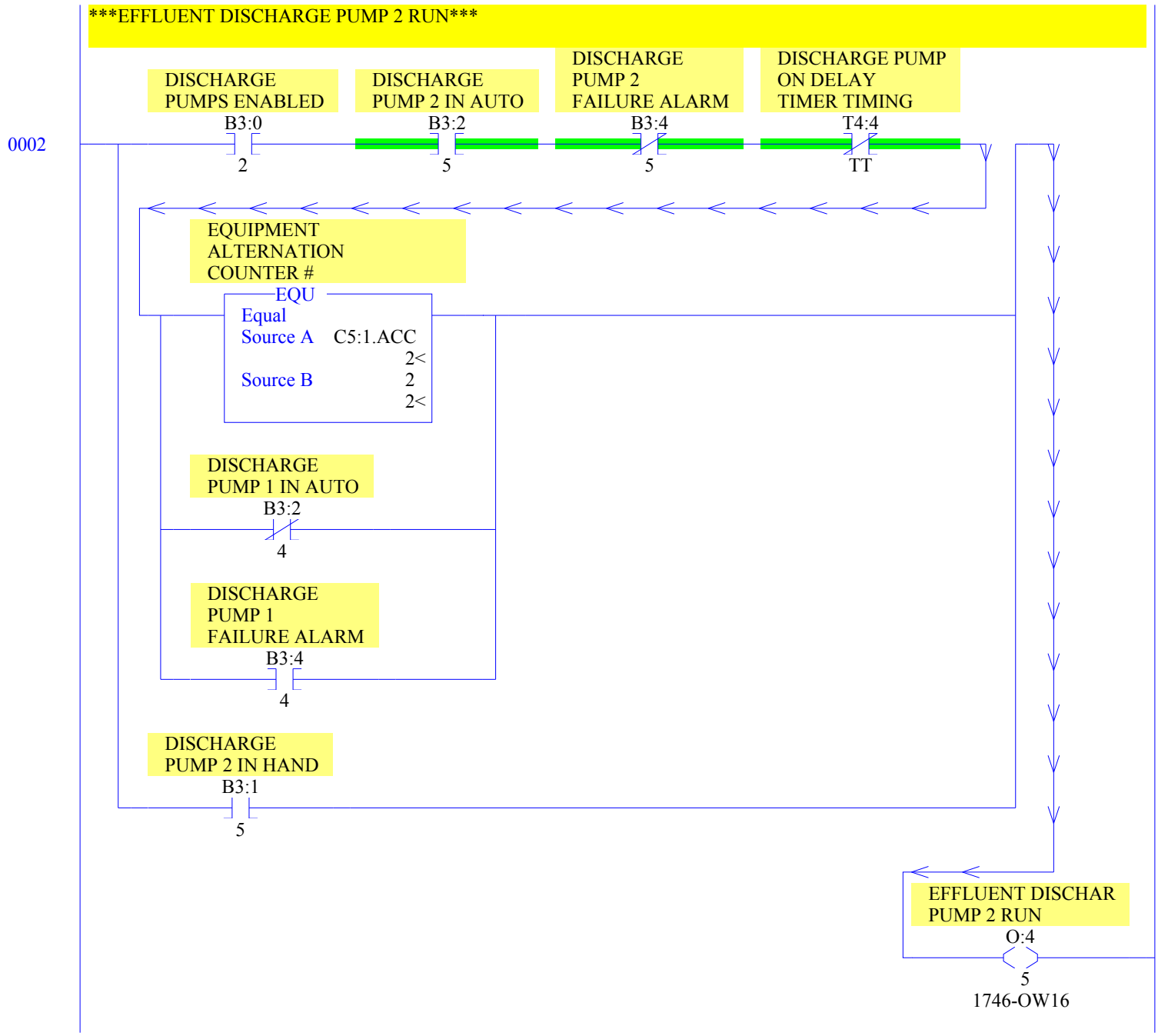

FEED PUMP 2 RUN
0002
FEED PUMPS ENABLED
B3:0
1
FEED PUMP 2 IN AUTO
B3:2
3
FEED PUMP 2 FAILURE ALARM
B3:4
3
AIR STRIPPER BLOWER 1 RUN
O:4
8
1746-OW16
AIR STRIPPER BLOWER 2 RUN
O:4
9
1746-OW16
EQUIPMENT ALTERNATION COUNTER #
EQU
Equal
Source A C5:1.ACC
2<
Source B
2
2<
FEED PUMP 1 IN AUTO
B3:2
2
FEED PUMP 1 FAILURE ALARM
B3:4
2
FEED PUMP 2 IN HAND
B3:1
3
FEED PUMP 2 RUN
O:4
3
1746-OW16

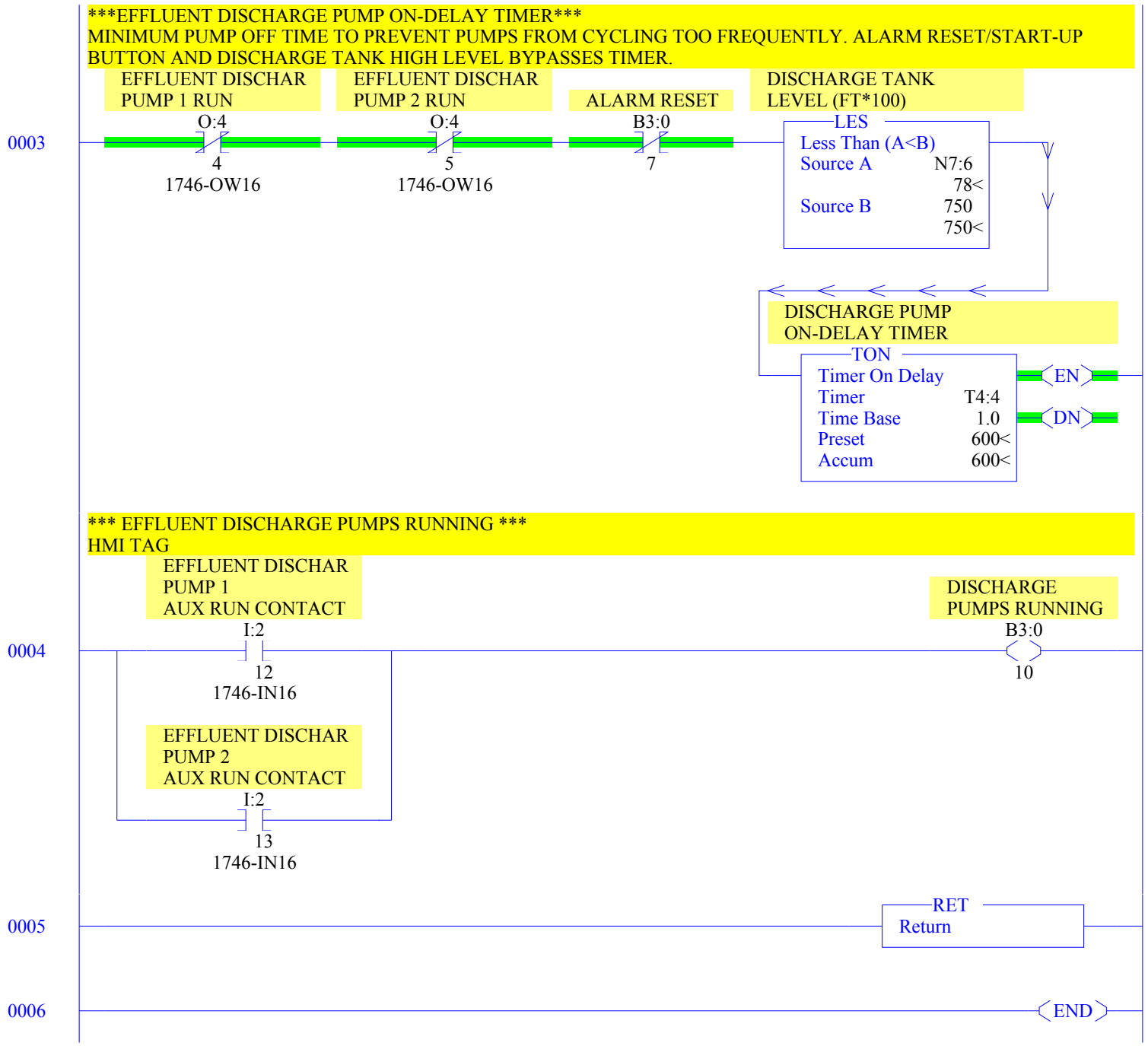
LAD 5 - FEED_PUMPS --- Total Rungs in File = 6



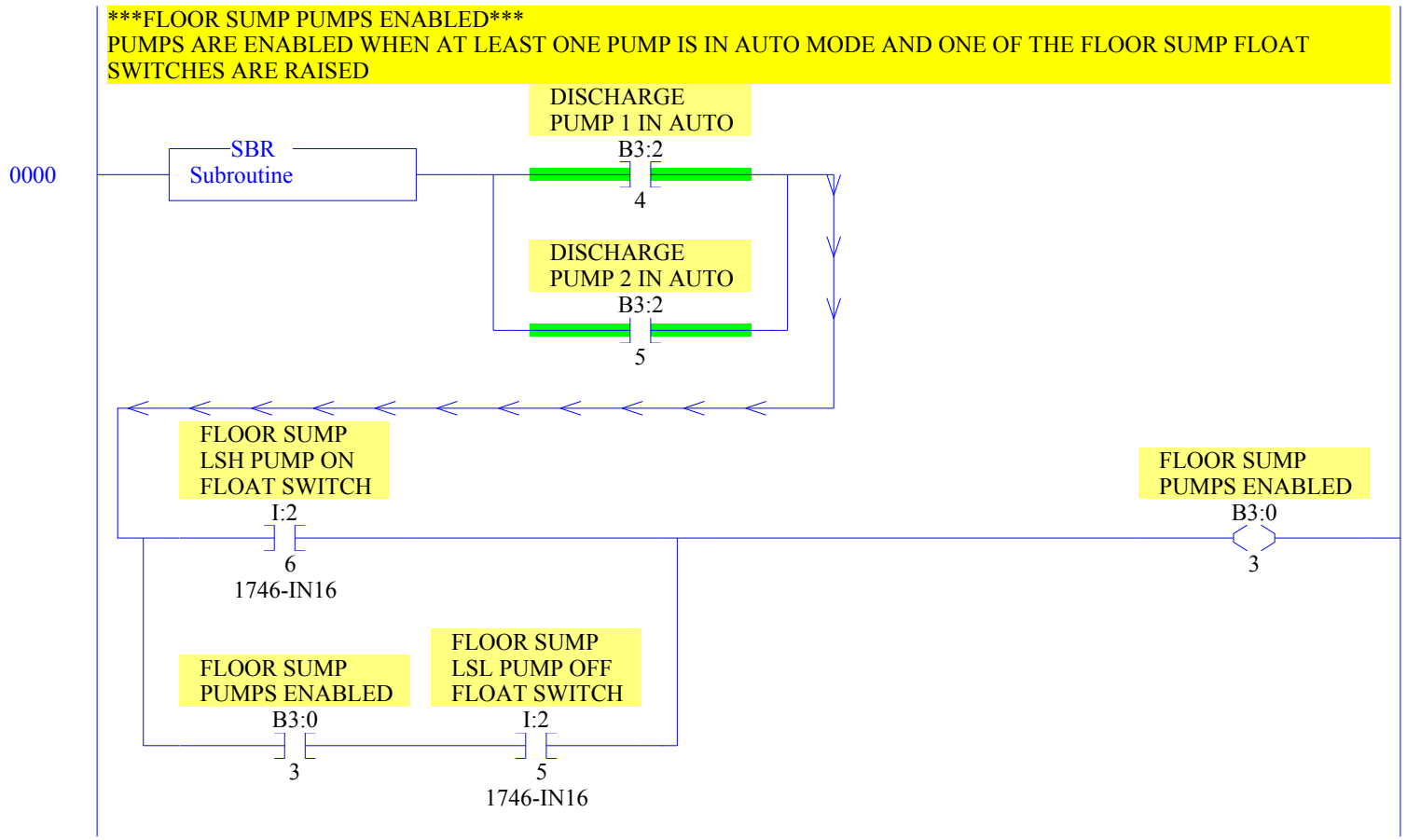

EFFLUENT DISCHARGE PUMPS ENABLED
PUMPS ARE ENABLED WHEN AT LEAST ONE PUMP IS IN AUTO MODE AND DISCHARGE TANK LEVEL IS ABOVE PUM
ON POINT (6 FT, WILL PUMP DOWN TO 5 FT) OR IN HIGH LEVEL CONDITION
0000
SBR
Subroutine
DISCHARGE
PUMP 1 IN AUTO
B3:2
4
DISCHARGE
PUMP 2 IN AUTO
B3:2
5
DISCHARGE TANK
LEVEL (FT*100)
GEQ
Grtr Than or Eql (A>=B)
Source A N7:6
78<
Source B 600
600<
DISCHARGE
PUMPS ENABLED
B3:0
2
DISCHARGE TANK
HIGH-HIGH LEVEL
N.C. FLOAT SWITC
I:2
4
1746-IN16
DISCHARGE
PUMPS ENABLED
B3:0
2
DISCHARGE TANK
LEVEL (FT*100)
GEQ
Grtr Than or Eql (A>=B)
Source A N7:6
78<
Source B 400
400<

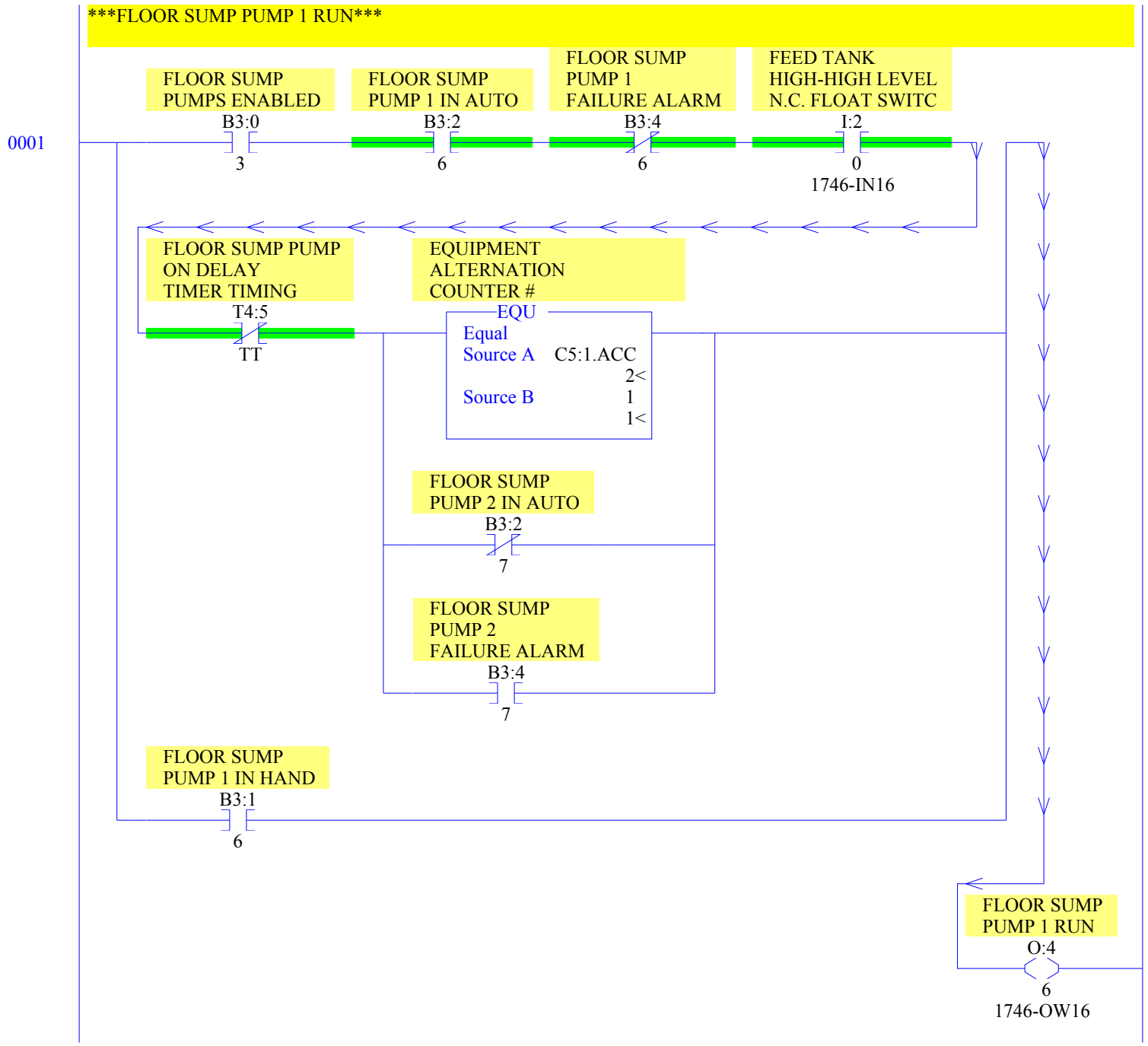

EFFLUENT DISCHARGE PUMP 1 RUN
0001
DISCHARGE PUMPS ENABLED
B3:0
2
DISCHARGE PUMP 1 IN AUTO
B3:2
4
DISCHARGE PUMP 1 FAILURE ALARM
B3:4
4
DISCHARGE PUMP ON DELAY TIMER TIMING
T4:4
TT
EQUIPMENT ALTERNATION COUNTER #
EQU
Equal
Source A C5:1.ACC
2<
Source B
1
1<
DISCHARGE PUMP 2 IN AUTO
B3:2
5
DISCHARGE PUMP 2 FAILURE ALARM
B3:4
5
DISCHARGE PUMP 1 IN HAND
B3:1
4
EFFLUENT DISCHAR PUMP 1 RUN
O:4
4
1746-OW16

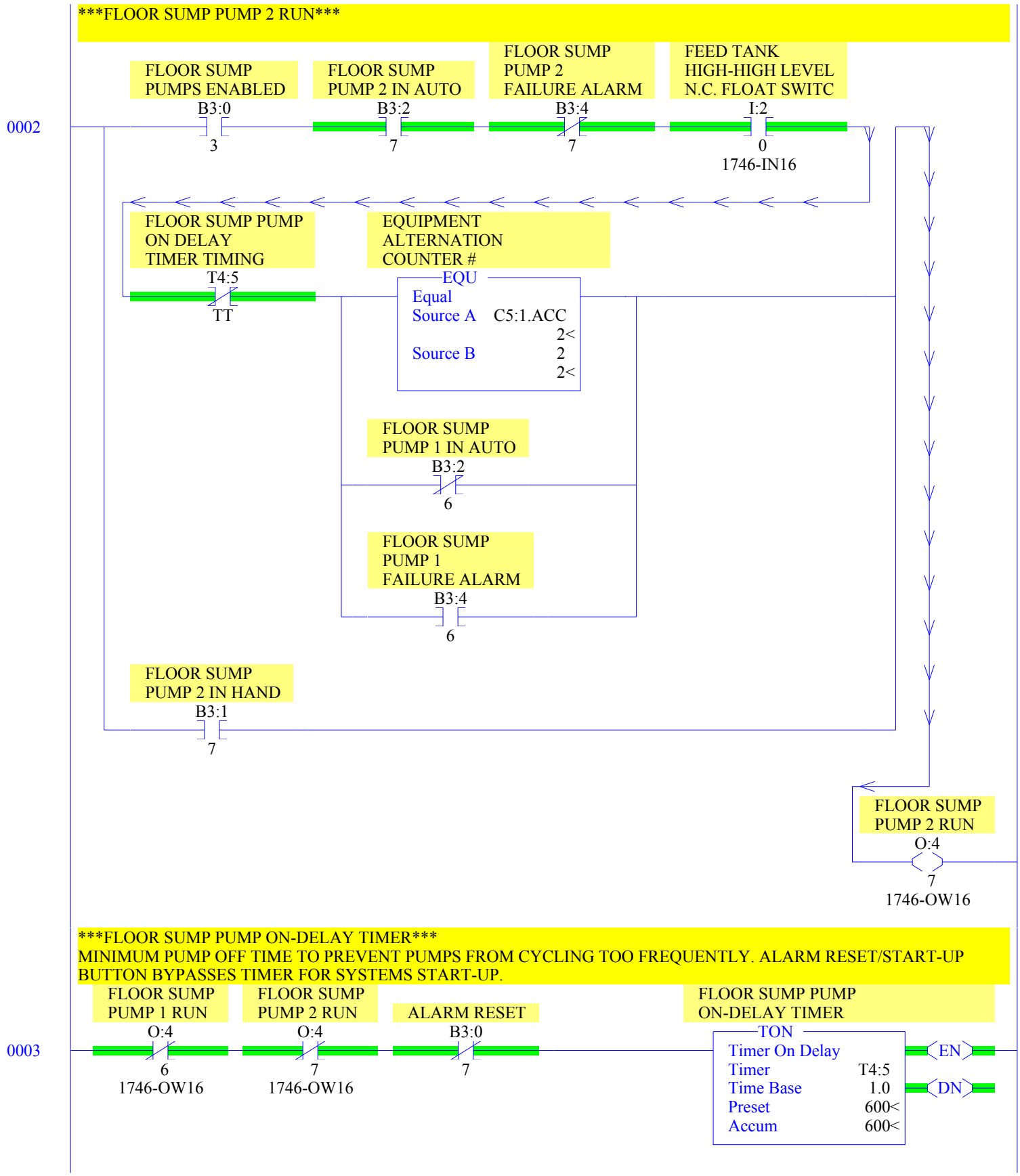

EFFLUENT DISCHARGE PUMP 2 RUN
0002
DISCHARGE PUMPS ENABLED
B3:0
2
DISCHARGE PUMP 2 IN AUTO
B3:2
5
DISCHARGE PUMP 2 FAILURE ALARM
B3:4
5
DISCHARGE PUMP ON DELAY TIMER TIMING
T4:4
TT
EQUIPMENT ALTERNATION COUNTER #
EQU
Equal
Source A C5:1.ACC
2<
Source B 2
2<
DISCHARGE PUMP 1 IN AUTO
B3:2
4
DISCHARGE PUMP 1 FAILURE ALARM
B3:4
4
DISCHARGE PUMP 2 IN HAND
B3:1
5
EFFLUENT DISCHAR PUMP 2 RUN
O:4
5
1746-OW16


EFFLUENT DISCHARGE PUMP ON-DELAY TIMER
MINIMUM PUMP OFF TIME TO PREVENT PUMPS FROM CYCLING TOO FREQUENTLY. ALARM RESET/START-UP BUTTON AND DISCHARGE TANK HIGH LEVEL BYPASSES TIMER.
EFFLUENT DISCHAR PUMP 1 RUN
O:4
4
1746-OW16
EFFLUENT DISCHAR PUMP 2 RUN
O:4
5
1746-OW16
ALARM RESET
B3:0
7
DISCHARGE TANK LEVEL (FT*100)
LES
Less Than (A<B)
Source A N7:6
78<
Source B 750
750<
0003
DISCHARGE PUMP ON-DELAY TIMER
TON
Timer On Delay
Timer T4:4
Time Base 1.0
Preset 600<
Accum 600<
EN
DN
*** EFFLUENT DISCHARGE PUMPS RUNNING ***
HMI TAG
EFFLUENT DISCHAR PUMP 1 AUX RUN CONTACT
I:2
12
1746-IN16
EFFLUENT DISCHAR PUMP 2 AUX RUN CONTACT
I:2
13
1746-IN16
DISCHARGE PUMPS RUNNING
B3:0
10
0004
RET
Return
0005
END
0006

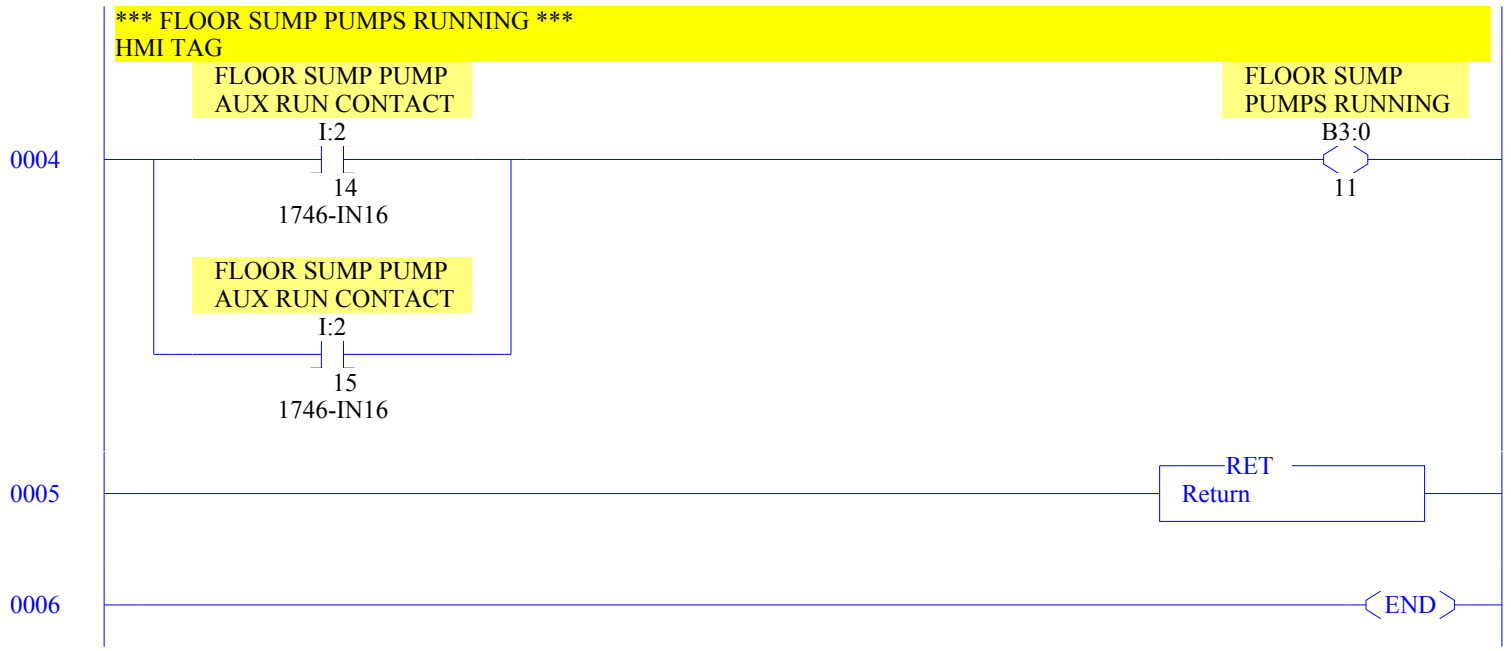
LAD 7 - SUMP_PUMPS --- Total Rungs in File = 7

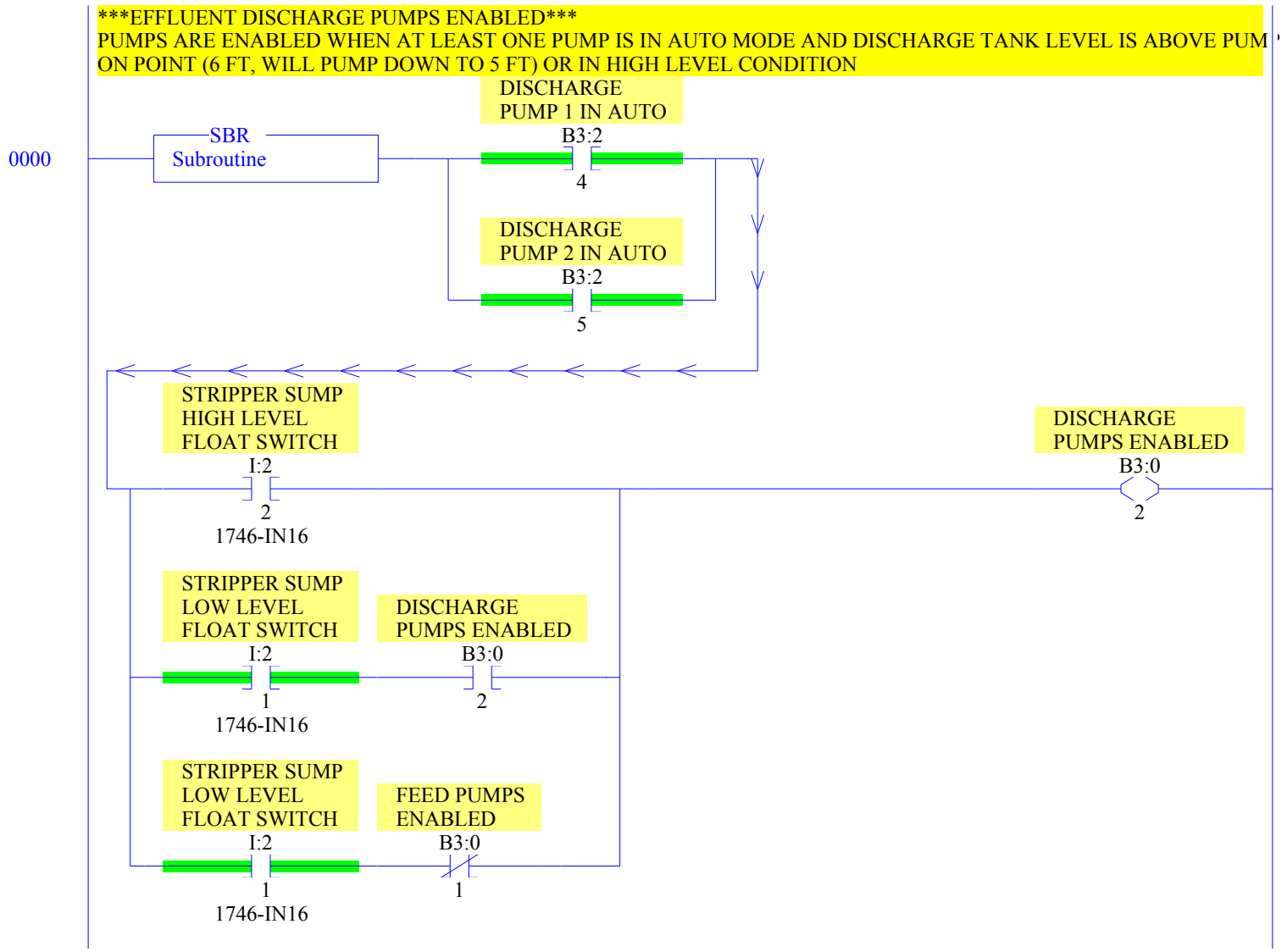


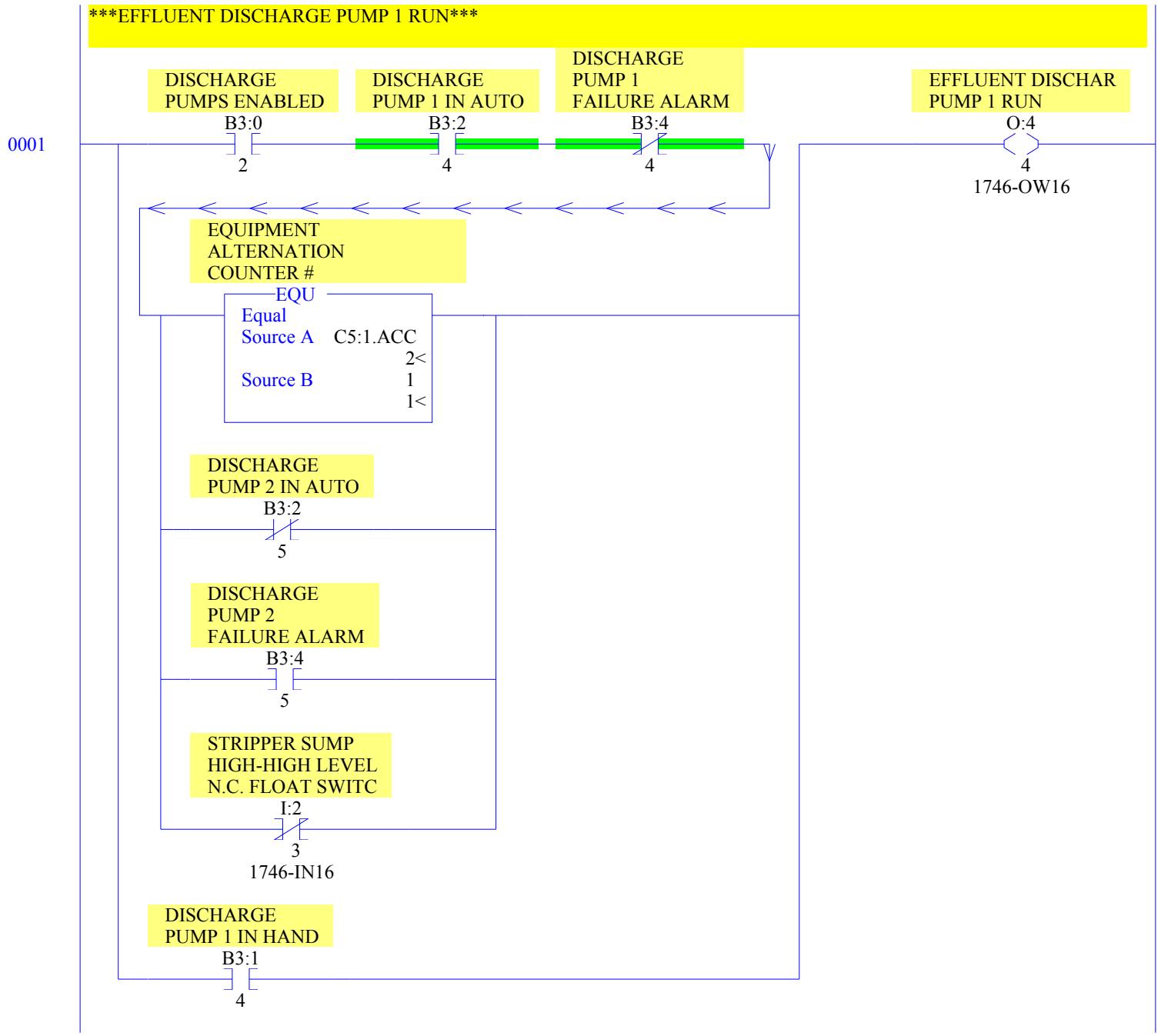

FLOOR SUMP PUMP 1 RUN
0001
FLOOR SUMP PUMPS ENABLED
B3:0
3
FLOOR SUMP PUMP 1 IN AUTO
B3:2
6
FLOOR SUMP PUMP 1 FAILURE ALARM
B3:4
6
FEED TANK HIGH-HIGH LEVEL N.C. FLOAT SWITC
I:2
0
1746-IN16
FLOOR SUMP PUMP ON DELAY TIMER TIMING
T4:5
TT
EQUIPMENT ALTERNATION COUNTER #
EQU
Equal
Source A C5:1.ACC
2<
Source B
1
1<
FLOOR SUMP PUMP 2 IN AUTO
B3:2
7
FLOOR SUMP PUMP 2 FAILURE ALARM
B3:4
7
FLOOR SUMP PUMP 1 IN HAND
B3:1
6
FLOOR SUMP PUMP 1 RUN
O:4
6
1746-OW16

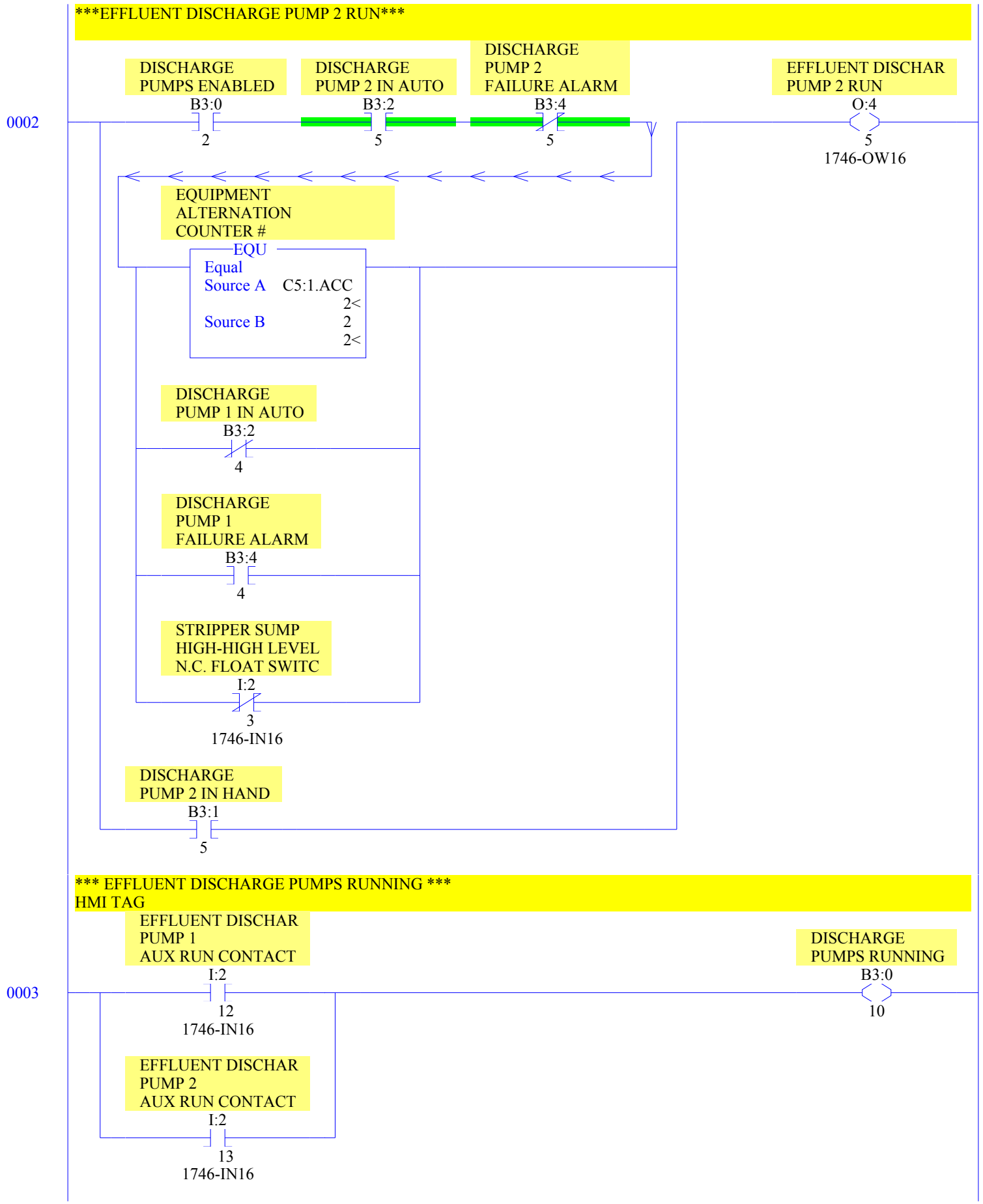

FLOOR SUMP PUMP 2 RUN
FLOOR SUMP PUMPS ENABLED
B3:0
3
FLOOR SUMP PUMP 2 IN AUTO
B3:2
7
FLOOR SUMP PUMP 2 FAILURE ALARM
B3:4
7
FEED TANK HIGH-HIGH LEVEL N.C. FLOAT SWITC
I:2
0
1746-IN16
0002
FLOOR SUMP PUMP ON DELAY TIMER TIMING
T4:5
TT
EQUIPMENT ALTERNATION COUNTER #
EQU
Equal
Source A C5:1.ACC
2<
Source B 2
2<
FLOOR SUMP PUMP 1 IN AUTO
B3:2
6
FLOOR SUMP PUMP 1 FAILURE ALARM
B3:4
6
FLOOR SUMP PUMP 2 IN HAND
B3:1
7
FLOOR SUMP PUMP 2 RUN
O:4
7
1746-OW16
FLOOR SUMP PUMP ON-DELAY TIMER
MINIMUM PUMP OFF TIME TO PREVENT PUMPS FROM CYCLING TOO FREQUENTLY. ALARM RESET/START-UP BUTTON BYPASSES TIMER FOR SYSTEMS START-UP.
FLOOR SUMP PUMP 1 RUN
O:4
6
1746-OW16
FLOOR SUMP PUMP 2 RUN
O:4
7
1746-OW16
ALARM RESET
B3:0
7
0003
FLOOR SUMP PUMP ON-DELAY TIMER
TON
Timer On Delay
Timer T4:5
Time Base 1.0
Preset 600<
Accum 600<
EN
DN

LAD 7 - SUMP_PUMPS --- Total Rungs in File = 7

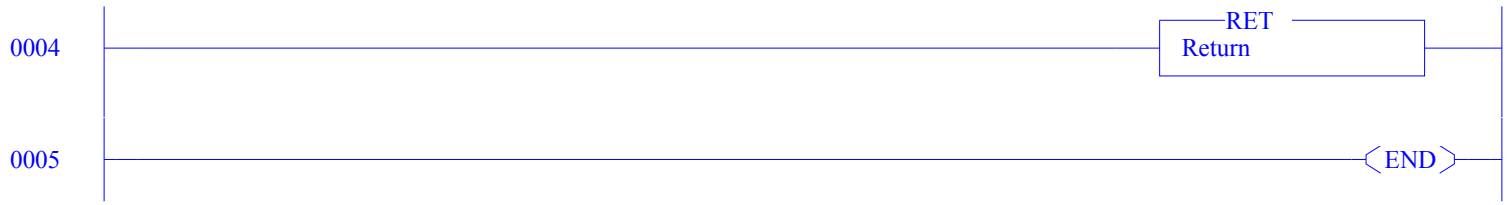



EFFLUENT DISCHARGE PUMPS ENABLED
PUMPS ARE ENABLED WHEN AT LEAST ONE PUMP IS IN AUTO MODE AND DISCHARGE TANK LEVEL IS ABOVE PUM
ON POINT (6 FT, WILL PUMP DOWN TO 5 FT) OR IN HIGH LEVEL CONDITION
0000
SBR
Subroutine
DISCHARGE PUMP 1 IN AUTO
B3:2
4
DISCHARGE PUMP 2 IN AUTO
B3:2
5
STRIPPER SUMP HIGH LEVEL FLOAT SWITCH
I:2
2
1746-IN16
DISCHARGE PUMPS ENABLED
B3:0
2
STRIPPER SUMP LOW LEVEL FLOAT SWITCH
I:2
1
1746-IN16
DISCHARGE PUMPS ENABLED
B3:0
2
STRIPPER SUMP LOW LEVEL FLOAT SWITCH
I:2
1
1746-IN16
FEED PUMPS ENABLED
B3:0
1

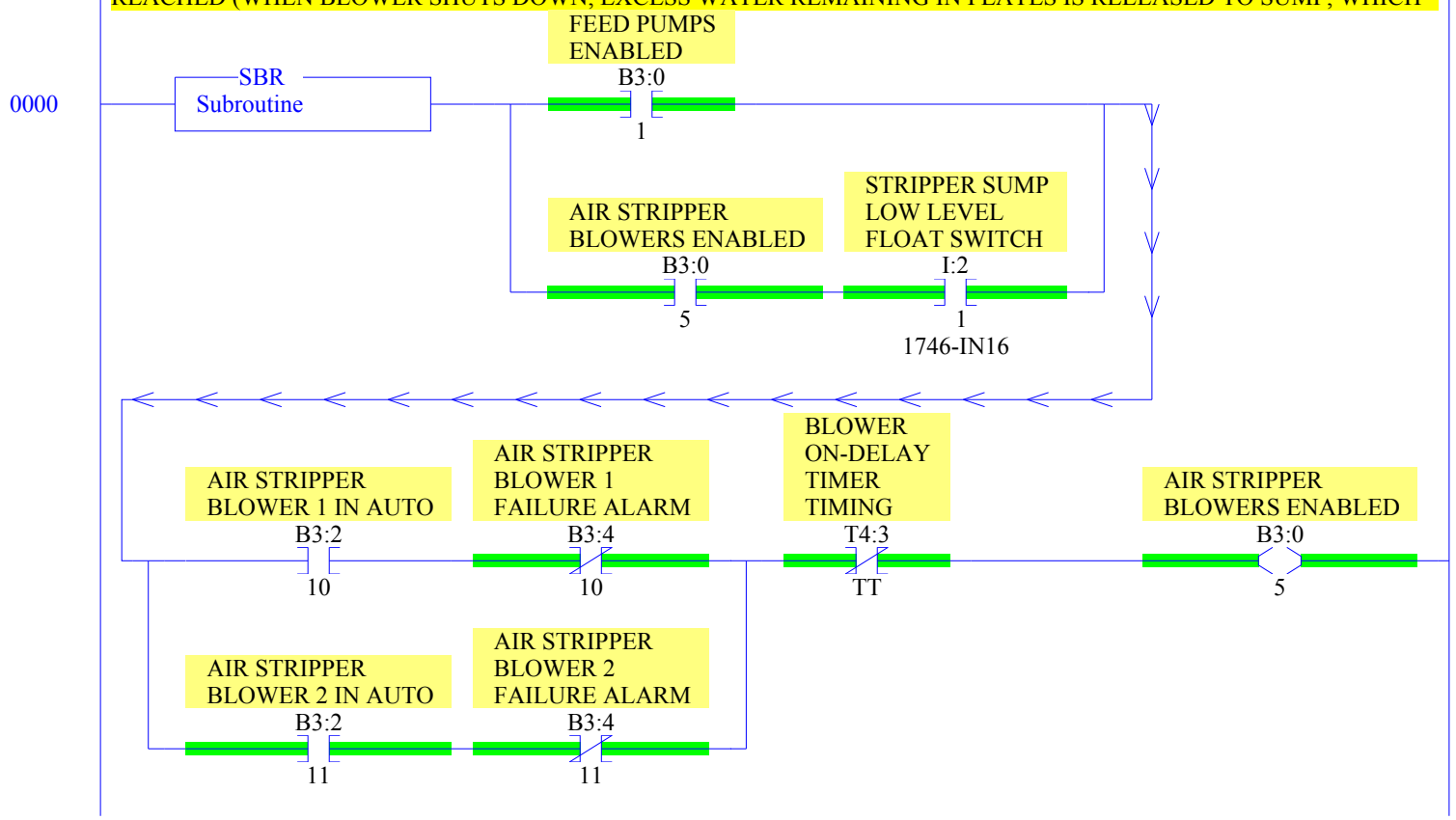

EFFLUENT DISCHARGE PUMP 1 RUN
DISCHARGE PUMPS ENABLED
B3:0
2
DISCHARGE PUMP 1 IN AUTO
B3:2
4
DISCHARGE PUMP 1 FAILURE ALARM
B3:4
4
EFFLUENT DISCHAR PUMP 1 RUN
O:4
4
1746-OW16
0001
EQUIPMENT ALTERNATION COUNTER #
EQU
Equal
Source A C5:1.ACC
2<
Source B
1
1<
DISCHARGE PUMP 2 IN AUTO
B3:2
5
DISCHARGE PUMP 2 FAILURE ALARM
B3:4
5
STRIPPER SUMP HIGH-HIGH LEVEL N.C. FLOAT SWITC
I:2
3
1746-IN16
DISCHARGE PUMP 1 IN HAND
B3:1
4

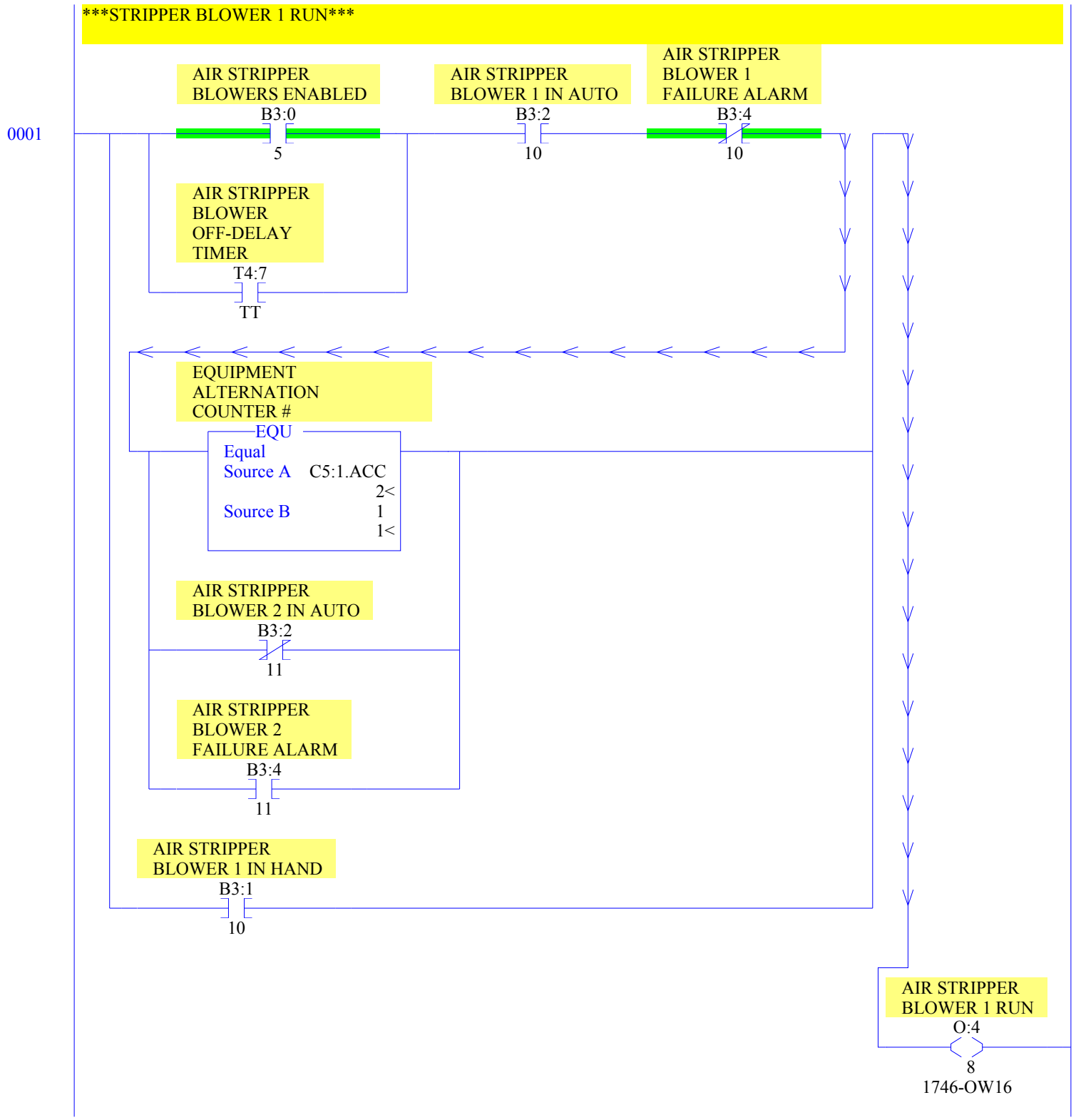

EFFLUENT DISCHARGE PUMP 2 RUN
DISCHARGE PUMPS ENABLED
B3:0
2
DISCHARGE PUMP 2 IN AUTO
B3:2
5
DISCHARGE PUMP 2 FAILURE ALARM
B3:4
5
EFFLUENT DISCHAR PUMP 2 RUN
O:4
5
1746-OW16
0002
EQUIPMENT ALTERNATION COUNTER #
EQU
Equal
Source A C5:1.ACC
2<
Source B 2
2<
DISCHARGE PUMP 1 IN AUTO
B3:2
4
DISCHARGE PUMP 1 FAILURE ALARM
B3:4
4
STRIPPER SUMP HIGH-HIGH LEVEL N.C. FLOAT SWITC
I:2
3
1746-IN16
DISCHARGE PUMP 2 IN HAND
B3:1
5
*** EFFLUENT DISCHARGE PUMPS RUNNING ***
HMI TAG
EFFLUENT DISCHAR PUMP 1 AUX RUN CONTACT
I:2
12
1746-IN16
DISCHARGE PUMPS RUNNING
B3:0
10
0003
EFFLUENT DISCHAR PUMP 2 AUX RUN CONTACT
I:2
13
1746-IN16

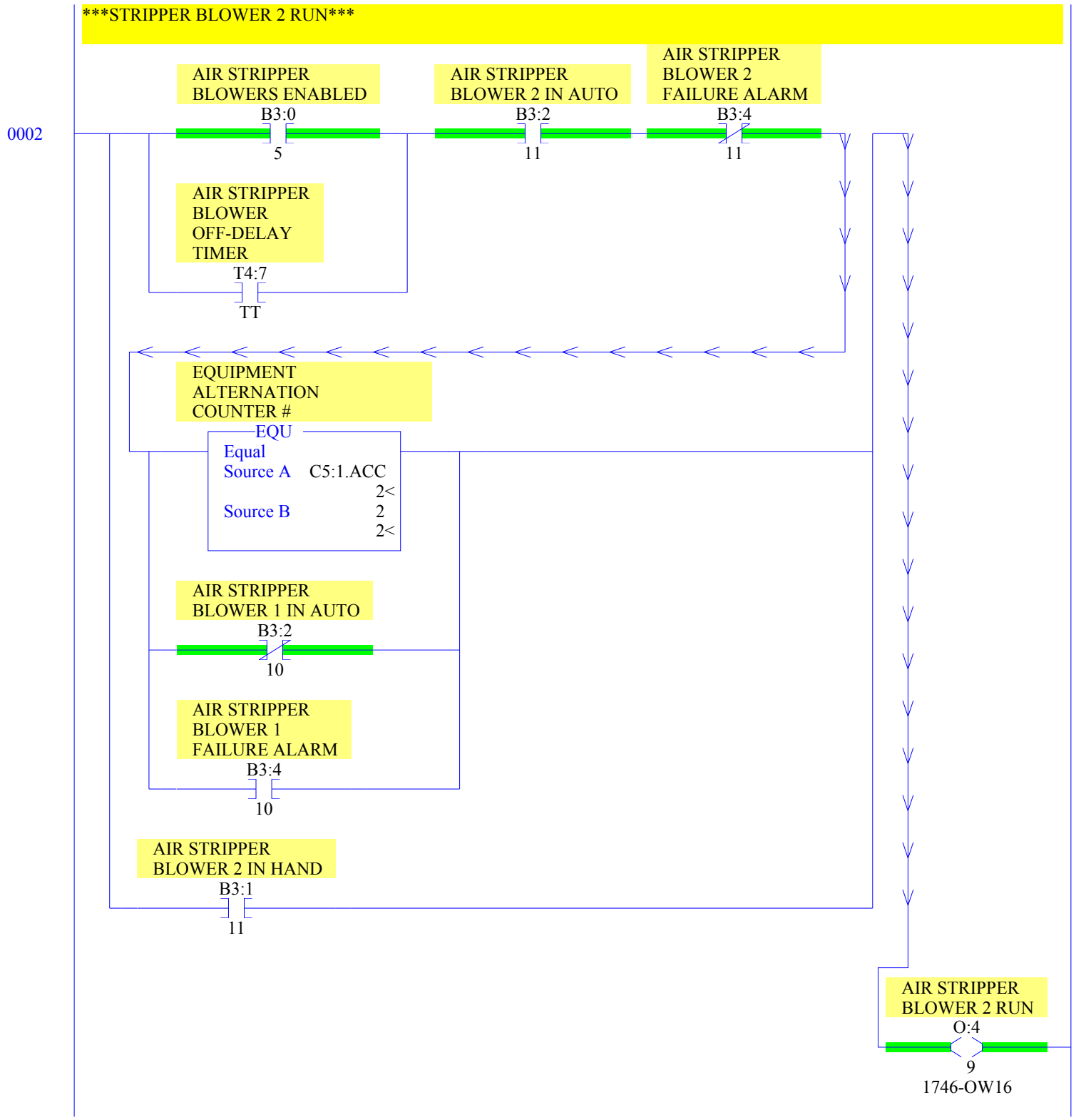
LAD 8 - DISCH_PUMP --- Total Rungs in File = 6

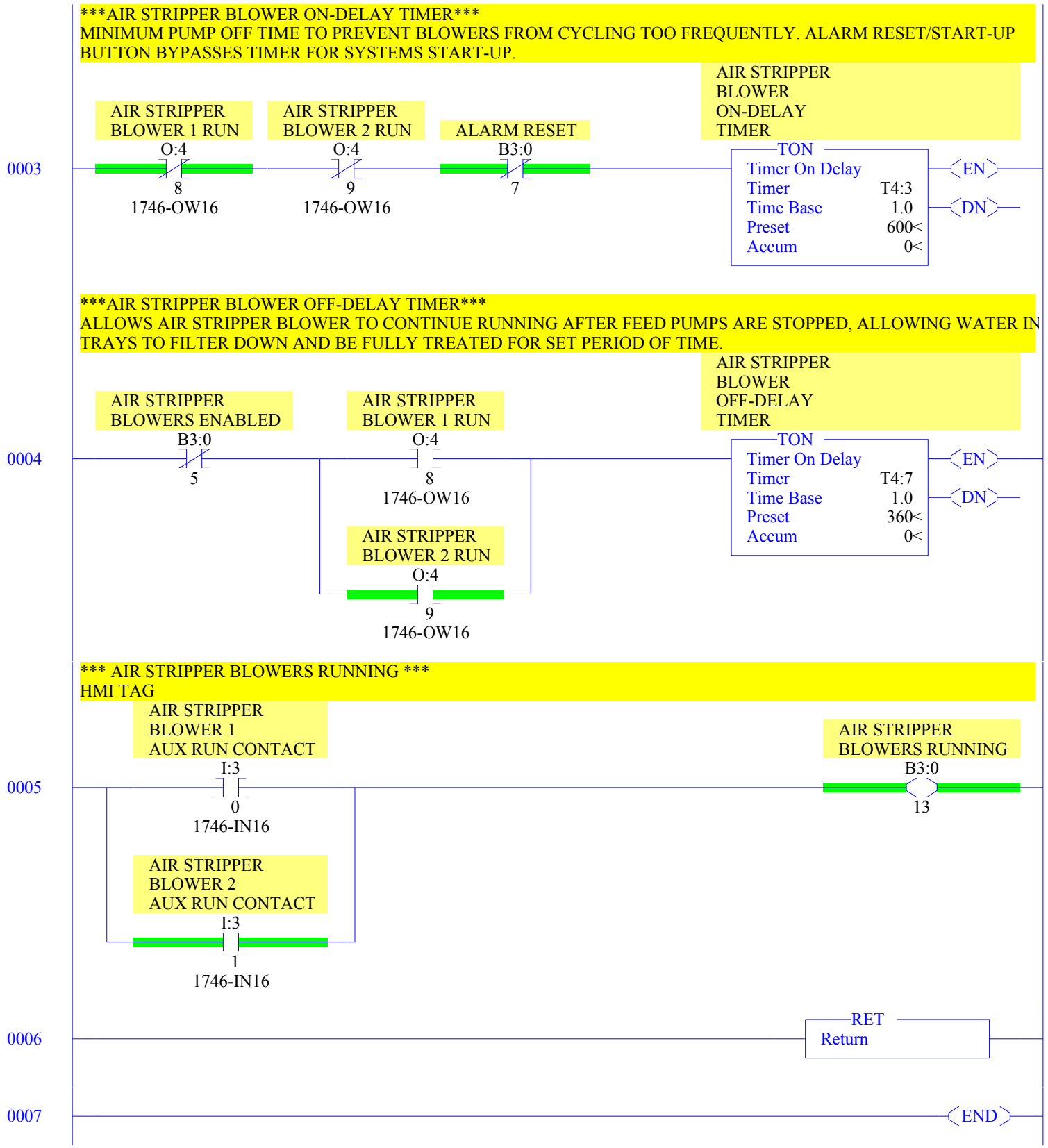


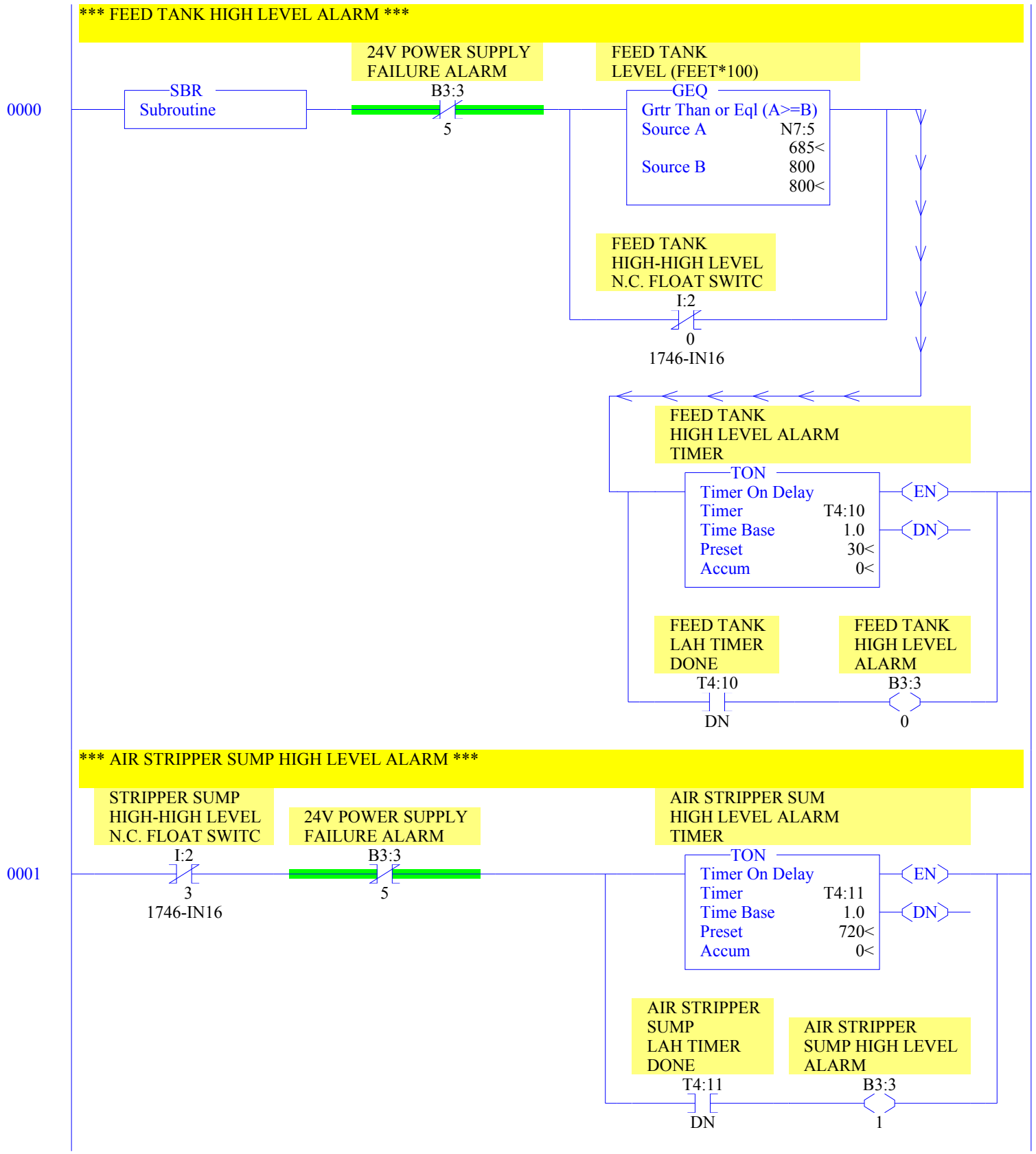
AIR STRIPPER BLOWERS ENABLED
BLOWERS ARE ENABLED WHEN AT LEAST ONE FEED PUMP AND BLOWER ARE IN AUTO MODE, AND FEED TANK LEVEL IS ABOVE MINIMUM SET POINT, AND BLOWERS HAVE BEEN OFF FOR SET PERIOD OF TIME (TO AVOID TOO FREQUENT CYCLING). BLOWERS WILL KEEP RUNNING AT END OF CYCLE UNTIL LOW LEVEL IN STRIPPER SUMP IS REACHED (WHEN BLOWER SHUTS DOWN, EXCESS WATER REMAINING IN PLATES IS RELEASED TO SUMP, WHICH

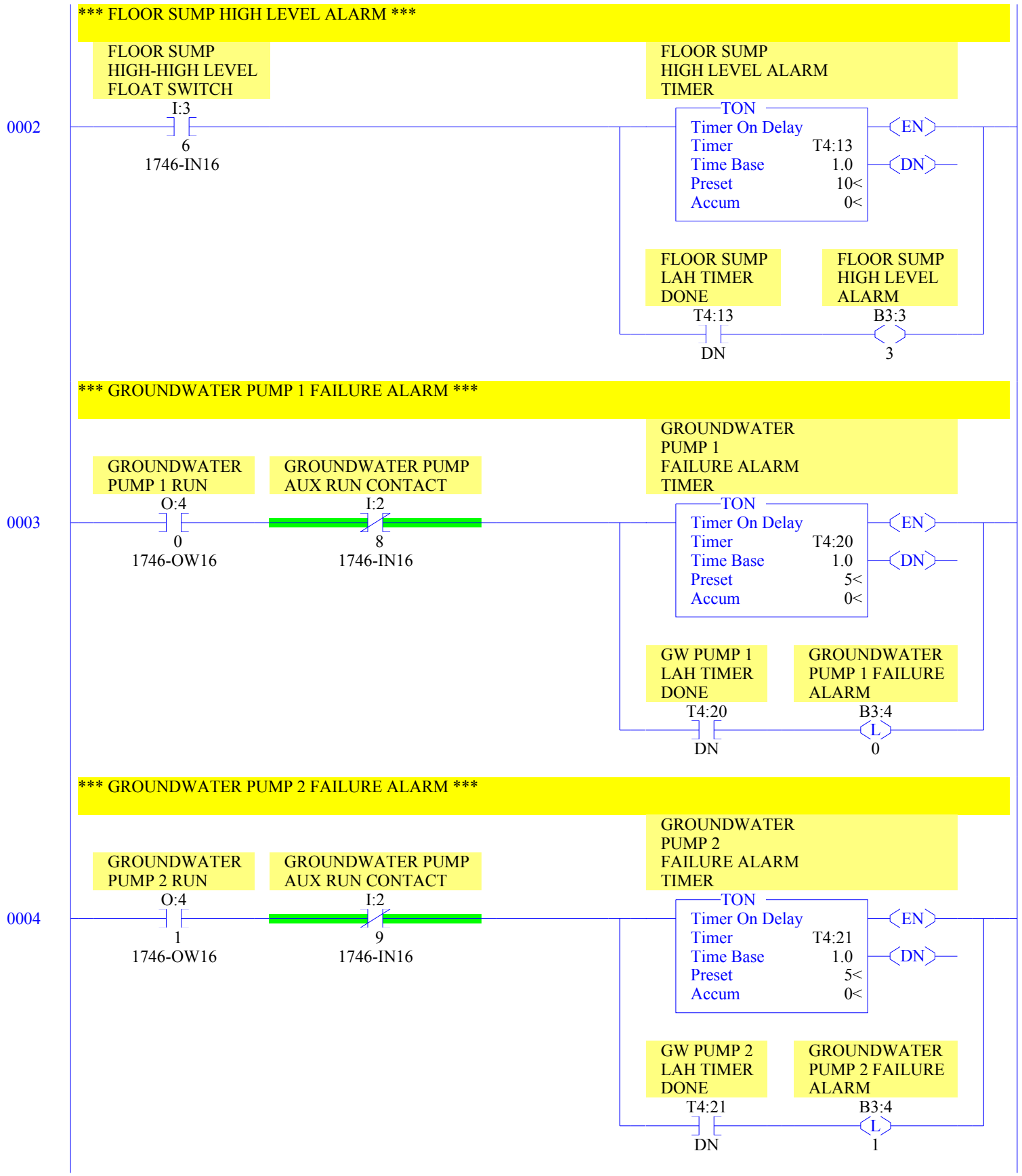


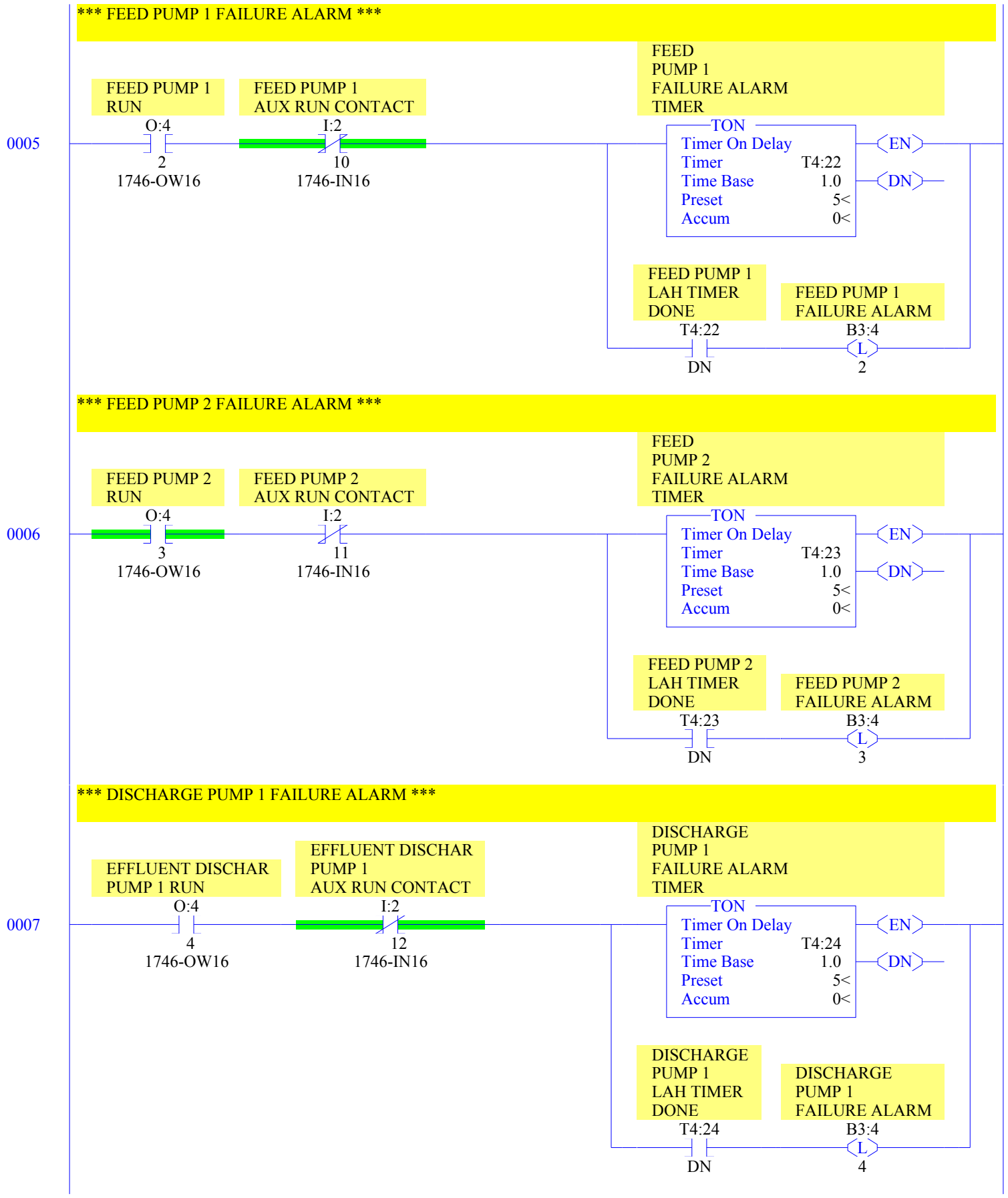

STRIPPER BLOWER 1 RUN
0001
AIR STRIPPER BLOWERS ENABLED
B3:0
5
AIR STRIPPER BLOWER 1 IN AUTO
B3:2
10
AIR STRIPPER BLOWER 1 FAILURE ALARM
B3:4
10
AIR STRIPPER BLOWER OFF-DELAY TIMER
T4:7
TT
EQUIPMENT ALTERNATION COUNTER #
EQU
Equal
Source A C5:1.ACC
2<
Source B
1
1<
AIR STRIPPER BLOWER 2 IN AUTO
B3:2
11
AIR STRIPPER BLOWER 2 FAILURE ALARM
B3:4
11
AIR STRIPPER BLOWER 1 IN HAND
B3:1
10
AIR STRIPPER BLOWER 1 RUN
O:4
8
1746-OW16

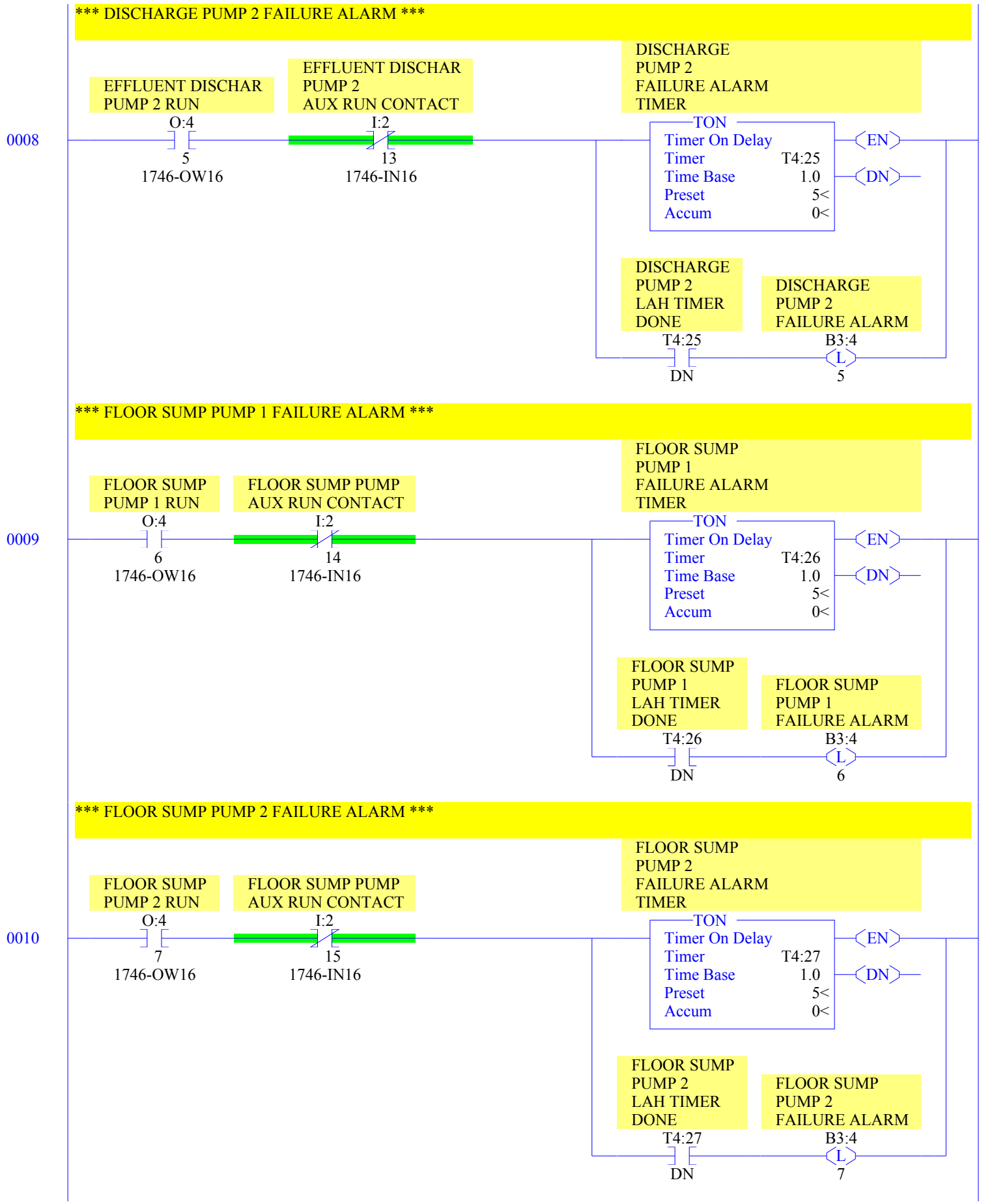

STRIPPER BLOWER 2 RUN
0002
AIR STRIPPER BLOWERS ENABLED
B3:0
5
AIR STRIPPER BLOWER 2 IN AUTO
B3:2
11
AIR STRIPPER BLOWER 2 FAILURE ALARM
B3:4
11
AIR STRIPPER BLOWER OFF-DELAY TIMER
T4:7
TT
EQUIPMENT ALTERNATION COUNTER #
EQU
Equal
Source A C5:1.ACC
2<
Source B
2
2<
AIR STRIPPER BLOWER 1 IN AUTO
B3:2
10
AIR STRIPPER BLOWER 1 FAILURE ALARM
B3:4
10
AIR STRIPPER BLOWER 2 IN HAND
B3:1
11
AIR STRIPPER BLOWER 2 RUN
O:4
9
1746-OW16

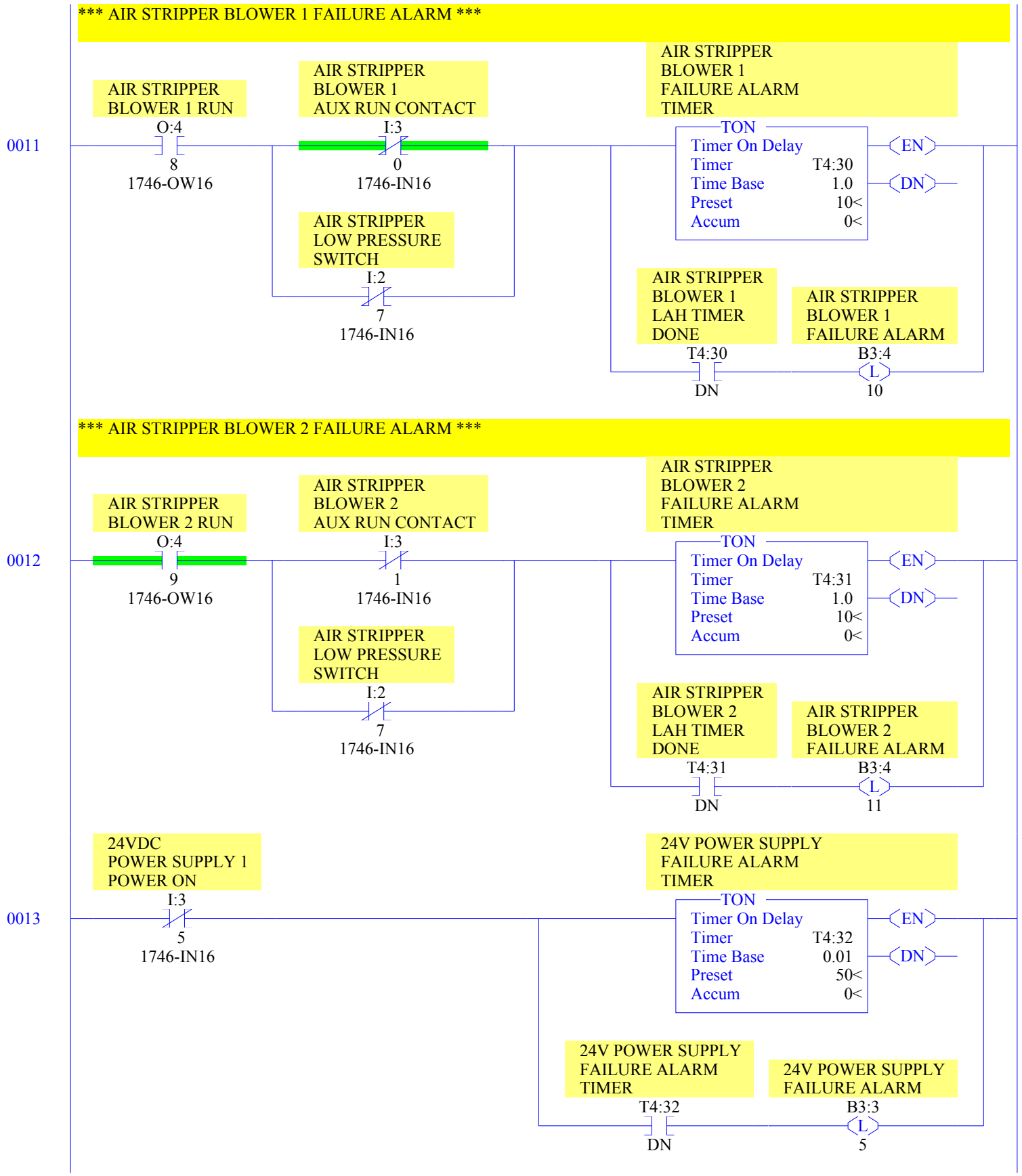

AIR STRIPPER BLOWER ON-DELAY TIMER
MINIMUM PUMP OFF TIME TO PREVENT BLOWERS FROM CYCLING TOO FREQUENTLY. ALARM RESET/START-UP BUTTON BYPASSES TIMER FOR SYSTEMS START-UP.
AIR STRIPPER BLOWER 1 RUN
O:4
8
1746-OW16
AIR STRIPPER BLOWER 2 RUN
O:4
9
1746-OW16
ALARM RESET
B3:0
7
AIR STRIPPER BLOWER ON-DELAY TIMER
TON
Timer On Delay
Timer T4:3
Time Base 1.0
Preset 600
Accum 0
EN
DN
0003
AIR STRIPPER BLOWER OFF-DELAY TIMER
ALLOWS AIR STRIPPER BLOWER TO CONTINUE RUNNING AFTER FEED PUMPS ARE STOPPED, ALLOWING WATER IN TRAYS TO FILTER DOWN AND BE FULLY TREATED FOR SET PERIOD OF TIME.
AIR STRIPPER BLOWERS ENABLED
B3:0
5
AIR STRIPPER BLOWER 1 RUN
O:4
8
1746-OW16
AIR STRIPPER BLOWER 2 RUN
O:4
9
1746-OW16
AIR STRIPPER BLOWER OFF-DELAY TIMER
TON
Timer On Delay
Timer T4:7
Time Base 1.0
Preset 360
Accum 0
EN
DN
0004
*** AIR STRIPPER BLOWERS RUNNING ***
HMI TAG
AIR STRIPPER BLOWER 1 AUX RUN CONTACT
I:3
0
1746-IN16
AIR STRIPPER BLOWER 2 AUX RUN CONTACT
I:3
1
1746-IN16
AIR STRIPPER BLOWERS RUNNING
B3:0
13
0005
RET
Return
0006
END
0007

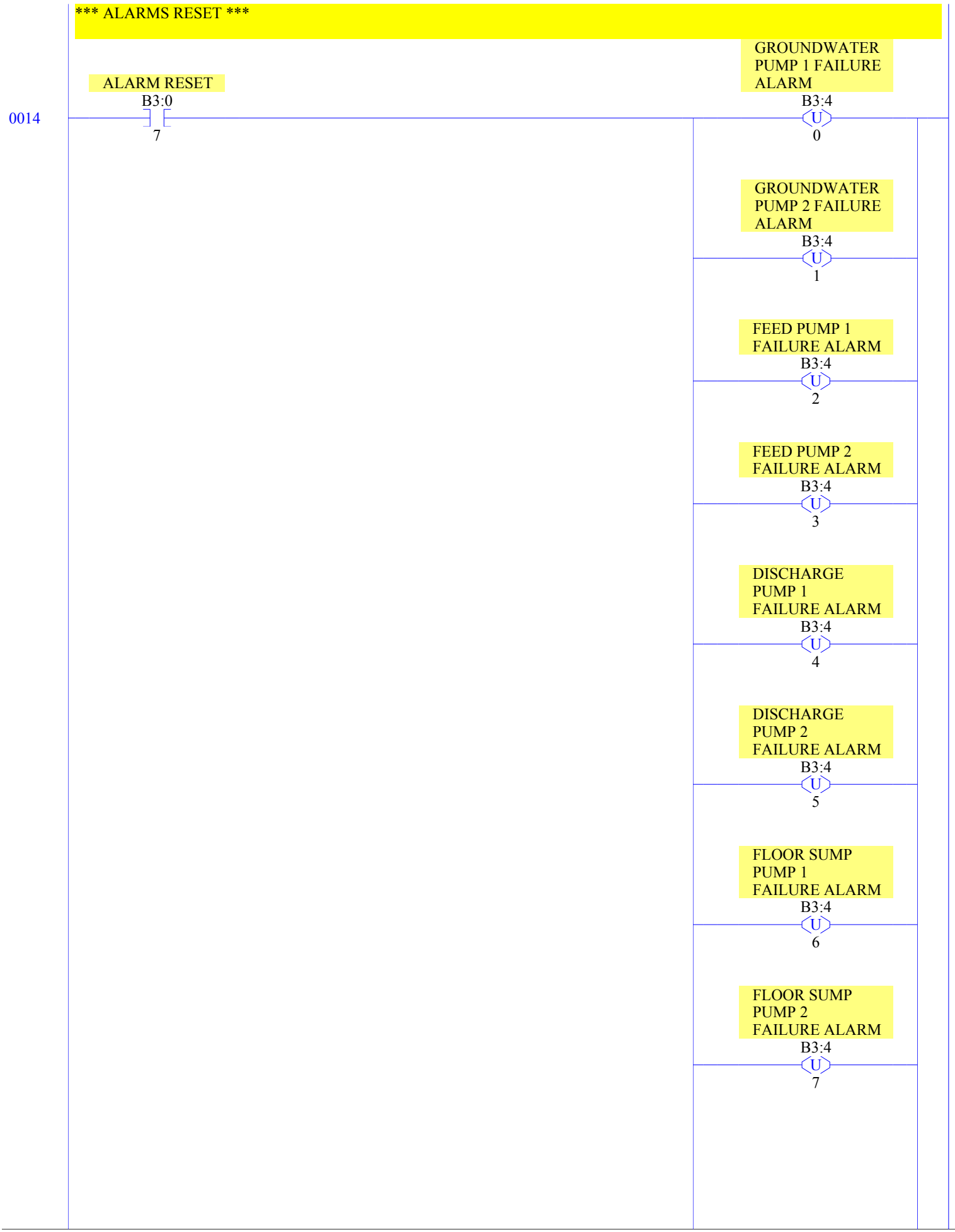

*** FEED TANK HIGH LEVEL ALARM ***
0000
SBR
Subroutine
24V POWER SUPPLY FAILURE ALARM
B3:3
5
FEED TANK LEVEL (FEET*100)
GEQ
Grtr Than or Eql (A>=B)
Source A N7:5
685<
Source B 800
800<
FEED TANK HIGH-HIGH LEVEL N.C. FLOAT SWITC
I:2
0
1746-IN16
FEED TANK HIGH LEVEL ALARM TIMER
TON
Timer On Delay
Timer T4:10
Time Base 1.0
Preset 30<
Accum 0<
EN
DN
FEED TANK LAH TIMER DONE
T4:10
DN
FEED TANK HIGH LEVEL ALARM
B3:3
0
*** AIR STRIPPER SUMP HIGH LEVEL ALARM ***
0001
STRIPPER SUMP HIGH-HIGH LEVEL N.C. FLOAT SWITC
I:2
3
1746-IN16
24V POWER SUPPLY FAILURE ALARM
B3:3
5
AIR STRIPPER SUM HIGH LEVEL ALARM TIMER
TON
Timer On Delay
Timer T4:11
Time Base 1.0
Preset 720<
Accum 0<
EN
DN
AIR STRIPPER SUMP LAH TIMER DONE
T4:11
DN
AIR STRIPPER SUMP HIGH LEVEL ALARM
B3:3
1

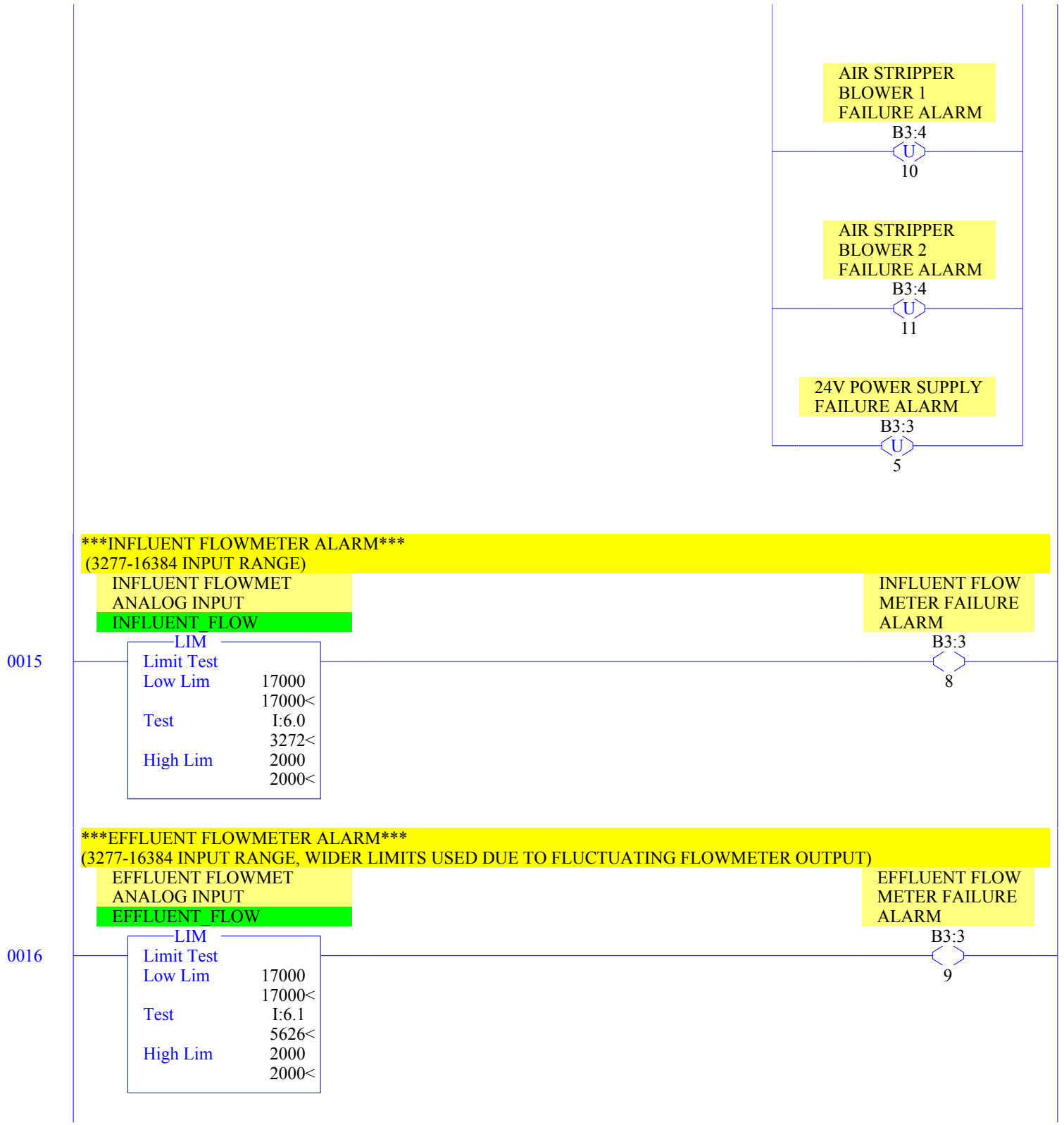

*** FLOOR SUMP HIGH LEVEL ALARM ***
FLOOR SUMP HIGH-HIGH LEVEL FLOAT SWITCH
I:3
6
1746-IN16
FLOOR SUMP HIGH LEVEL ALARM TIMER
TON
Timer On Delay
Timer T4:13
Time Base 1.0
Preset 10<
Accum 0<
EN
DN
FLOOR SUMP LAH TIMER DONE
T4:13
DN
FLOOR SUMP HIGH LEVEL ALARM
B3:3
3
0002
*** GROUNDWATER PUMP 1 FAILURE ALARM ***
GROUNDWATER PUMP 1 RUN
O:4
0
1746-OW16
GROUNDWATER PUMP AUX RUN CONTACT
I:2
8
1746-IN16
GROUNDWATER PUMP 1 FAILURE ALARM TIMER
TON
Timer On Delay
Timer T4:20
Time Base 1.0
Preset 5<
Accum 0<
EN
DN
GW PUMP 1 LAH TIMER DONE
T4:20
DN
GROUNDWATER PUMP 1 FAILURE ALARM
B3:4
L
0
0003
*** GROUNDWATER PUMP 2 FAILURE ALARM ***
GROUNDWATER PUMP 2 RUN
O:4
1
1746-OW16
GROUNDWATER PUMP AUX RUN CONTACT
I:2
9
1746-IN16
GROUNDWATER PUMP 2 FAILURE ALARM TIMER
TON
Timer On Delay
Timer T4:21
Time Base 1.0
Preset 5<
Accum 0<
EN
DN
GW PUMP 2 LAH TIMER DONE
T4:21
DN
GROUNDWATER PUMP 2 FAILURE ALARM
B3:4
L
1
0004

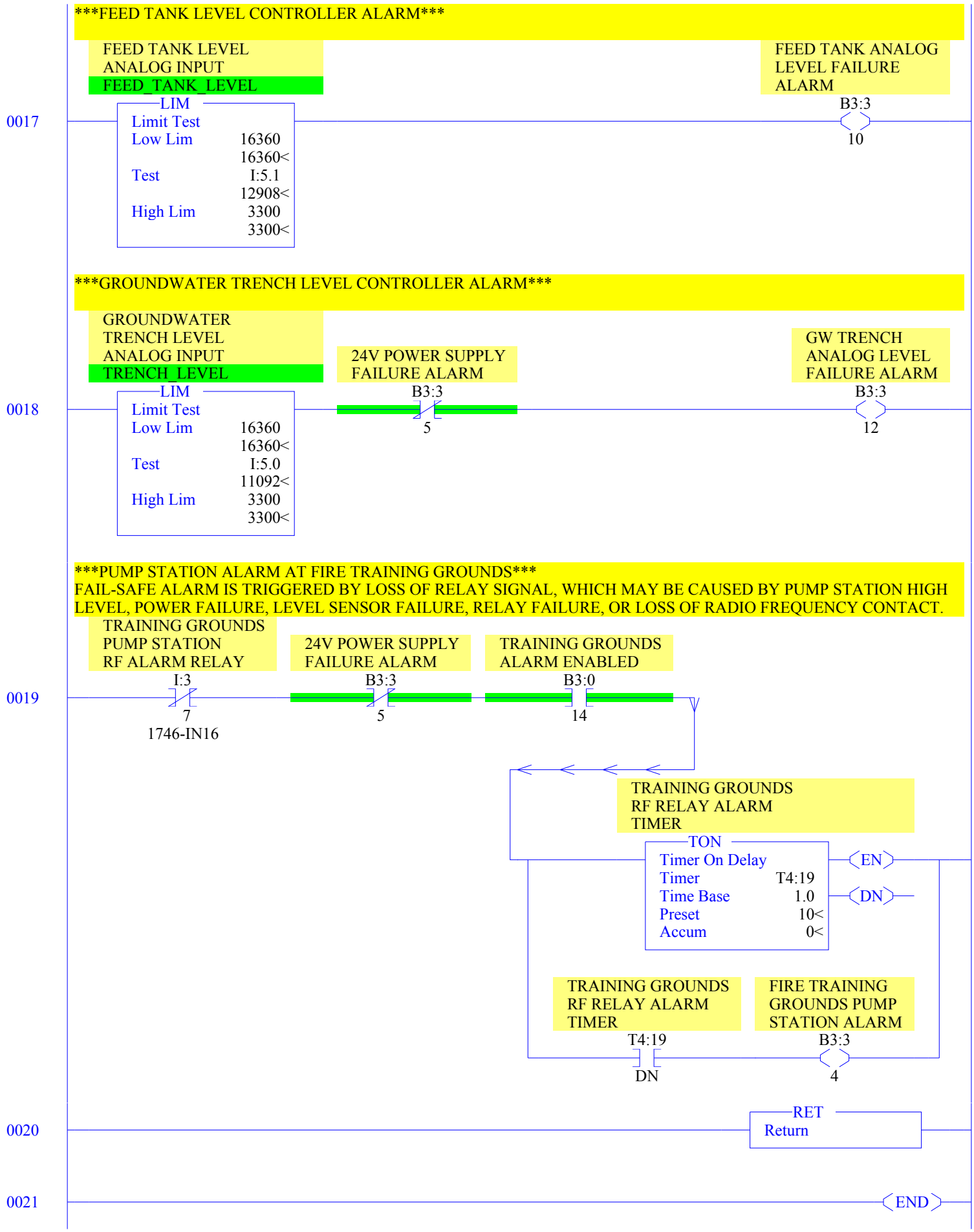

*** FEED PUMP 1 FAILURE ALARM ***
FEED PUMP 1 RUN
O:4
2
1746-OW16
FEED PUMP 1 AUX RUN CONTACT
I:2
10
1746-IN16
FEED PUMP 1 FAILURE ALARM TIMER
TON
Timer On Delay
Timer T4:22
Time Base 1.0
Preset 5<
Accum 0<
EN
DN
FEED PUMP 1 LAH TIMER DONE
T4:22
DN
FEED PUMP 1 FAILURE ALARM
B3:4
L
2
0005
*** FEED PUMP 2 FAILURE ALARM ***
FEED PUMP 2 RUN
O:4
3
1746-OW16
FEED PUMP 2 AUX RUN CONTACT
I:2
11
1746-IN16
FEED PUMP 2 FAILURE ALARM TIMER
TON
Timer On Delay
Timer T4:23
Time Base 1.0
Preset 5<
Accum 0<
EN
DN
FEED PUMP 2 LAH TIMER DONE
T4:23
DN
FEED PUMP 2 FAILURE ALARM
B3:4
L
3
0006
*** DISCHARGE PUMP 1 FAILURE ALARM ***
EFFLUENT DISCHAR PUMP 1 RUN
O:4
4
1746-OW16
EFFLUENT DISCHAR PUMP 1 AUX RUN CONTACT
I:2
12
1746-IN16
DISCHARGE PUMP 1 FAILURE ALARM TIMER
TON
Timer On Delay
Timer T4:24
Time Base 1.0
Preset 5<
Accum 0<
EN
DN
DISCHARGE PUMP 1 LAH TIMER DONE
T4:24
DN
DISCHARGE PUMP 1 FAILURE ALARM
B3:4
L
4
0007

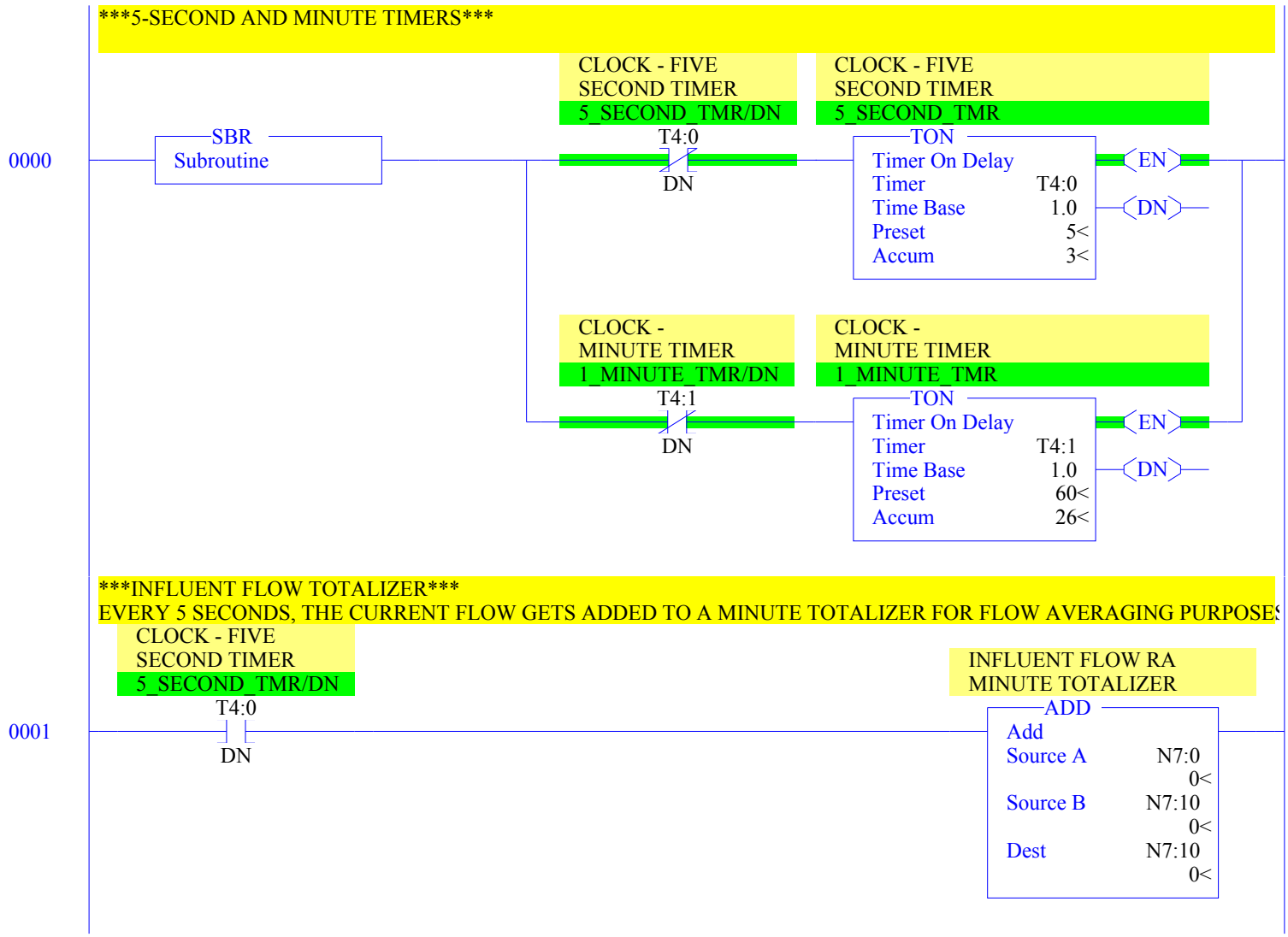

*** DISCHARGE PUMP 2 FAILURE ALARM ***
EFFLUENT DISCHAR PUMP 2 RUN
O:4
5
1746-OW16
EFFLUENT DISCHAR PUMP 2 AUX RUN CONTACT
I:2
13
1746-IN16
DISCHARGE PUMP 2 FAILURE ALARM TIMER
TON
Timer On Delay
Timer T4:25
Time Base 1.0
Preset 5<
Accum 0<
EN
DN
DISCHARGE PUMP 2 LAH TIMER DONE
T4:25
DN
DISCHARGE PUMP 2 FAILURE ALARM
B3:4
L
5
0008
*** FLOOR SUMP PUMP 1 FAILURE ALARM ***
FLOOR SUMP PUMP 1 RUN
O:4
6
1746-OW16
FLOOR SUMP PUMP AUX RUN CONTACT
I:2
14
1746-IN16
FLOOR SUMP PUMP 1 FAILURE ALARM TIMER
TON
Timer On Delay
Timer T4:26
Time Base 1.0
Preset 5<
Accum 0<
EN
DN
FLOOR SUMP PUMP 1 LAH TIMER DONE
T4:26
DN
FLOOR SUMP PUMP 1 FAILURE ALARM
B3:4
L
6
0009
*** FLOOR SUMP PUMP 2 FAILURE ALARM ***
FLOOR SUMP PUMP 2 RUN
O:4
7
1746-OW16
FLOOR SUMP PUMP AUX RUN CONTACT
I:2
15
1746-IN16
FLOOR SUMP PUMP 2 FAILURE ALARM TIMER
TON
Timer On Delay
Timer T4:27
Time Base 1.0
Preset 5<
Accum 0<
EN
DN
FLOOR SUMP PUMP 2 LAH TIMER DONE
T4:27
DN
FLOOR SUMP PUMP 2 FAILURE ALARM
B3:4
L
7
0010


*** AIR STRIPPER BLOWER 1 FAILURE ALARM ***
AIR STRIPPER BLOWER 1 RUN
O:4
8
1746-OW16
AIR STRIPPER BLOWER 1 AUX RUN CONTACT
I:3
0
1746-IN16
AIR STRIPPER LOW PRESSURE SWITCH
I:2
7
1746-IN16
AIR STRIPPER BLOWER 1 FAILURE ALARM TIMER
TON
Timer On Delay
Timer T4:30
Time Base 1.0
Preset 10<
Accum 0<
EN
DN
AIR STRIPPER BLOWER 1 LAH TIMER DONE
T4:30
DN
AIR STRIPPER BLOWER 1 FAILURE ALARM
B3:4
L
10
0011
*** AIR STRIPPER BLOWER 2 FAILURE ALARM ***
AIR STRIPPER BLOWER 2 RUN
O:4
9
1746-OW16
AIR STRIPPER BLOWER 2 AUX RUN CONTACT
I:3
1
1746-IN16
AIR STRIPPER LOW PRESSURE SWITCH
I:2
7
1746-IN16
AIR STRIPPER BLOWER 2 FAILURE ALARM TIMER
TON
Timer On Delay
Timer T4:31
Time Base 1.0
Preset 10<
Accum 0<
EN
DN
AIR STRIPPER BLOWER 2 LAH TIMER DONE
T4:31
DN
AIR STRIPPER BLOWER 2 FAILURE ALARM
B3:4
L
11
0012
24VDC POWER SUPPLY 1 POWER ON
I:3
5
1746-IN16
24V POWER SUPPLY FAILURE ALARM TIMER
TON
Timer On Delay
Timer T4:32
Time Base 0.01
Preset 50<
Accum 0<
EN
DN
24V POWER SUPPLY FAILURE ALARM TIMER
T4:32
DN
24V POWER SUPPLY FAILURE ALARM
B3:3
L
5
0013


*** ALARMS RESET ***
ALARM RESET
B3:0
7
0014
GROUNDWATER PUMP 1 FAILURE ALARM
B3:4
U
0
GROUNDWATER PUMP 2 FAILURE ALARM
B3:4
U
1
FEED PUMP 1 FAILURE ALARM
B3:4
U
2
FEED PUMP 2 FAILURE ALARM
B3:4
U
3
DISCHARGE PUMP 1 FAILURE ALARM
B3:4
U
4
DISCHARGE PUMP 2 FAILURE ALARM
B3:4
U
5
FLOOR SUMP PUMP 1 FAILURE ALARM
B3:4
U
6
FLOOR SUMP PUMP 2 FAILURE ALARM
B3:4
U
7


AIR STRIPPER BLOWER 1 FAILURE ALARM
B3:4
U
10
AIR STRIPPER BLOWER 2 FAILURE ALARM
B3:4
U
11
24V POWER SUPPLY FAILURE ALARM
B3:3
U
5
INFLUENT FLOWMETER ALARM
(3277-16384 INPUT RANGE)
INFLUENT FLOWMET ANALOG INPUT
INFLUENT_FLOW
INFLUENT FLOW METER FAILURE ALARM
B3:3
8
0015
LIM
Limit Test
Low Lim 17000
17000<
Test I:6.0
3272<
High Lim 2000
2000<
EFFLUENT FLOWMETER ALARM
(3277-16384 INPUT RANGE, WIDER LIMITS USED DUE TO FLUCTUATING FLOWMETER OUTPUT)
EFFLUENT FLOWMET ANALOG INPUT
EFFLUENT_FLOW
EFFLUENT FLOW METER FAILURE ALARM
B3:3
9
0016
LIM
Limit Test
Low Lim 17000
17000<
Test I:6.1
5626<
High Lim 2000
2000<


FEED TANK LEVEL CONTROLLER ALARM
FEED TANK LEVEL ANALOG INPUT FEED_TANK_LEVEL
LIM
Limit Test
Low Lim 16360 16360<
Test I:5.1 12908<
High Lim 3300 3300<
FEED TANK ANALOG LEVEL FAILURE ALARM
B3:3
10
0017
GROUNDWATER TRENCH LEVEL CONTROLLER ALARM
GROUNDWATER TRENCH LEVEL ANALOG INPUT TRENCH_LEVEL
LIM
Limit Test
Low Lim 16360 16360<
Test I:5.0 11092<
High Lim 3300 3300<
24V POWER SUPPLY FAILURE ALARM
B3:3
5
GW TRENCH ANALOG LEVEL FAILURE ALARM
B3:3
12
0018
PUMP STATION ALARM AT FIRE TRAINING GROUNDS
FAIL-SAFE ALARM IS TRIGGERED BY LOSS OF RELAY SIGNAL, WHICH MAY BE CAUSED BY PUMP STATION HIGH LEVEL, POWER FAILURE, LEVEL SENSOR FAILURE, RELAY FAILURE, OR LOSS OF RADIO FREQUENCY CONTACT.
TRAINING GROUNDS PUMP STATION RF ALARM RELAY
I:3
7
1746-IN16
24V POWER SUPPLY FAILURE ALARM
B3:3
5
TRAINING GROUNDS ALARM ENABLED
B3:0
14
TRAINING GROUNDS RF RELAY ALARM TIMER
TON
Timer On Delay
Timer T4:19
Time Base 1.0
Preset 10<
Accum 0<
EN
DN
TRAINING GROUNDS RF RELAY ALARM TIMER
T4:19
DN
FIRE TRAINING GROUNDS PUMP STATION ALARM
B3:3
4
0019
RET
Return
0020
END
0021


5-SECOND AND MINUTE TIMERS
CLOCK - FIVE SECOND TIMER
5_SECOND_TMR/DN
CLOCK - FIVE SECOND TIMER
5_SECOND_TMR
0000
SBR
Subroutine
T4:0
DN
TON
Timer On Delay
Timer T4:0
Time Base 1.0
Preset 5<
Accum 3<
EN
DN
CLOCK - MINUTE TIMER
1_MINUTE_TMR/DN
CLOCK - MINUTE TIMER
1_MINUTE_TMR
T4:1
DN
TON
Timer On Delay
Timer T4:1
Time Base 1.0
Preset 60<
Accum 26<
EN
DN
INFLUENT FLOW TOTALIZER
EVERY 5 SECONDS, THE CURRENT FLOW GETS ADDED TO A MINUTE TOTALIZER FOR FLOW AVERAGING PURPOSES
CLOCK - FIVE SECOND TIMER
5_SECOND_TMR/DN
T4:0
DN
0001
INFLUENT FLOW RA MINUTE TOTALIZER
ADD
Add
Source A N7:0 0<
Source B N7:10 0<
Dest N7:10 0<

INFLUENT FLOW TOTALIZER
AT END OF EACH MINUTE, THE MINUTE TOTALIZER IS DIVIDED BY 120 TO DETERMINE AVERAGE FLOW (GPM) OVE
THE PREVIOUS MINUTE, AND IS RESET, WHILE THE PREVIOUS MINUTE'S AVERAGED FLOW IS ADDED TO THE
INFLUENT FLOW TOTALIZER

0002

CLOCK - MINUTE TIMER
1_MINUTE_TMR/DN
T4:1
DN

INFLUENT FLOW TOTALIZER - AVG GPM OVER PRIOR MINUTE

DIV
Divide
Source A N7:10 0<
Source B 120 120<
Dest N7:12 0<

INFLUENT FLOW RA MINUTE TOTALIZER

MOV
Move
Source 0 0<
Dest N7:10 0<

INFLUENT FLOW TOTALIZER (GAL)

ADD
Add
Source A N7:12 0<
Source B N7:2 230<
Dest N7:2 230<

INFLUENT FLOW TOTALIZER
ONCE THE INFLUENT FLOW TOTALIZER REACHES 1000 GAL, THE 1000-GAL COUNTER IS TRIGGERED, AND THE
SMALLER TOTALIZER IS RESET TO 0 TO BEGIN AGAIN. THIS ALLOWS TWO REGISTERS TO BE USED FOR TOTALIZIN
AT 1 GAL PRECISION UP TO 10 MILLION GALLONS

0003

INFLUENT FLOW TOTALIZER (GAL)

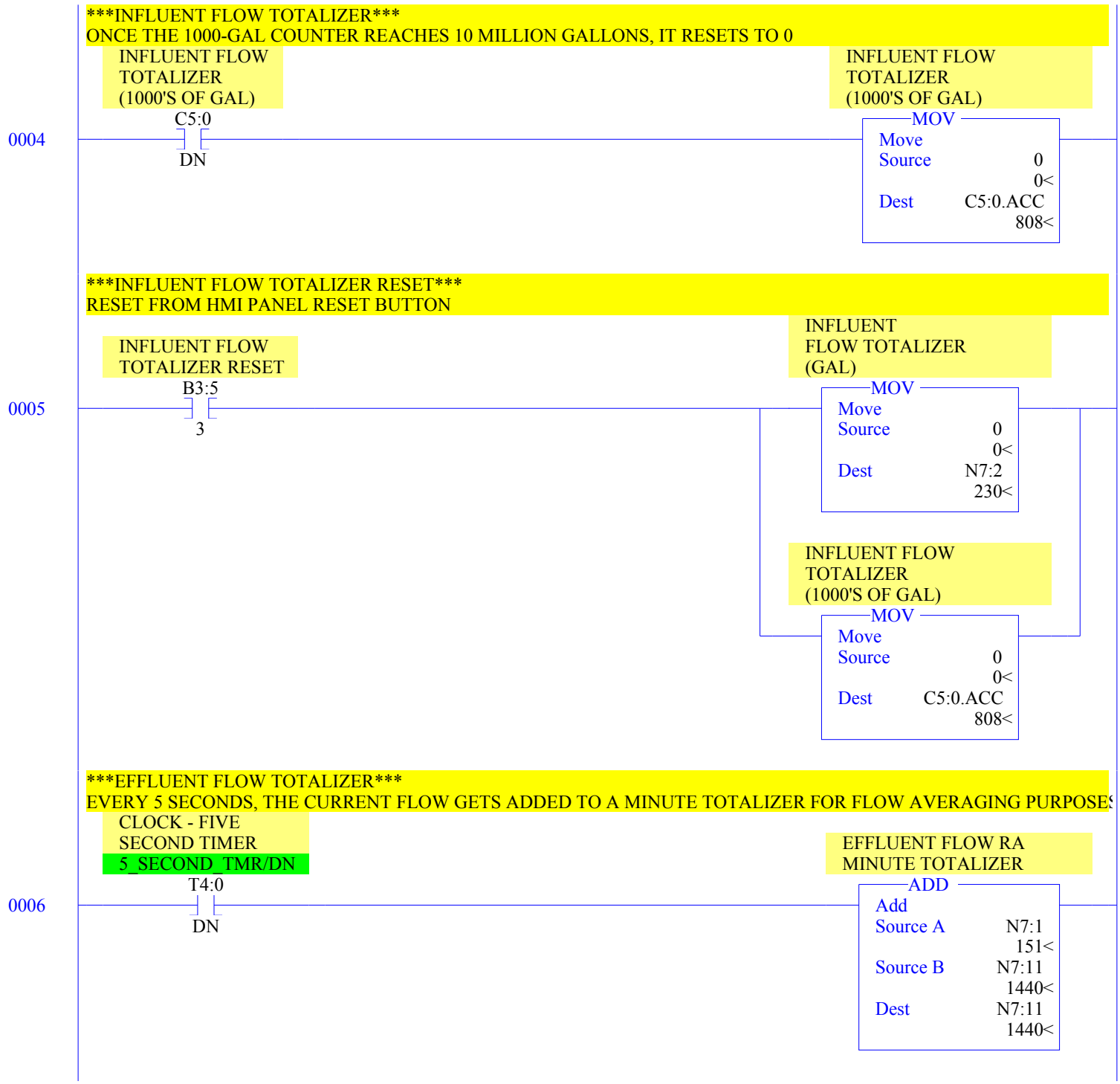
GEQ
Grtr Than or Eql (A>=B)
Source A N7:2 230<
Source B 1000 1000<

INFLUENT FLOW TOTALIZER (GAL)

MOV
Move
Source 0 0<
Dest N7:2 230<

INFLUENT FLOW TOTALIZER (1000'S OF GAL)

CTU
Count Up
Counter C5:0
Preset 10000<
Accum 808<
CU
DN


INFLUENT FLOW TOTALIZER
ONCE THE 1000-GAL COUNTER REACHES 10 MILLION GALLONS, IT RESETS TO 0
INFLUENT FLOW TOTALIZER (1000'S OF GAL)
C5:0
DN
0004
INFLUENT FLOW TOTALIZER (1000'S OF GAL)
MOV
Move
Source 0
0<
Dest C5:0.ACC
808<
INFLUENT FLOW TOTALIZER RESET
RESET FROM HMI PANEL RESET BUTTON
INFLUENT FLOW TOTALIZER RESET
B3:5
3
0005
INFLUENT FLOW TOTALIZER (GAL)
MOV
Move
Source 0
0<
Dest N7:2
230<
INFLUENT FLOW TOTALIZER (1000'S OF GAL)
MOV
Move
Source 0
0<
Dest C5:0.ACC
808<
EFFLUENT FLOW TOTALIZER
EVERY 5 SECONDS, THE CURRENT FLOW GETS ADDED TO A MINUTE TOTALIZER FOR FLOW AVERAGING PURPOSES
CLOCK - FIVE SECOND TIMER
5_SECOND_TMR/DN
T4:0
DN
0006
EFFLUENT FLOW RA MINUTE TOTALIZER
ADD
Add
Source A N7:1
151<
Source B N7:11
1440<
Dest N7:11
1440<

EFFLUENT FLOW TOTALIZER
AT END OF EACH MINUTE, THE MINUTE TOTALIZER IS DIVIDED BY 120 TO DETERMINE AVERAGE FLOW (GPM) OVE
THE PREVIOUS MINUTE, AND IS RESET, WHILE THE PREVIOUS MINUTE'S AVERAGED FLOW IS ADDED TO THE
EFFLUENT FLOW TOTALIZER

0007

CLOCK - MINUTE TIMER
1_MINUTE_TMR/DN
T4:1
DN

EFFLUENT FLOW TOTALIZER - AVG GPM OVER PRIOR MINUTE

DIV
Divide
Source A N7:11 1440<
Source B 120 120<
Dest N7:13 46<

EFFLUENT FLOW RA MINUTE TOTALIZER

MOV
Move
Source 0 0<
Dest N7:11 1440<

EFFLUENT FLOW TOTALIZER (GAL)

ADD
Add
Source A N7:13 46<
Source B N7:3 550<
Dest N7:3 550<

EFFLUENT FLOW TOTALIZER
ONCE THE EFFLUENT FLOW TOTALIZER REACHES 1000 GAL, THE 1000-GAL COUNTER IS TRIGGERED, AND THE
SMALLER TOTALIZER IS RESET TO 0 TO BEGIN AGAIN. THIS ALLOWS TWO REGISTERS TO BE USED FOR TOTALIZIN
AT 1 GAL PRECISION UP TO 10 MILLION GALLONS

0008

EFFLUENT FLOW TOTALIZER (GAL)

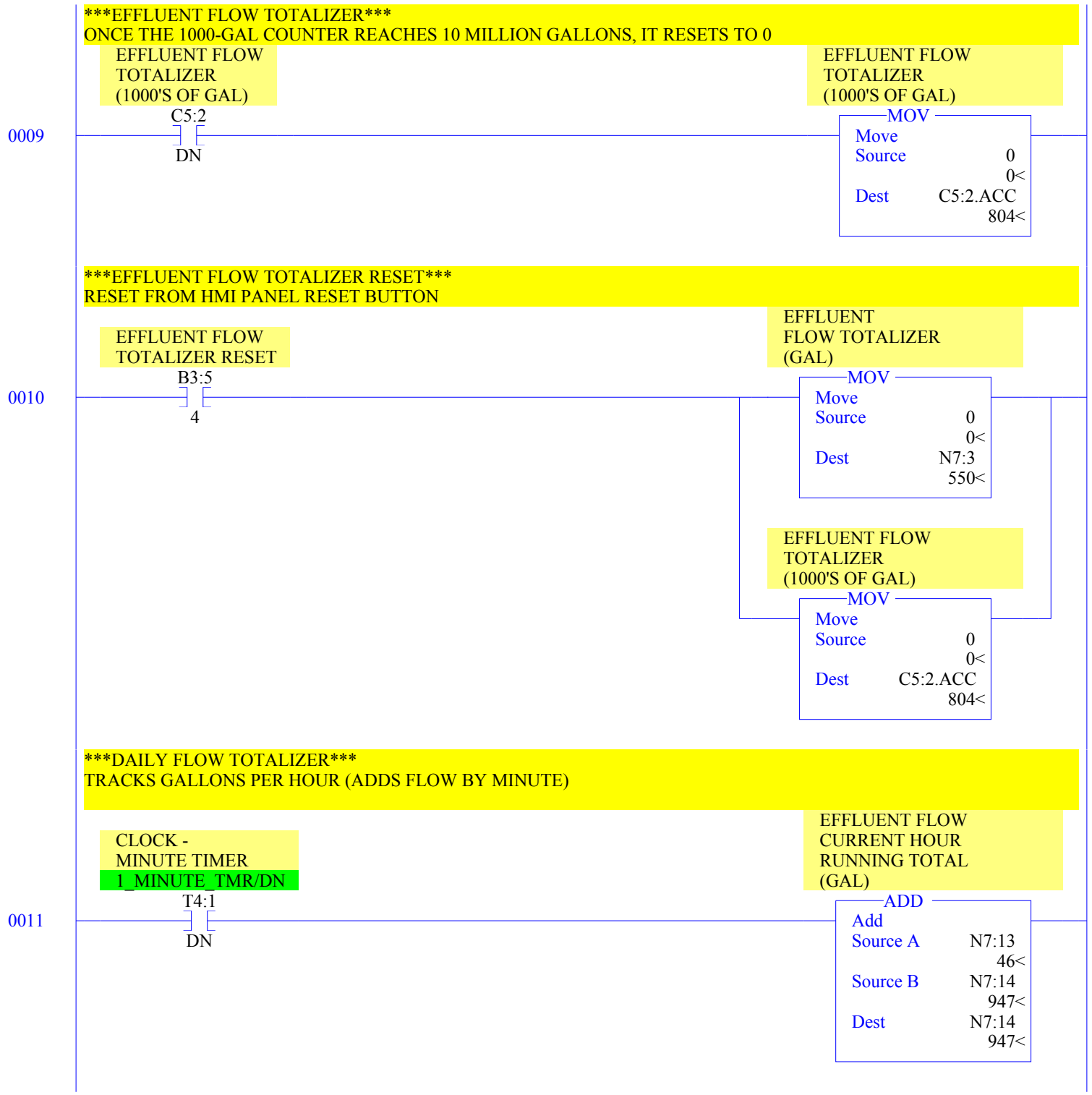
GEQ
Grtr Than or Eql (A>=B)
Source A N7:3 550<
Source B 1000 1000<

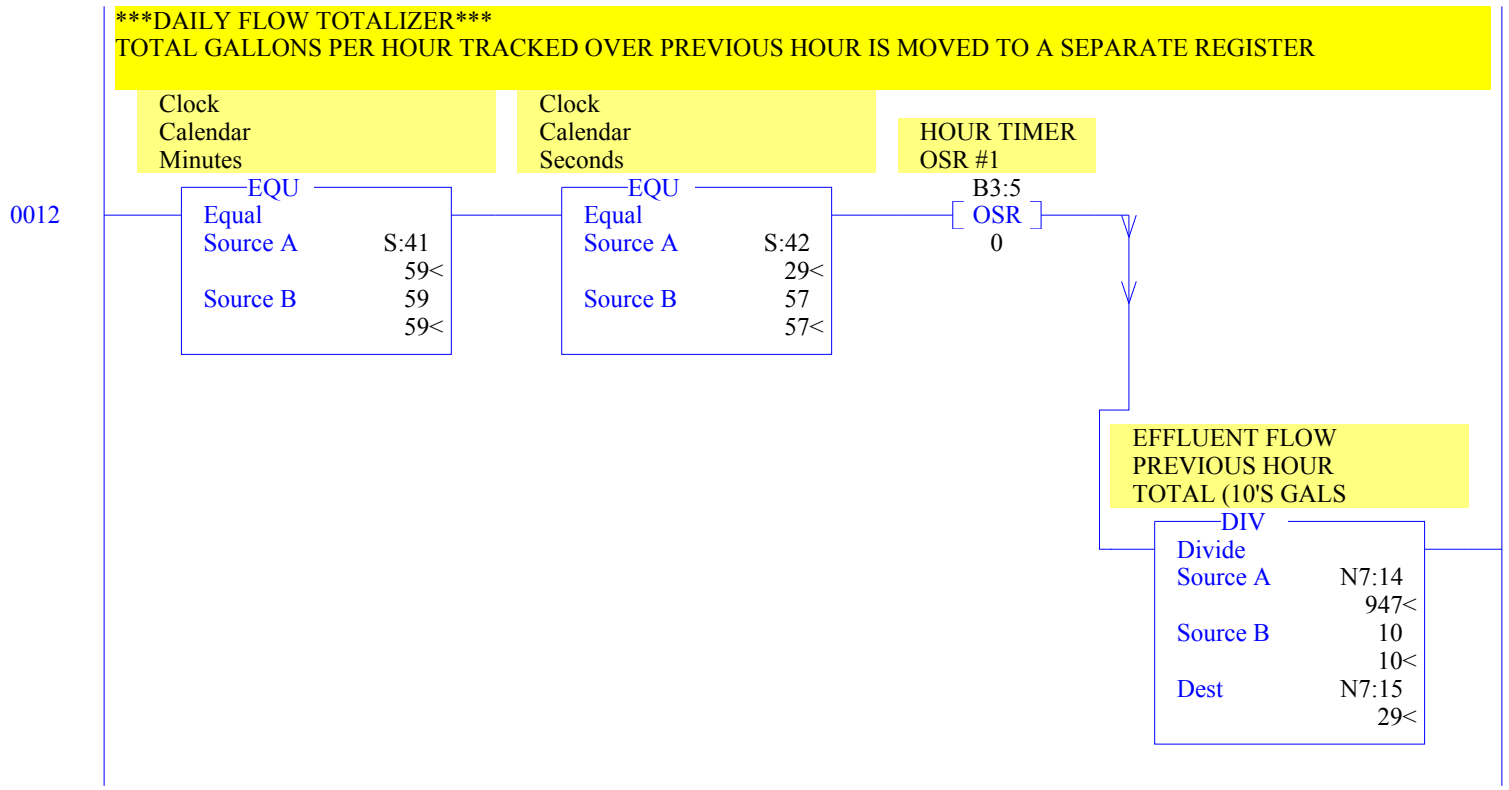
EFFLUENT FLOW TOTALIZER (GAL)

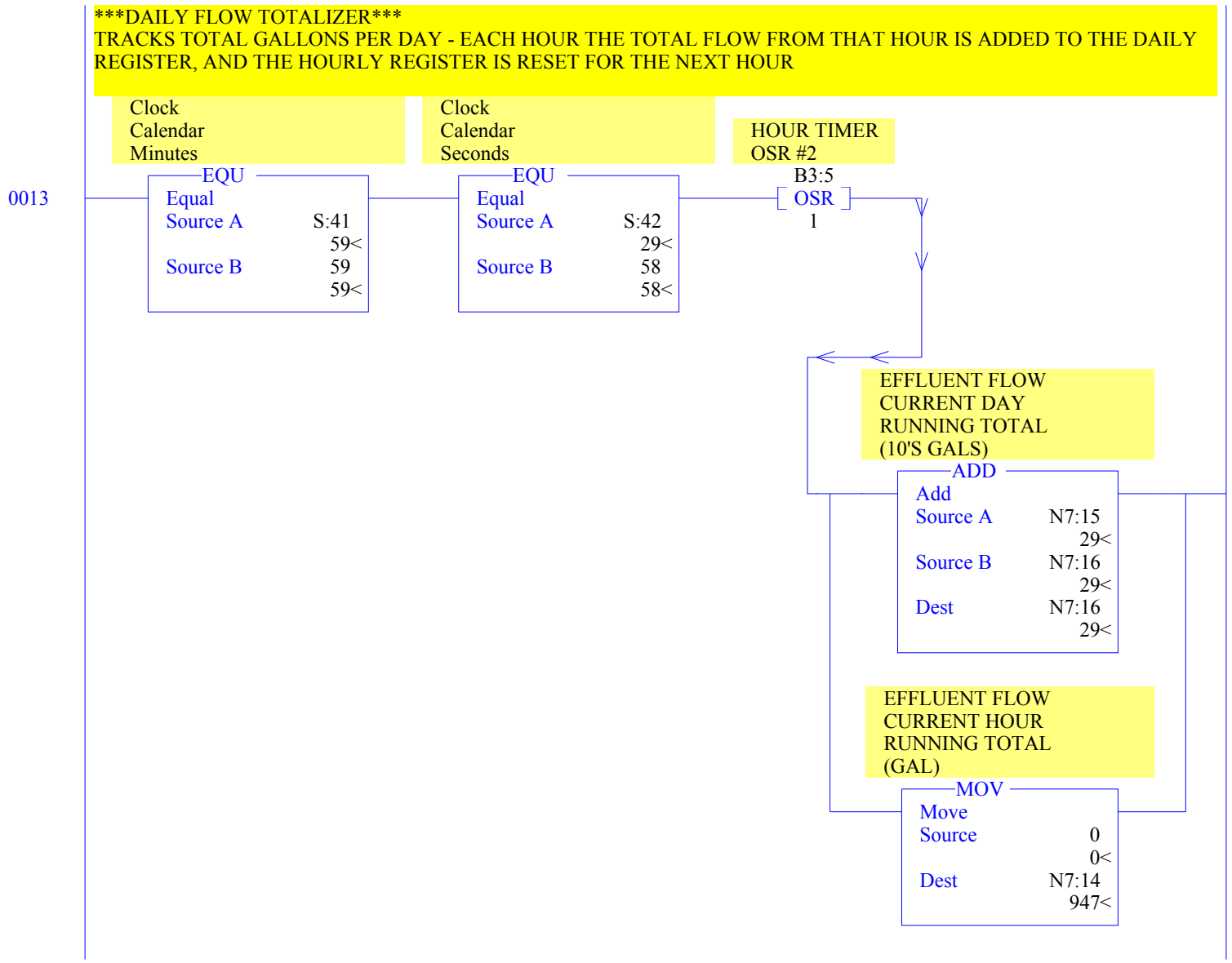
MOV
Move
Source 0 0<
Dest N7:3 550<

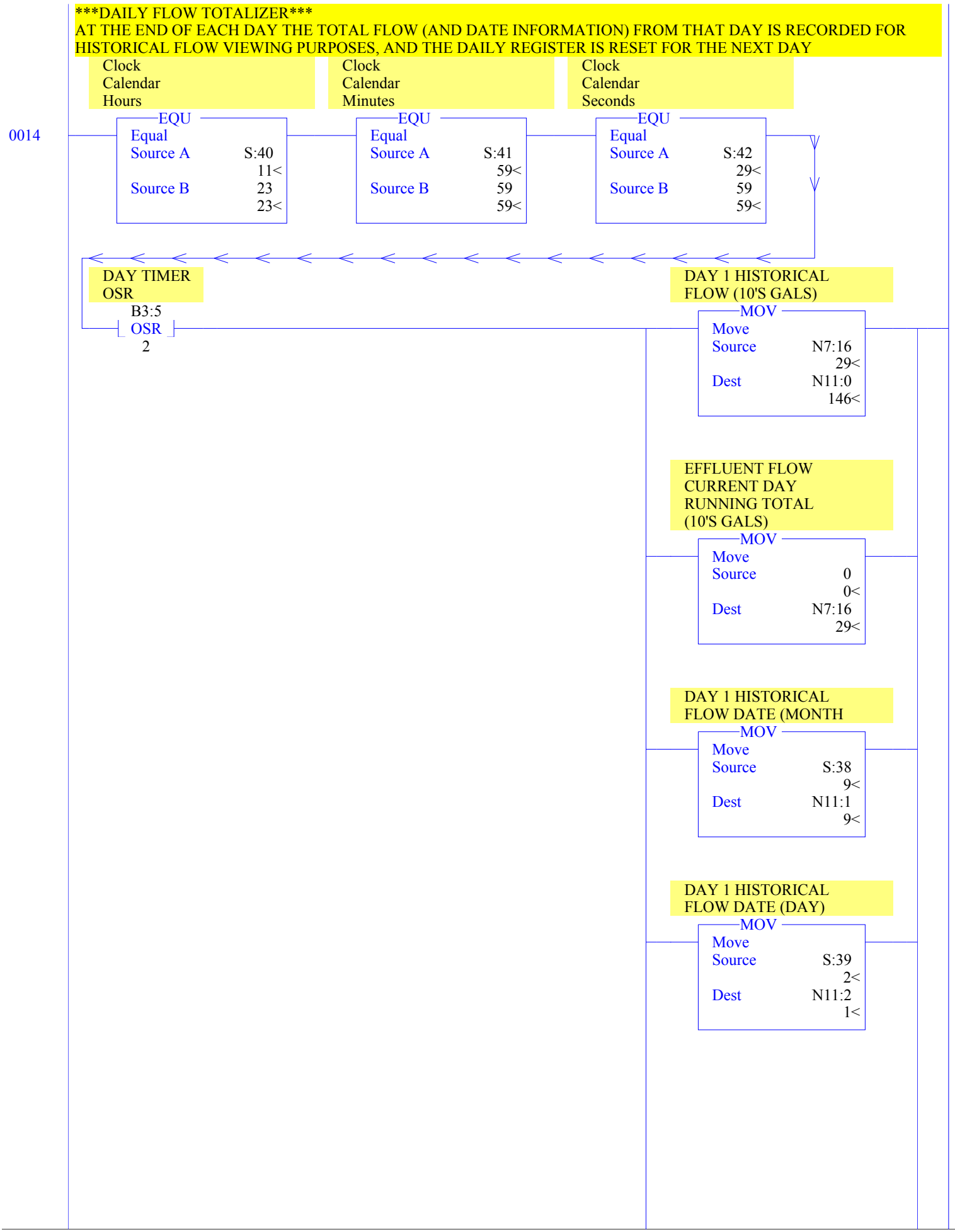
EFFLUENT FLOW TOTALIZER (1000'S OF GAL)

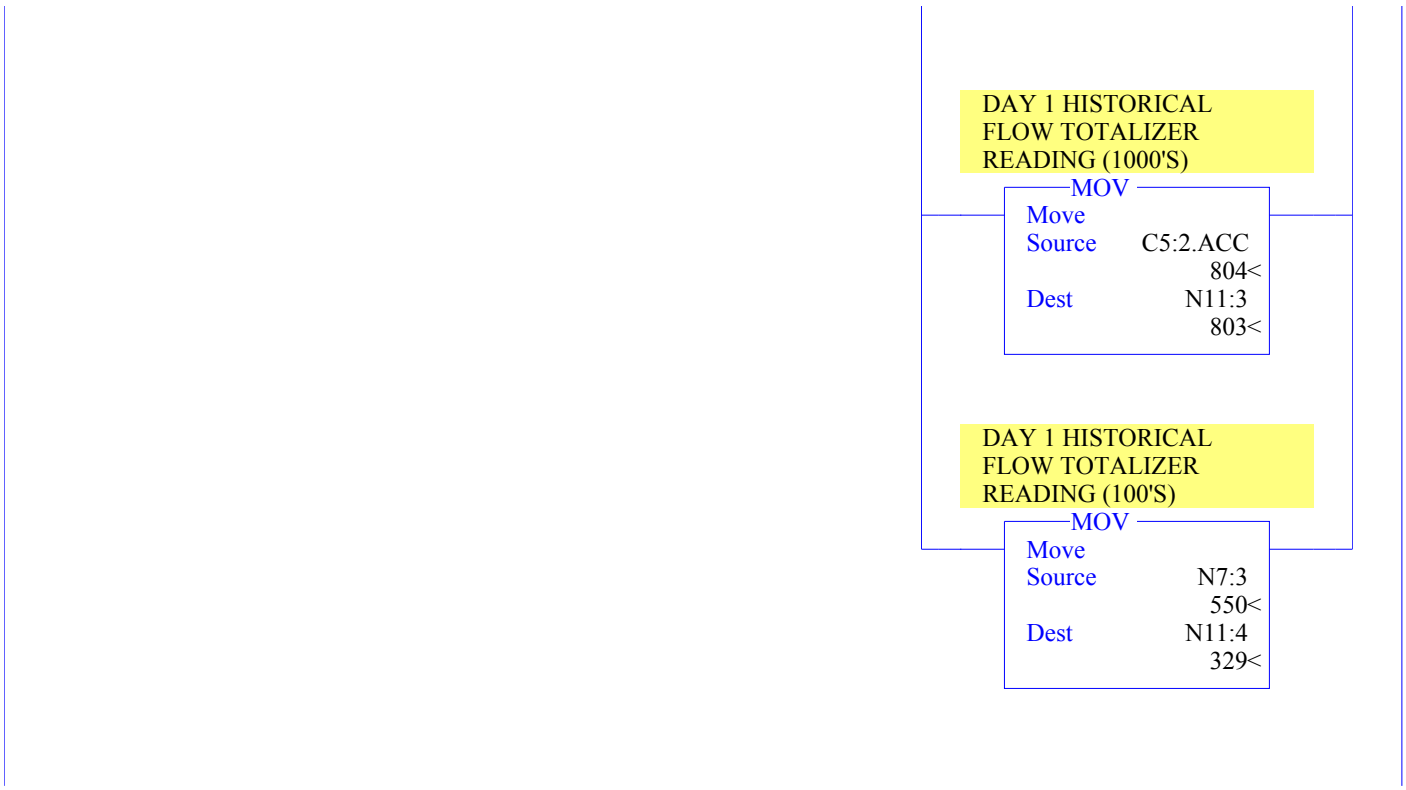
CTU
Count Up
Counter C5:2
Preset 10000<
Accum 804<
CU
DN

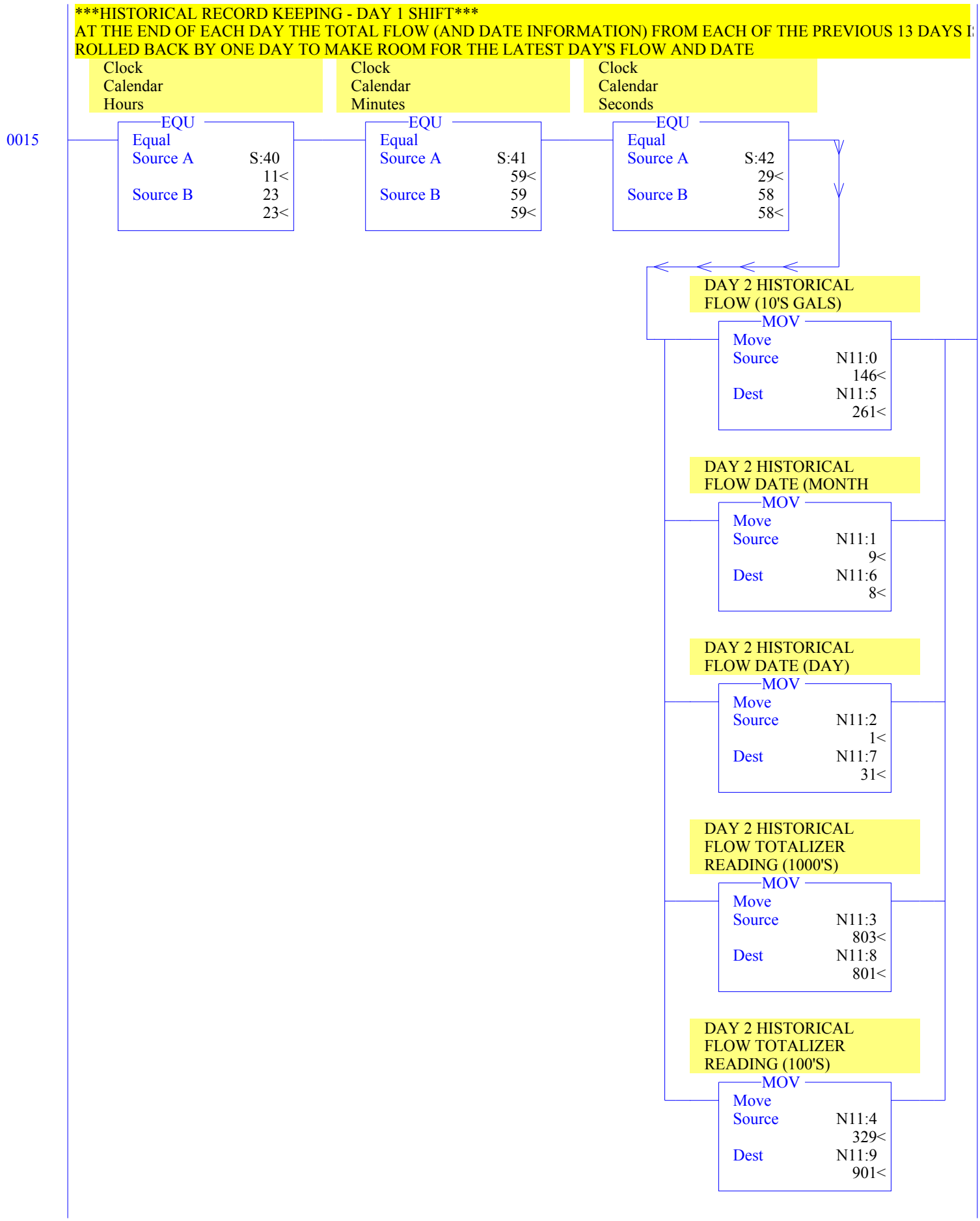

EFFLUENT FLOW TOTALIZER
ONCE THE 1000-GAL COUNTER REACHES 10 MILLION GALLONS, IT RESETS TO 0
EFFLUENT FLOW TOTALIZER (1000'S OF GAL)
C5:2
DN
0009
EFFLUENT FLOW TOTALIZER (1000'S OF GAL)
MOV
Move
Source 0
0<
Dest C5:2.ACC
804<
EFFLUENT FLOW TOTALIZER RESET
RESET FROM HMI PANEL RESET BUTTON
EFFLUENT FLOW TOTALIZER RESET
B3:5
4
0010
EFFLUENT FLOW TOTALIZER (GAL)
MOV
Move
Source 0
0<
Dest N7:3
550<
EFFLUENT FLOW TOTALIZER (1000'S OF GAL)
MOV
Move
Source 0
0<
Dest C5:2.ACC
804<
DAILY FLOW TOTALIZER
TRACKS GALLONS PER HOUR (ADDS FLOW BY MINUTE)
CLOCK - MINUTE TIMER
1_MINUTE_TMR/DN
T4:1
DN
0011
EFFLUENT FLOW CURRENT HOUR RUNNING TOTAL (GAL)
ADD
Add
Source A N7:13
46<
Source B N7:14
947<
Dest N7:14
947<

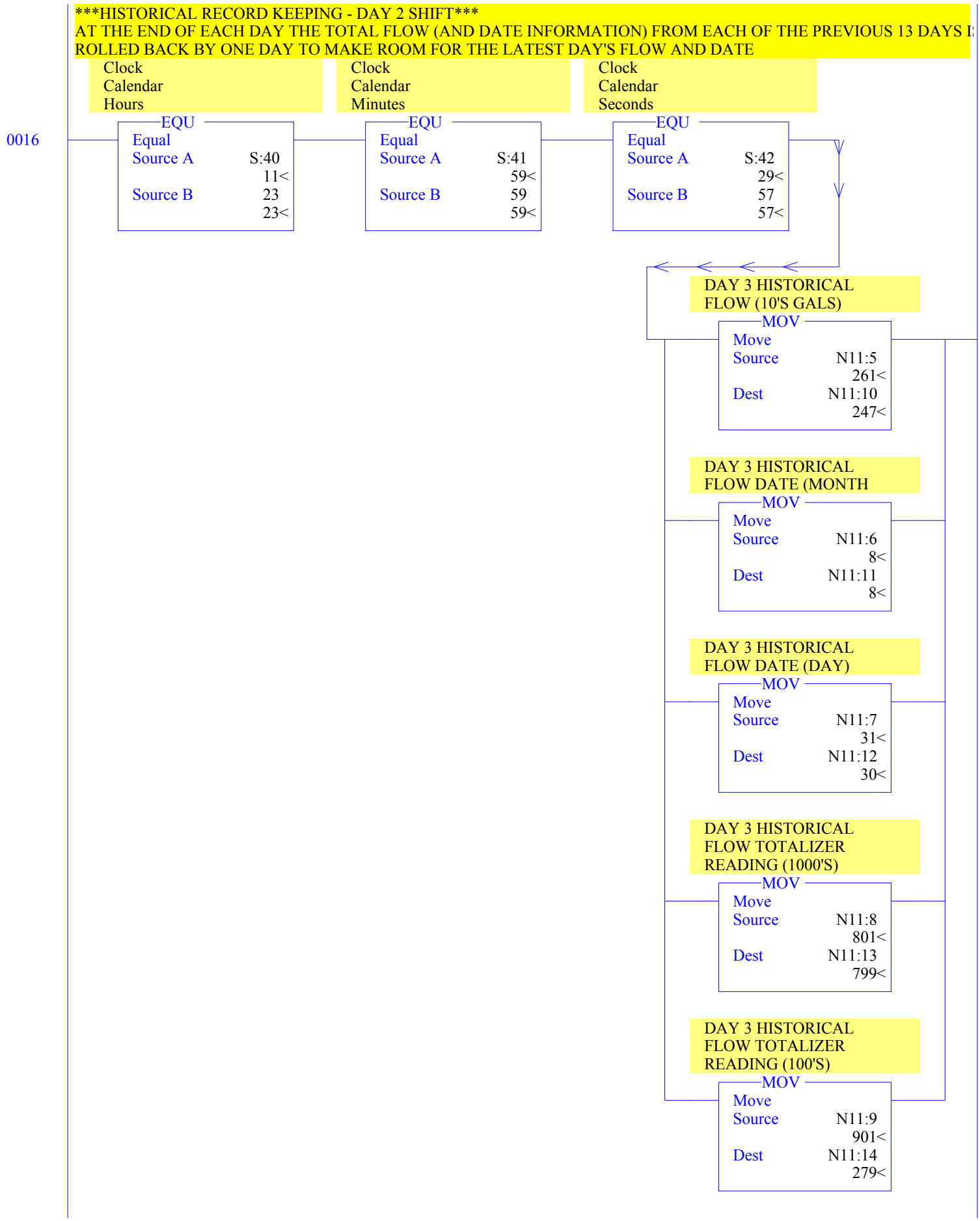

DAILY FLOW TOTALIZER
TOTAL GALLONS PER HOUR TRACKED OVER PREVIOUS HOUR IS MOVED TO A SEPARATE REGISTER
0012
Clock
Calendar
Minutes
EQU
Equal
Source A S:41
59<
Source B 59
59<
Clock
Calendar
Seconds
EQU
Equal
Source A S:42
29<
Source B 57
57<
HOUR TIMER
OSR #1
B3:5
OSR
0
EFFLUENT FLOW
PREVIOUS HOUR
TOTAL (10'S GALS
DIV
Divide
Source A N7:14
947<
Source B 10
10<
Dest N7:15
29<

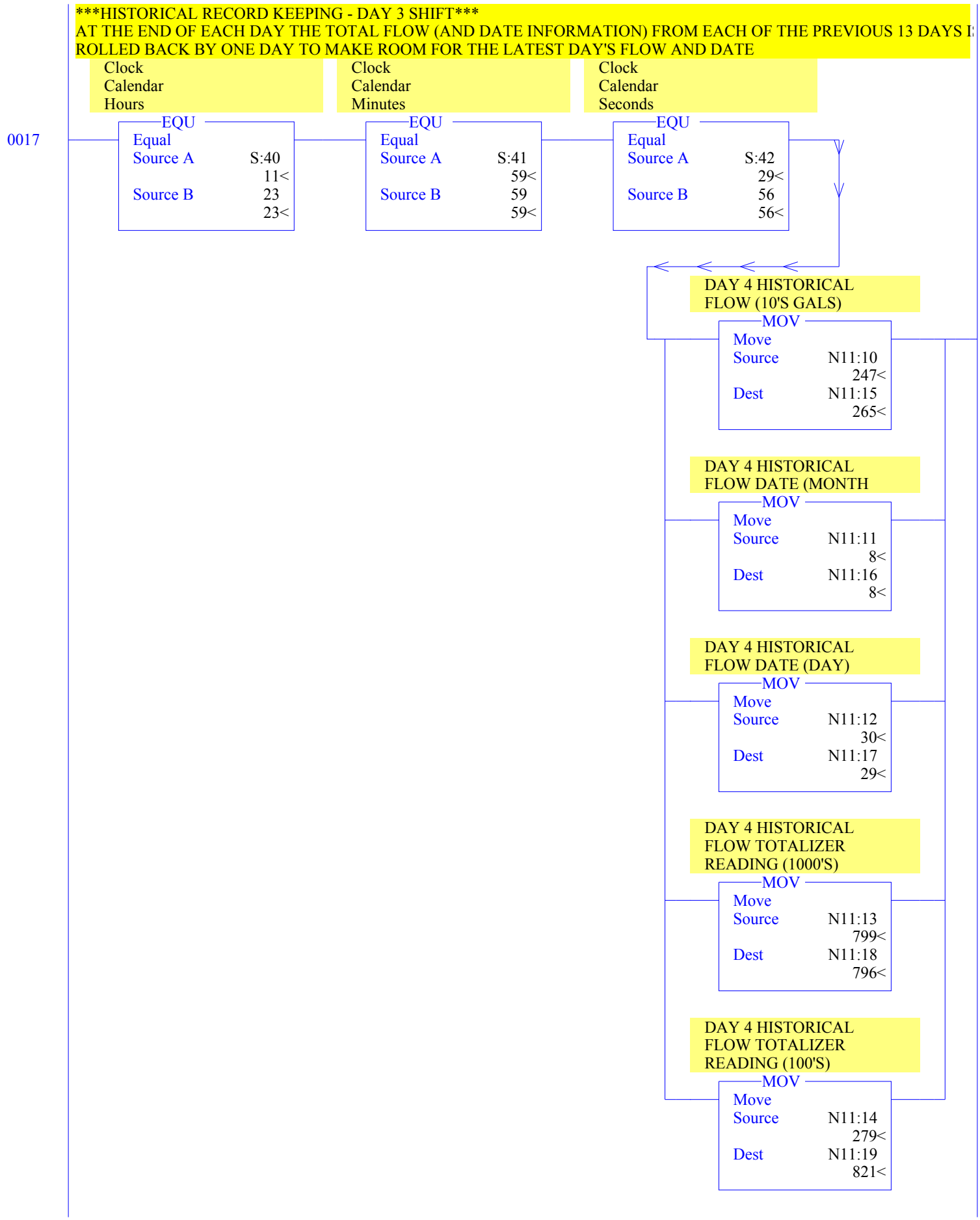

DAILY FLOW TOTALIZER
TRACKS TOTAL GALLONS PER DAY - EACH HOUR THE TOTAL FLOW FROM THAT HOUR IS ADDED TO THE DAILY REGISTER, AND THE HOURLY REGISTER IS RESET FOR THE NEXT HOUR
Clock Calendar Minutes
Clock Calendar Seconds
HOUR TIMER OSR #2
0013
EQU
Equal
Source A S:41 59< 59
Source B 59 59<
EQU
Equal
Source A S:42 29< 58
Source B 58 58<
B3:5
OSR
1
EFFLUENT FLOW CURRENT DAY RUNNING TOTAL (10'S GALS)
ADD
Add
Source A N7:15 29< 29
Source B N7:16 29< 29
Dest N7:16 29< 29
EFFLUENT FLOW CURRENT HOUR RUNNING TOTAL (GAL)
MOV
Move
Source 0 0< 0
Dest N7:14 947< 947

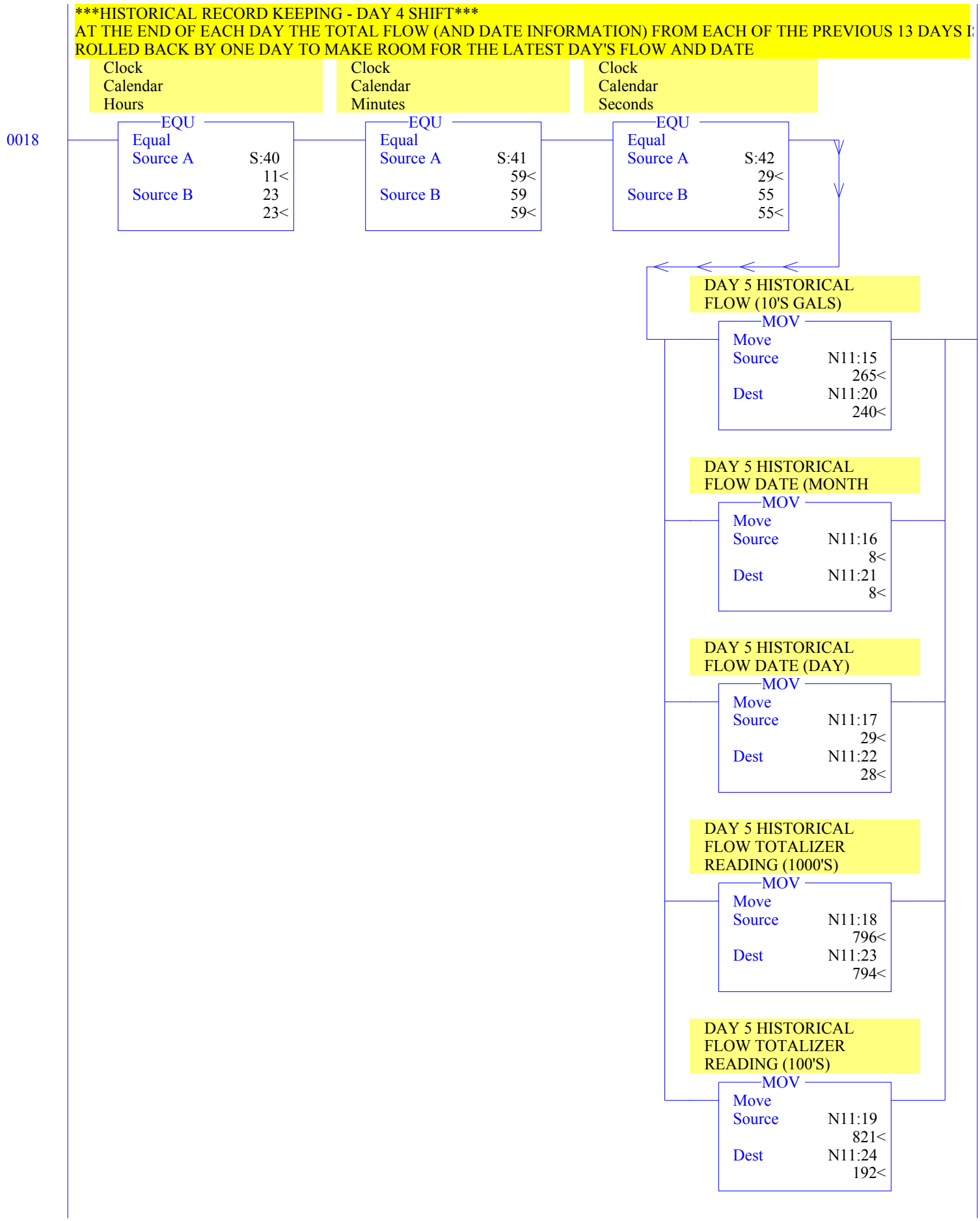

DAILY FLOW TOTALIZER
AT THE END OF EACH DAY THE TOTAL FLOW (AND DATE INFORMATION) FROM THAT DAY IS RECORDED FOR HISTORICAL FLOW VIEWING PURPOSES, AND THE DAILY REGISTER IS RESET FOR THE NEXT DAY
Clock Calendar Hours
Clock Calendar Minutes
Clock Calendar Seconds
0014
EQU Equal Source A S:40 11< Source B 23 23<
EQU Equal Source A S:41 59< Source B 59 59<
EQU Equal Source A S:42 29< Source B 59 59<
DAY TIMER OSR
B3:5
OSR
2
DAY 1 HISTORICAL FLOW (10'S GALS)
MOV Move Source N7:16 29< Dest N11:0 146<
EFFLUENT FLOW CURRENT DAY RUNNING TOTAL (10'S GALS)
MOV Move Source 0 0< Dest N7:16 29<
DAY 1 HISTORICAL FLOW DATE (MONTH
MOV Move Source S:38 9< Dest N11:1 9<
DAY 1 HISTORICAL FLOW DATE (DAY)
MOV Move Source S:39 2< Dest N11:2 1<

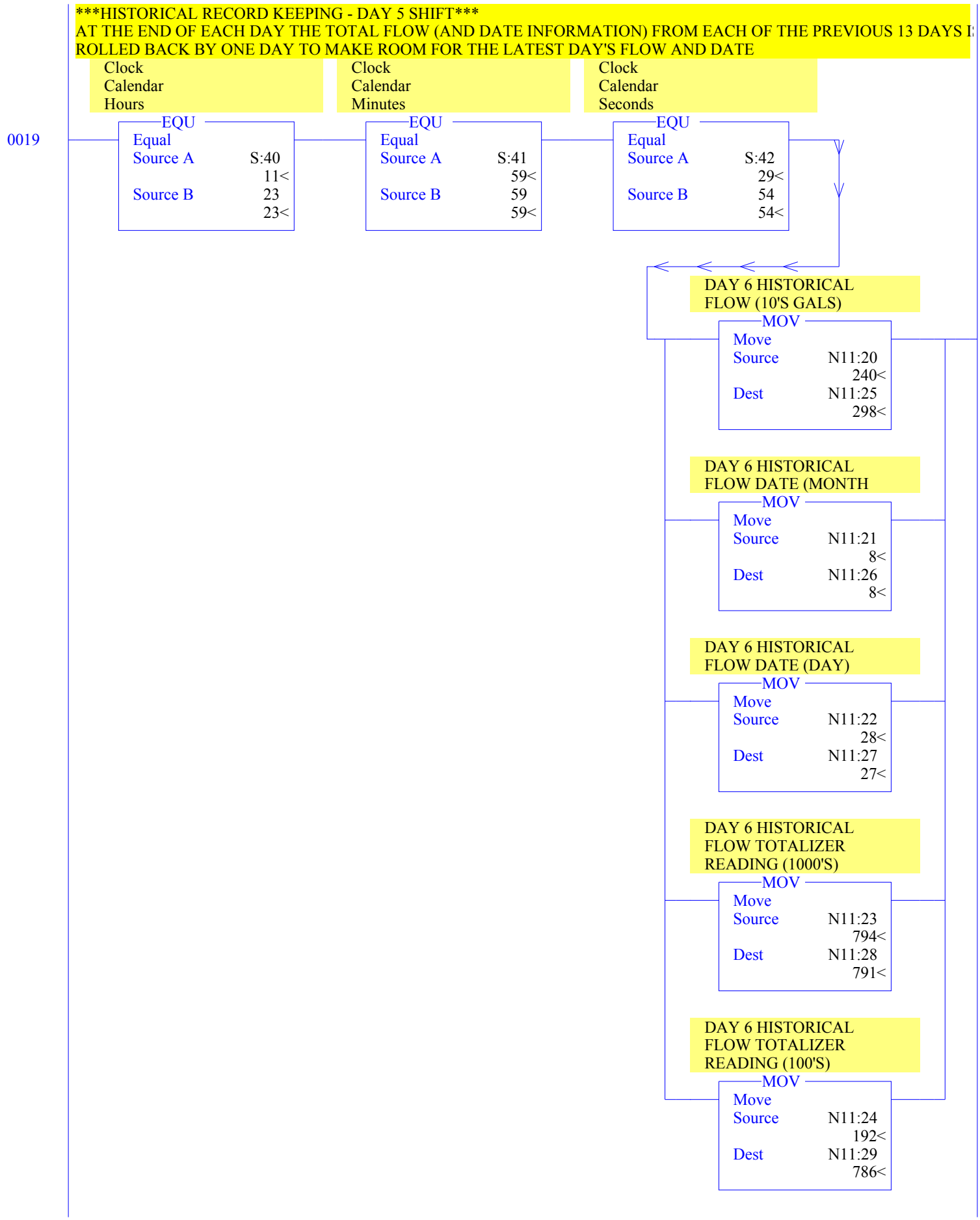

DAY 1 HISTORICAL FLOW TOTALIZER READING (1000'S)
MOV
Move
Source C5:2.ACC 804<
Dest N11:3 803<
DAY 1 HISTORICAL FLOW TOTALIZER READING (100'S)
MOV
Move
Source N7:3 550<
Dest N11:4 329<

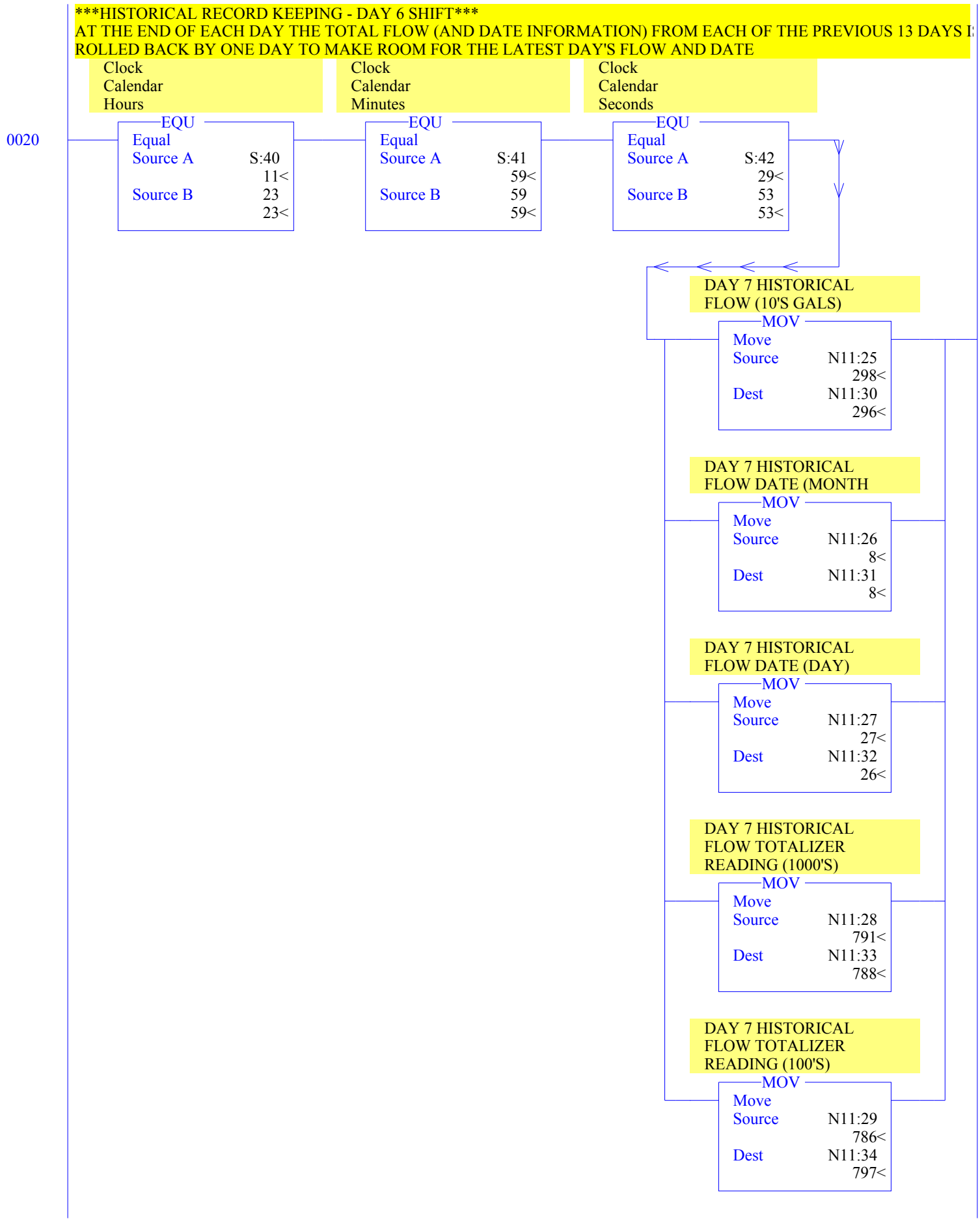

HISTORICAL RECORD KEEPING - DAY 1 SHIFT
AT THE END OF EACH DAY THE TOTAL FLOW (AND DATE INFORMATION) FROM EACH OF THE PREVIOUS 13 DAYS I
ROLLED BACK BY ONE DAY TO MAKE ROOM FOR THE LATEST DAY'S FLOW AND DATE
Clock Calendar Hours
Clock Calendar Minutes
Clock Calendar Seconds
0015
EQU Equal Source A S:40 11< Source B 23 23<
EQU Equal Source A S:41 59< Source B 59 59<
EQU Equal Source A S:42 29< Source B 58 58<
DAY 2 HISTORICAL FLOW (10'S GALS)
MOV Move Source N11:0 146< Dest N11:5 261<
DAY 2 HISTORICAL FLOW DATE (MONTH
MOV Move Source N11:1 9< Dest N11:6 8<
DAY 2 HISTORICAL FLOW DATE (DAY)
MOV Move Source N11:2 1< Dest N11:7 31<
DAY 2 HISTORICAL FLOW TOTALIZER READING (1000'S)
MOV Move Source N11:3 803< Dest N11:8 801<
DAY 2 HISTORICAL FLOW TOTALIZER READING (100'S)
MOV Move Source N11:4 329< Dest N11:9 901<

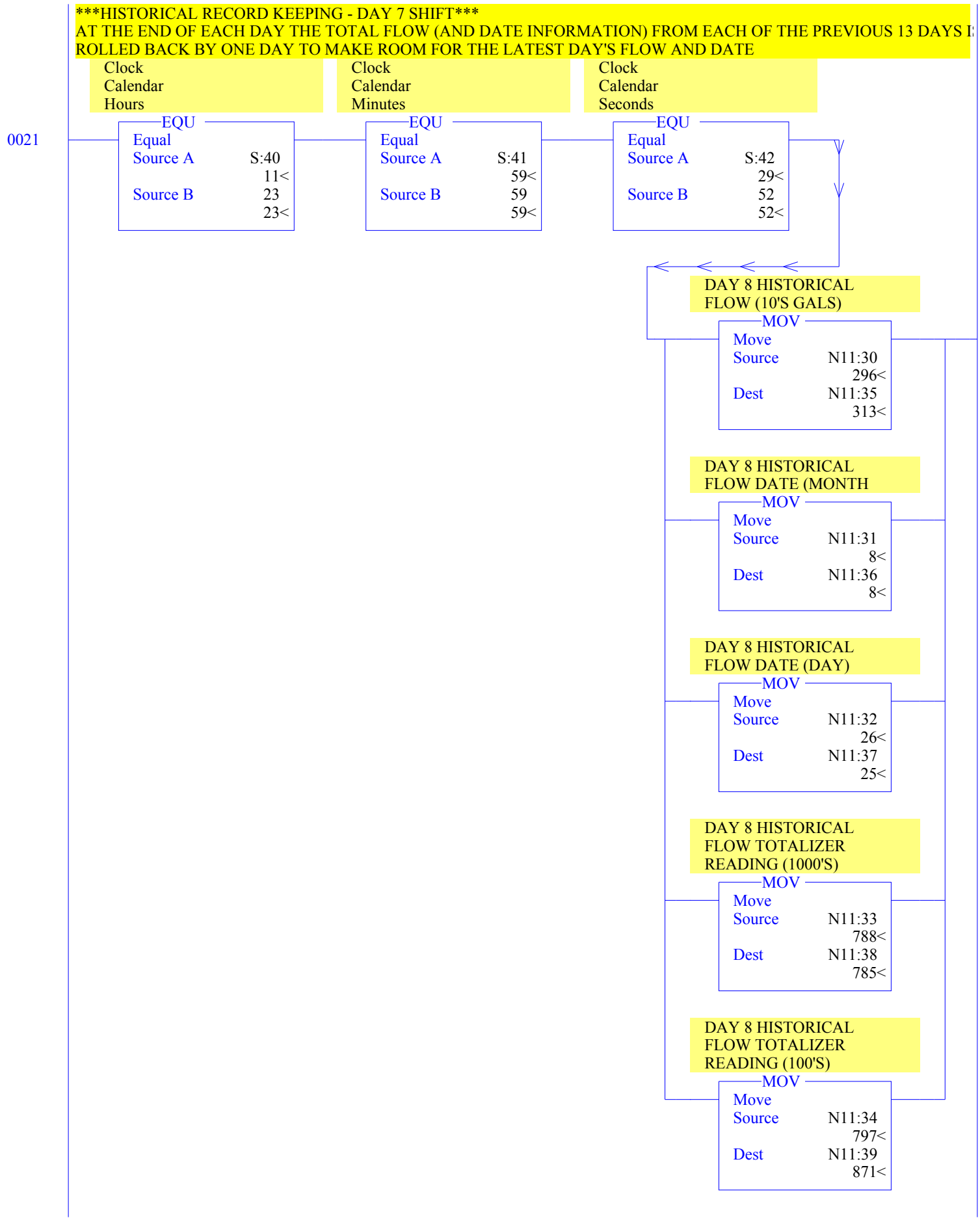

HISTORICAL RECORD KEEPING - DAY 2 SHIFT
AT THE END OF EACH DAY THE TOTAL FLOW (AND DATE INFORMATION) FROM EACH OF THE PREVIOUS 13 DAYS I
ROLLED BACK BY ONE DAY TO MAKE ROOM FOR THE LATEST DAY'S FLOW AND DATE
Clock Calendar Hours
Clock Calendar Minutes
Clock Calendar Seconds
0016
EQU Equal Source A S:40 11< Source B 23 23<
EQU Equal Source A S:41 59< Source B 59 59<
EQU Equal Source A S:42 29< Source B 57 57<
DAY 3 HISTORICAL FLOW (10'S GALS)
MOV Move Source N11:5 261< Dest N11:10 247<
DAY 3 HISTORICAL FLOW DATE (MONTH
MOV Move Source N11:6 8< Dest N11:11 8<
DAY 3 HISTORICAL FLOW DATE (DAY)
MOV Move Source N11:7 31< Dest N11:12 30<
DAY 3 HISTORICAL FLOW TOTALIZER READING (1000'S)
MOV Move Source N11:8 801< Dest N11:13 799<
DAY 3 HISTORICAL FLOW TOTALIZER READING (100'S)
MOV Move Source N11:9 901< Dest N11:14 279<

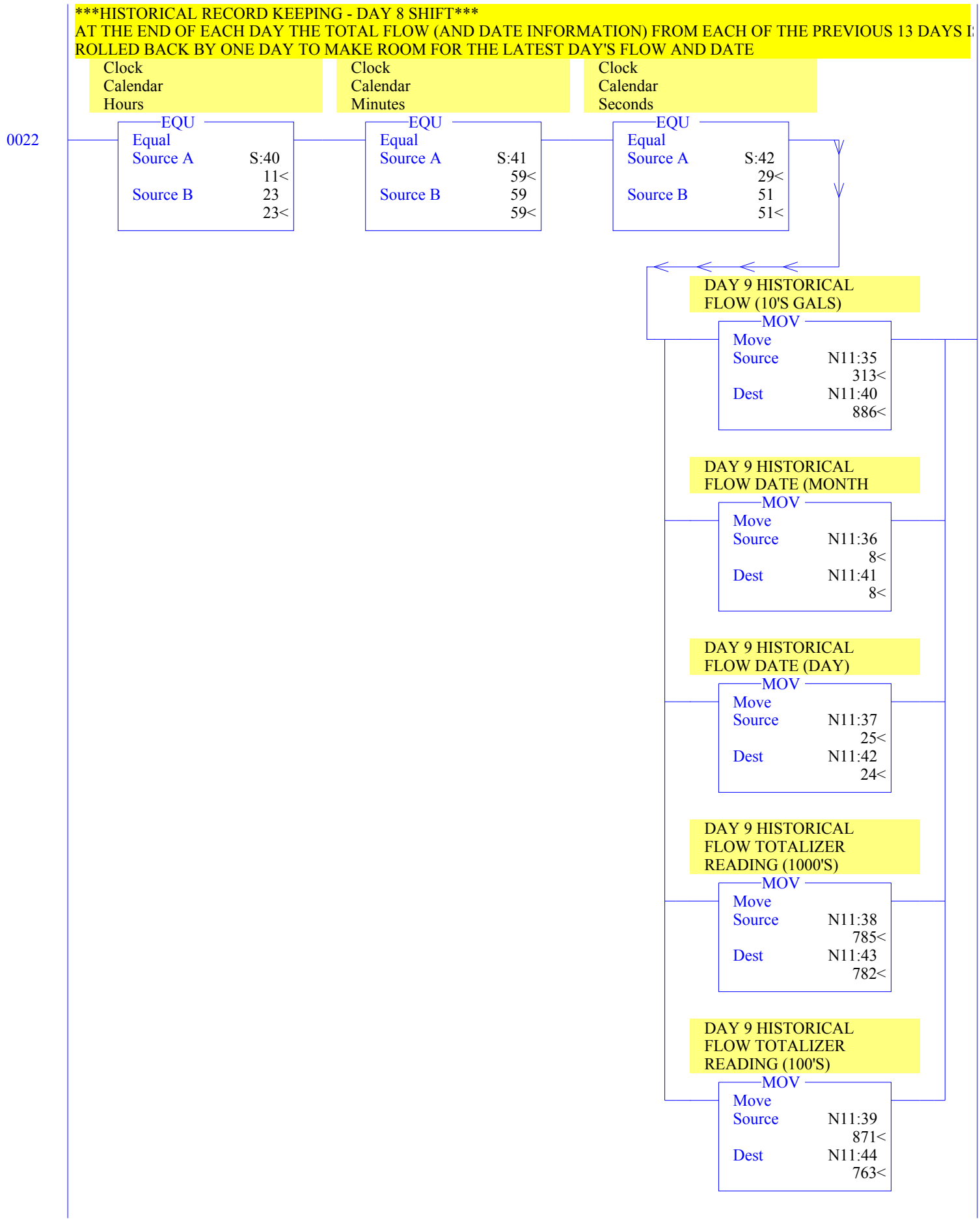

HISTORICAL RECORD KEEPING - DAY 3 SHIFT
AT THE END OF EACH DAY THE TOTAL FLOW (AND DATE INFORMATION) FROM EACH OF THE PREVIOUS 13 DAYS I
ROLLED BACK BY ONE DAY TO MAKE ROOM FOR THE LATEST DAY'S FLOW AND DATE
Clock Calendar Hours
Clock Calendar Minutes
Clock Calendar Seconds
0017
EQU Equal Source A S:40 11< Source B 23 23<
EQU Equal Source A S:41 59< Source B 59 59<
EQU Equal Source A S:42 29< Source B 56 56<
DAY 4 HISTORICAL FLOW (10'S GALS)
MOV Move Source N11:10 247< Dest N11:15 265<
DAY 4 HISTORICAL FLOW DATE (MONTH
MOV Move Source N11:11 8< Dest N11:16 8<
DAY 4 HISTORICAL FLOW DATE (DAY)
MOV Move Source N11:12 30< Dest N11:17 29<
DAY 4 HISTORICAL FLOW TOTALIZER READING (1000'S)
MOV Move Source N11:13 799< Dest N11:18 796<
DAY 4 HISTORICAL FLOW TOTALIZER READING (100'S)
MOV Move Source N11:14 279< Dest N11:19 821<

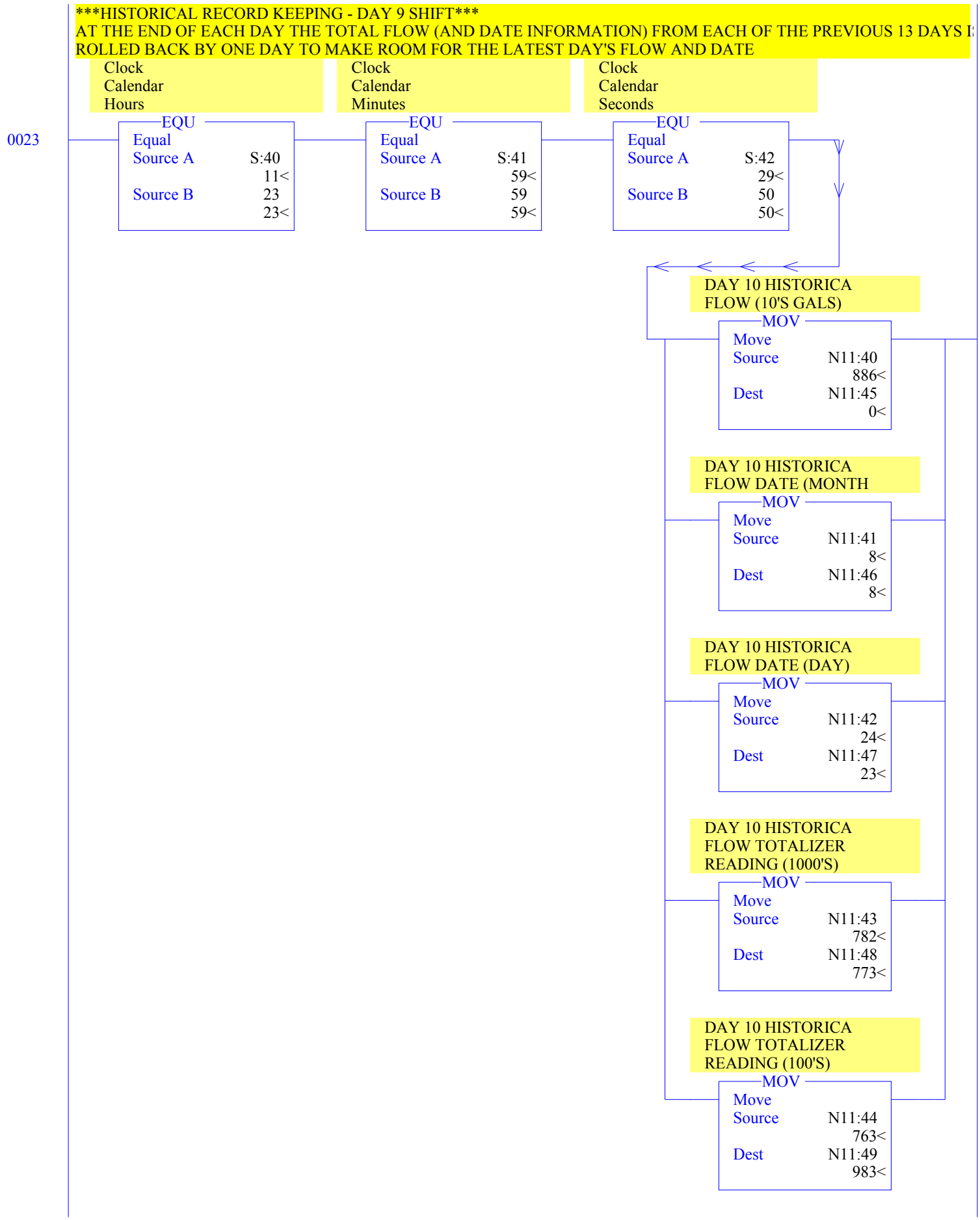

HISTORICAL RECORD KEEPING - DAY 4 SHIFT
AT THE END OF EACH DAY THE TOTAL FLOW (AND DATE INFORMATION) FROM EACH OF THE PREVIOUS 13 DAYS I
ROLLED BACK BY ONE DAY TO MAKE ROOM FOR THE LATEST DAY'S FLOW AND DATE
Clock Calendar Hours
Clock Calendar Minutes
Clock Calendar Seconds
0018
EQU Equal Source A S:40 11< Source B 23 23<
EQU Equal Source A S:41 59< Source B 59 59<
EQU Equal Source A S:42 29< Source B 55 55<
DAY 5 HISTORICAL FLOW (10'S GALS)
MOV Move Source N11:15 265< Dest N11:20 240<
DAY 5 HISTORICAL FLOW DATE (MONTH
MOV Move Source N11:16 8< Dest N11:21 8<
DAY 5 HISTORICAL FLOW DATE (DAY)
MOV Move Source N11:17 29< Dest N11:22 28<
DAY 5 HISTORICAL FLOW TOTALIZER READING (1000'S)
MOV Move Source N11:18 796< Dest N11:23 794<
DAY 5 HISTORICAL FLOW TOTALIZER READING (100'S)
MOV Move Source N11:19 821< Dest N11:24 192<

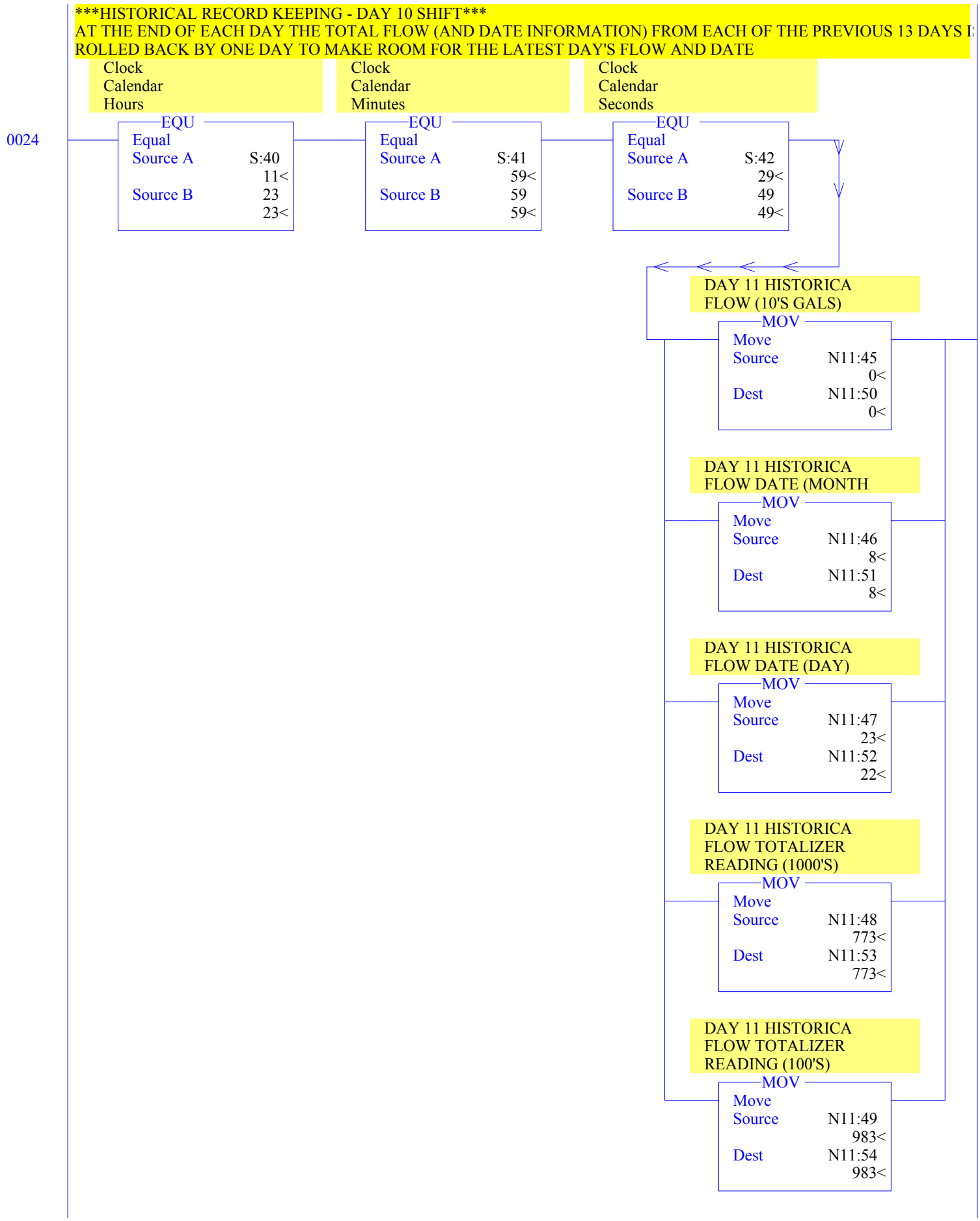

HISTORICAL RECORD KEEPING - DAY 5 SHIFT
AT THE END OF EACH DAY THE TOTAL FLOW (AND DATE INFORMATION) FROM EACH OF THE PREVIOUS 13 DAYS I
ROLLED BACK BY ONE DAY TO MAKE ROOM FOR THE LATEST DAY'S FLOW AND DATE
Clock Calendar Hours
Clock Calendar Minutes
Clock Calendar Seconds
0019
EQU Equal Source A S:40 11< Source B 23 23<
EQU Equal Source A S:41 59< Source B 59 59<
EQU Equal Source A S:42 29< Source B 54 54<
DAY 6 HISTORICAL FLOW (10'S GALS)
MOV Move Source N11:20 240< Dest N11:25 298<
DAY 6 HISTORICAL FLOW DATE (MONTH
MOV Move Source N11:21 8< Dest N11:26 8<
DAY 6 HISTORICAL FLOW DATE (DAY)
MOV Move Source N11:22 28< Dest N11:27 27<
DAY 6 HISTORICAL FLOW TOTALIZER READING (1000'S)
MOV Move Source N11:23 794< Dest N11:28 791<
DAY 6 HISTORICAL FLOW TOTALIZER READING (100'S)
MOV Move Source N11:24 192< Dest N11:29 786<

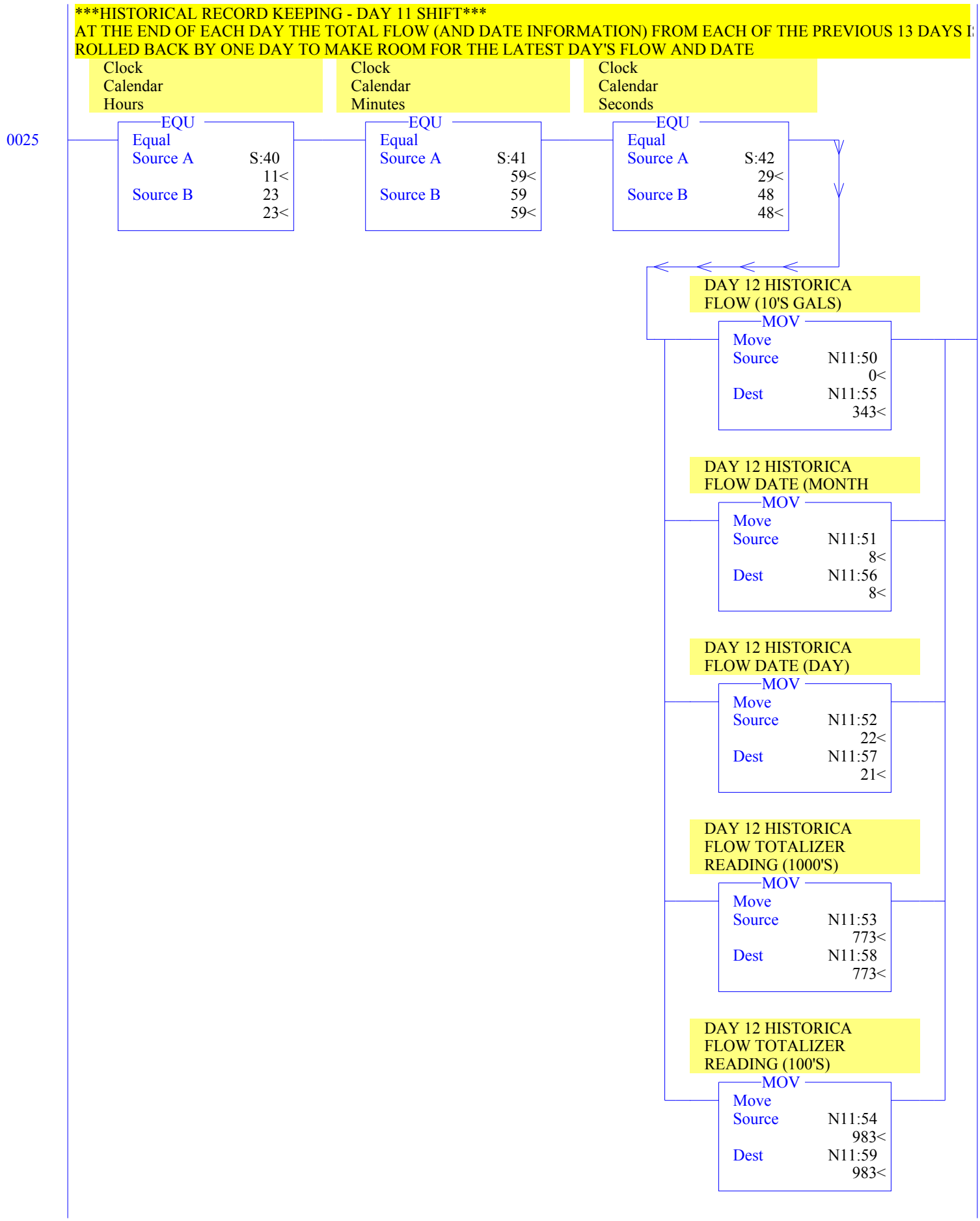

HISTORICAL RECORD KEEPING - DAY 6 SHIFT
AT THE END OF EACH DAY THE TOTAL FLOW (AND DATE INFORMATION) FROM EACH OF THE PREVIOUS 13 DAYS I
ROLLED BACK BY ONE DAY TO MAKE ROOM FOR THE LATEST DAY'S FLOW AND DATE
Clock Calendar Hours
Clock Calendar Minutes
Clock Calendar Seconds
0020
EQU Equal Source A S:40 11< Source B 23 23<
EQU Equal Source A S:41 59< Source B 59 59<
EQU Equal Source A S:42 29< Source B 53 53<
DAY 7 HISTORICAL FLOW (10'S GALS)
MOV Move Source N11:25 298< Dest N11:30 296<
DAY 7 HISTORICAL FLOW DATE (MONTH
MOV Move Source N11:26 8< Dest N11:31 8<
DAY 7 HISTORICAL FLOW DATE (DAY)
MOV Move Source N11:27 27< Dest N11:32 26<
DAY 7 HISTORICAL FLOW TOTALIZER READING (1000'S)
MOV Move Source N11:28 791< Dest N11:33 788<
DAY 7 HISTORICAL FLOW TOTALIZER READING (100'S)
MOV Move Source N11:29 786< Dest N11:34 797<

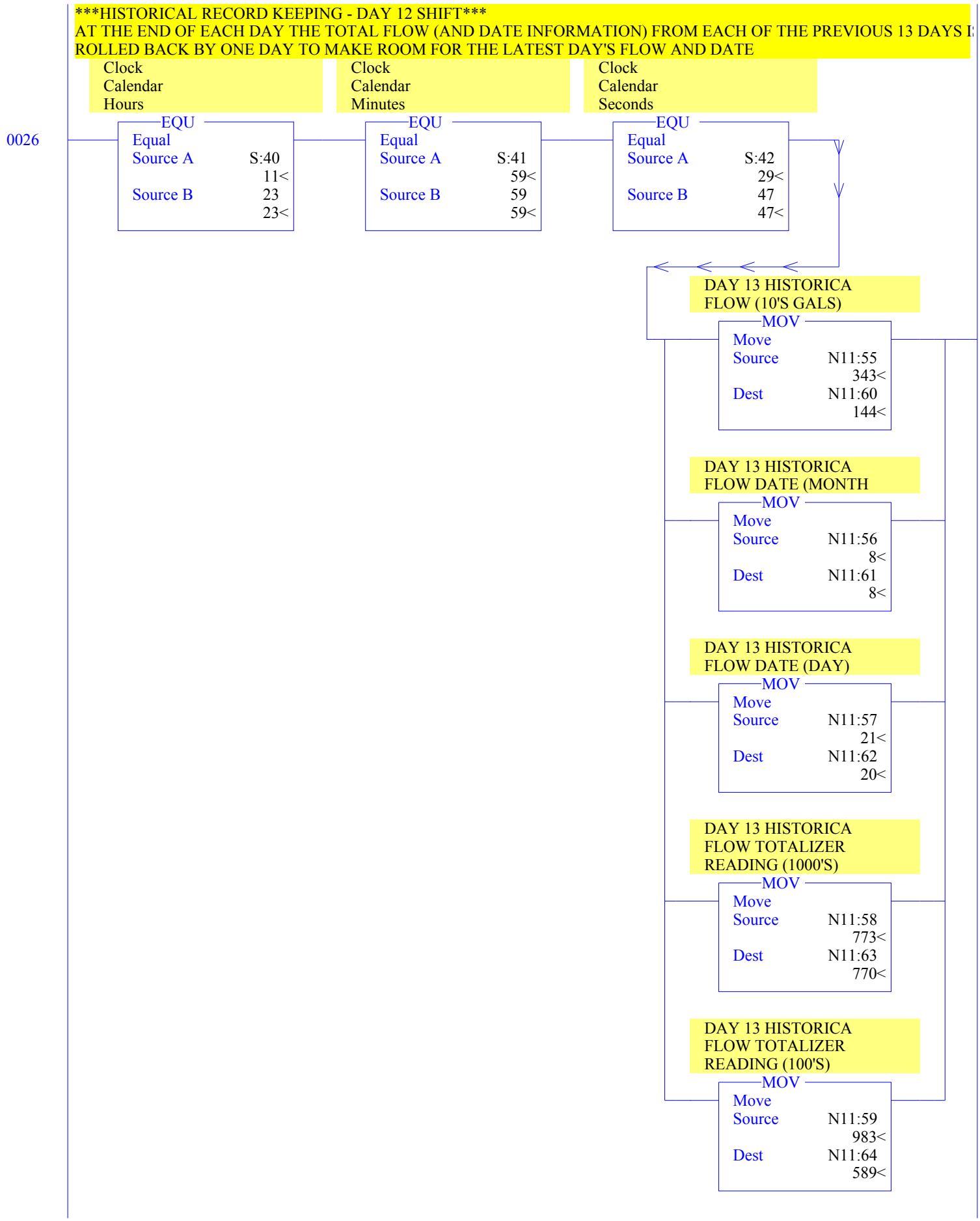

HISTORICAL RECORD KEEPING - DAY 7 SHIFT
AT THE END OF EACH DAY THE TOTAL FLOW (AND DATE INFORMATION) FROM EACH OF THE PREVIOUS 13 DAYS I
ROLLED BACK BY ONE DAY TO MAKE ROOM FOR THE LATEST DAY'S FLOW AND DATE
Clock Calendar Hours
Clock Calendar Minutes
Clock Calendar Seconds
0021
EQU Equal Source A S:40 11< Source B 23 23<
EQU Equal Source A S:41 59< Source B 59 59<
EQU Equal Source A S:42 29< Source B 52 52<
DAY 8 HISTORICAL FLOW (10'S GALS)
MOV Move Source N11:30 296< Dest N11:35 313<
DAY 8 HISTORICAL FLOW DATE (MONTH
MOV Move Source N11:31 8< Dest N11:36 8<
DAY 8 HISTORICAL FLOW DATE (DAY)
MOV Move Source N11:32 26< Dest N11:37 25<
DAY 8 HISTORICAL FLOW TOTALIZER READING (1000'S)
MOV Move Source N11:33 788< Dest N11:38 785<
DAY 8 HISTORICAL FLOW TOTALIZER READING (100'S)
MOV Move Source N11:34 797< Dest N11:39 871<

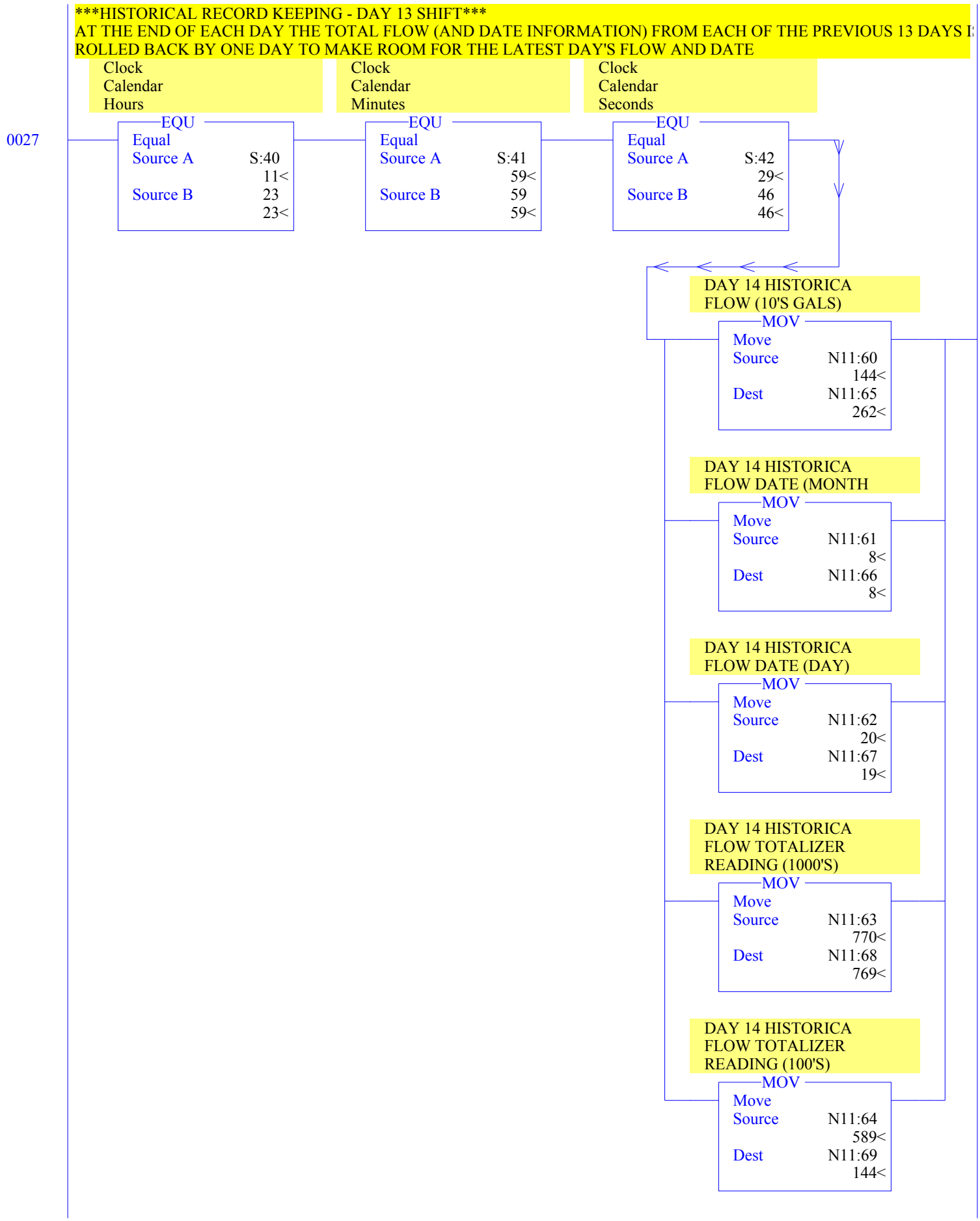

HISTORICAL RECORD KEEPING - DAY 8 SHIFT
AT THE END OF EACH DAY THE TOTAL FLOW (AND DATE INFORMATION) FROM EACH OF THE PREVIOUS 13 DAYS I
ROLLED BACK BY ONE DAY TO MAKE ROOM FOR THE LATEST DAY'S FLOW AND DATE
Clock Calendar Hours
Clock Calendar Minutes
Clock Calendar Seconds
0022
EQU Equal Source A S:40 11< Source B 23 23<
EQU Equal Source A S:41 59< Source B 59 59<
EQU Equal Source A S:42 29< Source B 51 51<
DAY 9 HISTORICAL FLOW (10'S GALS)
MOV Move Source N11:35 313< Dest N11:40 886<
DAY 9 HISTORICAL FLOW DATE (MONTH
MOV Move Source N11:36 8< Dest N11:41 8<
DAY 9 HISTORICAL FLOW DATE (DAY)
MOV Move Source N11:37 25< Dest N11:42 24<
DAY 9 HISTORICAL FLOW TOTALIZER READING (1000'S)
MOV Move Source N11:38 785< Dest N11:43 782<
DAY 9 HISTORICAL FLOW TOTALIZER READING (100'S)
MOV Move Source N11:39 871< Dest N11:44 763<


HISTORICAL RECORD KEEPING - DAY 9 SHIFT
AT THE END OF EACH DAY THE TOTAL FLOW (AND DATE INFORMATION) FROM EACH OF THE PREVIOUS 13 DAYS I
ROLLED BACK BY ONE DAY TO MAKE ROOM FOR THE LATEST DAY'S FLOW AND DATE
Clock Calendar Hours
Clock Calendar Minutes
Clock Calendar Seconds
0023
EQU Equal Source A S:40 11< Source B 23 23<
EQU Equal Source A S:41 59< Source B 59 59<
EQU Equal Source A S:42 29< Source B 50 50<
DAY 10 HISTORICA FLOW (10'S GALS)
MOV Move Source N11:40 886< Dest N11:45 0<
DAY 10 HISTORICA FLOW DATE (MONTH
MOV Move Source N11:41 8< Dest N11:46 8<
DAY 10 HISTORICA FLOW DATE (DAY)
MOV Move Source N11:42 24< Dest N11:47 23<
DAY 10 HISTORICA FLOW TOTALIZER READING (1000'S)
MOV Move Source N11:43 782< Dest N11:48 773<
DAY 10 HISTORICA FLOW TOTALIZER READING (100'S)
MOV Move Source N11:44 763< Dest N11:49 983<

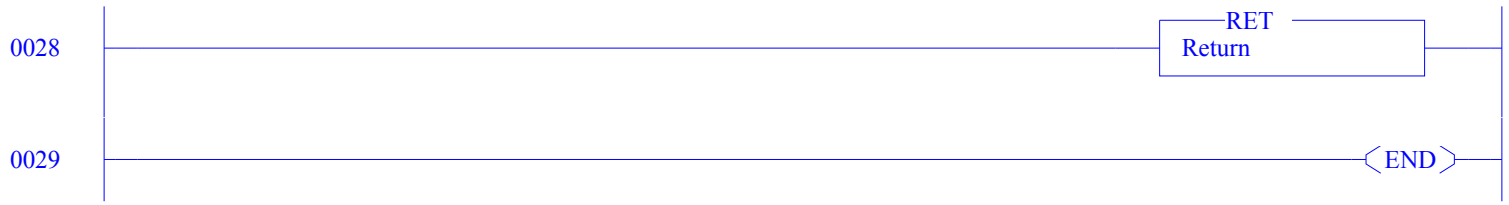

HISTORICAL RECORD KEEPING - DAY 10 SHIFT
AT THE END OF EACH DAY THE TOTAL FLOW (AND DATE INFORMATION) FROM EACH OF THE PREVIOUS 13 DAYS I
ROLLED BACK BY ONE DAY TO MAKE ROOM FOR THE LATEST DAY'S FLOW AND DATE
Clock Calendar Hours
Clock Calendar Minutes
Clock Calendar Seconds
0024
EQU Equal Source A S:40 11< Source B 23 23<
EQU Equal Source A S:41 59< Source B 59 59<
EQU Equal Source A S:42 29< Source B 49 49<
DAY 11 HISTORICA FLOW (10'S GALS)
MOV Move Source N11:45 0< Dest N11:50 0<
DAY 11 HISTORICA FLOW DATE (MONTH
MOV Move Source N11:46 8< Dest N11:51 8<
DAY 11 HISTORICA FLOW DATE (DAY)
MOV Move Source N11:47 23< Dest N11:52 22<
DAY 11 HISTORICA FLOW TOTALIZER READING (1000'S)
MOV Move Source N11:48 773< Dest N11:53 773<
DAY 11 HISTORICA FLOW TOTALIZER READING (100'S)
MOV Move Source N11:49 983< Dest N11:54 983<

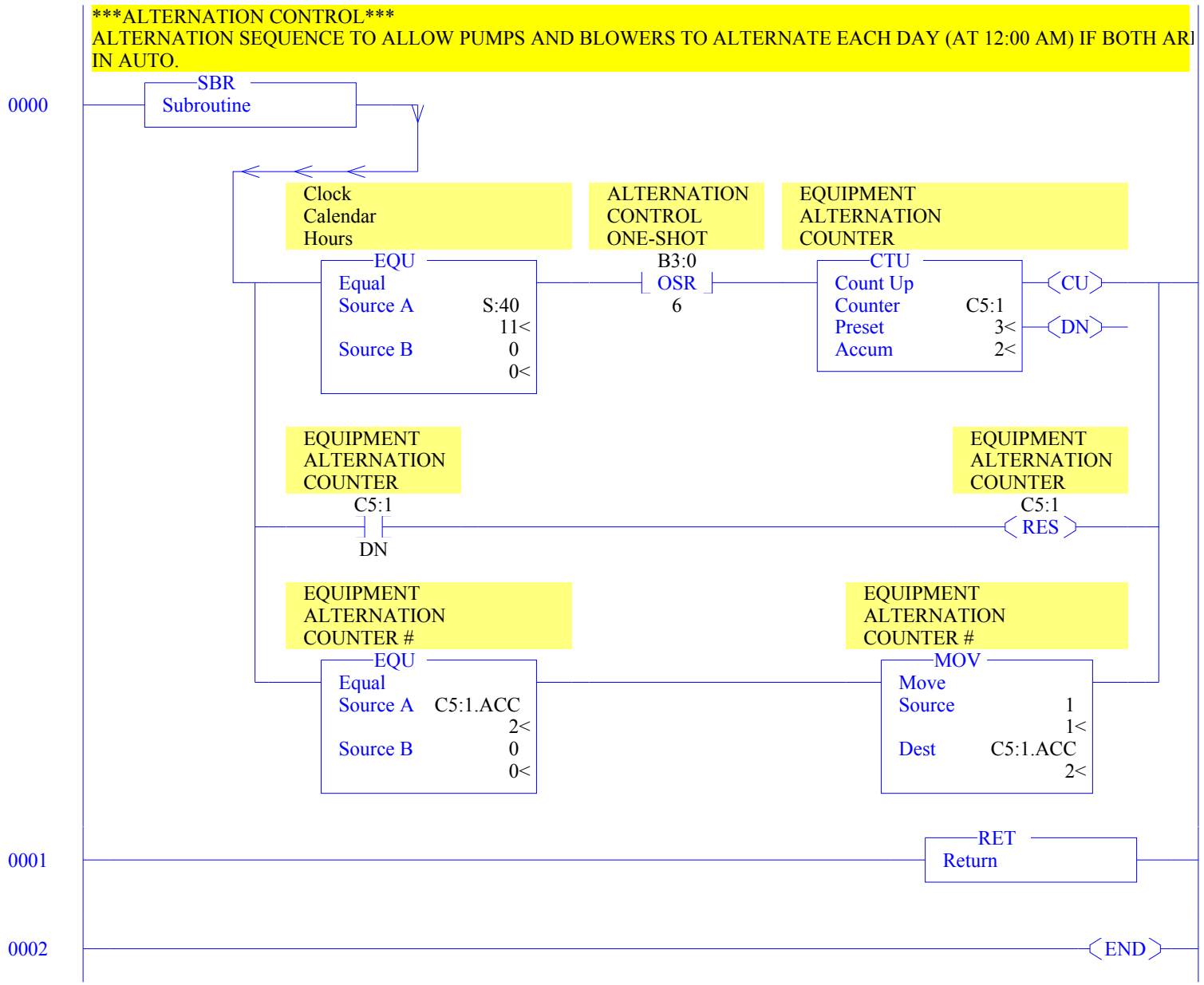

HISTORICAL RECORD KEEPING - DAY 11 SHIFT
AT THE END OF EACH DAY THE TOTAL FLOW (AND DATE INFORMATION) FROM EACH OF THE PREVIOUS 13 DAYS I
ROLLED BACK BY ONE DAY TO MAKE ROOM FOR THE LATEST DAY'S FLOW AND DATE
Clock Calendar Hours
Clock Calendar Minutes
Clock Calendar Seconds
0025
EQU Equal Source A S:40 11< Source B 23 23<
EQU Equal Source A S:41 59< Source B 59 59<
EQU Equal Source A S:42 29< Source B 48 48<
DAY 12 HISTORICA FLOW (10'S GALS)
MOV Move Source N11:50 0< Dest N11:55 343<
DAY 12 HISTORICA FLOW DATE (MONTH
MOV Move Source N11:51 8< Dest N11:56 8<
DAY 12 HISTORICA FLOW DATE (DAY)
MOV Move Source N11:52 22< Dest N11:57 21<
DAY 12 HISTORICA FLOW TOTALIZER READING (1000'S)
MOV Move Source N11:53 773< Dest N11:58 773<
DAY 12 HISTORICA FLOW TOTALIZER READING (100'S)
MOV Move Source N11:54 983< Dest N11:59 983<

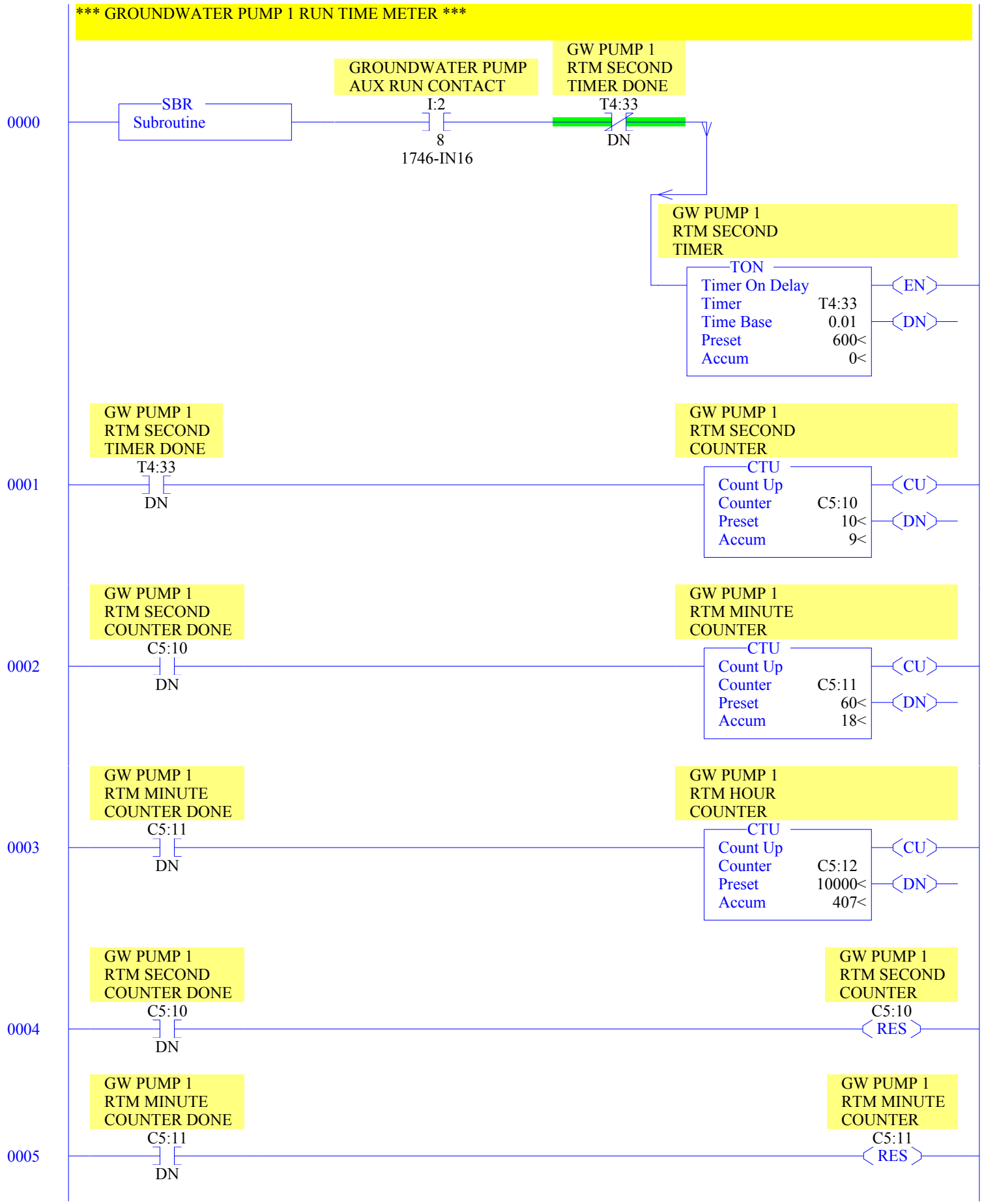

HISTORICAL RECORD KEEPING - DAY 12 SHIFT
AT THE END OF EACH DAY THE TOTAL FLOW (AND DATE INFORMATION) FROM EACH OF THE PREVIOUS 13 DAYS I
ROLLED BACK BY ONE DAY TO MAKE ROOM FOR THE LATEST DAY'S FLOW AND DATE
Clock Calendar Hours
Clock Calendar Minutes
Clock Calendar Seconds
0026
EQU Equal Source A S:40 11< Source B 23 23<
EQU Equal Source A S:41 59< Source B 59 59<
EQU Equal Source A S:42 29< Source B 47 47<
DAY 13 HISTORICA FLOW (10'S GALS)
MOV Move Source N11:55 343< Dest N11:60 144<
DAY 13 HISTORICA FLOW DATE (MONTH
MOV Move Source N11:56 8< Dest N11:61 8<
DAY 13 HISTORICA FLOW DATE (DAY)
MOV Move Source N11:57 21< Dest N11:62 20<
DAY 13 HISTORICA FLOW TOTALIZER READING (1000'S)
MOV Move Source N11:58 773< Dest N11:63 770<
DAY 13 HISTORICA FLOW TOTALIZER READING (100'S)
MOV Move Source N11:59 983< Dest N11:64 589<

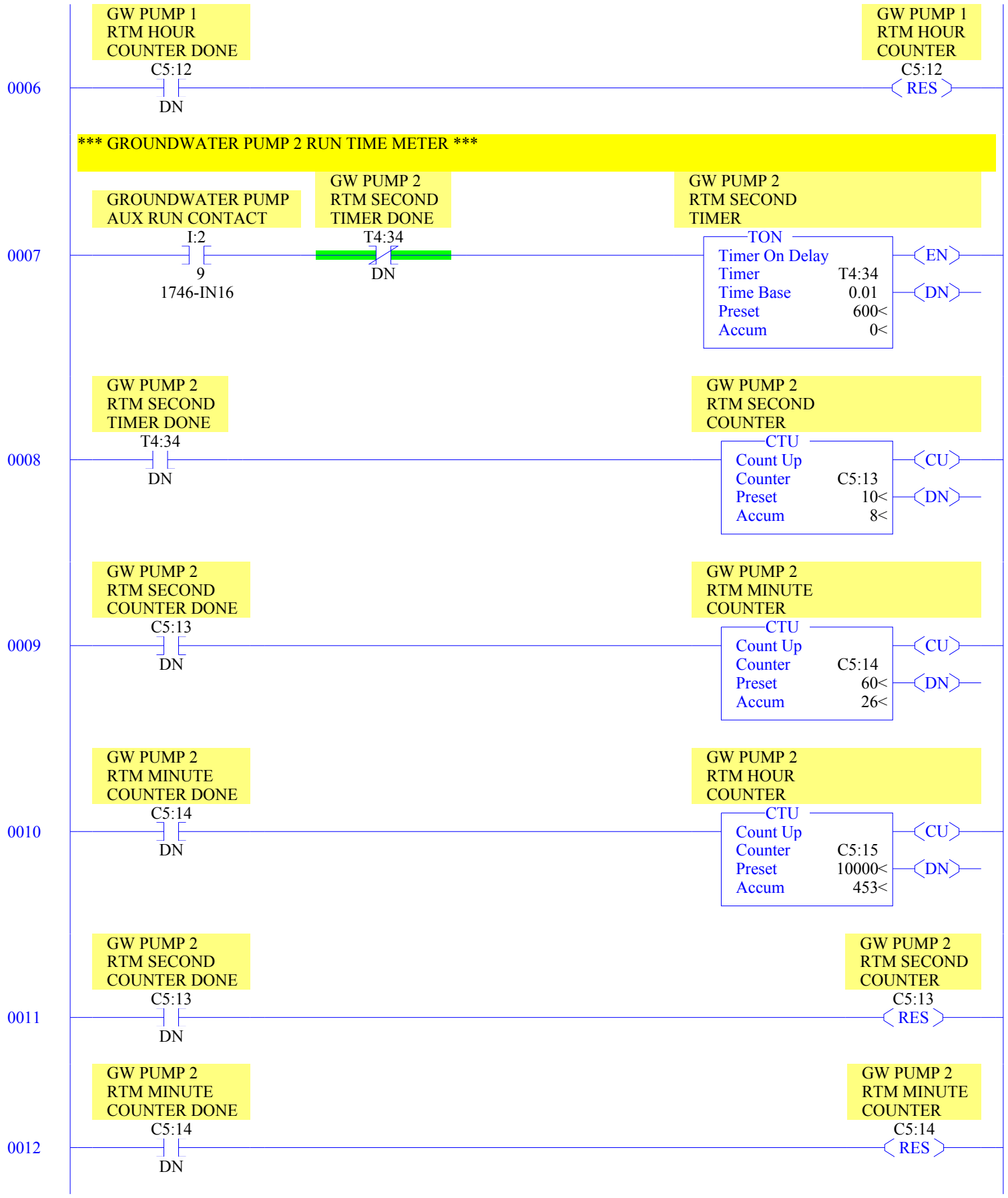

HISTORICAL RECORD KEEPING - DAY 13 SHIFT
AT THE END OF EACH DAY THE TOTAL FLOW (AND DATE INFORMATION) FROM EACH OF THE PREVIOUS 13 DAYS I
ROLLED BACK BY ONE DAY TO MAKE ROOM FOR THE LATEST DAY'S FLOW AND DATE
Clock Calendar Hours
Clock Calendar Minutes
Clock Calendar Seconds
0027
EQU Equal Source A S:40 11< Source B 23 23<
EQU Equal Source A S:41 59< Source B 59 59<
EQU Equal Source A S:42 29< Source B 46 46<
DAY 14 HISTORICA FLOW (10'S GALS)
MOV Move Source N11:60 144< Dest N11:65 262<
DAY 14 HISTORICA FLOW DATE (MONTH
MOV Move Source N11:61 8< Dest N11:66 8<
DAY 14 HISTORICA FLOW DATE (DAY)
MOV Move Source N11:62 20< Dest N11:67 19<
DAY 14 HISTORICA FLOW TOTALIZER READING (1000'S)
MOV Move Source N11:63 770< Dest N11:68 769<
DAY 14 HISTORICA FLOW TOTALIZER READING (100'S)
MOV Move Source N11:64 589< Dest N11:69 144<

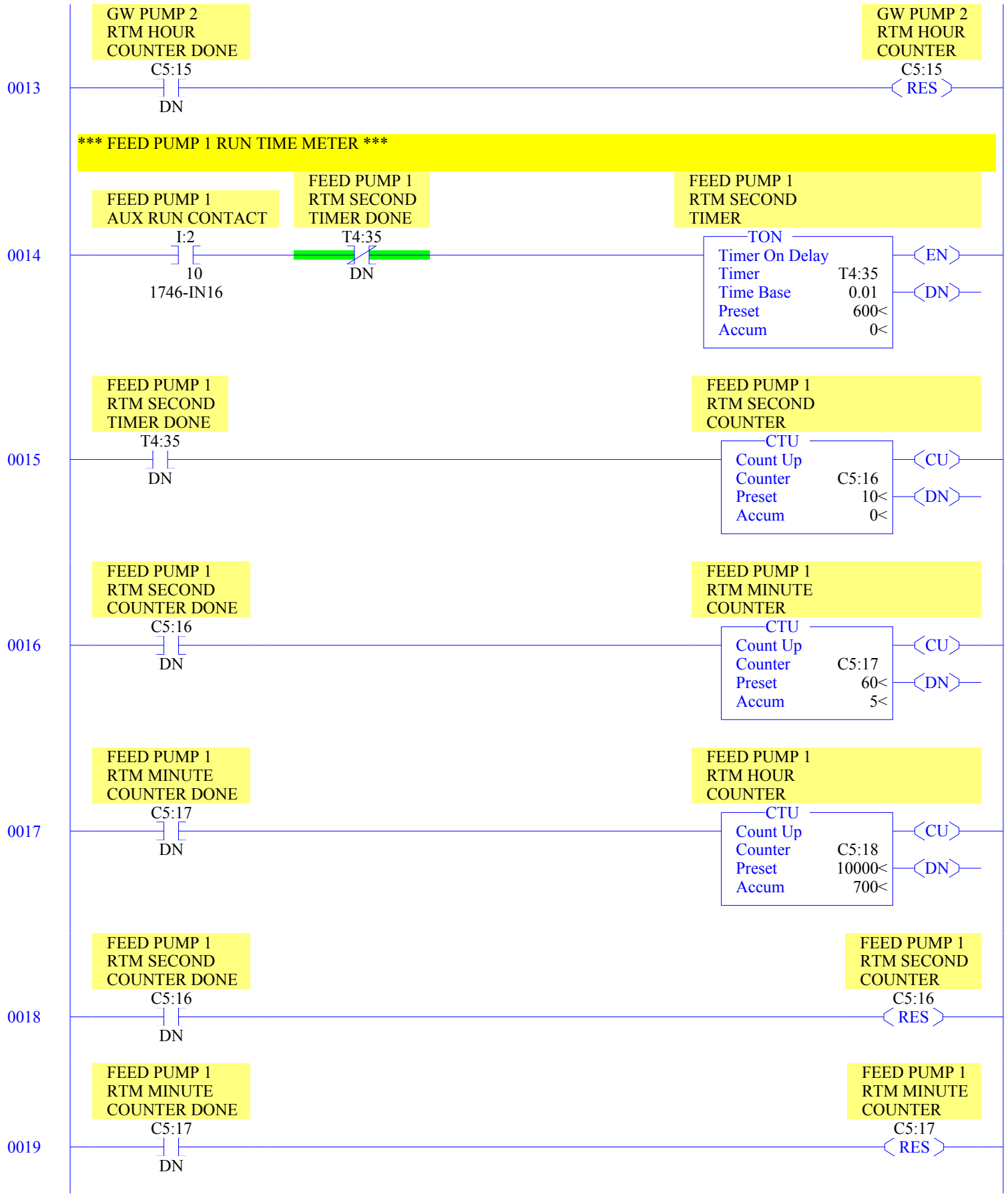
LAD 11 - FLOW_TOTAL --- Total Rungs in File = 30

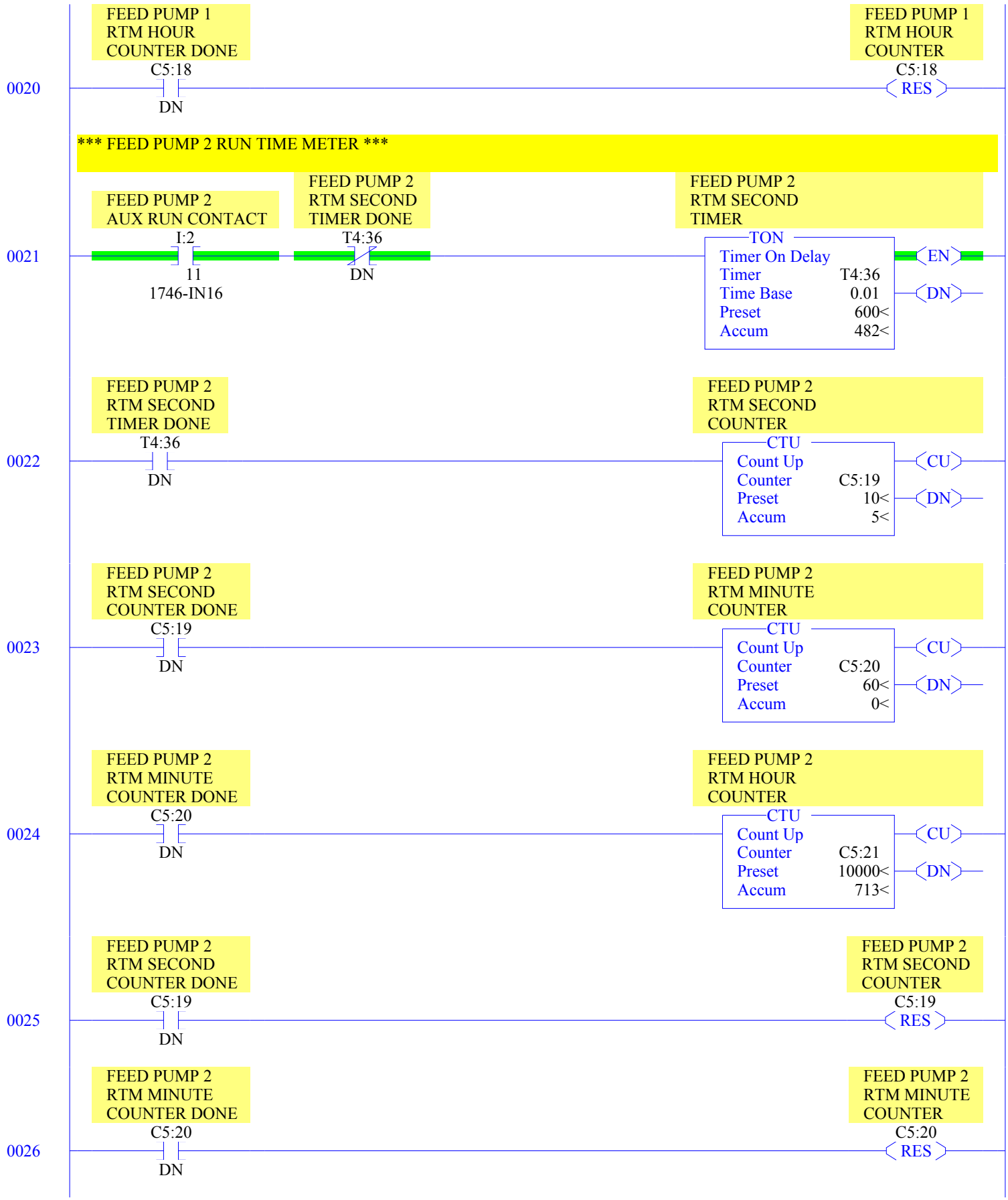


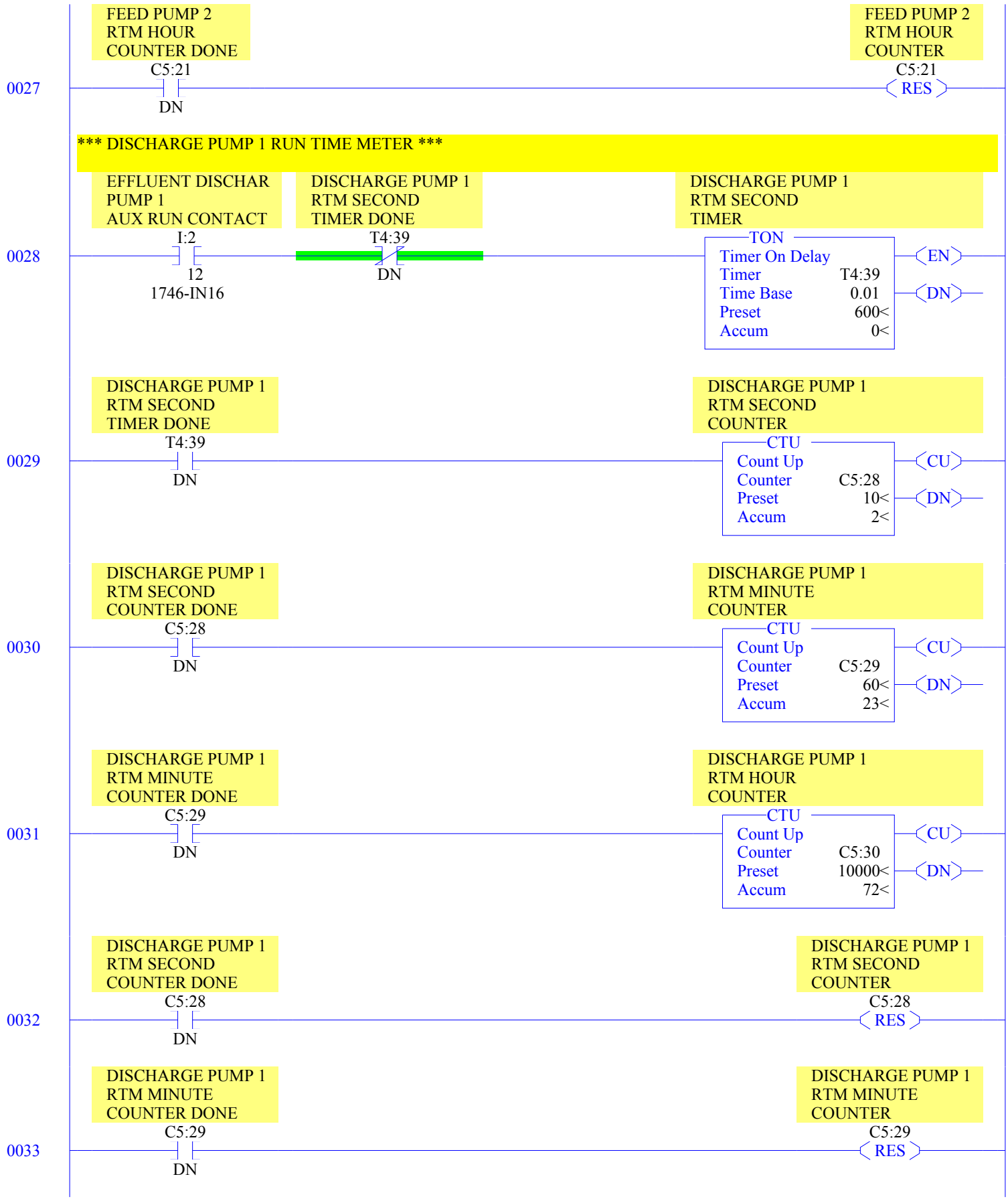

ALTERNATION CONTROL
ALTERNATION SEQUENCE TO ALLOW PUMPS AND BLOWERS TO ALTERNATE EACH DAY (AT 12:00 AM) IF BOTH ARI
IN AUTO.
0000
SBR
Subroutine
Clock
Calendar
Hours
EQU
Equal
Source A S:40
11<
Source B 0
0<
ALTERNATION
CONTROL
ONE-SHOT
B3:0
OSR
6
EQUIPMENT
ALTERNATION
COUNTER
CTU
Count Up
Counter C5:1
Preset 3<
Accum 2<
CU
DN
EQUIPMENT
ALTERNATION
COUNTER
C5:1
DN
EQUIPMENT
ALTERNATION
COUNTER
C5:1
RES
EQUIPMENT
ALTERNATION
COUNTER #
EQU
Equal
Source A C5:1.ACC
2<
Source B 0
0<
EQUIPMENT
ALTERNATION
COUNTER #
MOV
Move
Source 1
1<
Dest C5:1.ACC
2<
0001
RET
Return
0002
END

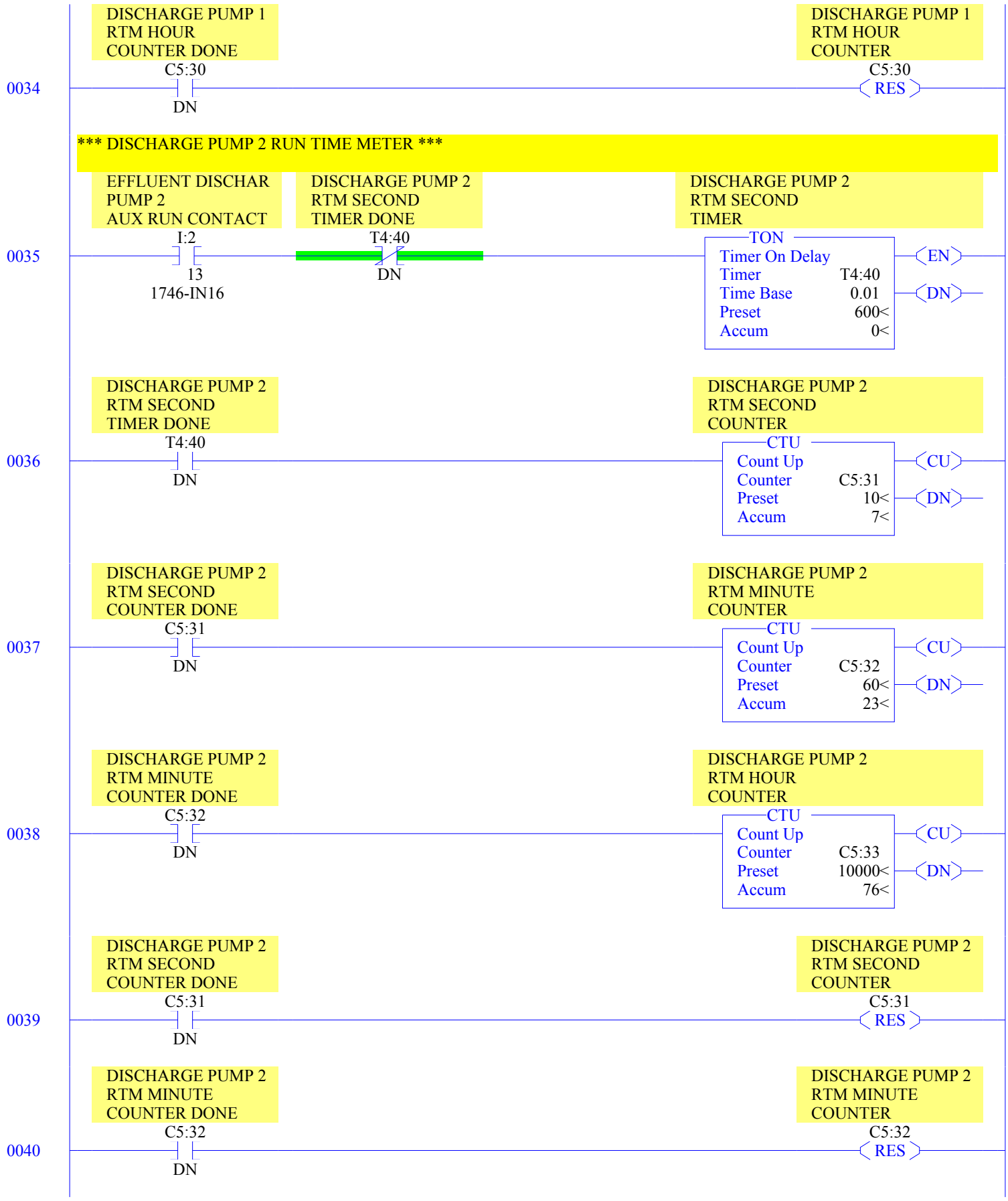

*** GROUNDWATER PUMP 1 RUN TIME METER ***
0000
SBR
Subroutine
GROUNDWATER PUMP
AUX RUN CONTACT
I:2
8
1746-IN16
GW PUMP 1
RTM SECOND
TIMER DONE
T4:33
DN
GW PUMP 1
RTM SECOND
TIMER
TON
Timer On Delay
Timer T4:33
Time Base 0.01
Preset 600<
Accum 0<
EN
DN
0001
GW PUMP 1
RTM SECOND
TIMER DONE
T4:33
DN
GW PUMP 1
RTM SECOND
COUNTER
CTU
Count Up
Counter C5:10
Preset 10<
Accum 9<
CU
DN
0002
GW PUMP 1
RTM SECOND
COUNTER DONE
C5:10
DN
GW PUMP 1
RTM MINUTE
COUNTER
CTU
Count Up
Counter C5:11
Preset 60<
Accum 18<
CU
DN
0003
GW PUMP 1
RTM MINUTE
COUNTER DONE
C5:11
DN
GW PUMP 1
RTM HOUR
COUNTER
CTU
Count Up
Counter C5:12
Preset 10000<
Accum 407<
CU
DN
0004
GW PUMP 1
RTM SECOND
COUNTER DONE
C5:10
DN
GW PUMP 1
RTM SECOND
COUNTER
C5:10
RES
0005
GW PUMP 1
RTM MINUTE
COUNTER DONE
C5:11
DN
GW PUMP 1
RTM MINUTE
COUNTER
C5:11
RES

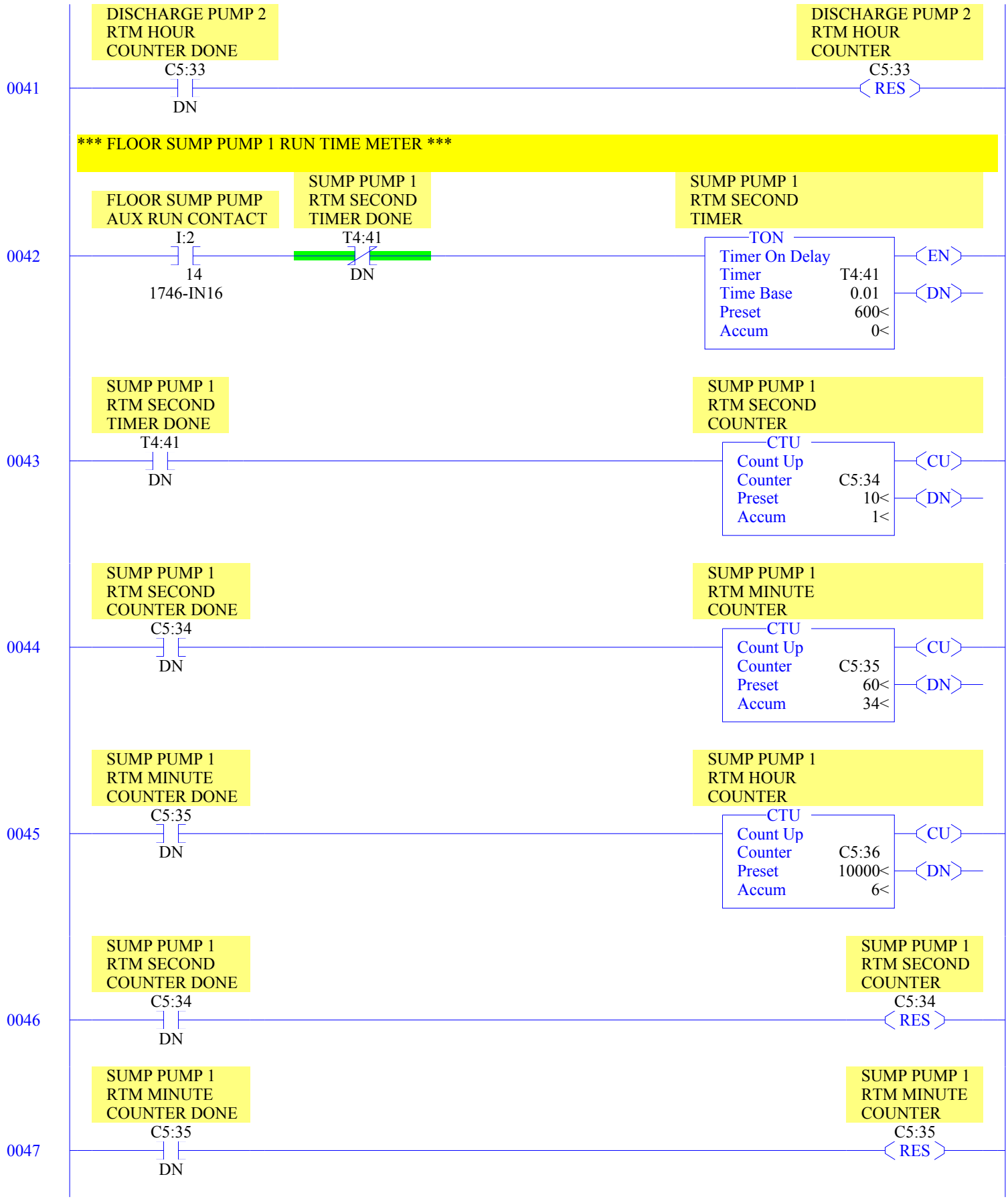

GW PUMP 1 RTM HOUR COUNTER DONE
C5:12
DN
GW PUMP 1 RTM HOUR COUNTER
C5:12
RES
0006
*** GROUNDWATER PUMP 2 RUN TIME METER ***
GROUNDWATER PUMP AUX RUN CONTACT
I:2
9
1746-IN16
GW PUMP 2 RTM SECOND TIMER DONE
T4:34
DN
GW PUMP 2 RTM SECOND TIMER
TON
Timer On Delay
Timer T4:34
Time Base 0.01
Preset 600<
Accum 0<
EN
DN
0007
GW PUMP 2 RTM SECOND TIMER DONE
T4:34
DN
GW PUMP 2 RTM SECOND COUNTER
CTU
Count Up
Counter C5:13
Preset 10<
Accum 8<
CU
DN
0008
GW PUMP 2 RTM SECOND COUNTER DONE
C5:13
DN
GW PUMP 2 RTM MINUTE COUNTER
CTU
Count Up
Counter C5:14
Preset 60<
Accum 26<
CU
DN
0009
GW PUMP 2 RTM MINUTE COUNTER DONE
C5:14
DN
GW PUMP 2 RTM HOUR COUNTER
CTU
Count Up
Counter C5:15
Preset 10000<
Accum 453<
CU
DN
0010
GW PUMP 2 RTM SECOND COUNTER DONE
C5:13
DN
GW PUMP 2 RTM SECOND COUNTER
C5:13
RES
0011
GW PUMP 2 RTM MINUTE COUNTER DONE
C5:14
DN
GW PUMP 2 RTM MINUTE COUNTER
C5:14
RES
0012

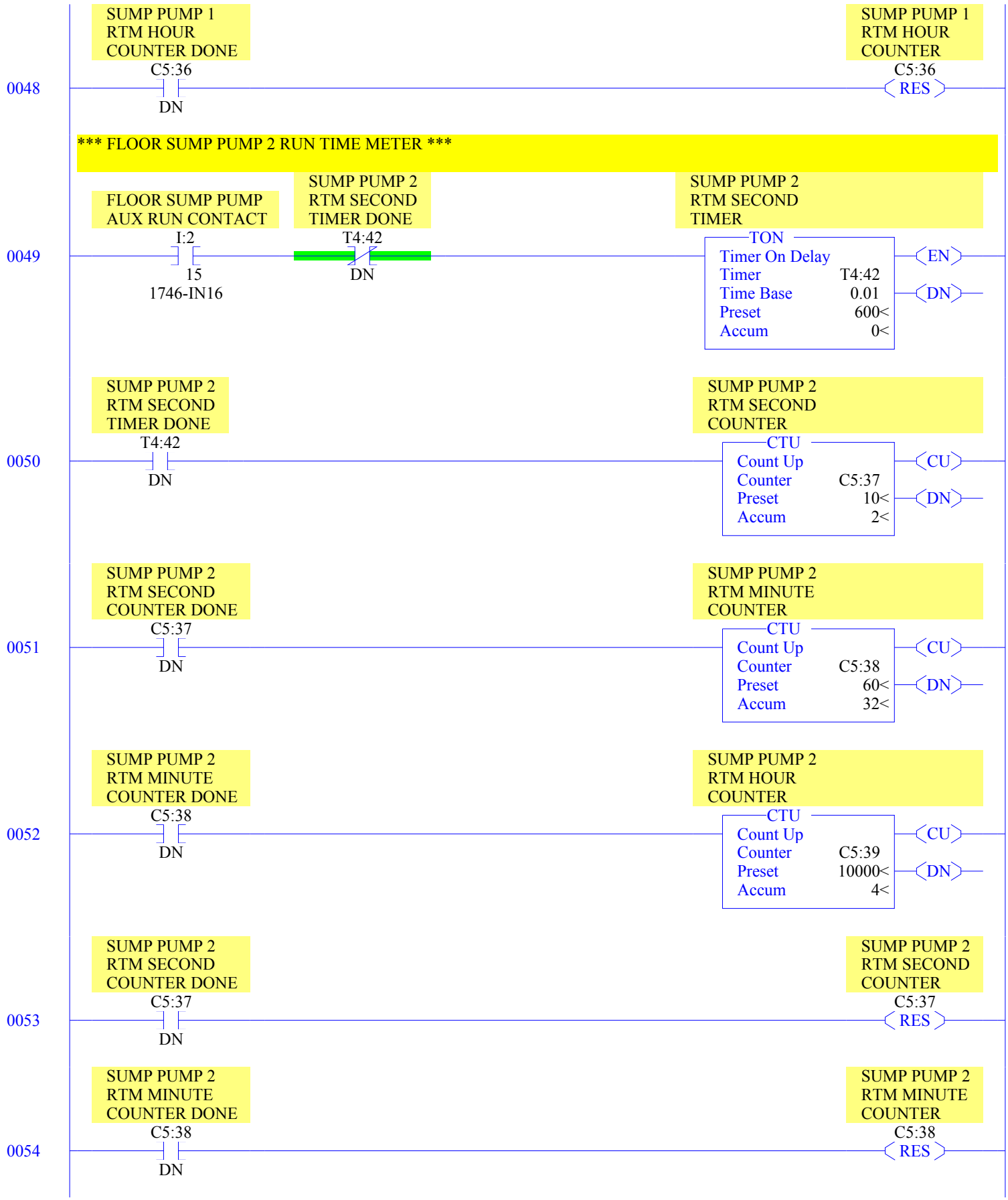

GW PUMP 2 RTM HOUR COUNTER DONE
C5:15
DN
0013
GW PUMP 2 RTM HOUR COUNTER
C5:15
RES
*** FEED PUMP 1 RUN TIME METER ***
FEED PUMP 1 AUX RUN CONTACT
I:2
10
1746-IN16
FEED PUMP 1 RTM SECOND TIMER DONE
T4:35
DN
0014
FEED PUMP 1 RTM SECOND TIMER
TON
Timer On Delay
Timer T4:35
Time Base 0.01
Preset 600<
Accum 0<
EN
DN
FEED PUMP 1 RTM SECOND TIMER DONE
T4:35
DN
0015
FEED PUMP 1 RTM SECOND COUNTER
CTU
Count Up
Counter C5:16
Preset 10<
Accum 0<
CU
DN
FEED PUMP 1 RTM SECOND COUNTER DONE
C5:16
DN
0016
FEED PUMP 1 RTM MINUTE COUNTER
CTU
Count Up
Counter C5:17
Preset 60<
Accum 5<
CU
DN
FEED PUMP 1 RTM MINUTE COUNTER DONE
C5:17
DN
0017
FEED PUMP 1 RTM HOUR COUNTER
CTU
Count Up
Counter C5:18
Preset 10000<
Accum 700<
CU
DN
FEED PUMP 1 RTM SECOND COUNTER DONE
C5:16
DN
0018
FEED PUMP 1 RTM SECOND COUNTER
C5:16
RES
FEED PUMP 1 RTM MINUTE COUNTER DONE
C5:17
DN
0019
FEED PUMP 1 RTM MINUTE COUNTER
C5:17
RES

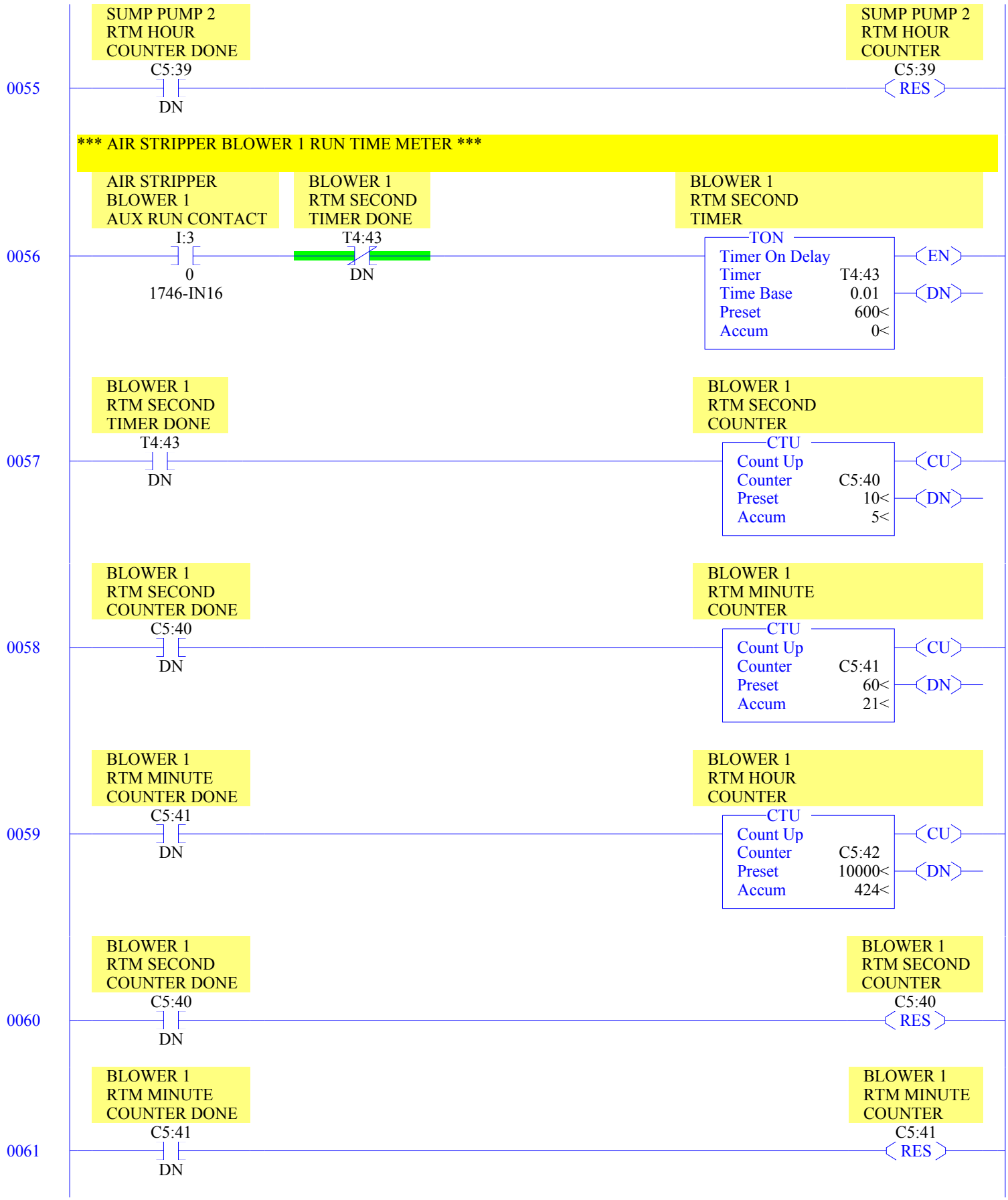

FEED PUMP 1 RTM HOUR COUNTER DONE
C5:18
DN
FEED PUMP 1 RTM HOUR COUNTER
C5:18
RES
0020
*** FEED PUMP 2 RUN TIME METER ***
FEED PUMP 2 AUX RUN CONTACT
I:2
11
1746-IN16
FEED PUMP 2 RTM SECOND TIMER DONE
T4:36
DN
FEED PUMP 2 RTM SECOND TIMER
TON
Timer On Delay
Timer T4:36
Time Base 0.01
Preset 600<
Accum 482<
EN
DN
0021
FEED PUMP 2 RTM SECOND TIMER DONE
T4:36
DN
FEED PUMP 2 RTM SECOND COUNTER
CTU
Count Up
Counter C5:19
Preset 10<
Accum 5<
CU
DN
0022
FEED PUMP 2 RTM SECOND COUNTER DONE
C5:19
DN
FEED PUMP 2 RTM MINUTE COUNTER
CTU
Count Up
Counter C5:20
Preset 60<
Accum 0<
CU
DN
0023
FEED PUMP 2 RTM MINUTE COUNTER DONE
C5:20
DN
FEED PUMP 2 RTM HOUR COUNTER
CTU
Count Up
Counter C5:21
Preset 10000<
Accum 713<
CU
DN
0024
FEED PUMP 2 RTM SECOND COUNTER DONE
C5:19
DN
FEED PUMP 2 RTM SECOND COUNTER
C5:19
RES
0025
FEED PUMP 2 RTM MINUTE COUNTER DONE
C5:20
DN
FEED PUMP 2 RTM MINUTE COUNTER
C5:20
RES
0026

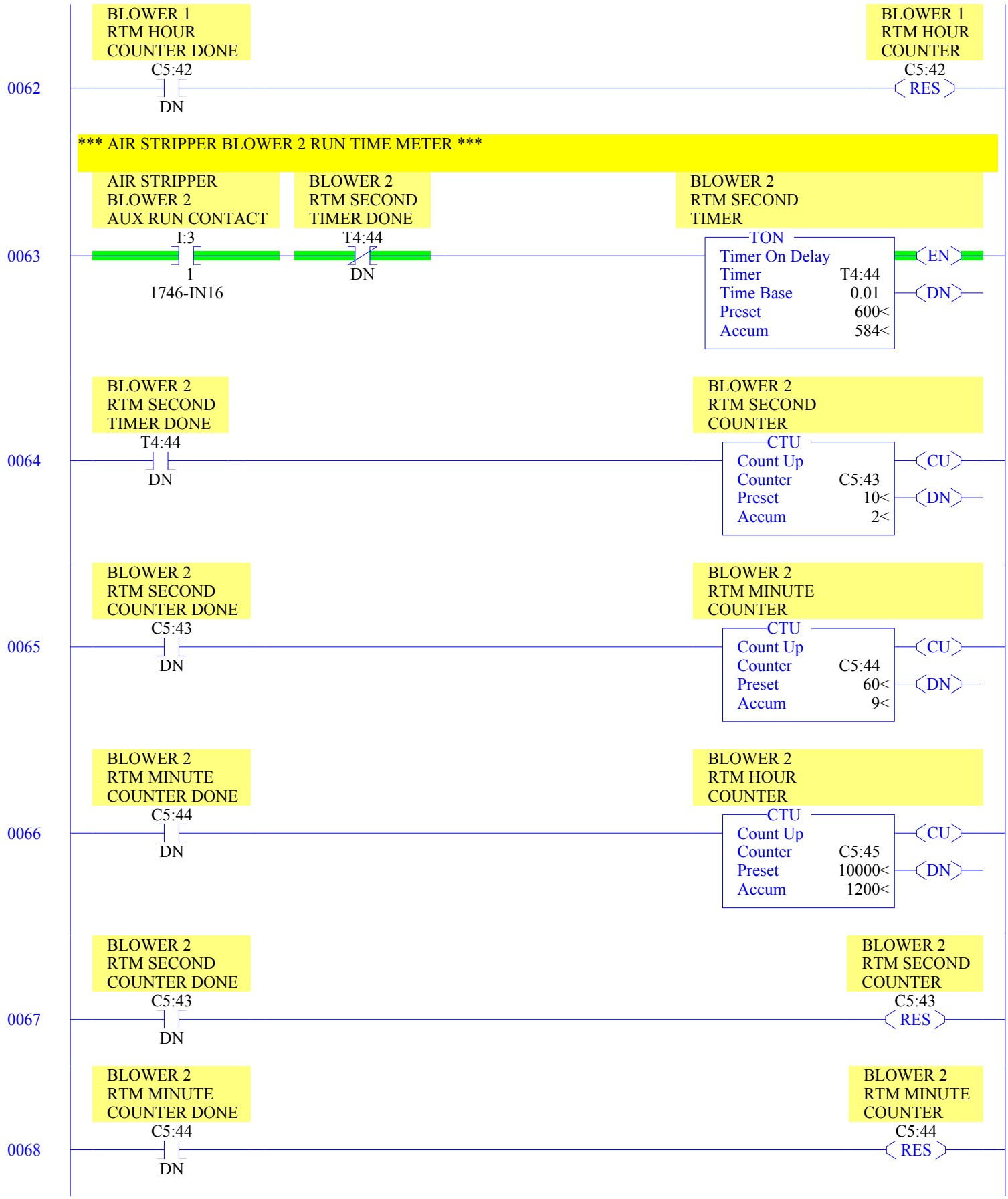

FEED PUMP 2 RTM HOUR COUNTER DONE
C5:21
DN
0027
FEED PUMP 2 RTM HOUR COUNTER
C5:21
RES
*** DISCHARGE PUMP 1 RUN TIME METER ***
EFFLUENT DISCHAR PUMP 1 AUX RUN CONTACT
I:2
12
1746-IN16
DISCHARGE PUMP 1 RTM SECOND TIMER DONE
T4:39
DN
0028
DISCHARGE PUMP 1 RTM SECOND TIMER
TON
Timer On Delay
Timer T4:39
Time Base 0.01
Preset 600<
Accum 0<
EN
DN
DISCHARGE PUMP 1 RTM SECOND TIMER DONE
T4:39
DN
0029
DISCHARGE PUMP 1 RTM SECOND COUNTER
CTU
Count Up
Counter C5:28
Preset 10<
Accum 2<
CU
DN
DISCHARGE PUMP 1 RTM SECOND COUNTER DONE
C5:28
DN
0030
DISCHARGE PUMP 1 RTM MINUTE COUNTER
CTU
Count Up
Counter C5:29
Preset 60<
Accum 23<
CU
DN
DISCHARGE PUMP 1 RTM MINUTE COUNTER DONE
C5:29
DN
0031
DISCHARGE PUMP 1 RTM HOUR COUNTER
CTU
Count Up
Counter C5:30
Preset 10000<
Accum 72<
CU
DN
DISCHARGE PUMP 1 RTM SECOND COUNTER DONE
C5:28
DN
0032
DISCHARGE PUMP 1 RTM SECOND COUNTER
C5:28
RES
DISCHARGE PUMP 1 RTM MINUTE COUNTER DONE
C5:29
DN
0033
DISCHARGE PUMP 1 RTM MINUTE COUNTER
C5:29
RES

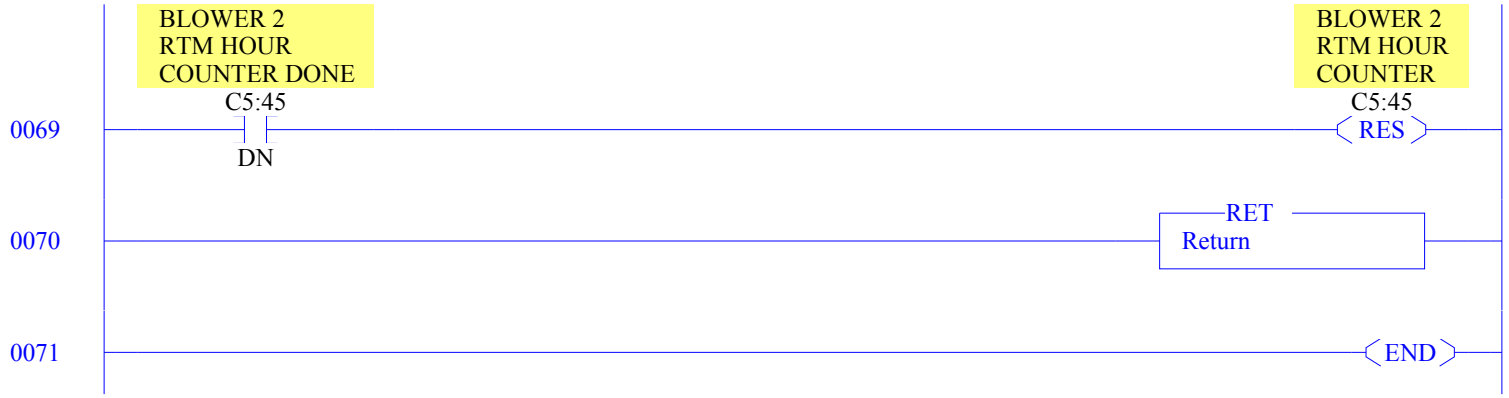

DISCHARGE PUMP 1 RTM HOUR COUNTER DONE
C5:30
DN
DISCHARGE PUMP 1 RTM HOUR COUNTER
C5:30
RES
0034
*** DISCHARGE PUMP 2 RUN TIME METER ***
EFFLUENT DISCHAR PUMP 2 AUX RUN CONTACT
I:2
13
1746-IN16
DISCHARGE PUMP 2 RTM SECOND TIMER DONE
T4:40
DN
DISCHARGE PUMP 2 RTM SECOND TIMER
TON
Timer On Delay
Timer T4:40
Time Base 0.01
Preset 600<
Accum 0<
EN
DN
0035
DISCHARGE PUMP 2 RTM SECOND TIMER DONE
T4:40
DN
DISCHARGE PUMP 2 RTM SECOND COUNTER
CTU
Count Up
Counter C5:31
Preset 10<
Accum 7<
CU
DN
0036
DISCHARGE PUMP 2 RTM SECOND COUNTER DONE
C5:31
DN
DISCHARGE PUMP 2 RTM MINUTE COUNTER
CTU
Count Up
Counter C5:32
Preset 60<
Accum 23<
CU
DN
0037
DISCHARGE PUMP 2 RTM MINUTE COUNTER DONE
C5:32
DN
DISCHARGE PUMP 2 RTM HOUR COUNTER
CTU
Count Up
Counter C5:33
Preset 10000<
Accum 76<
CU
DN
0038
DISCHARGE PUMP 2 RTM SECOND COUNTER DONE
C5:31
DN
DISCHARGE PUMP 2 RTM SECOND COUNTER
C5:31
RES
0039
DISCHARGE PUMP 2 RTM MINUTE COUNTER DONE
C5:32
DN
DISCHARGE PUMP 2 RTM MINUTE COUNTER
C5:32
RES
0040


DISCHARGE PUMP 2 RTM HOUR COUNTER DONE
C5:33
DN
0041
DISCHARGE PUMP 2 RTM HOUR COUNTER
C5:33
RES
*** FLOOR SUMP PUMP 1 RUN TIME METER ***
FLOOR SUMP PUMP AUX RUN CONTACT
I:2
14
1746-IN16
SUMP PUMP 1 RTM SECOND TIMER DONE
T4:41
DN
0042
SUMP PUMP 1 RTM SECOND TIMER
TON
Timer On Delay
Timer T4:41
Time Base 0.01
Preset 600<
Accum 0<
EN
DN
SUMP PUMP 1 RTM SECOND TIMER DONE
T4:41
DN
0043
SUMP PUMP 1 RTM SECOND COUNTER
CTU
Count Up
Counter C5:34
Preset 10<
Accum 1<
CU
DN
SUMP PUMP 1 RTM SECOND COUNTER DONE
C5:34
DN
0044
SUMP PUMP 1 RTM MINUTE COUNTER
CTU
Count Up
Counter C5:35
Preset 60<
Accum 34<
CU
DN
SUMP PUMP 1 RTM MINUTE COUNTER DONE
C5:35
DN
0045
SUMP PUMP 1 RTM HOUR COUNTER
CTU
Count Up
Counter C5:36
Preset 10000<
Accum 6<
CU
DN
SUMP PUMP 1 RTM SECOND COUNTER DONE
C5:34
DN
0046
SUMP PUMP 1 RTM SECOND COUNTER
C5:34
RES
SUMP PUMP 1 RTM MINUTE COUNTER DONE
C5:35
DN
0047
SUMP PUMP 1 RTM MINUTE COUNTER
C5:35
RES


SUMP PUMP 1 RTM HOUR COUNTER DONE
C5:36
DN
SUMP PUMP 1 RTM HOUR COUNTER
C5:36
RES
0048
*** FLOOR SUMP PUMP 2 RUN TIME METER ***
FLOOR SUMP PUMP AUX RUN CONTACT
I:2
15
1746-IN16
SUMP PUMP 2 RTM SECOND TIMER DONE
T4:42
DN
SUMP PUMP 2 RTM SECOND TIMER
TON
Timer On Delay
Timer T4:42
Time Base 0.01
Preset 600<
Accum 0<
EN
DN
0049
SUMP PUMP 2 RTM SECOND TIMER DONE
T4:42
DN
SUMP PUMP 2 RTM SECOND COUNTER
CTU
Count Up
Counter C5:37
Preset 10<
Accum 2<
CU
DN
0050
SUMP PUMP 2 RTM SECOND COUNTER DONE
C5:37
DN
SUMP PUMP 2 RTM MINUTE COUNTER
CTU
Count Up
Counter C5:38
Preset 60<
Accum 32<
CU
DN
0051
SUMP PUMP 2 RTM MINUTE COUNTER DONE
C5:38
DN
SUMP PUMP 2 RTM HOUR COUNTER
CTU
Count Up
Counter C5:39
Preset 10000<
Accum 4<
CU
DN
0052
SUMP PUMP 2 RTM SECOND COUNTER DONE
C5:37
DN
SUMP PUMP 2 RTM SECOND COUNTER
C5:37
RES
0053
SUMP PUMP 2 RTM MINUTE COUNTER DONE
C5:38
DN
SUMP PUMP 2 RTM MINUTE COUNTER
C5:38
RES
0054


SUMP PUMP 2 RTM HOUR COUNTER DONE
C5:39
DN
SUMP PUMP 2 RTM HOUR COUNTER
C5:39
RES
0055
*** AIR STRIPPER BLOWER 1 RUN TIME METER ***
AIR STRIPPER BLOWER 1 AUX RUN CONTACT
I:3
0
1746-IN16
BLOWER 1 RTM SECOND TIMER DONE
T4:43
DN
BLOWER 1 RTM SECOND TIMER
TON
Timer On Delay
Timer T4:43
Time Base 0.01
Preset 600<
Accum 0<
EN
DN
0056
BLOWER 1 RTM SECOND TIMER DONE
T4:43
DN
BLOWER 1 RTM SECOND COUNTER
CTU
Count Up
Counter C5:40
Preset 10<
Accum 5<
CU
DN
0057
BLOWER 1 RTM SECOND COUNTER DONE
C5:40
DN
BLOWER 1 RTM MINUTE COUNTER
CTU
Count Up
Counter C5:41
Preset 60<
Accum 21<
CU
DN
0058
BLOWER 1 RTM MINUTE COUNTER DONE
C5:41
DN
BLOWER 1 RTM HOUR COUNTER
CTU
Count Up
Counter C5:42
Preset 10000<
Accum 424<
CU
DN
0059
BLOWER 1 RTM SECOND COUNTER DONE
C5:40
DN
BLOWER 1 RTM SECOND COUNTER
C5:40
RES
0060
BLOWER 1 RTM MINUTE COUNTER DONE
C5:41
DN
BLOWER 1 RTM MINUTE COUNTER
C5:41
RES
0061


BLOWER 1 RTM HOUR COUNTER DONE
C5:42
DN
0062
BLOWER 1 RTM HOUR COUNTER
C5:42
RES
*** AIR STRIPPER BLOWER 2 RUN TIME METER ***
AIR STRIPPER BLOWER 2 AUX RUN CONTACT
I:3
1
1746-IN16
BLOWER 2 RTM SECOND TIMER DONE
T4:44
DN
0063
BLOWER 2 RTM SECOND TIMER
TON
Timer On Delay
Timer T4:44
Time Base 0.01
Preset 600<
Accum 584<
EN
DN
BLOWER 2 RTM SECOND TIMER DONE
T4:44
DN
0064
BLOWER 2 RTM SECOND COUNTER
CTU
Count Up
Counter C5:43
Preset 10<
Accum 2<
CU
DN
BLOWER 2 RTM SECOND COUNTER DONE
C5:43
DN
0065
BLOWER 2 RTM MINUTE COUNTER
CTU
Count Up
Counter C5:44
Preset 60<
Accum 9<
CU
DN
BLOWER 2 RTM MINUTE COUNTER DONE
C5:44
DN
0066
BLOWER 2 RTM HOUR COUNTER
CTU
Count Up
Counter C5:45
Preset 10000<
Accum 1200<
CU
DN
BLOWER 2 RTM SECOND COUNTER DONE
C5:43
DN
0067
BLOWER 2 RTM SECOND COUNTER
C5:43
RES
BLOWER 2 RTM MINUTE COUNTER DONE
C5:44
DN
0068
BLOWER 2 RTM MINUTE COUNTER
C5:44
RES


BLOWER 2
RTM HOUR
COUNTER DONE
C5:45
DN
BLOWER 2
RTM HOUR
COUNTER
C5:45
RES
0069
RET
Return
0070
END
0071

DAILY PUMP RUN TIME CALCULATION
CPU HAS NO COMPUTE (CPT) CAPABILITY SO PUMP RUN TIME FOR EACH DAY MUST BE CALCULATED IN STEPS TO IDENTIFY NUMBER OF HOURS RUN, EQUIVALENT NUMBER OF MINUTES FOR EACH OF THOSE HOURS, AND ADD (O SUBTRACT) NUMBER OF MINUTE DIFFERENCE BETWEEN THE MINUTE RTMS. FIRST STEP HERE DETERMINES NUMBER OF HOURS EACH PUMP HAS OPERATED THAT DAY BY COMPARING CURRENT RTM HOUR DATA TO PRIOR

0000

SBR
Subroutine

Clock Calendar Hours
EQU
Equal
Source A S:40 11<
Source B 0 0<

Clock Calendar Minutes
EQU
Equal
Source A S:41 59<
Source B 0 0<

Clock Calendar Seconds
EQU
Equal
Source A S:42 29<
Source B 0 0<

GW PUMP 1 RTM HOUR COUNTER
GEQ
Grtr Than or Eql (A>=B)
Source A C5:12.ACC 407<
Source B N9:1 407<

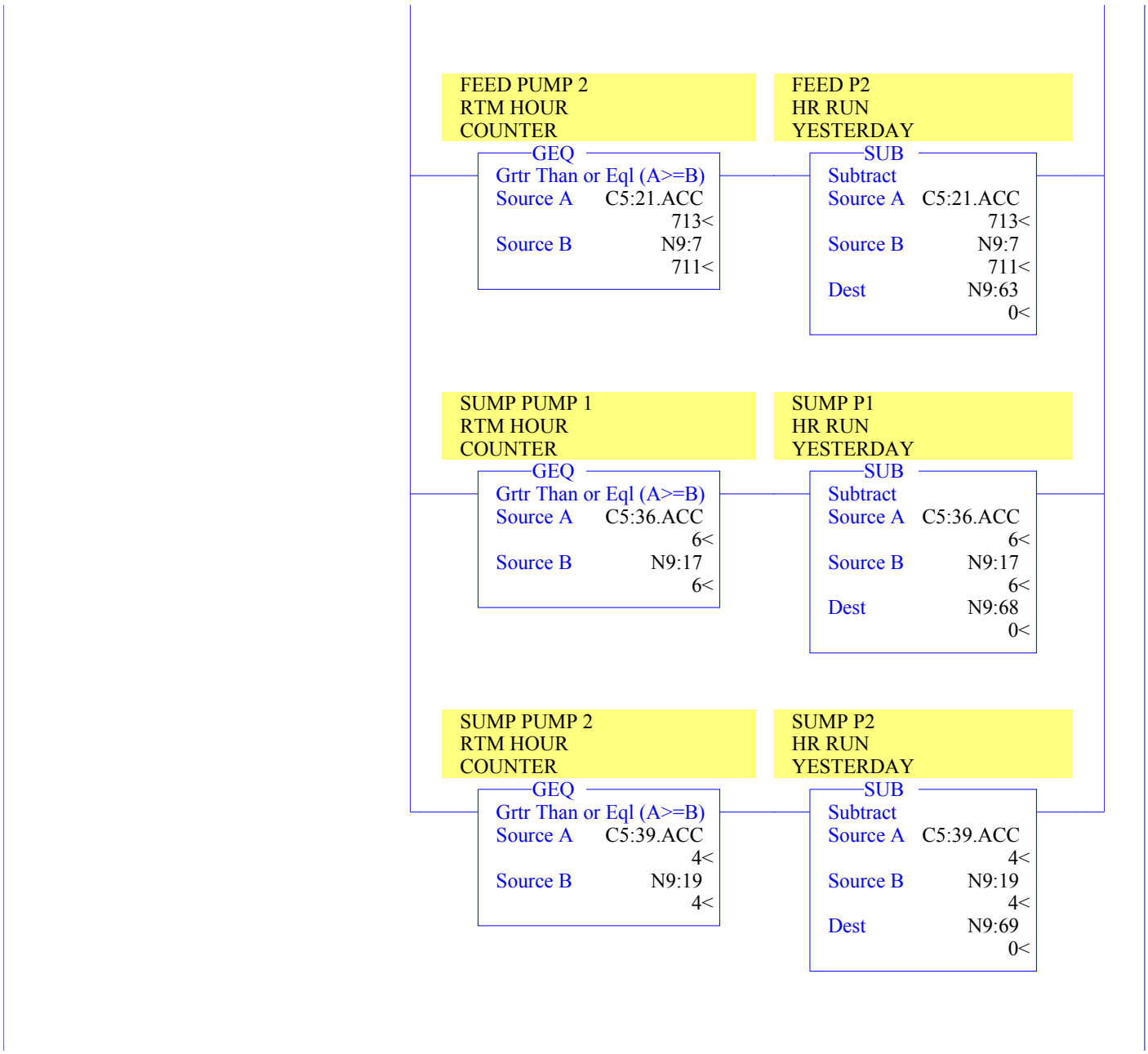
GW P1 HR RUN YESTERDAY
SUB
Subtract
Source A C5:12.ACC 407<
Source B N9:1 407<
Dest N9:60 1<

GW PUMP 2 RTM HOUR COUNTER
GEQ
Grtr Than or Eql (A>=B)
Source A C5:15.ACC 453<
Source B N9:3 452<

GW P2 HR RUN YESTERDAY
SUB
Subtract
Source A C5:15.ACC 453<
Source B N9:3 452<
Dest N9:61 0<

FEED PUMP 1 RTM HOUR COUNTER
GEQ
Grtr Than or Eql (A>=B)
Source A C5:18.ACC 700<
Source B N9:5 700<

FEED P1 HR RUN YESTERDAY
SUB
Subtract
Source A C5:18.ACC 700<
Source B N9:5 700<
Dest N9:62 1<


FEED PUMP 2
RTM HOUR
COUNTER
GEQ
Grtr Than or Eql (A>=B)
Source A C5:21.ACC
713<
Source B N9:7
711<
FEED P2
HR RUN
YESTERDAY
SUB
Subtract
Source A C5:21.ACC
713<
Source B N9:7
711<
Dest N9:63
0<
SUMP PUMP 1
RTM HOUR
COUNTER
GEQ
Grtr Than or Eql (A>=B)
Source A C5:36.ACC
6<
Source B N9:17
6<
SUMP P1
HR RUN
YESTERDAY
SUB
Subtract
Source A C5:36.ACC
6<
Source B N9:17
6<
Dest N9:68
0<
SUMP PUMP 2
RTM HOUR
COUNTER
GEQ
Grtr Than or Eql (A>=B)
Source A C5:39.ACC
4<
Source B N9:19
4<
SUMP P2
HR RUN
YESTERDAY
SUB
Subtract
Source A C5:39.ACC
4<
Source B N9:19
4<
Dest N9:69
0<

DAILY PUMP RUN TIME CALCULATION
CONVERTS NUMBER OF HOURS FROM ABOVE STEP INTO MINUTES (NUMBER OF MINUTES FROM THE HOUR COUNTER RUN BY EACH PUMP)

0001

Clock Calendar Hours

EQU
Equal
Source A S:40 11<
Source B 0 0<

Clock Calendar Minutes

EQU
Equal
Source A S:41 59<
Source B 0 0<

Clock Calendar Seconds

EQU
Equal
Source A S:42 29<
Source B 1 1<

GW P1 RTM HOUR MIN'S

MUL
Multiply
Source A N9:60 1<
Source B 60 60<
Dest N9:40 60<

GW P2 RTM HOUR MIN'S

MUL
Multiply
Source A N9:61 0<
Source B 60 60<
Dest N9:41 0<

FEED P1 RTM HOUR MIN'S

MUL
Multiply
Source A N9:62 1<
Source B 60 60<
Dest N9:42 60<

FEED P2
RTM HOUR
MIN'S

MUL
Multiply
Source A N9:63
0<
Source B 60
60<
Dest N9:43
0<

SUMP P1
RTM HOUR
MIN'S

MUL
Multiply
Source A N9:68
0<
Source B 60
60<
Dest N9:48
0<

SUMP P2
RTM HOUR
MIN'S

MUL
Multiply
Source A N9:69
0<
Source B 60
60<
Dest N9:49
0<

DAILY PUMP RUN TIME CALCULATION
DETERMINES NUMBER OF MINUTES TO BE ADDED TO (OR SUBTRACTED FROM) HOUR RTM DATA BY COMPARING CURRENT RTM MINUTE DATA TO PRIOR DAY'S RTM MINUTE DATA

0002

Clock Calendar Hours

EQU Equal
Source A S:40 11<
Source B 0 0<

Clock Calendar Minutes

EQU Equal
Source A S:41 59<
Source B 0 0<

Clock Calendar Seconds

EQU Equal
Source A S:42 29<
Source B 2 2<

GW PUMP 1 RTM MINUTE COUNTER

GEQ Grtr Than or Eql (A>=B)
Source A C5:11.ACC 18<
Source B N9:0 18<

GW P1 RTM MIN MIN'S

SUB Subtract
Source A C5:11.ACC 18<
Source B N9:0 18<
Dest N9:50 39<

GW PUMP 1 RTM MINUTE COUNTER

LES Less Than (A<B)
Source A C5:11.ACC 18<
Source B N9:0 18<

GW P1 RTM MIN MIN'S

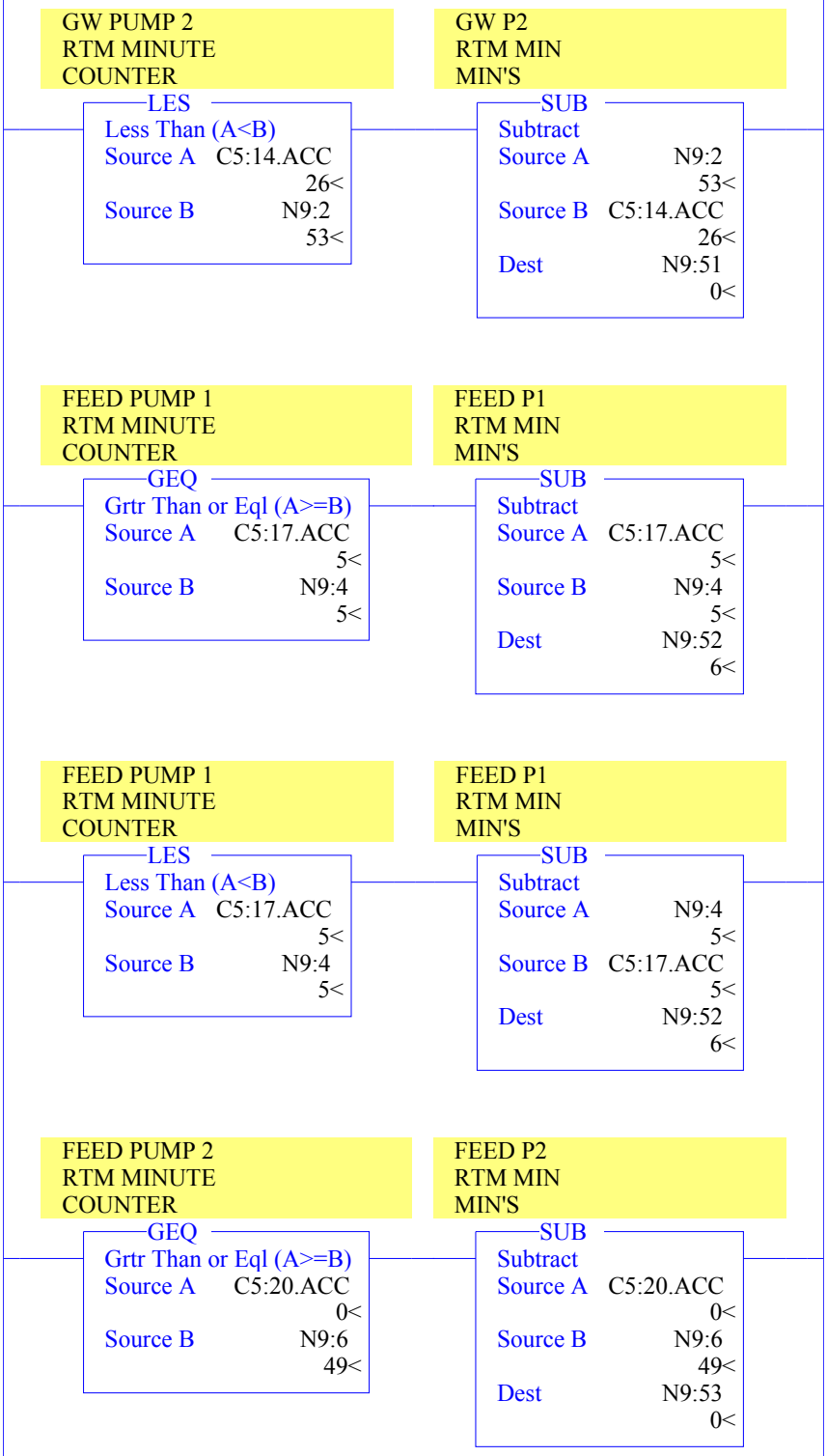
SUB Subtract
Source A N9:0 18<
Source B C5:11.ACC 18<
Dest N9:50 39<

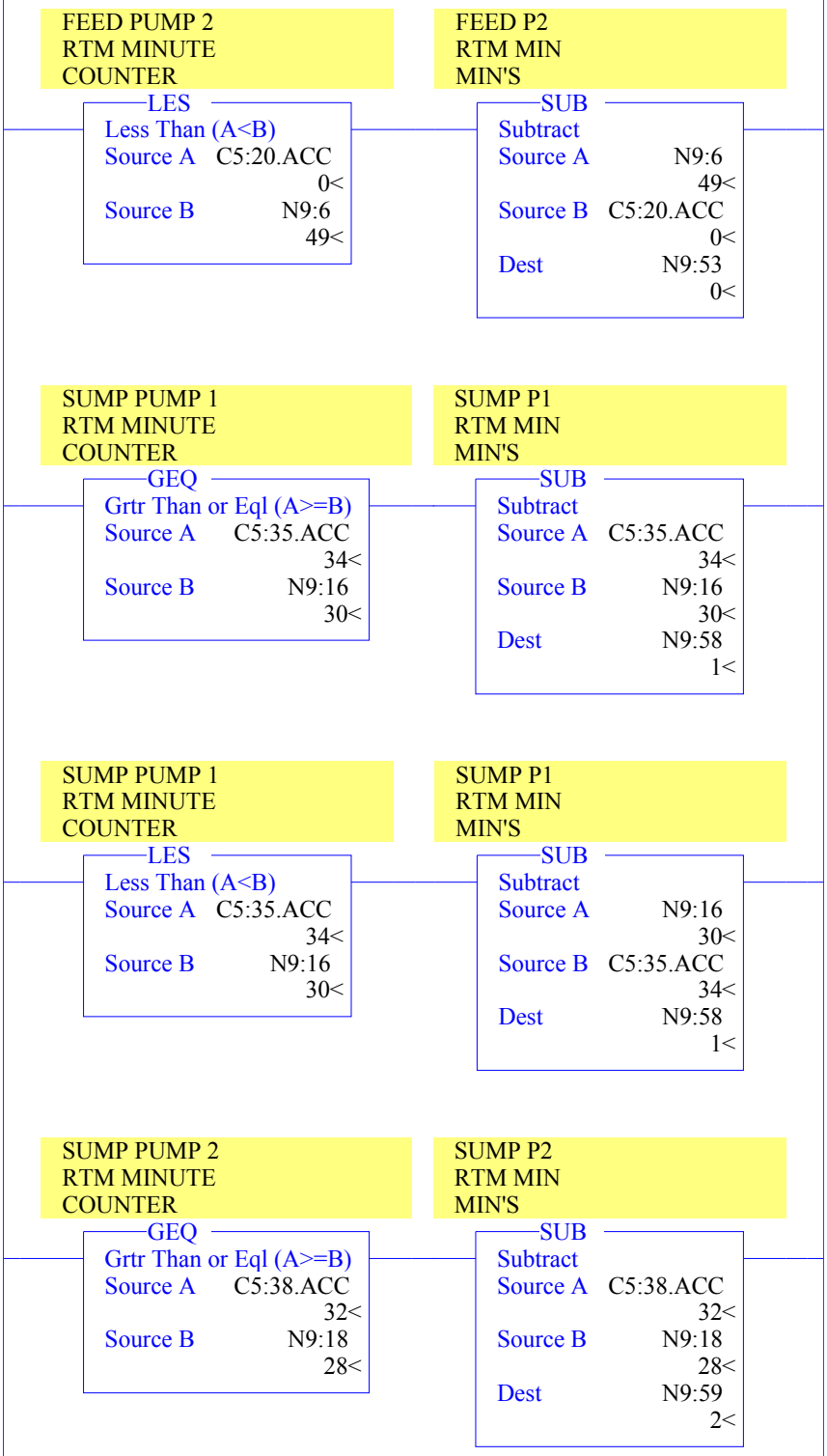
GW PUMP 2 RTM MINUTE COUNTER

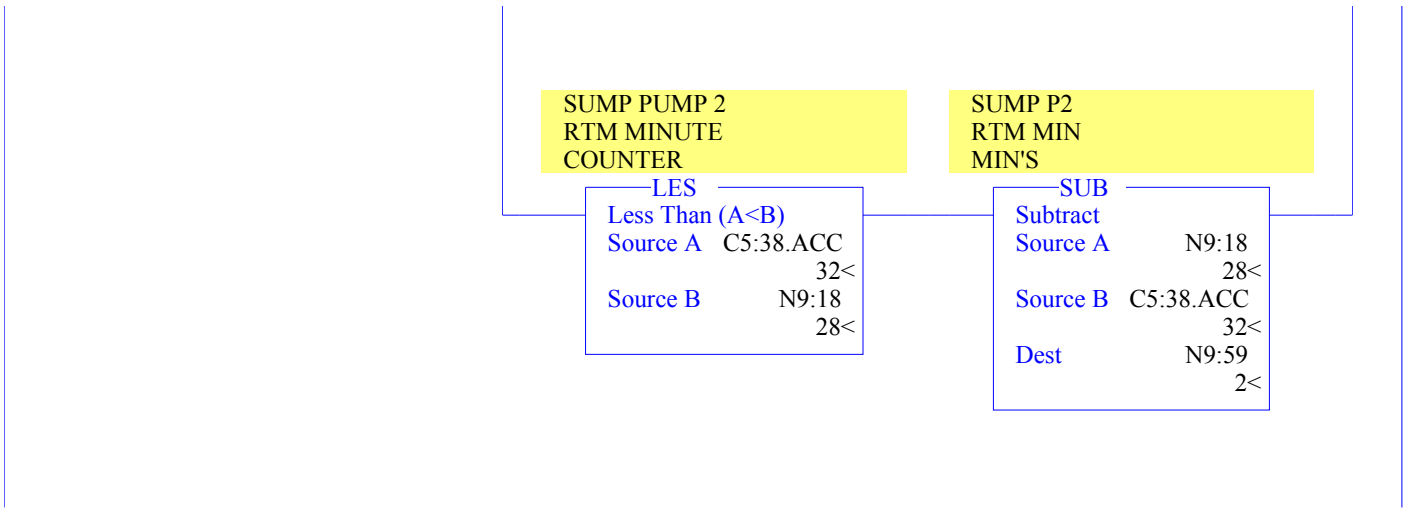
GEQ Grtr Than or Eql (A>=B)
Source A C5:14.ACC 26<
Source B N9:2 53<

GW P2 RTM MIN MIN'S

SUB Subtract
Source A C5:14.ACC 26<
Source B N9:2 53<
Dest N9:51 0<


GW PUMP 2
RTM MINUTE
COUNTER
LES
Less Than (A<B)
Source A C5:14.ACC
26<
Source B N9:2
53<
GW P2
RTM MIN
MIN'S
SUB
Subtract
Source A N9:2
53<
Source B C5:14.ACC
26<
Dest N9:51
0<
FEED PUMP 1
RTM MINUTE
COUNTER
GEQ
Grtr Than or Eql (A>=B)
Source A C5:17.ACC
5<
Source B N9:4
5<
FEED P1
RTM MIN
MIN'S
SUB
Subtract
Source A C5:17.ACC
5<
Source B N9:4
5<
Dest N9:52
6<
FEED PUMP 1
RTM MINUTE
COUNTER
LES
Less Than (A<B)
Source A C5:17.ACC
5<
Source B N9:4
5<
FEED P1
RTM MIN
MIN'S
SUB
Subtract
Source A N9:4
5<
Source B C5:17.ACC
5<
Dest N9:52
6<
FEED PUMP 2
RTM MINUTE
COUNTER
GEQ
Grtr Than or Eql (A>=B)
Source A C5:20.ACC
0<
Source B N9:6
49<
FEED P2
RTM MIN
MIN'S
SUB
Subtract
Source A C5:20.ACC
0<
Source B N9:6
49<
Dest N9:53
0<


FEED PUMP 2
RTM MINUTE
COUNTER
LES
Less Than (A<B)
Source A C5:20.ACC
0<
Source B N9:6
49<
FEED P2
RTM MIN
MIN'S
SUB
Subtract
Source A N9:6
49<
Source B C5:20.ACC
0<
Dest N9:53
0<
SUMP PUMP 1
RTM MINUTE
COUNTER
GEQ
Grtr Than or Eql (A>=B)
Source A C5:35.ACC
34<
Source B N9:16
30<
SUMP P1
RTM MIN
MIN'S
SUB
Subtract
Source A C5:35.ACC
34<
Source B N9:16
30<
Dest N9:58
1<
SUMP PUMP 1
RTM MINUTE
COUNTER
LES
Less Than (A<B)
Source A C5:35.ACC
34<
Source B N9:16
30<
SUMP P1
RTM MIN
MIN'S
SUB
Subtract
Source A N9:16
30<
Source B C5:35.ACC
34<
Dest N9:58
1<
SUMP PUMP 2
RTM MINUTE
COUNTER
GEQ
Grtr Than or Eql (A>=B)
Source A C5:38.ACC
32<
Source B N9:18
28<
SUMP P2
RTM MIN
MIN'S
SUB
Subtract
Source A C5:38.ACC
32<
Source B N9:18
28<
Dest N9:59
2<


SUMP PUMP 2
RTM MINUTE
COUNTER
LES
Less Than (A<B)
Source A C5:38.ACC
32<
Source B N9:18
28<
SUMP P2
RTM MIN
MIN'S
SUB
Subtract
Source A N9:18
28<
Source B C5:38.ACC
32<
Dest N9:59
2<

DAILY PUMP RUN TIME CALCULATION
DETERMINES TOTAL NUMBER OF MINUTES THAT EACH PUMP WAS RUN BY TAKING MINUTES FROM THE HOUR RTMS AND ADDING (OR SUBTRACTING) THE DIFFERENCES IN THE MINUTE RTMS, EACH AS CALCULATED IN THE ABOVE STEPS

0003

Clock Calendar Hours

EQU
Equal
Source A S:40 11<
Source B 0 0<

Clock Calendar Minutes

EQU
Equal
Source A S:41 59<
Source B 0 0<

Clock Calendar Seconds

EQU
Equal
Source A S:42 29<
Source B 3 3<

GW PUMP 1 RTM MINUTE COUNTER

GEQ
Grtr Than or Eql (A>=B)
Source A C5:11.ACC 18<
Source B N9:0 18<

GW P1 YESTERDAY RUN TIME (MIN)

ADD
Add
Source A N9:40 60<
Source B N9:50 39<
Dest N9:20 21<

GW PUMP 1 RTM MINUTE COUNTER

LES
Less Than (A<B)
Source A C5:11.ACC 18<
Source B N9:0 18<

GW P1 YESTERDAY RUN TIME (MIN)

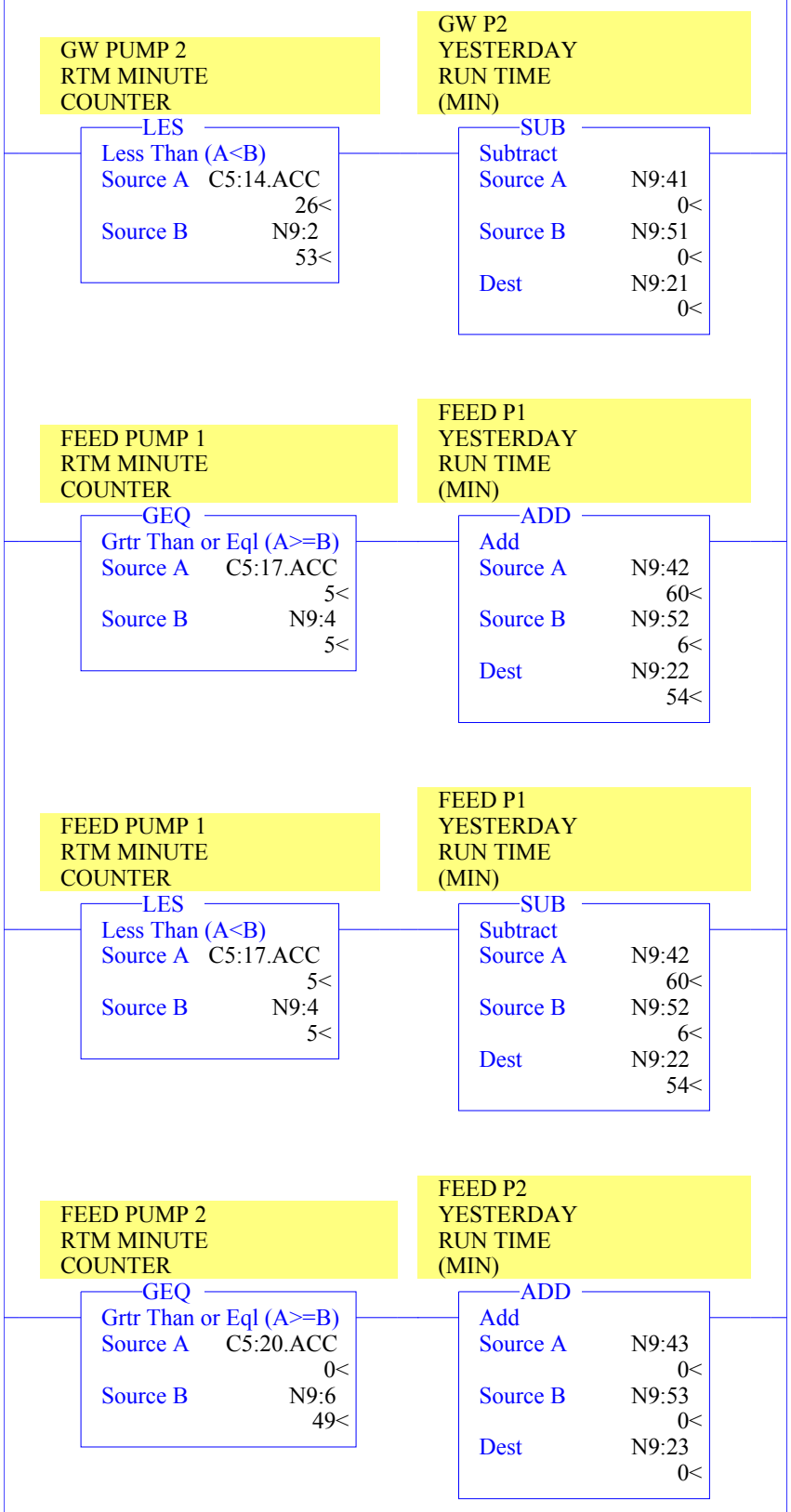
SUB
Subtract
Source A N9:40 60<
Source B N9:50 39<
Dest N9:20 21<

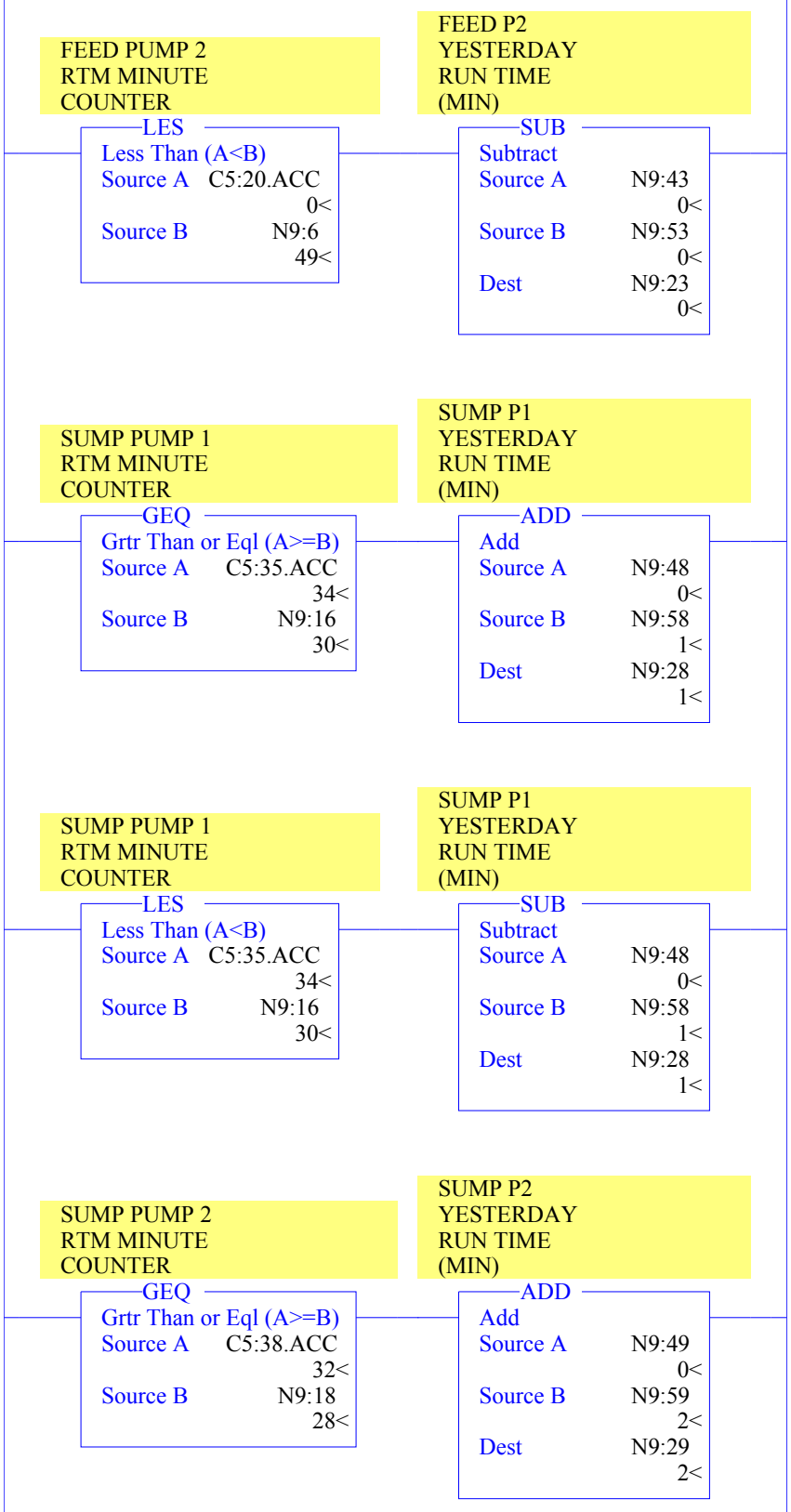
GW PUMP 2 RTM MINUTE COUNTER

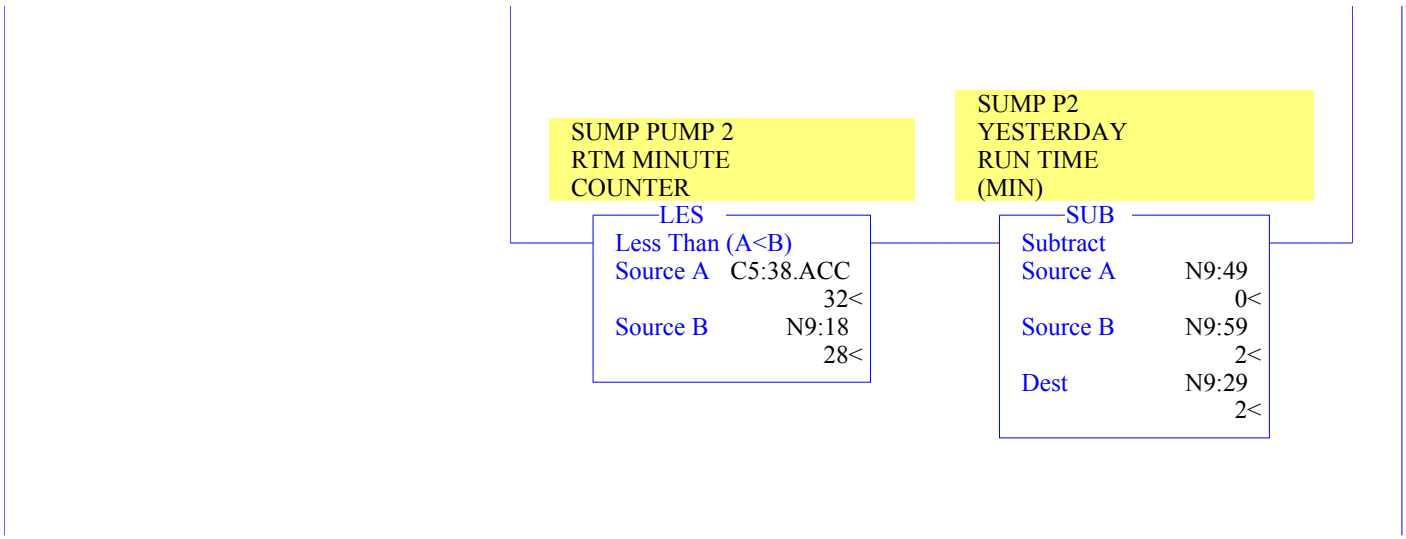
GEQ
Grtr Than or Eql (A>=B)
Source A C5:14.ACC 26<
Source B N9:2 53<

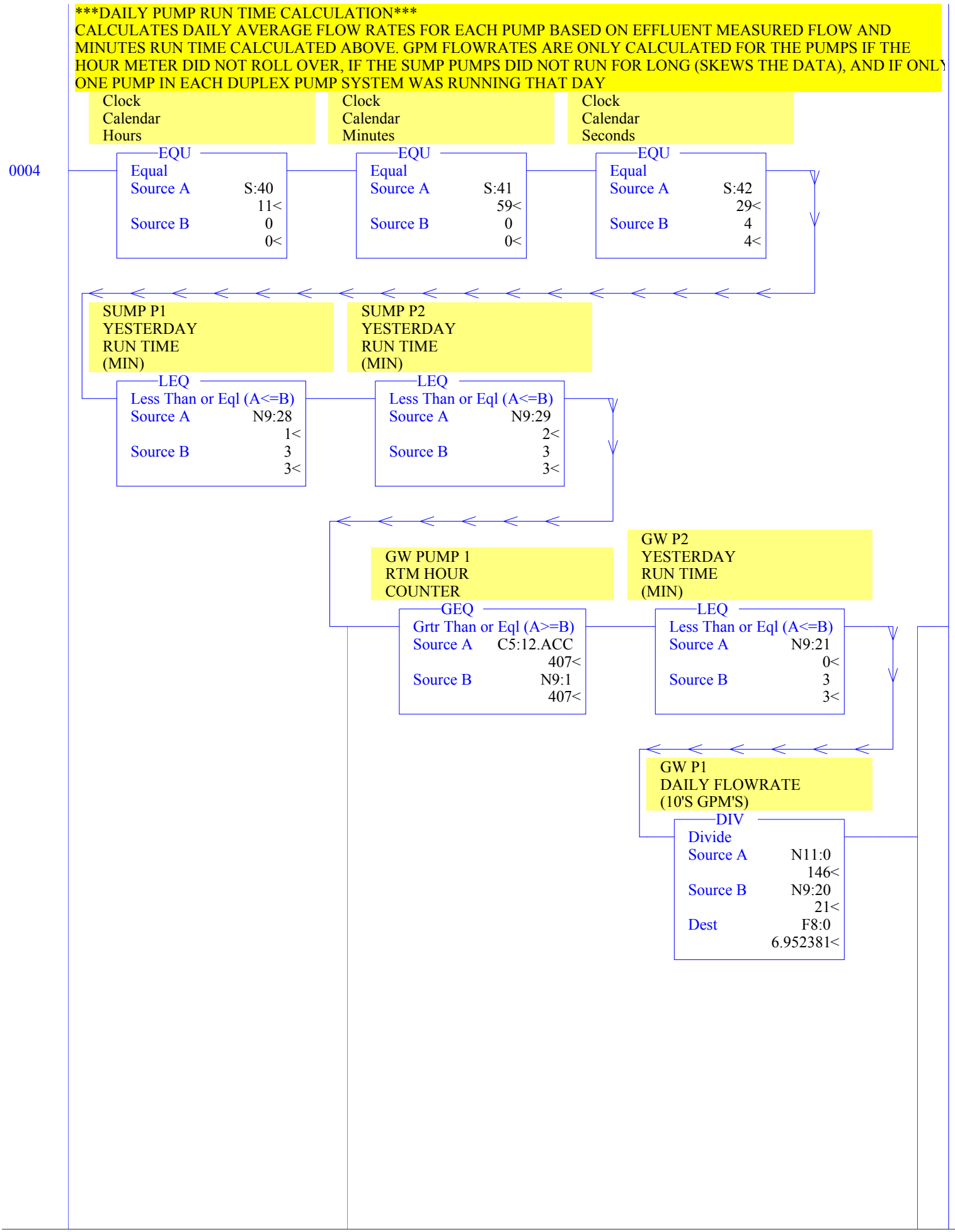
GW P2 YESTERDAY RUN TIME (MIN)

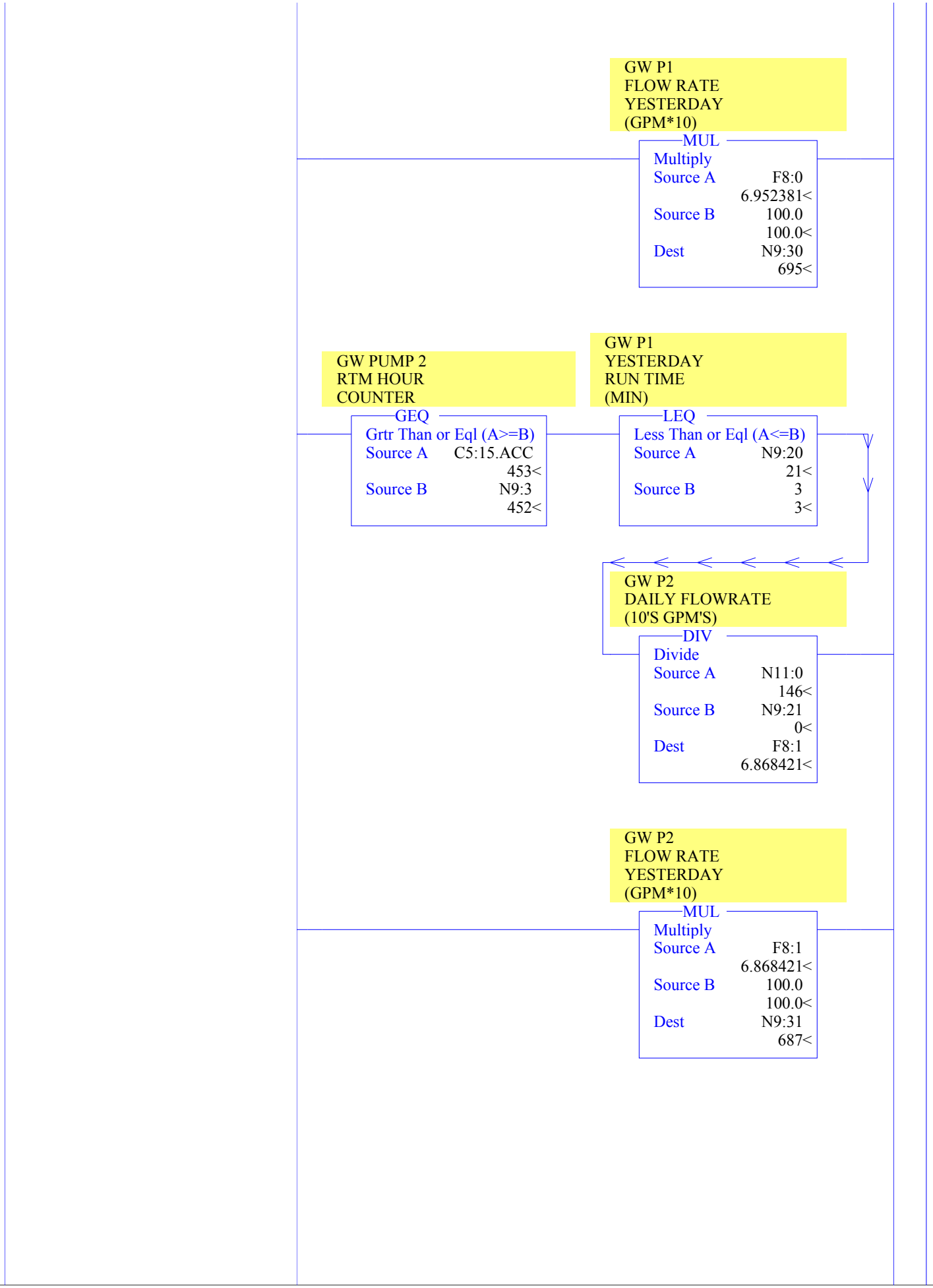
ADD
Add
Source A N9:41 0<
Source B N9:51 0<
Dest N9:21 0<

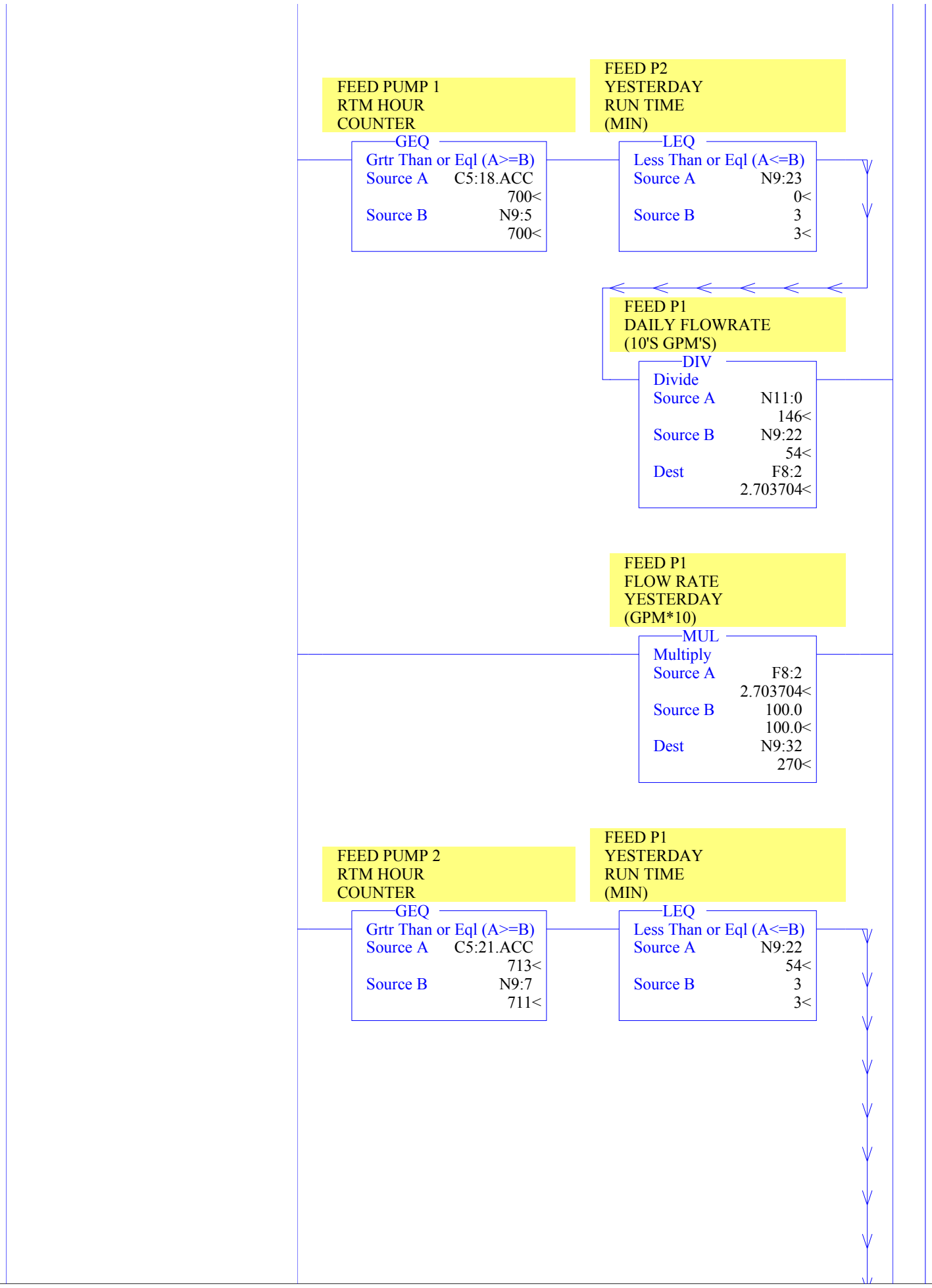

GW PUMP 2
RTM MINUTE
COUNTER
LES
Less Than (A<B)
Source A C5:14.ACC
26<
Source B N9:2
53<
GW P2
YESTERDAY
RUN TIME
(MIN)
SUB
Subtract
Source A N9:41
0<
Source B N9:51
0<
Dest N9:21
0<
FEED PUMP 1
RTM MINUTE
COUNTER
GEQ
Grtr Than or Eql (A>=B)
Source A C5:17.ACC
5<
Source B N9:4
5<
FEED P1
YESTERDAY
RUN TIME
(MIN)
ADD
Add
Source A N9:42
60<
Source B N9:52
6<
Dest N9:22
54<
FEED PUMP 1
RTM MINUTE
COUNTER
LES
Less Than (A<B)
Source A C5:17.ACC
5<
Source B N9:4
5<
FEED P1
YESTERDAY
RUN TIME
(MIN)
SUB
Subtract
Source A N9:42
60<
Source B N9:52
6<
Dest N9:22
54<
FEED PUMP 2
RTM MINUTE
COUNTER
GEQ
Grtr Than or Eql (A>=B)
Source A C5:20.ACC
0<
Source B N9:6
49<
FEED P2
YESTERDAY
RUN TIME
(MIN)
ADD
Add
Source A N9:43
0<
Source B N9:53
0<
Dest N9:23
0<

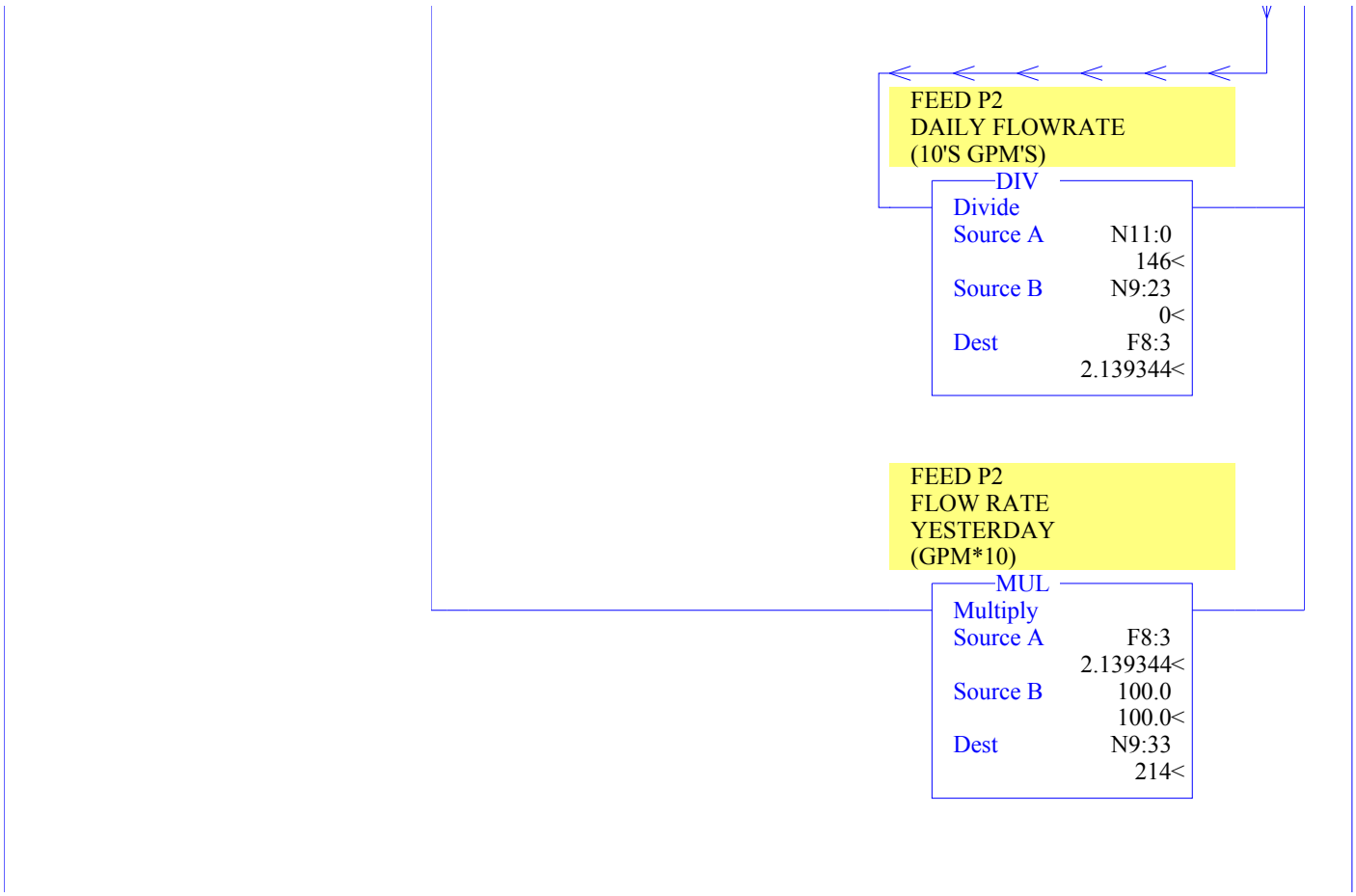

FEED PUMP 2
RTM MINUTE
COUNTER
LES
Less Than (A<B)
Source A C5:20.ACC
0<
Source B N9:6
49<
FEED P2
YESTERDAY
RUN TIME
(MIN)
SUB
Subtract
Source A N9:43
0<
Source B N9:53
0<
Dest N9:23
0<
SUMP PUMP 1
RTM MINUTE
COUNTER
GEQ
Grtr Than or Eql (A>=B)
Source A C5:35.ACC
34<
Source B N9:16
30<
SUMP P1
YESTERDAY
RUN TIME
(MIN)
ADD
Add
Source A N9:48
0<
Source B N9:58
1<
Dest N9:28
1<
SUMP PUMP 1
RTM MINUTE
COUNTER
LES
Less Than (A<B)
Source A C5:35.ACC
34<
Source B N9:16
30<
SUMP P1
YESTERDAY
RUN TIME
(MIN)
SUB
Subtract
Source A N9:48
0<
Source B N9:58
1<
Dest N9:28
1<
SUMP PUMP 2
RTM MINUTE
COUNTER
GEQ
Grtr Than or Eql (A>=B)
Source A C5:38.ACC
32<
Source B N9:18
28<
SUMP P2
YESTERDAY
RUN TIME
(MIN)
ADD
Add
Source A N9:49
0<
Source B N9:59
2<
Dest N9:29
2<

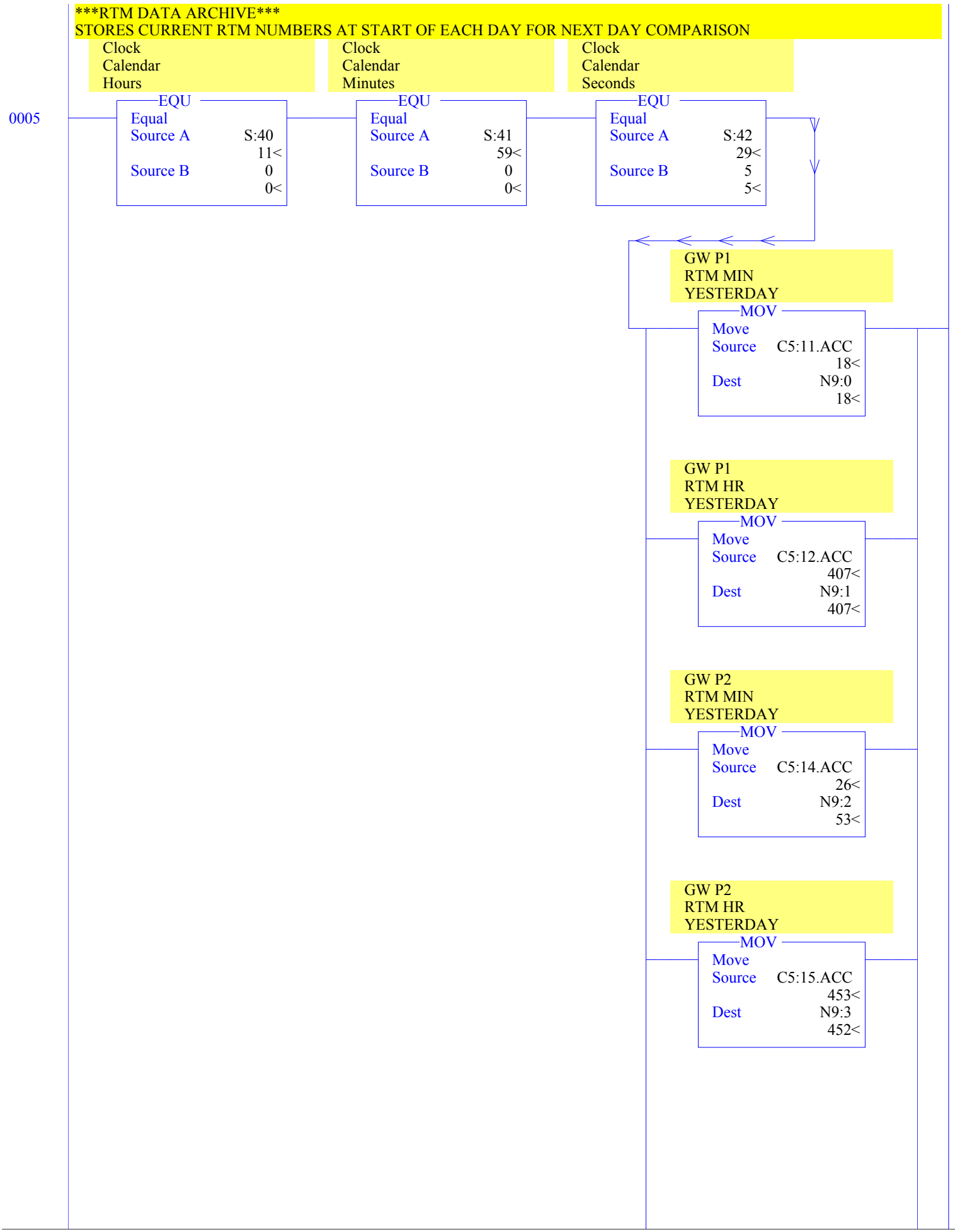

SUMP PUMP 2
RTM MINUTE
COUNTER
LES
Less Than (A<B)
Source A C5:38.ACC
32<
Source B N9:18
28<
SUMP P2
YESTERDAY
RUN TIME
(MIN)
SUB
Subtract
Source A N9:49
0<
Source B N9:59
2<
Dest N9:29
2<


DAILY PUMP RUN TIME CALCULATION
CALCULATES DAILY AVERAGE FLOW RATES FOR EACH PUMP BASED ON EFFLUENT MEASURED FLOW AND MINUTES RUN TIME CALCULATED ABOVE. GPM FLOWRATES ARE ONLY CALCULATED FOR THE PUMPS IF THE HOUR METER DID NOT ROLL OVER, IF THE SUMP PUMPS DID NOT RUN FOR LONG (SKEWS THE DATA), AND IF ONLY ONE PUMP IN EACH DUPLEX PUMP SYSTEM WAS RUNNING THAT DAY
Clock Calendar Hours
Clock Calendar Minutes
Clock Calendar Seconds
0004
EQU Equal Source A S:40 11< Source B 0 0<
EQU Equal Source A S:41 59< Source B 0 0<
EQU Equal Source A S:42 29< Source B 4 4<
SUMP P1 YESTERDAY RUN TIME (MIN)
SUMP P2 YESTERDAY RUN TIME (MIN)
LEQ Less Than or Eql (A<=B) Source A N9:28 1< Source B 3 3<
LEQ Less Than or Eql (A<=B) Source A N9:29 2< Source B 3 3<
GW PUMP 1 RTM HOUR COUNTER
GW P2 YESTERDAY RUN TIME (MIN)
GEQ Grtr Than or Eql (A>=B) Source A C5:12.ACC 407< Source B N9:1 407<
LEQ Less Than or Eql (A<=B) Source A N9:21 0< Source B 3 3<
GW P1 DAILY FLOWRATE (10'S GPM'S)
DIV Divide Source A N11:0 146< Source B N9:20 21< Dest F8:0 6.952381<


GW P1
FLOW RATE
YESTERDAY
(GPM*10)
MUL
Multiply
Source A F8:0
6.952381<
Source B 100.0
100.0<
Dest N9:30
695<
GW PUMP 2
RTM HOUR
COUNTER
GEQ
Grtr Than or Eql (A>=B)
Source A C5:15.ACC
453<
Source B N9:3
452<
GW P1
YESTERDAY
RUN TIME
(MIN)
LEQ
Less Than or Eql (A<=B)
Source A N9:20
21<
Source B 3
3<
GW P2
DAILY FLOWRATE
(10'S GPM'S)
DIV
Divide
Source A N11:0
146<
Source B N9:21
0<
Dest F8:1
6.868421<
GW P2
FLOW RATE
YESTERDAY
(GPM*10)
MUL
Multiply
Source A F8:1
6.868421<
Source B 100.0
100.0<
Dest N9:31
687<


FEED PUMP 1
RTM HOUR
COUNTER
GEQ
Grtr Than or Eql (A>=B)
Source A C5:18.ACC
700<
Source B N9:5
700<
FEED P2
YESTERDAY
RUN TIME
(MIN)
LEQ
Less Than or Eql (A<=B)
Source A N9:23
0<
Source B 3
3<
FEED P1
DAILY FLOWRATE
(10'S GPM'S)
DIV
Divide
Source A N11:0
146<
Source B N9:22
54<
Dest F8:2
2.703704<
FEED P1
FLOW RATE
YESTERDAY
(GPM*10)
MUL
Multiply
Source A F8:2
2.703704<
Source B 100.0
100.0<
Dest N9:32
270<
FEED PUMP 2
RTM HOUR
COUNTER
GEQ
Grtr Than or Eql (A>=B)
Source A C5:21.ACC
713<
Source B N9:7
711<
FEED P1
YESTERDAY
RUN TIME
(MIN)
LEQ
Less Than or Eql (A<=B)
Source A N9:22
54<
Source B 3
3<


FEED P2
DAILY FLOWRATE
(10'S GPM'S)
DIV
Divide
Source A N11:0
146<
Source B N9:23
0<
Dest F8:3
2.139344<
FEED P2
FLOW RATE
YESTERDAY
(GPM*10)
MUL
Multiply
Source A F8:3
2.139344<
Source B 100.0
100.0<
Dest N9:33
214<


RTM DATA ARCHIVE
STORES CURRENT RTM NUMBERS AT START OF EACH DAY FOR NEXT DAY COMPARISON
Clock
Calendar
Hours
Clock
Calendar
Minutes
Clock
Calendar
Seconds
0005
EQU
Equal
Source A S:40 11<
Source B 0 0<
EQU
Equal
Source A S:41 59<
Source B 0 0<
EQU
Equal
Source A S:42 29<
Source B 5 5<
GW P1
RTM MIN
YESTERDAY
MOV
Move
Source C5:11.ACC 18<
Dest N9:0 18<
GW P1
RTM HR
YESTERDAY
MOV
Move
Source C5:12.ACC 407<
Dest N9:1 407<
GW P2
RTM MIN
YESTERDAY
MOV
Move
Source C5:14.ACC 26<
Dest N9:2 53<
GW P2
RTM HR
YESTERDAY
MOV
Move
Source C5:15.ACC 453<
Dest N9:3 452<

FEED P1
RTM MIN
YESTERDAY

MOV
Move
Source C5:17.ACC
5<
Dest N9:4
5<

FEED P1
RTM HR
YESTERDAY

MOV
Move
Source C5:18.ACC
700<
Dest N9:5
700<

FEED P2
RTM MIN
YESTERDAY

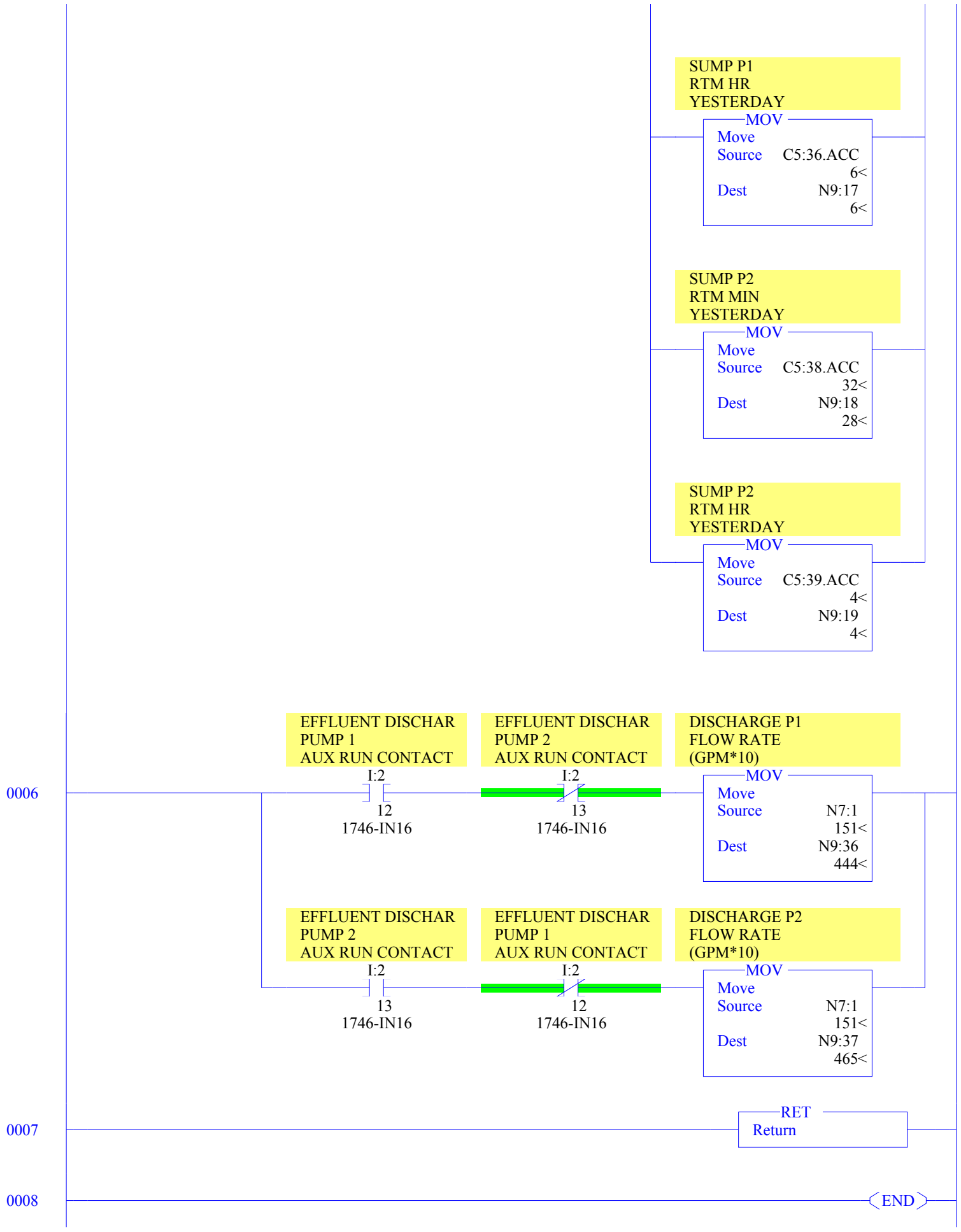
MOV
Move
Source C5:20.ACC
0<
Dest N9:6
49<

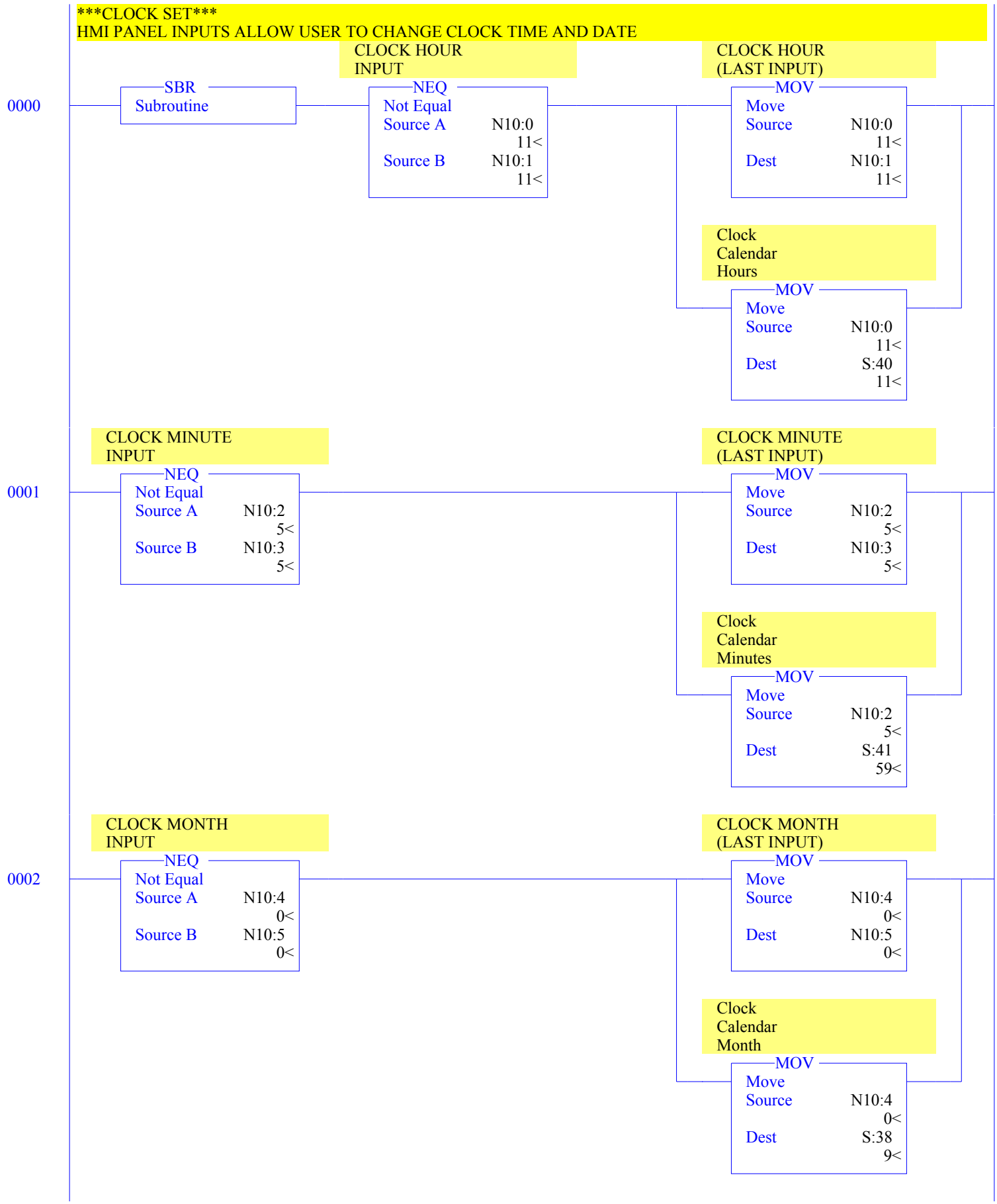
FEED P2
RTM HR
YESTERDAY

MOV
Move
Source C5:21.ACC
713<
Dest N9:7
711<

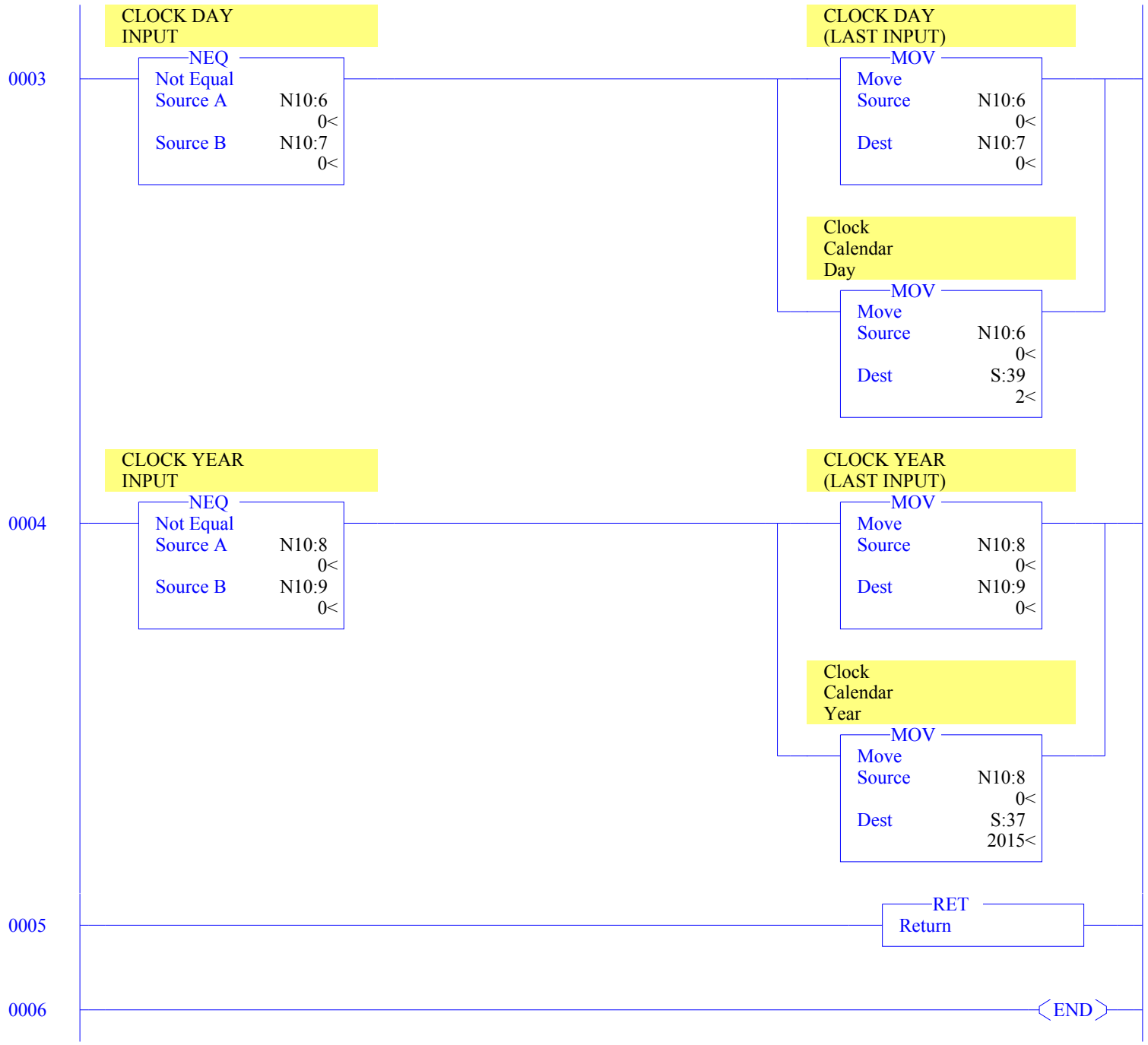
SUMP P1
RTM MIN
YESTERDAY

MOV
Move
Source C5:35.ACC
34<
Dest N9:16
30<


SUMP P1
RTM HR
YESTERDAY
MOV
Move
Source C5:36.ACC
6<
Dest N9:17
6<
SUMP P2
RTM MIN
YESTERDAY
MOV
Move
Source C5:38.ACC
32<
Dest N9:18
28<
SUMP P2
RTM HR
YESTERDAY
MOV
Move
Source C5:39.ACC
4<
Dest N9:19
4<
0006
EFFLUENT DISCHAR
PUMP 1
AUX RUN CONTACT
I:2
12
1746-IN16
EFFLUENT DISCHAR
PUMP 2
AUX RUN CONTACT
I:2
13
1746-IN16
DISCHARGE P1
FLOW RATE
(GPM*10)
MOV
Move
Source N7:1
151<
Dest N9:36
444<
EFFLUENT DISCHAR
PUMP 2
AUX RUN CONTACT
I:2
13
1746-IN16
EFFLUENT DISCHAR
PUMP 1
AUX RUN CONTACT
I:2
12
1746-IN16
DISCHARGE P2
FLOW RATE
(GPM*10)
MOV
Move
Source N7:1
151<
Dest N9:37
465<
0007
RET
Return
0008
END


CLOCK SET
HMI PANEL INPUTS ALLOW USER TO CHANGE CLOCK TIME AND DATE
CLOCK HOUR INPUT
CLOCK HOUR (LAST INPUT)
0000
SBR
Subroutine
NEQ
Not Equal
Source A N10:0 11<
Source B N10:1 11<
MOV
Move
Source N10:0 11<
Dest N10:1 11<
Clock Calendar Hours
MOV
Move
Source N10:0 11<
Dest S:40 11<
CLOCK MINUTE INPUT
CLOCK MINUTE (LAST INPUT)
0001
NEQ
Not Equal
Source A N10:2 5<
Source B N10:3 5<
MOV
Move
Source N10:2 5<
Dest N10:3 5<
Clock Calendar Minutes
MOV
Move
Source N10:2 5<
Dest S:41 59<
CLOCK MONTH INPUT
CLOCK MONTH (LAST INPUT)
0002
NEQ
Not Equal
Source A N10:4 0<
Source B N10:5 0<
MOV
Move
Source N10:4 0<
Dest N10:5 0<
Clock Calendar Month
MOV
Move
Source N10:4 0<
Dest S:38 9<

LAD 15 - CLOCK_SET - CHANGE TIME FROM HMI PANEL --- Total Rungs in File = 7



Data File O0 (bin) -- OUTPUT

Offset	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
O:4.0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1746-OW16 - 16-Output (RLY) 240 VAC
O:6.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1746-NIO4I - Analog 2 Ch In/2 Ch Curren
O:6.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1746-NIO4I - Analog 2 Ch In/2 Ch Curren

Data File I1 (bin) -- INPUT

Offset	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
I:2.0	0	0	0	0	1	0	0	0	1	0	0	1	1	0	1	1	1746-IN16 - 16-Input (SINK) 24VAC/DC
I:3.0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	1746-IN16 - 16-Input (SINK) 24VAC/DC
I:5.0	0	0	1	0	1	0	1	1	0	1	0	1	0	1	0	0	1746-NI4 - Analog 4 Channel Input Modu
I:5.1	0	0	1	1	0	0	1	0	0	1	1	0	1	1	0	0	1746-NI4 - Analog 4 Channel Input Modu
I:5.2	0	0	1	0	1	0	1	1	0	0	1	0	1	1	0	0	1746-NI4 - Analog 4 Channel Input Modu
I:5.3	0	0	0	1	0	0	0	1	0	1	0	0	1	1	0	0	1746-NI4 - Analog 4 Channel Input Modu
I:6.0	0	0	0	0	1	1	0	0	1	1	0	0	1	0	0	0	1746-NIO4I - Analog 2 Ch In/2 Ch Curren
I:6.1	0	0	0	1	0	1	0	1	1	1	1	1	1	0	1	0	1746-NIO4I - Analog 2 Ch In/2 Ch Curren

Main

```
First Pass S:1/15 = No                                                DD / MM / YYYY
Index Register S:24 = 0                                 Date S:39-37 = 2 / 9 / 2015
Free Running Clock S:4 = 1011-1100-1001-1010
Index Across Data Files S:2/3 = No                                    HH : MM : SS
CIF Addressing Mode S:2/8 = 0                           Time S:40-42 = 11 : 59 : 29
Online Edits S:33/11 - S:33/12 = No online edits exist
```

Proc

```
OS Catalog Number S:57 = 301          User Program Type S:63 = 1
OS Series S:58 = A                    User Program Functionality Index S:64 = 35
OS FRS S:59 = 8                       User RAM Size S:66 = 64
Processor Catalog Number S:60 = 532   OS Memory Size S:66 = 480
Processor Series S:61 = C
Processor FRN S:62 = 3
```

Scan Times

```
Maximum (x10 ms) S:22 = 2
Average (x10 ms) S:23 = 1
Current (x10 ms) S:3 (low byte) = 1
Watchdog (x10 ms) S:3 (high byte) = 10
Last 1ms Scan Time S:35 = 4
Scan Toggle Bit S:33/9 = 1
Time Base Selection S:33/13 = 0
```

Math

```
Math Overflow Selected S:2/14 = 0          Math Register (lo word) S:13 = 50
Overflow Trap S:5/0 = 0                    Math Register (high word) S:14-S:13 = 46
Carry S:0/0 = 0                            Math Register (32 Bit) S:14-S:13 = 3014706
Overflow S:0/1 = 0
Zero Bit S:0/2 = 0
Sign Bit S:0/3 = 0
```

IO

```
I/O Interrupt Executing S:32 = 0       Interrrupt Latency Control S:33/8 = 0
                                       Event Interrupt 10 uS Time Stamp S:44 = 0

I/O Slot Enables: S:11 _S:12
0         10              20             30
10111111 11111111       11111111       11111111

I/O Slot Interrupt Enables: S:27 _S:28
0         10              20             30
11111111 11111111       11111111       11111111

I/O Slot Interrupt Pending: S:25 _S:26
0         10              20             30
00000000 00000000       00000000       00000000
```

Chan 0

```
Processor Mode S:1/0- S:1/4 = Remote Run
Channel Mode S:33/3 = 1                    DTR Control Bit S:33/14 = 0
Comms Active S:33/4 = 0                    DTR Force Bit S:33/15 = 0
Incoming Cmd Pending S:33/0 = 0            Outgoing Msg Cmd Pending S:33/2 = 0
Msg Reply Pending S:33/1 = 0               Comms Servicing Sel S:33/5 = 0
                                           Msg Servicing Sel S:33/6 = 0
                                           Modem Lost S:5/14 = 1
```

Data File S2 (hex) -- STATUS

Chan 1

Processor Mode S:1/0- S:1/4 = Remote Run
Node Address S:15 (low byte) = 1
Baud Rate S:15 (high byte) = 19200
Comms Active S:1/7 = 0
Incoming Cmd Pending S:2/5 = 0
Msg Reply Pending S:2/6 = 0
Outgoing Msg Cmd Pending S:2/7 = 0
Comms Servicing Sel S:2/15 = 1
Msg Servicing Sel S:33/7 = 0

Active Nodes: S:9 _S:10

0	10	20	30
01000000	00000000	00000000	00000000

Debug

Suspend Code S:7 = 0
Suspend File S:8 = 0
Compiled For Single Step S:2/4 = Yes
Test Single Step Breakpoint
Rung # S:18 = 0
File # S:19 = 0

Fault/Powerdown
Fault/Powerdown (Rung #) S:20 = 3
(File #) S:21 = 2
Test Single Step
Rung # S:16 = 0
File # S:17 = 2

Errors

Fault Override At Power Up S:1/8 = 0
Startup Protection Fault S:1/9 = 0
Major Error Halt S:1/13 = 0
Overflow Trap S:5/0 = 0
Control Register Error S:5/2 = 0
Major Error Executing User
Fault Rtn. S:5/3 = 0
M0/M1 Referenced On Disabled
Slot S:5/4 = 0
Battery Low S:5/11 = 0
Fault/Powerdown (Rung #) S:20 = 3
(File #) S:21 = 2
ASCII String Manipulation error S:5/15 = 0
Fault Routine S:29 = 0
Major Error S:6 = 0h
Error Description:

STI

Setpoint (x10ms) S:30 = 0
File Number S:31 = 0
10 uS Time Stamp S:43 = 0
Pending Bit S:2/0 = 0
Enable Bit S:2/1 = 1
Resolution Select Bit S:2/10 = 0
Executing Bit S:2/2 = 0
Overflow Bit S:5/10 = 0
Lost S:36/9 = 0
Interrrupt Latency Control S:33/8 = 0

DII

Preset S:50 = 0
Accumulator S:52 = 0
Pending Bit S:2/11 = 0
Enable Bit S:2/12 = 1
Executing Bit S:2/13 = 0
Reconfiguration Bit S:33/10 = 0
Overflow Bit S:5/12 = 0
Lost S:36/8 = 0
10 uS Time Stamp S:45 = 0
File Number S:46 = 0
Slot Number S:47 = 0
Bit Mask S:48 = 0h
Compare Value S:49 = 0h
Return Mask S:51 = 0h
Last Scan Time (x1 ms) S:55 = 0
Max Observed Scan Time (x1 ms) S:56 = 0
Interrrupt Latency Control S:33/8 = 0

Protection

Deny Future Access S:1/14 = No

Mem Module

Memory Module Loaded On Boot S:5/8 = 0
Password Mismatch S:5/9 = 0
Load Memory Module On Memory Error S:1/10 = 0
Load Memory Module Always S:1/11 = 0
Load Memory Module and RUN S:1/12 = 0
Program Compare S:2/9 = 0
Data File Overwrite Protection Lost S:36/10 = 0

Forces

Forces Enabled S:1/5 = No
Forces Installed S:1/6 = No

Data File B3 (bin) -- BINARY

Offset	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	(Symbol) Description
B3:0	0	1	1	0	0	0	1	0	0	0	1	0	0	0	1	1	
B3:1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
B3:2	0	0	0	0	1	0	0	0	1	1	1	1	1	1	1	1	
B3:3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
B3:4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	PUMP FAILURE ALARMS
B3:5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
B3:6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Data File T4 -- TIMER

Offset	EN	TT	DN	BASE	PRE	ACC	(Symbol) Description
T4:0	1	1	0	1.0 sec	5	3	(5_SECOND_TMR) CLOCK - FIVE SECOND TIMER
T4:1	1	1	0	1.0 sec	60	26	(1_MINUTE_TMR) CLOCK - MINUTE TIMER
T4:2	1	1	0	1.0 sec	600	342	GROUNDWATER PUMP ON-DELAY TIMER
T4:3	0	0	0	1.0 sec	600	0	AIR STRIPPER BLOWER ON-DELAY TIMER
T4:4	1	0	1	1.0 sec	600	600	DISCHARGE PUMP ON-DELAY TIMER
T4:5	1	0	1	1.0 sec	600	600	FLOOR SUMP PUMP ON-DELAY TIMER
T4:6	1	0	1	1.0 sec	10	10	
T4:7	0	0	0	1.0 sec	360	0	AIR STRIPPER BLOWER OFF-DELAY TIMER
T4:8	0	0	0	.01 sec	0	0	
T4:9	0	0	0	.01 sec	0	0	
T4:10	0	0	0	1.0 sec	30	0	FEED TANK HIGH LEVEL ALARM TIMER
T4:11	0	0	0	1.0 sec	720	0	AIR STRIPPER SUMP HIGH LEVEL ALARM TIMER
T4:12	0	0	0	1.0 sec	10	0	DISCHARGE TANK HIGH LEVEL ALARM TIMER
T4:13	0	0	0	1.0 sec	10	0	FLOOR SUMP HIGH LEVEL ALARM TIMER
T4:14	0	0	0	1.0 sec	15	0	
T4:15	1	0	1	1.0 sec	15	15	
T4:16	0	0	0	1.0 sec	15	0	
T4:17	1	0	1	1.0 sec	15	15	
T4:18	0	0	0	.01 sec	0	0	
T4:19	0	0	0	1.0 sec	10	0	TRAINING GROUNDS RF RELAY ALARM TIMER
T4:20	0	0	0	1.0 sec	5	0	GROUNDWATER PUMP 1 FAILURE ALARM TIMER
T4:21	0	0	0	1.0 sec	5	0	GROUNDWATER PUMP 2 FAILURE ALARM TIMER
T4:22	0	0	0	1.0 sec	5	0	FEED PUMP 1 FAILURE ALARM TIMER
T4:23	0	0	0	1.0 sec	5	0	FEED PUMP 2 FAILURE ALARM TIMER
T4:24	0	0	0	1.0 sec	5	0	DISCHARGE PUMP 1 FAILURE ALARM TIMER
T4:25	0	0	0	1.0 sec	5	0	DISCHARGE PUMP 2 FAILURE ALARM TIMER
T4:26	0	0	0	1.0 sec	5	0	FLOOR SUMP PUMP 1 FAILURE ALARM TIMER
T4:27	0	0	0	1.0 sec	5	0	FLOOR SUMP PUMP 2 FAILURE ALARM TIMER
T4:28	0	0	0	1.0 sec	5	0	
T4:29	0	0	0	1.0 sec	5	0	
T4:30	0	0	0	1.0 sec	10	0	AIR STRIPPER BLOWER 1 FAILURE ALARM TIMER
T4:31	0	0	0	1.0 sec	10	0	AIR STRIPPER BLOWER 2 FAILURE ALARM TIMER
T4:32	0	0	0	.01 sec	50	0	24V POWER SUPPLY FAILURE ALARM TIMER
T4:33	0	0	0	.01 sec	600	0	GW PUMP 1 RTM SECOND TIMER
T4:34	0	0	0	.01 sec	600	0	GW PUMP 2 RTM SECOND TIMER
T4:35	0	0	0	.01 sec	600	0	FEED PUMP 1 RTM SECOND TIMER
T4:36	1	1	0	.01 sec	600	482	FEED PUMP 2 RTM SECOND TIMER
T4:37	0	0	0	.01 sec	600	0	
T4:38	0	0	0	.01 sec	600	0	
T4:39	0	0	0	.01 sec	600	0	DISCHARGE PUMP 1 RTM SECOND TIMER
T4:40	0	0	0	.01 sec	600	0	DISCHARGE PUMP 2 RTM SECOND TIMER
T4:41	0	0	0	.01 sec	600	0	SUMP PUMP 1 RTM SECOND TIMER
T4:42	0	0	0	.01 sec	600	0	SUMP PUMP 2 RTM SECOND TIMER
T4:43	0	0	0	.01 sec	600	0	BLOWER 1 RTM SECOND TIMER
T4:44	1	1	0	.01 sec	600	584	BLOWER 2 RTM SECOND TIMER

Data File C5 -- COUNTER

Offset	CU	CD	DN	OV	UN	UA	PRE	ACC	(Symbol) Description
C5:0	0	0	0	0	0	0	10000	808	INFLUENT FLOW TOTALIZER (1000'S OF GAL)
C5:1	0	0	0	0	0	0	3	2	EQUIPMENT ALTERNATION COUNTER
C5:2	0	0	0	0	0	0	10000	804	EFFLUENT FLOW TOTALIZER (1000'S OF GAL)
C5:3	0	0	0	0	0	0	0	0	
C5:4	0	0	0	0	0	0	0	0	
C5:5	0	0	0	0	0	0	0	0	
C5:6	0	0	0	0	0	0	0	0	
C5:7	0	0	0	0	0	0	0	0	
C5:8	0	0	0	0	0	0	0	0	
C5:9	0	0	0	0	0	0	0	0	
C5:10	0	0	0	0	0	0	10	9	GW PUMP 1 RTM SECOND COUNTER
C5:11	0	0	0	0	0	0	60	18	GW PUMP 1 RTM MINUTE COUNTER
C5:12	0	0	0	0	0	0	10000	407	GW PUMP 1 RTM HOUR COUNTER
C5:13	0	0	0	0	0	0	10	8	GW PUMP 2 RTM SECOND COUNTER
C5:14	0	0	0	0	0	0	60	26	GW PUMP 2 RTM MINUTE COUNTER
C5:15	0	0	0	0	0	0	10000	453	GW PUMP 2 RTM HOUR COUNTER
C5:16	0	0	0	0	0	0	10	0	FEED PUMP 1 RTM SECOND COUNTER
C5:17	0	0	0	0	0	0	60	5	FEED PUMP 1 RTM MINUTE COUNTER
C5:18	0	0	0	0	0	0	10000	700	FEED PUMP 1 RTM HOUR COUNTER
C5:19	0	0	0	0	0	0	10	5	FEED PUMP 2 RTM SECOND COUNTER
C5:20	0	0	0	0	0	0	60	0	FEED PUMP 2 RTM MINUTE COUNTER
C5:21	0	0	0	0	0	0	10000	713	FEED PUMP 2 RTM HOUR COUNTER
C5:22	0	0	0	0	0	0	10	0	
C5:23	0	0	0	0	0	0	60	41	
C5:24	0	0	0	0	0	0	10000	655	
C5:25	0	0	0	0	0	0	10	4	
C5:26	0	0	0	0	0	0	60	6	
C5:27	0	0	0	0	0	0	10000	717	
C5:28	0	0	0	0	0	0	10	2	DISCHARGE PUMP 1 RTM SECOND COUNTER
C5:29	0	0	0	0	0	0	60	23	DISCHARGE PUMP 1 RTM MINUTE COUNTER
C5:30	0	0	0	0	0	0	10000	72	DISCHARGE PUMP 1 RTM HOUR COUNTER
C5:31	0	0	0	0	0	0	10	7	DISCHARGE PUMP 2 RTM SECOND COUNTER
C5:32	0	0	0	0	0	0	60	23	DISCHARGE PUMP 2 RTM MINUTE COUNTER
C5:33	0	0	0	0	0	0	10000	76	DISCHARGE PUMP 2 RTM HOUR COUNTER
C5:34	0	0	0	0	0	0	10	1	SUMP PUMP 1 RTM SECOND COUNTER
C5:35	0	0	0	0	0	0	60	34	SUMP PUMP 1 RTM MINUTE COUNTER
C5:36	0	0	0	0	0	0	10000	6	SUMP PUMP 1 RTM HOUR COUNTER
C5:37	0	0	0	0	0	0	10	2	SUMP PUMP 2 RTM SECOND COUNTER
C5:38	0	0	0	0	0	0	60	32	SUMP PUMP 2 RTM MINUTE COUNTER
C5:39	0	0	0	0	0	0	10000	4	SUMP PUMP 2 RTM HOUR COUNTER
C5:40	0	0	0	0	0	0	10	5	BLOWER 1 RTM SECOND COUNTER
C5:41	0	0	0	0	0	0	60	21	BLOWER 1 RTM MINUTE COUNTER
C5:42	0	0	0	0	0	0	10000	424	BLOWER 1 RTM HOUR COUNTER
C5:43	0	0	0	0	0	0	10	2	BLOWER 2 RTM SECOND COUNTER
C5:44	0	0	0	0	0	0	60	9	BLOWER 2 RTM MINUTE COUNTER
C5:45	0	0	0	0	0	0	10000	1200	BLOWER 2 RTM HOUR COUNTER
C5:46	0	0	0	0	0	0	0	0	
C5:47	0	0	0	0	0	0	0	0	
C5:48	0	0	0	0	0	0	0	0	
C5:49	0	0	0	0	0	0	0	0	

Data File R6 -- CONTROL

Offset	EN	EU	DN	EM	ER	UL	IN	FD	LEN	POS	(Symbol) Description
R6:0	0	0	0	0	0	0	0	0	0	0	

Data File N7 (dec) -- INTEGER

Offset	0	1	2	3	4	5	6	7	8	9
N7:0	0	151	230	550	447	685	78	793	0	0
N7:10	0	1440	0	46	947	29	29	4444	4444	4444
N7:20	2933	75	4444	4444	4444	4444	4444	4444	4444	4444
N7:30	450	400	430							

Data File F8 -- FLOAT

Offset	0	1	2	3	4
F8:0	6.952381	6.868421	2.703704	2.139344	0
F8:5	0	31.4	503		

Data File N9 (dec) -- INTEGER

Offset	0	1	2	3	4	5	6	7	8	9
N9:0	18	407	53	452	5	700	49	711	0	0
N9:10	0	0	11	3	54	2	30	6	28	4
N9:20	21	0	54	0	0	0	25	0	1	2
N9:30	695	687	270	214	0	0	444	465	0	0
N9:40	60	0	60	0	0	0	60	0	0	0
N9:50	39	0	6	0	0	0	35	0	1	2
N9:60	1	0	1	0	0	0	1	0	0	0

Data File N10 (dec) -- INTEGER

Offset	0	1	2	3	4	5	6	7	8	9
N10:0	11	11	5	5	0	0	0	0	0	0

Data File N11 (dec) -- INTEGER

Offset	0	1	2	3	4	5	6	7	8	9
N11:0	146	9	1	803	329	261	8	31	801	901
N11:10	247	8	30	799	279	265	8	29	796	821
N11:20	240	8	28	794	192	298	8	27	791	786
N11:30	296	8	26	788	797	313	8	25	785	871
N11:40	886	8	24	782	763	0	8	23	773	983
N11:50	0	8	22	773	983	343	8	21	773	983
N11:60	144	8	20	770	589	262	8	19	769	144
N11:70	0	0	0							

```
O:4.0        - EQUIPMENT OUTPUTS
               MOV - File #2 MAIN - 1
O:4/0        - GROUNDWATER PUMP 1 RUN
               OTE - File #4 GW_PUMPS - 2
               XIC - File #10 ALARMS - 3
               XIO - File #4 GW_PUMPS - 4
O:4/1        - GROUNDWATER PUMP 2 RUN
               OTE - File #4 GW_PUMPS - 3
               XIC - File #10 ALARMS - 4
               XIO - File #4 GW_PUMPS - 4
O:4/2        - FEED PUMP 1 RUN
               OTE - File #5 FEED_PUMPS - 1
               XIC - File #10 ALARMS - 5
O:4/3        - FEED PUMP 2 RUN
               OTE - File #5 FEED_PUMPS - 2
               XIC - File #10 ALARMS - 6
O:4/4        - EFFLUENT DISCHARGE PUMP 1 RUN
               OTE - File #6 NOT USED - 1
                     File #8 DISCH_PUMP - 1
               XIC - File #10 ALARMS - 7
               XIO - File #6 NOT USED - 3
O:4/5        - EFFLUENT DISCHARGE PUMP 2 RUN
               OTE - File #6 NOT USED - 2
                     File #8 DISCH_PUMP - 2
               XIC - File #10 ALARMS - 8
               XIO - File #6 NOT USED - 3
O:4/6        - FLOOR SUMP PUMP 1 RUN
               OTE - File #7 SUMP_PUMPS - 1
               XIC - File #10 ALARMS - 9
               XIO - File #7 SUMP_PUMPS - 3
O:4/7        - FLOOR SUMP PUMP 2 RUN
               OTE - File #7 SUMP_PUMPS - 2
               XIC - File #10 ALARMS - 10
               XIO - File #7 SUMP_PUMPS - 3
O:4/8        - AIR STRIPPER BLOWER 1 RUN
               OTE - File #9 BLOWERS - 1
               XIC - File #5 FEED_PUMPS - 1, 2
                     File #9 BLOWERS - 4
                     File #10 ALARMS - 11
               XIO - File #9 BLOWERS - 3
O:4/9        - AIR STRIPPER BLOWER 2 RUN
               OTE - File #9 BLOWERS - 2
               XIC - File #5 FEED_PUMPS - 1, 2
                     File #9 BLOWERS - 4
                     File #10 ALARMS - 12
               XIO - File #9 BLOWERS - 3
I:2/0        - FEED TANK HIGH-HIGH LEVEL N.C. FLOAT SWITCH
               XIC - File #4 GW_PUMPS - 1
                     File #7 SUMP_PUMPS - 1, 2
               XIO - File #5 FEED_PUMPS - 0
                     File #10 ALARMS - 0
I:2/1        - STRIPPER SUMP LOW LEVEL FLOAT SWITCH
               XIC - File #8 DISCH_PUMP - 0
                     File #9 BLOWERS - 0
I:2/2        - STRIPPER SUMP HIGH LEVEL FLOAT SWITCH
               XIC - File #8 DISCH_PUMP - 0
I:2/3        - STRIPPER SUMP HIGH-HIGH LEVEL N.C. FLOAT SWITCH
               XIC - File #5 FEED_PUMPS - 0
               XIO - File #8 DISCH_PUMP - 1, 2
                     File #10 ALARMS - 1
I:2/4        - DISCHARGE TANK HIGH-HIGH LEVEL N.C. FLOAT SWITCH
               XIO - File #6 NOT USED - 0
I:2/5        - FLOOR SUMP LSL PUMP OFF FLOAT SWITCH
               XIC - File #7 SUMP_PUMPS - 0
I:2/6        - FLOOR SUMP LSH PUMP ON FLOAT SWITCH
               XIC - File #7 SUMP_PUMPS - 0
I:2/7        - AIR STRIPPER LOW PRESSURE SWITCH
               XIO - File #10 ALARMS - 11, 12
I:2/8        - GROUNDWATER PUMP 1 AUX RUN CONTACT
```

```
                XIC - File #3 ANALOG_IN - 0
                      File #4 GW_PUMPS - 5
                      File #13 RUN-TIME - 0
                XIO - File #3 ANALOG_IN - 0
                      File #10 ALARMS - 3
    I:2/9       - GROUNDWATER PUMP 2 AUX RUN CONTACT
                XIC - File #3 ANALOG_IN - 0
                      File #4 GW_PUMPS - 5
                      File #13 RUN-TIME - 7
                XIO - File #3 ANALOG_IN - 0
                      File #10 ALARMS - 4
    I:2/10      - FEED PUMP 1 AUX RUN CONTACT
                XIC - File #5 FEED_PUMPS - 3
                      File #13 RUN-TIME - 14
                XIO - File #10 ALARMS - 5
    I:2/11      - FEED PUMP 2 AUX RUN CONTACT
                XIC - File #5 FEED_PUMPS - 3
                      File #13 RUN-TIME - 21
                XIO - File #10 ALARMS - 6
    I:2/12      - EFFLUENT DISCHARGE PUMP 1 AUX RUN CONTACT
                XIC - File #6 NOT USED - 4
                      File #8 DISCH_PUMP - 3
                      File #13 RUN-TIME - 28
                      File #14 PUMP_GPMS - 6
                XIO - File #10 ALARMS - 7
                      File #14 PUMP_GPMS - 6
    I:2/13      - EFFLUENT DISCHARGE PUMP 2 AUX RUN CONTACT
                XIC - File #6 NOT USED - 4
                      File #8 DISCH_PUMP - 3
                      File #13 RUN-TIME - 35
                      File #14 PUMP_GPMS - 6
                XIO - File #10 ALARMS - 8
                      File #14 PUMP_GPMS - 6
    I:2/14      - FLOOR SUMP PUMP 1 AUX RUN CONTACT
                XIC - File #7 SUMP_PUMPS - 4
                      File #13 RUN-TIME - 42
                XIO - File #10 ALARMS - 9
    I:2/15      - FLOOR SUMP PUMP 2 AUX RUN CONTACT
                XIC - File #7 SUMP_PUMPS - 4
                      File #13 RUN-TIME - 49
                XIO - File #10 ALARMS - 10
    I:3/0       - AIR STRIPPER BLOWER 1 AUX RUN CONTACT
                XIC - File #9 BLOWERS - 5
                      File #13 RUN-TIME - 56
                XIO - File #10 ALARMS - 11
    I:3/1       - AIR STRIPPER BLOWER 2 AUX RUN CONTACT
                XIC - File #9 BLOWERS - 5
                      File #13 RUN-TIME - 63
                XIO - File #10 ALARMS - 12
    I:3/5       - 24VDC POWER SUPPLY 1 POWER ON
                XIO - File #10 ALARMS - 13
    I:3/6       - FLOOR SUMP HIGH-HIGH LEVEL FLOAT SWITCH
                XIC - File #10 ALARMS - 2
                XIO - File #4 GW_PUMPS - 1
    I:3/7       - TRAINING GROUNDS PUMP STATION RF ALARM RELAY
                XIO - File #10 ALARMS - 19
    I:5.0       - {TRENCH_LEVEL} GROUNDWATER TRENCH LEVEL ANALOG INPUT
                SCL - File #3 ANALOG_IN - 4
                LIM - File #3 ANALOG_IN - 4
                      File #10 ALARMS - 18
    I:5.1       - {FEED_TANK_LEVEL} FEED TANK LEVEL ANALOG INPUT
                SCL - File #3 ANALOG_IN - 2
                LIM - File #3 ANALOG_IN - 2
                      File #10 ALARMS - 17
    I:5.2       - {AIR_TEMPERATURE} INDOOR AIR TEMPERATURE ANALOG INPUT
                SCL - File #3 ANALOG_IN - 5
                LIM - File #3 ANALOG_IN - 5
    I:5.3       - {DISCHARGE_TANK} DISCHARGE TANK LEVEL ANALOG INPUT
                SCL - File #3 ANALOG_IN - 3
```

```
                LIM - File #3 ANALOG_IN - 3
I:6.0         - {INFLUENT_FLOW} INFLUENT FLOWMETER ANALOG INPUT
                SCL - File #3 ANALOG_IN - 0
                LIM - File #3 ANALOG_IN - 0
                      File #10 ALARMS - 15
I:6.1         - {EFFLUENT_FLOW} EFFLUENT FLOWMETER ANALOG INPUT
                SCL - File #3 ANALOG_IN - 1
                LIM - File #3 ANALOG_IN - 1
                      File #10 ALARMS - 16
S:5/0         - Overflow Trap
                OTU - File #2 MAIN - 2
S:37          - Clock Calendar Year
                MOV - File #15 CLOCK_SET - 4
S:38          - Clock Calendar Month
                MOV - File #11 FLOW_TOTAL - 14
                      File #15 CLOCK_SET - 2
S:39          - Clock Calendar Day
                MOV - File #11 FLOW_TOTAL - 14
                      File #15 CLOCK_SET - 3
S:40          - Clock Calendar Hours
                MOV - File #15 CLOCK_SET - 0
                EQU - File #11 FLOW_TOTAL - 14, 15, 16, 17, 18, 19, 20, 21
                        22, 23, 24, 25, 26, 27
                      File #12 ALTERNATIN - 0
                      File #14 PUMP_GPMS - 0, 1, 2, 3, 4, 5
S:41          - Clock Calendar Minutes
                MOV - File #15 CLOCK_SET - 1
                EQU - File #11 FLOW_TOTAL - 12, 13, 14, 15, 16, 17, 18, 19
                        20, 21, 22, 23, 24, 25, 26, 27
                      File #14 PUMP_GPMS - 0, 1, 2, 3, 4, 5
S:42          - Clock Calendar Seconds
                EQU - File #11 FLOW_TOTAL - 12, 13, 14, 15, 16, 17, 18, 19
                        20, 21, 22, 23, 24, 25, 26, 27
                      File #14 PUMP_GPMS - 0, 1, 2, 3, 4, 5
B3:0/0        - GROUNDWATER PUMPS ENABLED
                OTE - File #4 GW_PUMPS - 1
                XIC - File #4 GW_PUMPS - 1, 2, 3
B3:0/1        - FEED PUMPS ENABLED
                OTE - File #5 FEED_PUMPS - 0
                XIC - File #5 FEED_PUMPS - 0, 1, 2
                      File #9 BLOWERS - 0
                XIO - File #8 DISCH_PUMP - 0
B3:0/2        - DISCHARGE PUMPS ENABLED
                OTE - File #6 NOT USED - 0
                      File #8 DISCH_PUMP - 0
                XIC - File #6 NOT USED - 0, 1, 2
                      File #8 DISCH_PUMP - 0, 1, 2
B3:0/3        - FLOOR SUMP PUMPS ENABLED
                OTE - File #7 SUMP_PUMPS - 0
                XIC - File #7 SUMP_PUMPS - 0, 1, 2
B3:0/5        - AIR STRIPPER BLOWERS ENABLED
                OTE - File #9 BLOWERS - 0
                XIC - File #9 BLOWERS - 0, 1, 2
                XIO - File #9 BLOWERS - 4
B3:0/6        - ALTERNATION CONTROL ONE-SHOT
                OSR - File #12 ALTERNATIN - 0
B3:0/7        - ALARM RESET
                XIC - File #10 ALARMS - 14
                XIO - File #4 GW_PUMPS - 4
                      File #6 NOT USED - 3
                      File #7 SUMP_PUMPS - 3
                      File #9 BLOWERS - 3
B3:0/8        - GROUNDWATER PUMPS RUNNING
                OTE - File #4 GW_PUMPS - 5
B3:0/9        - FEED PUMPS RUNNING
                OTE - File #5 FEED_PUMPS - 3
B3:0/10       - DISCHARGE PUMPS RUNNING
                OTE - File #6 NOT USED - 4
                      File #8 DISCH_PUMP - 3
```

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B3:0/11      - FLOOR SUMP PUMPS RUNNING
               OTE - File #7 SUMP_PUMPS - 4
B3:0/13      - AIR STRIPPER BLOWERS RUNNING
               OTE - File #9 BLOWERS - 5
B3:0/14      - TRAINING GROUNDS ALARM ENABLED
               XIC - File #10 ALARMS - 19
B3:1/0       - GROUNDWATER PUMP 1 IN HAND
               XIC - File #4 GW_PUMPS - 2
B3:1/1       - GROUNDWATER PUMP 2 IN HAND
               XIC - File #4 GW_PUMPS - 3
B3:1/2       - FEED PUMP 1 IN HAND
               XIC - File #5 FEED_PUMPS - 1
B3:1/3       - FEED PUMP 2 IN HAND
               XIC - File #5 FEED_PUMPS - 2
B3:1/4       - DISCHARGE PUMP 1 IN HAND
               XIC - File #6 NOT USED - 1
                     File #8 DISCH_PUMP - 1
B3:1/5       - DISCHARGE PUMP 2 IN HAND
               XIC - File #6 NOT USED - 2
                     File #8 DISCH_PUMP - 2
B3:1/6       - FLOOR SUMP PUMP 1 IN HAND
               XIC - File #7 SUMP_PUMPS - 1
B3:1/7       - FLOOR SUMP PUMP 2 IN HAND
               XIC - File #7 SUMP_PUMPS - 2
B3:1/10      - AIR STRIPPER BLOWER 1 IN HAND
               XIC - File #9 BLOWERS - 1
B3:1/11      - AIR STRIPPER BLOWER 2 IN HAND
               XIC - File #9 BLOWERS - 2
B3:2/0       - GROUNDWATER PUMP 1 IN AUTO
               XIC - File #4 GW_PUMPS - 1, 2
               XIO - File #4 GW_PUMPS - 3
B3:2/1       - GROUNDWATER PUMP 2 IN AUTO
               XIC - File #4 GW_PUMPS - 1, 3
               XIO - File #4 GW_PUMPS - 2
B3:2/2       - FEED PUMP 1 IN AUTO
               XIC - File #5 FEED_PUMPS - 0, 1
               XIO - File #5 FEED_PUMPS - 2
B3:2/3       - FEED PUMP 2 IN AUTO
               XIC - File #5 FEED_PUMPS - 0, 2
               XIO - File #5 FEED_PUMPS - 1
B3:2/4       - DISCHARGE PUMP 1 IN AUTO
               XIC - File #6 NOT USED - 0, 1
                     File #7 SUMP_PUMPS - 0
                     File #8 DISCH_PUMP - 0, 1
               XIO - File #6 NOT USED - 2
                     File #8 DISCH_PUMP - 2
B3:2/5       - DISCHARGE PUMP 2 IN AUTO
               XIC - File #6 NOT USED - 0, 2
                     File #7 SUMP_PUMPS - 0
                     File #8 DISCH_PUMP - 0, 2
               XIO - File #6 NOT USED - 1
                     File #8 DISCH_PUMP - 1
B3:2/6       - FLOOR SUMP PUMP 1 IN AUTO
               XIC - File #7 SUMP_PUMPS - 1
               XIO - File #7 SUMP_PUMPS - 2
B3:2/7       - FLOOR SUMP PUMP 2 IN AUTO
               XIC - File #7 SUMP_PUMPS - 2
               XIO - File #7 SUMP_PUMPS - 1
B3:2/10      - AIR STRIPPER BLOWER 1 IN AUTO
               XIC - File #9 BLOWERS - 0, 1
               XIO - File #9 BLOWERS - 2
B3:2/11      - AIR STRIPPER BLOWER 2 IN AUTO
               XIC - File #9 BLOWERS - 0, 2
               XIO - File #9 BLOWERS - 1
B3:3/0       - FEED TANK HIGH LEVEL ALARM
               OTE - File #10 ALARMS - 0
B3:3/1       - AIR STRIPPER SUMP HIGH LEVEL ALARM
               OTE - File #10 ALARMS - 1
B3:3/3       - FLOOR SUMP HIGH LEVEL ALARM
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                OTE - File #10 ALARMS - 2
B3:3/4        - FIRE TRAINING GROUNDS PUMP STATION ALARM
                OTE - File #10 ALARMS - 19
                XIC - File #2 MAIN - 1
                XIO - File #4 GW_PUMPS - 1
B3:3/5        - 24V POWER SUPPLY FAILURE ALARM
                OTL - File #10 ALARMS - 13
                OTU - File #10 ALARMS - 14
                XIC - File #2 MAIN - 1
                XIO - File #10 ALARMS - 0, 1, 18, 19
B3:3/8        - INFLUENT FLOW METER FAILURE ALARM
                OTE - File #10 ALARMS - 15
B3:3/9        - EFFLUENT FLOW METER FAILURE ALARM
                OTE - File #10 ALARMS - 16
B3:3/10       - FEED TANK ANALOG LEVEL FAILURE ALARM
                OTE - File #10 ALARMS - 17
B3:3/12       - GW TRENCH ANALOG LEVEL FAILURE ALARM
                OTE - File #10 ALARMS - 18
B3:4          - PUMP FAILURE ALARMS
                MOV - File #2 MAIN - 1
B3:4/0        - GROUNDWATER PUMP 1 FAILURE ALARM
                OTL - File #10 ALARMS - 3
                OTU - File #10 ALARMS - 14
                XIC - File #4 GW_PUMPS - 3
                XIO - File #4 GW_PUMPS - 2
B3:4/1        - GROUNDWATER PUMP 2 FAILURE ALARM
                OTL - File #10 ALARMS - 4
                OTU - File #10 ALARMS - 14
                XIC - File #4 GW_PUMPS - 2
                XIO - File #4 GW_PUMPS - 3
B3:4/2        - FEED PUMP 1 FAILURE ALARM
                OTL - File #10 ALARMS - 5
                OTU - File #10 ALARMS - 14
                XIC - File #5 FEED_PUMPS - 2
                XIO - File #5 FEED_PUMPS - 0, 1
B3:4/3        - FEED PUMP 2 FAILURE ALARM
                OTL - File #10 ALARMS - 6
                OTU - File #10 ALARMS - 14
                XIC - File #5 FEED_PUMPS - 1
                XIO - File #5 FEED_PUMPS - 0, 2
B3:4/4        - DISCHARGE PUMP 1 FAILURE ALARM
                OTL - File #10 ALARMS - 7
                OTU - File #10 ALARMS - 14
                XIC - File #6 NOT USED - 2
                      File #8 DISCH_PUMP - 2
                XIO - File #6 NOT USED - 1
                      File #8 DISCH_PUMP - 1
B3:4/5        - DISCHARGE PUMP 2 FAILURE ALARM
                OTL - File #10 ALARMS - 8
                OTU - File #10 ALARMS - 14
                XIC - File #6 NOT USED - 1
                      File #8 DISCH_PUMP - 1
                XIO - File #6 NOT USED - 2
                      File #8 DISCH_PUMP - 2
B3:4/6        - FLOOR SUMP PUMP 1 FAILURE ALARM
                OTL - File #10 ALARMS - 9
                OTU - File #10 ALARMS - 14
                XIC - File #7 SUMP_PUMPS - 2
                XIO - File #7 SUMP_PUMPS - 1
B3:4/7        - FLOOR SUMP PUMP 2 FAILURE ALARM
                OTL - File #10 ALARMS - 10
                OTU - File #10 ALARMS - 14
                XIC - File #7 SUMP_PUMPS - 1
                XIO - File #7 SUMP_PUMPS - 2
B3:4/10       - AIR STRIPPER BLOWER 1 FAILURE ALARM
                OTL - File #10 ALARMS - 11
                OTU - File #10 ALARMS - 14
                XIC - File #9 BLOWERS - 2
                XIO - File #9 BLOWERS - 0, 1
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B3:4/11      - AIR STRIPPER BLOWER 2 FAILURE ALARM
               OTL - File #10 ALARMS - 12
               OTU - File #10 ALARMS - 14
               XIC - File #9 BLOWERS - 1
               XIO - File #9 BLOWERS - 0, 2
B3:5/0       - HOUR TIMER OSR #1
               OSR - File #11 FLOW_TOTAL - 12
B3:5/1       - HOUR TIMER OSR #2
               OSR - File #11 FLOW_TOTAL - 13
B3:5/2       - DAY TIMER OSR
               OSR - File #11 FLOW_TOTAL - 14
B3:5/3       - INFLUENT FLOW TOTALIZER RESET
               XIC - File #11 FLOW_TOTAL - 5
B3:5/4       - EFFLUENT FLOW TOTALIZER RESET
               XIC - File #11 FLOW_TOTAL - 10
T4:0         - {5_SECOND_TMR} CLOCK - FIVE SECOND TIMER
               TON - File #11 FLOW_TOTAL - 0
T4:0/DN      - XIC - File #11 FLOW_TOTAL - 1, 6
               XIO - File #11 FLOW_TOTAL - 0
T4:1         - {1_MINUTE_TMR} CLOCK - MINUTE TIMER
               TON - File #11 FLOW_TOTAL - 0
T4:1/DN      - XIC - File #11 FLOW_TOTAL - 2, 7, 11
               XIO - File #11 FLOW_TOTAL - 0
T4:2         - GROUNDWATER PUMP ON-DELAY TIMER
               TON - File #4 GW_PUMPS - 4
T4:2/TT      - GROUNDWATER PUMP ON-DELAY TIMER TIMING
               XIO - File #4 GW_PUMPS - 2, 3
T4:3         - AIR STRIPPER BLOWER ON-DELAY TIMER
               TON - File #9 BLOWERS - 3
T4:3/TT      - BLOWER ON-DELAY TIMER TIMING
               XIO - File #9 BLOWERS - 0
T4:4         - DISCHARGE PUMP ON-DELAY TIMER
               TON - File #6 NOT USED - 3
T4:4/TT      - DISCHARGE PUMP ON DELAY TIMER TIMING
               XIO - File #6 NOT USED - 1, 2
T4:5         - FLOOR SUMP PUMP ON-DELAY TIMER
               TON - File #7 SUMP_PUMPS - 3
T4:5/TT      - FLOOR SUMP PUMP ON DELAY TIMER TIMING
               XIO - File #7 SUMP_PUMPS - 1, 2
T4:7         - AIR STRIPPER BLOWER OFF-DELAY TIMER
               TON - File #9 BLOWERS - 4
T4:7/TT      - XIC - File #9 BLOWERS - 1, 2
T4:10        - FEED TANK HIGH LEVEL ALARM TIMER
               TON - File #10 ALARMS - 0
T4:10/DN     - FEED TANK LAH TIMER DONE
               XIC - File #10 ALARMS - 0
T4:11        - AIR STRIPPER SUMP HIGH LEVEL ALARM TIMER
               TON - File #10 ALARMS - 1
T4:11/DN     - AIR STRIPPER SUMP LAH TIMER DONE
               XIC - File #10 ALARMS - 1
T4:13        - FLOOR SUMP HIGH LEVEL ALARM TIMER
               TON - File #10 ALARMS - 2
T4:13/DN     - FLOOR SUMP LAH TIMER DONE
               XIC - File #10 ALARMS - 2
T4:19        - TRAINING GROUNDS RF RELAY ALARM TIMER
               TON - File #10 ALARMS - 19
T4:19/DN     - XIC - File #10 ALARMS - 19
T4:20        - GROUNDWATER PUMP 1 FAILURE ALARM TIMER
               TON - File #10 ALARMS - 3
T4:20/DN     - GW PUMP 1 LAH TIMER DONE
               XIC - File #10 ALARMS - 3
T4:21        - GROUNDWATER PUMP 2 FAILURE ALARM TIMER
               TON - File #10 ALARMS - 4
T4:21/DN     - GW PUMP 2 LAH TIMER DONE
               XIC - File #10 ALARMS - 4
T4:22        - FEED PUMP 1 FAILURE ALARM TIMER
               TON - File #10 ALARMS - 5
T4:22/DN     - FEED PUMP 1 LAH TIMER DONE
               XIC - File #10 ALARMS - 5
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T4:23        - FEED PUMP 2 FAILURE ALARM TIMER
                 TON - File #10 ALARMS - 6
T4:23/DN     - FEED PUMP 2 LAH TIMER DONE
                 XIC - File #10 ALARMS - 6
T4:24        - DISCHARGE PUMP 1 FAILURE ALARM TIMER
                 TON - File #10 ALARMS - 7
T4:24/DN     - DISCHARGE PUMP 1 LAH TIMER DONE
                 XIC - File #10 ALARMS - 7
T4:25        - DISCHARGE PUMP 2 FAILURE ALARM TIMER
                 TON - File #10 ALARMS - 8
T4:25/DN     - DISCHARGE PUMP 2 LAH TIMER DONE
                 XIC - File #10 ALARMS - 8
T4:26        - FLOOR SUMP PUMP 1 FAILURE ALARM TIMER
                 TON - File #10 ALARMS - 9
T4:26/DN     - FLOOR SUMP PUMP 1 LAH TIMER DONE
                 XIC - File #10 ALARMS - 9
T4:27        - FLOOR SUMP PUMP 2 FAILURE ALARM TIMER
                 TON - File #10 ALARMS - 10
T4:27/DN     - FLOOR SUMP PUMP 2 LAH TIMER DONE
                 XIC - File #10 ALARMS - 10
T4:30        - AIR STRIPPER BLOWER 1 FAILURE ALARM TIMER
                 TON - File #10 ALARMS - 11
T4:30/DN     - AIR STRIPPER BLOWER 1 LAH TIMER DONE
                 XIC - File #10 ALARMS - 11
T4:31        - AIR STRIPPER BLOWER 2 FAILURE ALARM TIMER
                 TON - File #10 ALARMS - 12
T4:31/DN     - AIR STRIPPER BLOWER 2 LAH TIMER DONE
                 XIC - File #10 ALARMS - 12
T4:32        - 24V POWER SUPPLY FAILURE ALARM TIMER
                 TON - File #10 ALARMS - 13
T4:32/DN     - XIC - File #10 ALARMS - 13
T4:33        - GW PUMP 1 RTM SECOND TIMER
                 TON - File #13 RUN-TIME - 0
T4:33/DN     - GW PUMP 1 RTM SECOND TIMER DONE
                 XIC - File #13 RUN-TIME - 1
                 XIO - File #13 RUN-TIME - 0
T4:34        - GW PUMP 2 RTM SECOND TIMER
                 TON - File #13 RUN-TIME - 7
T4:34/DN     - GW PUMP 2 RTM SECOND TIMER DONE
                 XIC - File #13 RUN-TIME - 8
                 XIO - File #13 RUN-TIME - 7
T4:35        - FEED PUMP 1 RTM SECOND TIMER
                 TON - File #13 RUN-TIME - 14
T4:35/DN     - FEED PUMP 1 RTM SECOND TIMER DONE
                 XIC - File #13 RUN-TIME - 15
                 XIO - File #13 RUN-TIME - 14
T4:36        - FEED PUMP 2 RTM SECOND TIMER
                 TON - File #13 RUN-TIME - 21
T4:36/DN     - FEED PUMP 2 RTM SECOND TIMER DONE
                 XIC - File #13 RUN-TIME - 22
                 XIO - File #13 RUN-TIME - 21
T4:39        - DISCHARGE PUMP 1 RTM SECOND TIMER
                 TON - File #13 RUN-TIME - 28
T4:39/DN     - DISCHARGE PUMP 1 RTM SECOND TIMER DONE
                 XIC - File #13 RUN-TIME - 29
                 XIO - File #13 RUN-TIME - 28
T4:40        - DISCHARGE PUMP 2 RTM SECOND TIMER
                 TON - File #13 RUN-TIME - 35
T4:40/DN     - DISCHARGE PUMP 2 RTM SECOND TIMER DONE
                 XIC - File #13 RUN-TIME - 36
                 XIO - File #13 RUN-TIME - 35
T4:41        - SUMP PUMP 1 RTM SECOND TIMER
                 TON - File #13 RUN-TIME - 42
T4:41/DN     - SUMP PUMP 1 RTM SECOND TIMER DONE
                 XIC - File #13 RUN-TIME - 43
                 XIO - File #13 RUN-TIME - 42
T4:42        - SUMP PUMP 2 RTM SECOND TIMER
                 TON - File #13 RUN-TIME - 49
T4:42/DN     - SUMP PUMP 2 RTM SECOND TIMER DONE
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                XIC - File #13 RUN-TIME - 50
                XIO - File #13 RUN-TIME - 49
T4:43         - BLOWER 1 RTM SECOND TIMER
                TON - File #13 RUN-TIME - 56
T4:43/DN      - BLOWER 1 RTM SECOND TIMER DONE
                XIC - File #13 RUN-TIME - 57
                XIO - File #13 RUN-TIME - 56
T4:44         - BLOWER 2 RTM SECOND TIMER
                TON - File #13 RUN-TIME - 63
T4:44/DN      - BLOWER 2 RTM SECOND TIMER DONE
                XIC - File #13 RUN-TIME - 64
                XIO - File #13 RUN-TIME - 63
C5:0          - INFLUENT FLOW TOTALIZER (1000'S OF GAL)
                CTU - File #11 FLOW_TOTAL - 3
C5:0/DN       - XIC - File #11 FLOW_TOTAL - 4
C5:0.ACC      - MOV - File #11 FLOW_TOTAL - 4, 5
C5:1          - EQUIPMENT ALTERNATION COUNTER
                CTU - File #12 ALTERNATIN - 0
                RES - File #12 ALTERNATIN - 0
C5:1/DN       - XIC - File #12 ALTERNATIN - 0
C5:1.ACC      - EQUIPMENT ALTERNATION COUNTER #
                MOV - File #12 ALTERNATIN - 0
                EQU - File #4 GW_PUMPS - 2, 3
                      File #5 FEED_PUMPS - 1, 2
                      File #6 NOT USED - 1, 2
                      File #7 SUMP_PUMPS - 1, 2
                      File #8 DISCH_PUMP - 1, 2
                      File #9 BLOWERS - 1, 2
                      File #12 ALTERNATIN - 0
C5:2          - EFFLUENT FLOW TOTALIZER (1000'S OF GAL)
                CTU - File #11 FLOW_TOTAL - 8
C5:2/DN       - XIC - File #11 FLOW_TOTAL - 9
C5:2.ACC      - MOV - File #11 FLOW_TOTAL - 9, 10, 14
C5:10         - GW PUMP 1 RTM SECOND COUNTER
                CTU - File #13 RUN-TIME - 1
                RES - File #13 RUN-TIME - 4
C5:10/DN      - GW PUMP 1 RTM SECOND COUNTER DONE
                XIC - File #13 RUN-TIME - 2, 4
C5:11         - GW PUMP 1 RTM MINUTE COUNTER
                CTU - File #13 RUN-TIME - 2
                RES - File #13 RUN-TIME - 5
C5:11/DN      - GW PUMP 1 RTM MINUTE COUNTER DONE
                XIC - File #13 RUN-TIME - 3, 5
C5:11.ACC     - MOV - File #14 PUMP_GPMS - 5
                SUB - File #14 PUMP_GPMS - 2
                GEQ - File #14 PUMP_GPMS - 2, 3
                LES - File #14 PUMP_GPMS - 2, 3
C5:12         - GW PUMP 1 RTM HOUR COUNTER
                CTU - File #13 RUN-TIME - 3
                RES - File #13 RUN-TIME - 6
C5:12/DN      - GW PUMP 1 RTM HOUR COUNTER DONE
                XIC - File #13 RUN-TIME - 6
C5:12.ACC     - MOV - File #14 PUMP_GPMS - 5
                SUB - File #14 PUMP_GPMS - 0
                GEQ - File #14 PUMP_GPMS - 0, 4
C5:13         - GW PUMP 2 RTM SECOND COUNTER
                CTU - File #13 RUN-TIME - 8
                RES - File #13 RUN-TIME - 11
C5:13/DN      - GW PUMP 2 RTM SECOND COUNTER DONE
                XIC - File #13 RUN-TIME - 9, 11
C5:14         - GW PUMP 2 RTM MINUTE COUNTER
                CTU - File #13 RUN-TIME - 9
                RES - File #13 RUN-TIME - 12
C5:14/DN      - GW PUMP 2 RTM MINUTE COUNTER DONE
                XIC - File #13 RUN-TIME - 10, 12
C5:14.ACC     - MOV - File #14 PUMP_GPMS - 5
                SUB - File #14 PUMP_GPMS - 2
                GEQ - File #14 PUMP_GPMS - 2, 3
                LES - File #14 PUMP_GPMS - 2, 3
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C5:15         - GW PUMP 2 RTM HOUR COUNTER
                CTU - File #13 RUN-TIME - 10
                RES - File #13 RUN-TIME - 13
C5:15/DN      - GW PUMP 2 RTM HOUR COUNTER DONE
                XIC - File #13 RUN-TIME - 13
C5:15.ACC     - MOV - File #14 PUMP_GPMS - 5
                SUB - File #14 PUMP_GPMS - 0
                GEQ - File #14 PUMP_GPMS - 0, 4
C5:16         - FEED PUMP 1 RTM SECOND COUNTER
                CTU - File #13 RUN-TIME - 15
                RES - File #13 RUN-TIME - 18
C5:16/DN      - FEED PUMP 1 RTM SECOND COUNTER DONE
                XIC - File #13 RUN-TIME - 16, 18
C5:17         - FEED PUMP 1 RTM MINUTE COUNTER
                CTU - File #13 RUN-TIME - 16
                RES - File #13 RUN-TIME - 19
C5:17/DN      - FEED PUMP 1 RTM MINUTE COUNTER DONE
                XIC - File #13 RUN-TIME - 17, 19
C5:17.ACC     - MOV - File #14 PUMP_GPMS - 5
                SUB - File #14 PUMP_GPMS - 2
                GEQ - File #14 PUMP_GPMS - 2, 3
                LES - File #14 PUMP_GPMS - 2, 3
C5:18         - FEED PUMP 1 RTM HOUR COUNTER
                CTU - File #13 RUN-TIME - 17
                RES - File #13 RUN-TIME - 20
C5:18/DN      - FEED PUMP 1 RTM HOUR COUNTER DONE
                XIC - File #13 RUN-TIME - 20
C5:18.ACC     - MOV - File #14 PUMP_GPMS - 5
                SUB - File #14 PUMP_GPMS - 0
                GEQ - File #14 PUMP_GPMS - 0, 4
C5:19         - FEED PUMP 2 RTM SECOND COUNTER
                CTU - File #13 RUN-TIME - 22
                RES - File #13 RUN-TIME - 25
C5:19/DN      - FEED PUMP 2 RTM SECOND COUNTER DONE
                XIC - File #13 RUN-TIME - 23, 25
C5:20         - FEED PUMP 2 RTM MINUTE COUNTER
                CTU - File #13 RUN-TIME - 23
                RES - File #13 RUN-TIME - 26
C5:20/DN      - FEED PUMP 2 RTM MINUTE COUNTER DONE
                XIC - File #13 RUN-TIME - 24, 26
C5:20.ACC     - MOV - File #14 PUMP_GPMS - 5
                SUB - File #14 PUMP_GPMS - 2
                GEQ - File #14 PUMP_GPMS - 2, 3
                LES - File #14 PUMP_GPMS - 2, 3
C5:21         - FEED PUMP 2 RTM HOUR COUNTER
                CTU - File #13 RUN-TIME - 24
                RES - File #13 RUN-TIME - 27
C5:21/DN      - FEED PUMP 2 RTM HOUR COUNTER DONE
                XIC - File #13 RUN-TIME - 27
C5:21.ACC     - MOV - File #14 PUMP_GPMS - 5
                SUB - File #14 PUMP_GPMS - 0
                GEQ - File #14 PUMP_GPMS - 0, 4
C5:28         - DISCHARGE PUMP 1 RTM SECOND COUNTER
                CTU - File #13 RUN-TIME - 29
                RES - File #13 RUN-TIME - 32
C5:28/DN      - DISCHARGE PUMP 1 RTM SECOND COUNTER DONE
                XIC - File #13 RUN-TIME - 30, 32
C5:29         - DISCHARGE PUMP 1 RTM MINUTE COUNTER
                CTU - File #13 RUN-TIME - 30
                RES - File #13 RUN-TIME - 33
C5:29/DN      - DISCHARGE PUMP 1 RTM MINUTE COUNTER DONE
                XIC - File #13 RUN-TIME - 31, 33
C5:30         - DISCHARGE PUMP 1 RTM HOUR COUNTER
                CTU - File #13 RUN-TIME - 31
                RES - File #13 RUN-TIME - 34
C5:30/DN      - DISCHARGE PUMP 1 RTM HOUR COUNTER DONE
                XIC - File #13 RUN-TIME - 34
C5:31         - DISCHARGE PUMP 2 RTM SECOND COUNTER
                CTU - File #13 RUN-TIME - 36
```

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                RES - File #13 RUN-TIME - 39
C5:31/DN      - DISCHARGE PUMP 2 RTM SECOND COUNTER DONE
                XIC - File #13 RUN-TIME - 37, 39
C5:32         - DISCHARGE PUMP 2 RTM MINUTE COUNTER
                CTU - File #13 RUN-TIME - 37
                RES - File #13 RUN-TIME - 40
C5:32/DN      - DISCHARGE PUMP 2 RTM MINUTE COUNTER DONE
                XIC - File #13 RUN-TIME - 38, 40
C5:33         - DISCHARGE PUMP 2 RTM HOUR COUNTER
                CTU - File #13 RUN-TIME - 38
                RES - File #13 RUN-TIME - 41
C5:33/DN      - DISCHARGE PUMP 2 RTM HOUR COUNTER DONE
                XIC - File #13 RUN-TIME - 41
C5:34         - SUMP PUMP 1 RTM SECOND COUNTER
                CTU - File #13 RUN-TIME - 43
                RES - File #13 RUN-TIME - 46
C5:34/DN      - SUMP PUMP 1 RTM SECOND COUNTER DONE
                XIC - File #13 RUN-TIME - 44, 46
C5:35         - SUMP PUMP 1 RTM MINUTE COUNTER
                CTU - File #13 RUN-TIME - 44
                RES - File #13 RUN-TIME - 47
C5:35/DN      - SUMP PUMP 1 RTM MINUTE COUNTER DONE
                XIC - File #13 RUN-TIME - 45, 47
C5:35.ACC     - MOV - File #14 PUMP_GPMS - 5
                SUB - File #14 PUMP_GPMS - 2
                GEQ - File #14 PUMP_GPMS - 2, 3
                LES - File #14 PUMP_GPMS - 2, 3
C5:36         - SUMP PUMP 1 RTM HOUR COUNTER
                CTU - File #13 RUN-TIME - 45
                RES - File #13 RUN-TIME - 48
C5:36/DN      - SUMP PUMP 1 RTM HOUR COUNTER DONE
                XIC - File #13 RUN-TIME - 48
C5:36.ACC     - MOV - File #14 PUMP_GPMS - 5
                SUB - File #14 PUMP_GPMS - 0
                GEQ - File #14 PUMP_GPMS - 0
C5:37         - SUMP PUMP 2 RTM SECOND COUNTER
                CTU - File #13 RUN-TIME - 50
                RES - File #13 RUN-TIME - 53
C5:37/DN      - SUMP PUMP 2 RTM SECOND COUNTER DONE
                XIC - File #13 RUN-TIME - 51, 53
C5:38         - SUMP PUMP 2 RTM MINUTE COUNTER
                CTU - File #13 RUN-TIME - 51
                RES - File #13 RUN-TIME - 54
C5:38/DN      - SUMP PUMP 2 RTM MINUTE COUNTER DONE
                XIC - File #13 RUN-TIME - 52, 54
C5:38.ACC     - MOV - File #14 PUMP_GPMS - 5
                SUB - File #14 PUMP_GPMS - 2
                GEQ - File #14 PUMP_GPMS - 2, 3
                LES - File #14 PUMP_GPMS - 2, 3
C5:39         - SUMP PUMP 2 RTM HOUR COUNTER
                CTU - File #13 RUN-TIME - 52
                RES - File #13 RUN-TIME - 55
C5:39/DN      - SUMP PUMP 2 RTM HOUR COUNTER DONE
                XIC - File #13 RUN-TIME - 55
C5:39.ACC     - MOV - File #14 PUMP_GPMS - 5
                SUB - File #14 PUMP_GPMS - 0
                GEQ - File #14 PUMP_GPMS - 0
C5:40         - BLOWER 1 RTM SECOND COUNTER
                CTU - File #13 RUN-TIME - 57
                RES - File #13 RUN-TIME - 60
C5:40/DN      - BLOWER 1 RTM SECOND COUNTER DONE
                XIC - File #13 RUN-TIME - 58, 60
C5:41         - BLOWER 1 RTM MINUTE COUNTER
                CTU - File #13 RUN-TIME - 58
                RES - File #13 RUN-TIME - 61
C5:41/DN      - BLOWER 1 RTM MINUTE COUNTER DONE
                XIC - File #13 RUN-TIME - 59, 61
C5:42         - BLOWER 1 RTM HOUR COUNTER
                CTU - File #13 RUN-TIME - 59
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                RES - File #13 RUN-TIME - 62
C5:42/DN      - BLOWER 1 RTM HOUR COUNTER DONE
                XIC - File #13 RUN-TIME - 62
C5:43         - BLOWER 2 RTM SECOND COUNTER
                CTU - File #13 RUN-TIME - 64
                RES - File #13 RUN-TIME - 67
C5:43/DN      - BLOWER 2 RTM SECOND COUNTER DONE
                XIC - File #13 RUN-TIME - 65, 67
C5:44         - BLOWER 2 RTM MINUTE COUNTER
                CTU - File #13 RUN-TIME - 65
                RES - File #13 RUN-TIME - 68
C5:44/DN      - BLOWER 2 RTM MINUTE COUNTER DONE
                XIC - File #13 RUN-TIME - 66, 68
C5:45         - BLOWER 2 RTM HOUR COUNTER
                CTU - File #13 RUN-TIME - 66
                RES - File #13 RUN-TIME - 69
C5:45/DN      - BLOWER 2 RTM HOUR COUNTER DONE
                XIC - File #13 RUN-TIME - 69
N7:0          - {SCALED_INFLUENT} INFLUENT FLOW RATE (GPM*10)
                MOV - File #3 ANALOG_IN - 0
                ADD - File #11 FLOW_TOTAL - 1
                SCL - File #3 ANALOG_IN - 0
N7:1          - {SCALED_EFFLUENT} EFFLUENT FLOW RATE (GPM*10)
                MOV - File #3 ANALOG_IN - 1
                      File #14 PUMP_GPMS - 6
                ADD - File #11 FLOW_TOTAL - 6
                SCL - File #3 ANALOG_IN - 1
N7:2          - INFLUENT FLOW TOTALIZER (GAL)
                MOV - File #11 FLOW_TOTAL - 3, 5
                ADD - File #11 FLOW_TOTAL - 2
                GEQ - File #11 FLOW_TOTAL - 3
N7:3          - EFFLUENT FLOW TOTALIZER (GAL)
                MOV - File #11 FLOW_TOTAL - 8, 10, 14
                ADD - File #11 FLOW_TOTAL - 7
                GEQ - File #11 FLOW_TOTAL - 8
N7:4          - GROUNDWATER SUMP LEVEL (FEET*100)
                MOV - File #3 ANALOG_IN - 4
                SCL - File #3 ANALOG_IN - 4
                GEQ - File #4 GW_PUMPS - 1
N7:5          - FEED TANK LEVEL (FEET*100)
                MOV - File #3 ANALOG_IN - 2
                SCL - File #3 ANALOG_IN - 2
                GRT - File #5 FEED_PUMPS - 0
                GEQ - File #5 FEED_PUMPS - 0
                      File #10 ALARMS - 0
                LEQ - File #4 GW_PUMPS - 1
N7:6          - DISCHARGE TANK LEVEL (FT*100)
                MOV - File #3 ANALOG_IN - 3
                SCL - File #3 ANALOG_IN - 3
                GEQ - File #6 NOT USED - 0
                LES - File #6 NOT USED - 3
N7:7          - INDOOR AIR TEMP (DEG*10)
                SCL - File #3 ANALOG_IN - 5
N7:10         - INFLUENT FLOW RATE MINUTE TOTALIZER
                MOV - File #11 FLOW_TOTAL - 2
                ADD - File #11 FLOW_TOTAL - 1
                DIV - File #11 FLOW_TOTAL - 2
N7:11         - EFFLUENT FLOW RATE MINUTE TOTALIZER
                MOV - File #11 FLOW_TOTAL - 7
                ADD - File #11 FLOW_TOTAL - 6
                DIV - File #11 FLOW_TOTAL - 7
N7:12         - INFLUENT FLOW TOTALIZER - AVG GPM OVER PRIOR MINUTE
                ADD - File #11 FLOW_TOTAL - 2
                DIV - File #11 FLOW_TOTAL - 2
N7:13         - EFFLUENT FLOW TOTALIZER - AVG GPM OVER PRIOR MINUTE
                ADD - File #11 FLOW_TOTAL - 7, 11
                DIV - File #11 FLOW_TOTAL - 7
N7:14         - EFFLUENT FLOW CURRENT HOUR RUNNING TOTAL (GAL)
                MOV - File #11 FLOW_TOTAL - 13
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                ADD - File #11 FLOW_TOTAL - 11
                DIV - File #11 FLOW_TOTAL - 12
    N7:15       - EFFLUENT FLOW PREVIOUS HOUR TOTAL (10'S GALS)
                ADD - File #11 FLOW_TOTAL - 13
                DIV - File #11 FLOW_TOTAL - 12
    N7:16       - EFFLUENT FLOW CURRENT DAY RUNNING TOTAL (10'S GALS)
                MOV - File #11 FLOW_TOTAL - 14
                ADD - File #11 FLOW_TOTAL - 13
    N7:30       - GW LEVEL USER SETPOINT (FT*100) (PUMP ON)
                SUB - File #4 GW_PUMPS - 0
                GEQ - File #4 GW_PUMPS - 1
    N7:31       - GW LEVEL USER SETPOINT (FT*100) (PUMP OFF)
                MOV - File #4 GW_PUMPS - 0
                GEQ - File #4 GW_PUMPS - 1
                LES - File #4 GW_PUMPS - 0
    N7:32       - GW LEVEL REFERENCE PUMP OFF (FEET*100) (PUMP ON MINUS 20)
                MOV - File #4 GW_PUMPS - 0
                SUB - File #4 GW_PUMPS - 0
                LES - File #4 GW_PUMPS - 0
    F8:0        - GW P1 DAILY FLOWRATE (10'S GPM'S)
                MUL - File #14 PUMP_GPMS - 4
                DIV - File #14 PUMP_GPMS - 4
    F8:1        - GW P2 DAILY FLOWRATE (10'S GPM'S)
                MUL - File #14 PUMP_GPMS - 4
                DIV - File #14 PUMP_GPMS - 4
    F8:2        - FEED P1 DAILY FLOWRATE (10'S GPM'S)
                MUL - File #14 PUMP_GPMS - 4
                DIV - File #14 PUMP_GPMS - 4
    F8:3        - FEED P2 DAILY FLOWRATE (10'S GPM'S)
                MUL - File #14 PUMP_GPMS - 4
                DIV - File #14 PUMP_GPMS - 4
    N9:0        - GW P1 RTM MIN YESTERDAY
                MOV - File #14 PUMP_GPMS - 5
                SUB - File #14 PUMP_GPMS - 2
                GEQ - File #14 PUMP_GPMS - 2, 3
                LES - File #14 PUMP_GPMS - 2, 3
    N9:1        - GW P1 RTM HR YESTERDAY
                MOV - File #14 PUMP_GPMS - 5
                SUB - File #14 PUMP_GPMS - 0
                GEQ - File #14 PUMP_GPMS - 0, 4
    N9:2        - GW P2 RTM MIN YESTERDAY
                MOV - File #14 PUMP_GPMS - 5
                SUB - File #14 PUMP_GPMS - 2
                GEQ - File #14 PUMP_GPMS - 2, 3
                LES - File #14 PUMP_GPMS - 2, 3
    N9:3        - GW P2 RTM HR YESTERDAY
                MOV - File #14 PUMP_GPMS - 5
                SUB - File #14 PUMP_GPMS - 0
                GEQ - File #14 PUMP_GPMS - 0, 4
    N9:4        - FEED P1 RTM MIN YESTERDAY
                MOV - File #14 PUMP_GPMS - 5
                SUB - File #14 PUMP_GPMS - 2
                GEQ - File #14 PUMP_GPMS - 2, 3
                LES - File #14 PUMP_GPMS - 2, 3
    N9:5        - FEED P1 RTM HR YESTERDAY
                MOV - File #14 PUMP_GPMS - 5
                SUB - File #14 PUMP_GPMS - 0
                GEQ - File #14 PUMP_GPMS - 0, 4
    N9:6        - FEED P2 RTM MIN YESTERDAY
                MOV - File #14 PUMP_GPMS - 5
                SUB - File #14 PUMP_GPMS - 2
                GEQ - File #14 PUMP_GPMS - 2, 3
                LES - File #14 PUMP_GPMS - 2, 3
    N9:7        - FEED P2 RTM HR YESTERDAY
                MOV - File #14 PUMP_GPMS - 5
                SUB - File #14 PUMP_GPMS - 0
                GEQ - File #14 PUMP_GPMS - 0, 4
    N9:16       - SUMP P1 RTM MIN YESTERDAY
                MOV - File #14 PUMP_GPMS - 5
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                SUB - File #14 PUMP_GPMS - 2
                GEQ - File #14 PUMP_GPMS - 2, 3
                LES - File #14 PUMP_GPMS - 2, 3
    N9:17       - SUMP P1 RTM HR YESTERDAY
                MOV - File #14 PUMP_GPMS - 5
                SUB - File #14 PUMP_GPMS - 0
                GEQ - File #14 PUMP_GPMS - 0
    N9:18       - SUMP P2 RTM MIN YESTERDAY
                MOV - File #14 PUMP_GPMS - 5
                SUB - File #14 PUMP_GPMS - 2
                GEQ - File #14 PUMP_GPMS - 2, 3
                LES - File #14 PUMP_GPMS - 2, 3
    N9:19       - SUMP P2 RTM HR YESTERDAY
                MOV - File #14 PUMP_GPMS - 5
                SUB - File #14 PUMP_GPMS - 0
                GEQ - File #14 PUMP_GPMS - 0
    N9:20       - GW P1 YESTERDAY RUN TIME (MIN)
                ADD - File #14 PUMP_GPMS - 3
                SUB - File #14 PUMP_GPMS - 3
                DIV - File #14 PUMP_GPMS - 4
                LEQ - File #14 PUMP_GPMS - 4
    N9:21       - GW P2 YESTERDAY RUN TIME (MIN)
                ADD - File #14 PUMP_GPMS - 3
                SUB - File #14 PUMP_GPMS - 3
                DIV - File #14 PUMP_GPMS - 4
                LEQ - File #14 PUMP_GPMS - 4
    N9:22       - FEED P1 YESTERDAY RUN TIME (MIN)
                ADD - File #14 PUMP_GPMS - 3
                SUB - File #14 PUMP_GPMS - 3
                DIV - File #14 PUMP_GPMS - 4
                LEQ - File #14 PUMP_GPMS - 4
    N9:23       - FEED P2 YESTERDAY RUN TIME (MIN)
                ADD - File #14 PUMP_GPMS - 3
                SUB - File #14 PUMP_GPMS - 3
                DIV - File #14 PUMP_GPMS - 4
                LEQ - File #14 PUMP_GPMS - 4
    N9:28       - SUMP P1 YESTERDAY RUN TIME (MIN)
                ADD - File #14 PUMP_GPMS - 3
                SUB - File #14 PUMP_GPMS - 3
                LEQ - File #14 PUMP_GPMS - 4
    N9:29       - SUMP P2 YESTERDAY RUN TIME (MIN)
                ADD - File #14 PUMP_GPMS - 3
                SUB - File #14 PUMP_GPMS - 3
                LEQ - File #14 PUMP_GPMS - 4
    N9:30       - GW P1 FLOW RATE YESTERDAY (GPM*10)
                MUL - File #14 PUMP_GPMS - 4
    N9:31       - GW P2 FLOW RATE YESTERDAY (GPM*10)
                MUL - File #14 PUMP_GPMS - 4
    N9:32       - FEED P1 FLOW RATE YESTERDAY (GPM*10)
                MUL - File #14 PUMP_GPMS - 4
    N9:33       - FEED P2 FLOW RATE YESTERDAY (GPM*10)
                MUL - File #14 PUMP_GPMS - 4
    N9:36       - DISCHARGE P1 FLOW RATE (GPM*10)
                MOV - File #14 PUMP_GPMS - 6
    N9:37       - DISCHARGE P2 FLOW RATE (GPM*10)
                MOV - File #14 PUMP_GPMS - 6
    N9:40       - GW P1 RTM HOUR MIN'S
                ADD - File #14 PUMP_GPMS - 3
                SUB - File #14 PUMP_GPMS - 3
                MUL - File #14 PUMP_GPMS - 1
    N9:41       - GW P2 RTM HOUR MIN'S
                ADD - File #14 PUMP_GPMS - 3
                SUB - File #14 PUMP_GPMS - 3
                MUL - File #14 PUMP_GPMS - 1
    N9:42       - FEED P1 RTM HOUR MIN'S
                ADD - File #14 PUMP_GPMS - 3
                SUB - File #14 PUMP_GPMS - 3
                MUL - File #14 PUMP_GPMS - 1
    N9:43       - FEED P2 RTM HOUR MIN'S
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                ADD - File #14 PUMP_GPMS - 3
                SUB - File #14 PUMP_GPMS - 3
                MUL - File #14 PUMP_GPMS - 1
    N9:48       - SUMP P1 RTM HOUR MIN'S
                ADD - File #14 PUMP_GPMS - 3
                SUB - File #14 PUMP_GPMS - 3
                MUL - File #14 PUMP_GPMS - 1
    N9:49       - SUMP P2 RTM HOUR MIN'S
                ADD - File #14 PUMP_GPMS - 3
                SUB - File #14 PUMP_GPMS - 3
                MUL - File #14 PUMP_GPMS - 1
    N9:50       - GW P1 RTM MIN MIN'S
                ADD - File #14 PUMP_GPMS - 3
                SUB - File #14 PUMP_GPMS - 2, 3
    N9:51       - GW P2 RTM MIN MIN'S
                ADD - File #14 PUMP_GPMS - 3
                SUB - File #14 PUMP_GPMS - 2, 3
    N9:52       - FEED P1 RTM MIN MIN'S
                ADD - File #14 PUMP_GPMS - 3
                SUB - File #14 PUMP_GPMS - 2, 3
    N9:53       - FEED P2 RTM MIN MIN'S
                ADD - File #14 PUMP_GPMS - 3
                SUB - File #14 PUMP_GPMS - 2, 3
    N9:58       - SUMP P1 RTM MIN MIN'S
                ADD - File #14 PUMP_GPMS - 3
                SUB - File #14 PUMP_GPMS - 2, 3
    N9:59       - SUMP P2 RTM MIN MIN'S
                ADD - File #14 PUMP_GPMS - 3
                SUB - File #14 PUMP_GPMS - 2, 3
    N9:60       - GW P1 HR RUN YESTERDAY
                SUB - File #14 PUMP_GPMS - 0
                MUL - File #14 PUMP_GPMS - 1
    N9:61       - GW P2 HR RUN YESTERDAY
                SUB - File #14 PUMP_GPMS - 0
                MUL - File #14 PUMP_GPMS - 1
    N9:62       - FEED P1 HR RUN YESTERDAY
                SUB - File #14 PUMP_GPMS - 0
                MUL - File #14 PUMP_GPMS - 1
    N9:63       - FEED P2 HR RUN YESTERDAY
                SUB - File #14 PUMP_GPMS - 0
                MUL - File #14 PUMP_GPMS - 1
    N9:68       - SUMP P1 HR RUN YESTERDAY
                SUB - File #14 PUMP_GPMS - 0
                MUL - File #14 PUMP_GPMS - 1
    N9:69       - SUMP P2 HR RUN YESTERDAY
                SUB - File #14 PUMP_GPMS - 0
                MUL - File #14 PUMP_GPMS - 1
    N10:0       - CLOCK HOUR INPUT
                MOV - File #15 CLOCK_SET - 0
                NEQ - File #15 CLOCK_SET - 0
    N10:1       - CLOCK HOUR (LAST INPUT)
                MOV - File #15 CLOCK_SET - 0
                NEQ - File #15 CLOCK_SET - 0
    N10:2       - CLOCK MINUTE INPUT
                MOV - File #15 CLOCK_SET - 1
                NEQ - File #15 CLOCK_SET - 1
    N10:3       - CLOCK MINUTE (LAST INPUT)
                MOV - File #15 CLOCK_SET - 1
                NEQ - File #15 CLOCK_SET - 1
    N10:4       - CLOCK MONTH INPUT
                MOV - File #15 CLOCK_SET - 2
                NEQ - File #15 CLOCK_SET - 2
    N10:5       - CLOCK MONTH (LAST INPUT)
                MOV - File #15 CLOCK_SET - 2
                NEQ - File #15 CLOCK_SET - 2
    N10:6       - CLOCK DAY INPUT
                MOV - File #15 CLOCK_SET - 3
                NEQ - File #15 CLOCK_SET - 3
    N10:7       - CLOCK DAY (LAST INPUT)
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                MOV - File #15 CLOCK_SET - 3
                NEQ - File #15 CLOCK_SET - 3
    N10:8       - CLOCK YEAR INPUT
                MOV - File #15 CLOCK_SET - 4
                NEQ - File #15 CLOCK_SET - 4
    N10:9       - CLOCK YEAR (LAST INPUT)
                MOV - File #15 CLOCK_SET - 4
                NEQ - File #15 CLOCK_SET - 4
    N11:0       - DAY 1 HISTORICAL FLOW (10'S GALS)
                MOV - File #11 FLOW_TOTAL - 14, 15
                DIV - File #14 PUMP_GPMS - 4
    N11:1       - DAY 1 HISTORICAL FLOW DATE (MONTH)
                MOV - File #11 FLOW_TOTAL - 14, 15
    N11:2       - DAY 1 HISTORICAL FLOW DATE (DAY)
                MOV - File #11 FLOW_TOTAL - 14, 15
    N11:3       - DAY 1 HISTORICAL FLOW TOTALIZER READING (1000'S)
                MOV - File #11 FLOW_TOTAL - 14, 15
    N11:4       - DAY 1 HISTORICAL FLOW TOTALIZER READING (100'S)
                MOV - File #11 FLOW_TOTAL - 14, 15
    N11:5       - DAY 2 HISTORICAL FLOW (10'S GALS)
                MOV - File #11 FLOW_TOTAL - 15, 16
    N11:6       - DAY 2 HISTORICAL FLOW DATE (MONTH)
                MOV - File #11 FLOW_TOTAL - 15, 16
    N11:7       - DAY 2 HISTORICAL FLOW DATE (DAY)
                MOV - File #11 FLOW_TOTAL - 15, 16
    N11:8       - DAY 2 HISTORICAL FLOW TOTALIZER READING (1000'S)
                MOV - File #11 FLOW_TOTAL - 15, 16
    N11:9       - DAY 2 HISTORICAL FLOW TOTALIZER READING (100'S)
                MOV - File #11 FLOW_TOTAL - 15, 16
    N11:10      - DAY 3 HISTORICAL FLOW (10'S GALS)
                MOV - File #11 FLOW_TOTAL - 16, 17
    N11:11      - DAY 3 HISTORICAL FLOW DATE (MONTH)
                MOV - File #11 FLOW_TOTAL - 16, 17
    N11:12      - DAY 3 HISTORICAL FLOW DATE (DAY)
                MOV - File #11 FLOW_TOTAL - 16, 17
    N11:13      - DAY 3 HISTORICAL FLOW TOTALIZER READING (1000'S)
                MOV - File #11 FLOW_TOTAL - 16, 17
    N11:14      - DAY 3 HISTORICAL FLOW TOTALIZER READING (100'S)
                MOV - File #11 FLOW_TOTAL - 16, 17
    N11:15      - DAY 4 HISTORICAL FLOW (10'S GALS)
                MOV - File #11 FLOW_TOTAL - 17, 18
    N11:16      - DAY 4 HISTORICAL FLOW DATE (MONTH)
                MOV - File #11 FLOW_TOTAL - 17, 18
    N11:17      - DAY 4 HISTORICAL FLOW DATE (DAY)
                MOV - File #11 FLOW_TOTAL - 17, 18
    N11:18      - DAY 4 HISTORICAL FLOW TOTALIZER READING (1000'S)
                MOV - File #11 FLOW_TOTAL - 17, 18
    N11:19      - DAY 4 HISTORICAL FLOW TOTALIZER READING (100'S)
                MOV - File #11 FLOW_TOTAL - 17, 18
    N11:20      - DAY 5 HISTORICAL FLOW (10'S GALS)
                MOV - File #11 FLOW_TOTAL - 18, 19
    N11:21      - DAY 5 HISTORICAL FLOW DATE (MONTH)
                MOV - File #11 FLOW_TOTAL - 18, 19
    N11:22      - DAY 5 HISTORICAL FLOW DATE (DAY)
                MOV - File #11 FLOW_TOTAL - 18, 19
    N11:23      - DAY 5 HISTORICAL FLOW TOTALIZER READING (1000'S)
                MOV - File #11 FLOW_TOTAL - 18, 19
    N11:24      - DAY 5 HISTORICAL FLOW TOTALIZER READING (100'S)
                MOV - File #11 FLOW_TOTAL - 18, 19
    N11:25      - DAY 6 HISTORICAL FLOW (10'S GALS)
                MOV - File #11 FLOW_TOTAL - 19, 20
    N11:26      - DAY 6 HISTORICAL FLOW DATE (MONTH)
                MOV - File #11 FLOW_TOTAL - 19, 20
    N11:27      - DAY 6 HISTORICAL FLOW DATE (DAY)
                MOV - File #11 FLOW_TOTAL - 19, 20
    N11:28      - DAY 6 HISTORICAL FLOW TOTALIZER READING (1000'S)
                MOV - File #11 FLOW_TOTAL - 19, 20
    N11:29      - DAY 6 HISTORICAL FLOW TOTALIZER READING (100'S)
                MOV - File #11 FLOW_TOTAL - 19, 20
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N11:30       - DAY 7 HISTORICAL FLOW (10'S GALS)
                 MOV - File #11 FLOW_TOTAL - 20, 21
N11:31       - DAY 7 HISTORICAL FLOW DATE (MONTH)
                 MOV - File #11 FLOW_TOTAL - 20, 21
N11:32       - DAY 7 HISTORICAL FLOW DATE (DAY)
                 MOV - File #11 FLOW_TOTAL - 20, 21
N11:33       - DAY 7 HISTORICAL FLOW TOTALIZER READING (1000'S)
                 MOV - File #11 FLOW_TOTAL - 20, 21
N11:34       - DAY 7 HISTORICAL FLOW TOTALIZER READING (100'S)
                 MOV - File #11 FLOW_TOTAL - 20, 21
N11:35       - DAY 8 HISTORICAL FLOW (10'S GALS)
                 MOV - File #11 FLOW_TOTAL - 21, 22
N11:36       - DAY 8 HISTORICAL FLOW DATE (MONTH)
                 MOV - File #11 FLOW_TOTAL - 21, 22
N11:37       - DAY 8 HISTORICAL FLOW DATE (DAY)
                 MOV - File #11 FLOW_TOTAL - 21, 22
N11:38       - DAY 8 HISTORICAL FLOW TOTALIZER READING (1000'S)
                 MOV - File #11 FLOW_TOTAL - 21, 22
N11:39       - DAY 8 HISTORICAL FLOW TOTALIZER READING (100'S)
                 MOV - File #11 FLOW_TOTAL - 21, 22
N11:40       - DAY 9 HISTORICAL FLOW (10'S GALS)
                 MOV - File #11 FLOW_TOTAL - 22, 23
N11:41       - DAY 9 HISTORICAL FLOW DATE (MONTH)
                 MOV - File #11 FLOW_TOTAL - 22, 23
N11:42       - DAY 9 HISTORICAL FLOW DATE (DAY)
                 MOV - File #11 FLOW_TOTAL - 22, 23
N11:43       - DAY 9 HISTORICAL FLOW TOTALIZER READING (1000'S)
                 MOV - File #11 FLOW_TOTAL - 22, 23
N11:44       - DAY 9 HISTORICAL FLOW TOTALIZER READING (100'S)
                 MOV - File #11 FLOW_TOTAL - 22, 23
N11:45       - DAY 10 HISTORICAL FLOW (10'S GALS)
                 MOV - File #11 FLOW_TOTAL - 23, 24
N11:46       - DAY 10 HISTORICAL FLOW DATE (MONTH)
                 MOV - File #11 FLOW_TOTAL - 23, 24
N11:47       - DAY 10 HISTORICAL FLOW DATE (DAY)
                 MOV - File #11 FLOW_TOTAL - 23, 24
N11:48       - DAY 10 HISTORICAL FLOW TOTALIZER READING (1000'S)
                 MOV - File #11 FLOW_TOTAL - 23, 24
N11:49       - DAY 10 HISTORICAL FLOW TOTALIZER READING (100'S)
                 MOV - File #11 FLOW_TOTAL - 23, 24
N11:50       - DAY 11 HISTORICAL FLOW (10'S GALS)
                 MOV - File #11 FLOW_TOTAL - 24, 25
N11:51       - DAY 11 HISTORICAL FLOW DATE (MONTH)
                 MOV - File #11 FLOW_TOTAL - 24, 25
N11:52       - DAY 11 HISTORICAL FLOW DATE (DAY)
                 MOV - File #11 FLOW_TOTAL - 24, 25
N11:53       - DAY 11 HISTORICAL FLOW TOTALIZER READING (1000'S)
                 MOV - File #11 FLOW_TOTAL - 24, 25
N11:54       - DAY 11 HISTORICAL FLOW TOTALIZER READING (100'S)
                 MOV - File #11 FLOW_TOTAL - 24, 25
N11:55       - DAY 12 HISTORICAL FLOW (10'S GALS)
                 MOV - File #11 FLOW_TOTAL - 25, 26
N11:56       - DAY 12 HISTORICAL FLOW DATE (MONTH)
                 MOV - File #11 FLOW_TOTAL - 25, 26
N11:57       - DAY 12 HISTORICAL FLOW DATE (DAY)
                 MOV - File #11 FLOW_TOTAL - 25, 26
N11:58       - DAY 12 HISTORICAL FLOW TOTALIZER READING (1000'S)
                 MOV - File #11 FLOW_TOTAL - 25, 26
N11:59       - DAY 12 HISTORICAL FLOW TOTALIZER READING (100'S)
                 MOV - File #11 FLOW_TOTAL - 25, 26
N11:60       - DAY 13 HISTORICAL FLOW (10'S GALS)
                 MOV - File #11 FLOW_TOTAL - 26, 27
N11:61       - DAY 13 HISTORICAL FLOW DATE (MONTH)
                 MOV - File #11 FLOW_TOTAL - 26, 27
N11:62       - DAY 13 HISTORICAL FLOW DATE (DAY)
                 MOV - File #11 FLOW_TOTAL - 26, 27
N11:63       - DAY 13 HISTORICAL FLOW TOTALIZER READING (1000'S)
                 MOV - File #11 FLOW_TOTAL - 26, 27
N11:64       - DAY 13 HISTORICAL FLOW TOTALIZER READING (100'S)
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                MOV - File #11 FLOW_TOTAL - 26, 27
N11:65        - DAY 14 HISTORICAL FLOW (10'S GALS)
                MOV - File #11 FLOW_TOTAL - 27
N11:66        - DAY 14 HISTORICAL FLOW DATE (MONTH)
                MOV - File #11 FLOW_TOTAL - 27
N11:67        - DAY 14 HISTORICAL FLOW DATE (DAY)
                MOV - File #11 FLOW_TOTAL - 27
N11:68        - DAY 14 HISTORICAL FLOW TOTALIZER READING (1000'S)
                MOV - File #11 FLOW_TOTAL - 27
N11:69        - DAY 14 HISTORICAL FLOW TOTALIZER READING (100'S)
                MOV - File #11 FLOW_TOTAL - 27
U:3           - ANALOG INPUT
                JSR - File #2 MAIN - 0
U:4           - GROUNDWATER PUMPS
                JSR - File #2 MAIN - 0
U:5           - FEED PUMPS
                JSR - File #2 MAIN - 0
U:7           - SUMP PUMPS
                JSR - File #2 MAIN - 0
U:8           - STRIPPER PUMPS
                JSR - File #2 MAIN - 0
U:9           - STRIPPER BLOWERS
                JSR - File #2 MAIN - 0
U:10          - ALARMS
                JSR - File #2 MAIN - 0
U:11          - FLOW TOTALIZER
                JSR - File #2 MAIN - 0
U:12          - ALTERNATION LOGIC
                JSR - File #2 MAIN - 0
U:13          - RUN-TIME METERS
                JSR - File #2 MAIN - 0
U:14          - PUMP GPM LOGIC
                JSR - File #2 MAIN - 0
U:15          - HMI PANEL CLOCK CHANGE
                JSR - File #2 MAIN - 0
```

Data File O0 -- OUTPUT Usage

Offset	FW	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
O:4.0	W	.	.	.	.	.	.	X	X	X	X	X	X	X	X	X	X	1746-OW16 - 16-Output (RLY) 240 VAC
O:6.0		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1746-NIO4I - Analog 2 Ch In/2 Ch Cu
O:6.1		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1746-NIO4I - Analog 2 Ch In/2 Ch Cu

Data File I1 -- INPUT Usage

Offset	FW	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
I:2.0		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1746-IN16 - 16-Input (SINK) 24VAC/D
I:3.0		.	.	.	.	.	.	.	.	X	X	X	.	.	.	X	X	1746-IN16 - 16-Input (SINK) 24VAC/D
I:5.0	W	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1746-NI4 - Analog 4 Channel Input
I:5.1	W	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1746-NI4 - Analog 4 Channel Input
I:5.2	W	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1746-NI4 - Analog 4 Channel Input
I:5.3	W	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1746-NI4 - Analog 4 Channel Input
I:6.0	W	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1746-NIO4I - Analog 2 Ch In/2 Ch Cu
I:6.1	W	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1746-NIO4I - Analog 2 Ch In/2 Ch Cu

Data File S2 -- STATUS Usage

Offset	0	1	2	3	4	5	6	7	8	9
S:0	.	.	.	.	.	X	.	.	.	.
S:10	.	.	.	.	.	.	.	.	.	.
S:20	.	.	.	.	.	.	.	.	.	.
S:30	.	.	.	.	.	.	.	X	X	X
S:40	X	X	X	.	.	.	.	.	.	.
S:50	.	.	.	.	.	.	.	.	.	.
S:60	.	.	.	.	.	.	.	.	.	.
S:70	.	.	.	.	.	.	.	.	.	.
S:80	.	.	.							

Data File B3 -- BINARY Usage

Offset	FW	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	(Symbol) Description
B3:0		.	X	X	.	X	X	X	X	X	X	X	.	X	X	X	X	
B3:1		.	.	.	.	X	X	.	.	X	X	X	X	X	X	X	X	
B3:2		.	.	.	.	X	X	.	.	X	X	X	X	X	X	X	X	
B3:3		.	.	.	X	.	X	X	X	.	.	X	X	X	.	X	X	
B3:4	W	.	.	.	.	X	X	.	.	X	X	X	X	X	X	X	X	PUMP FAILURE ALARMS
B3:5		.	.	.	.	.	.	.	.	.	.	.	X	X	X	X	X	
B3:6		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	

Data File T4 -- TIMER Usage

Offset	FW	EN	TT	DN	BASE	PRE	ACC	(Symbol) Description
T4:0	W	.	.	X	.	.	.	(5_SECOND_TMR) CLOCK - FIVE SECOND TIMER
T4:1	W	.	.	X	.	.	.	(1_MINUTE_TMR) CLOCK - MINUTE TIMER
T4:2	W	.	X	.	.	.	.	GROUNDWATER PUMP ON-DELAY TIMER
T4:3	W	.	X	.	.	.	.	AIR STRIPPER BLOWER ON-DELAY TIMER
T4:4	W	.	X	.	.	.	.	DISCHARGE PUMP ON-DELAY TIMER
T4:5	W	.	X	.	.	.	.	FLOOR SUMP PUMP ON-DELAY TIMER
T4:6		.	.	.	.	.	.	
T4:7	W	.	X	.	.	.	.	AIR STRIPPER BLOWER OFF-DELAY TIMER
T4:8		.	.	.	.	.	.	
T4:9		.	.	.	.	.	.	
T4:10	W	.	.	X	.	.	.	FEED TANK HIGH LEVEL ALARM TIMER
T4:11	W	.	.	X	.	.	.	AIR STRIPPER SUMP HIGH LEVEL ALARM TIMER
T4:12		.	.	.	.	.	.	DISCHARGE TANK HIGH LEVEL ALARM TIMER
T4:13	W	.	.	X	.	.	.	FLOOR SUMP HIGH LEVEL ALARM TIMER
T4:14		.	.	.	.	.	.	
T4:15		.	.	.	.	.	.	
T4:16		.	.	.	.	.	.	
T4:17		.	.	.	.	.	.	
T4:18		.	.	.	.	.	.	
T4:19	W	.	.	X	.	.	.	TRAINING GROUNDS RF RELAY ALARM TIMER
T4:20	W	.	.	X	.	.	.	GROUNDWATER PUMP 1 FAILURE ALARM TIMER
T4:21	W	.	.	X	.	.	.	GROUNDWATER PUMP 2 FAILURE ALARM TIMER
T4:22	W	.	.	X	.	.	.	FEED PUMP 1 FAILURE ALARM TIMER
T4:23	W	.	.	X	.	.	.	FEED PUMP 2 FAILURE ALARM TIMER
T4:24	W	.	.	X	.	.	.	DISCHARGE PUMP 1 FAILURE ALARM TIMER
T4:25	W	.	.	X	.	.	.	DISCHARGE PUMP 2 FAILURE ALARM TIMER
T4:26	W	.	.	X	.	.	.	FLOOR SUMP PUMP 1 FAILURE ALARM TIMER
T4:27	W	.	.	X	.	.	.	FLOOR SUMP PUMP 2 FAILURE ALARM TIMER
T4:28		.	.	.	.	.	.	
T4:29		.	.	.	.	.	.	
T4:30	W	.	.	X	.	.	.	AIR STRIPPER BLOWER 1 FAILURE ALARM TIMER
T4:31	W	.	.	X	.	.	.	AIR STRIPPER BLOWER 2 FAILURE ALARM TIMER
T4:32	W	.	.	X	.	.	.	24V POWER SUPPLY FAILURE ALARM TIMER
T4:33	W	.	.	X	.	.	.	GW PUMP 1 RTM SECOND TIMER
T4:34	W	.	.	X	.	.	.	GW PUMP 2 RTM SECOND TIMER
T4:35	W	.	.	X	.	.	.	FEED PUMP 1 RTM SECOND TIMER
T4:36	W	.	.	X	.	.	.	FEED PUMP 2 RTM SECOND TIMER
T4:37		.	.	.	.	.	.	
T4:38		.	.	.	.	.	.	
T4:39	W	.	.	X	.	.	.	DISCHARGE PUMP 1 RTM SECOND TIMER
T4:40	W	.	.	X	.	.	.	DISCHARGE PUMP 2 RTM SECOND TIMER
T4:41	W	.	.	X	.	.	.	SUMP PUMP 1 RTM SECOND TIMER
T4:42	W	.	.	X	.	.	.	SUMP PUMP 2 RTM SECOND TIMER
T4:43	W	.	.	X	.	.	.	BLOWER 1 RTM SECOND TIMER
T4:44	W	.	.	X	.	.	.	BLOWER 2 RTM SECOND TIMER

Data File C5 -- COUNTER Usage

Offset	FW	CU	CD	DN	OV	UN	UA	PRE	ACC	(Symbol) Description
C5:0	W	.	.	X	.	.	.	.	X	INFLUENT FLOW TOTALIZER (1000'S OF GAL)
C5:1	W	.	.	X	.	.	.	.	X	EQUIPMENT ALTERNATION COUNTER
C5:2	W	.	.	X	.	.	.	.	X	EFFLUENT FLOW TOTALIZER (1000'S OF GAL)
C5:3		.	.	.	.	.	.	.	.	
C5:4		.	.	.	.	.	.	.	.	
C5:5		.	.	.	.	.	.	.	.	
C5:6		.	.	.	.	.	.	.	.	
C5:7		.	.	.	.	.	.	.	.	
C5:8		.	.	.	.	.	.	.	.	
C5:9		.	.	.	.	.	.	.	.	
C5:10	W	.	.	X	.	.	.	.	.	GW PUMP 1 RTM SECOND COUNTER
C5:11	W	.	.	X	.	.	.	.	X	GW PUMP 1 RTM MINUTE COUNTER
C5:12	W	.	.	X	.	.	.	.	X	GW PUMP 1 RTM HOUR COUNTER
C5:13	W	.	.	X	.	.	.	.	.	GW PUMP 2 RTM SECOND COUNTER
C5:14	W	.	.	X	.	.	.	.	X	GW PUMP 2 RTM MINUTE COUNTER
C5:15	W	.	.	X	.	.	.	.	X	GW PUMP 2 RTM HOUR COUNTER
C5:16	W	.	.	X	.	.	.	.	.	FEED PUMP 1 RTM SECOND COUNTER
C5:17	W	.	.	X	.	.	.	.	X	FEED PUMP 1 RTM MINUTE COUNTER
C5:18	W	.	.	X	.	.	.	.	X	FEED PUMP 1 RTM HOUR COUNTER
C5:19	W	.	.	X	.	.	.	.	.	FEED PUMP 2 RTM SECOND COUNTER
C5:20	W	.	.	X	.	.	.	.	X	FEED PUMP 2 RTM MINUTE COUNTER
C5:21	W	.	.	X	.	.	.	.	X	FEED PUMP 2 RTM HOUR COUNTER
C5:22		.	.	.	.	.	.	.	.	
C5:23		.	.	.	.	.	.	.	.	
C5:24		.	.	.	.	.	.	.	.	
C5:25		.	.	.	.	.	.	.	.	
C5:26		.	.	.	.	.	.	.	.	
C5:27		.	.	.	.	.	.	.	.	
C5:28	W	.	.	X	.	.	.	.	.	DISCHARGE PUMP 1 RTM SECOND COUNTER
C5:29	W	.	.	X	.	.	.	.	.	DISCHARGE PUMP 1 RTM MINUTE COUNTER
C5:30	W	.	.	X	.	.	.	.	.	DISCHARGE PUMP 1 RTM HOUR COUNTER
C5:31	W	.	.	X	.	.	.	.	.	DISCHARGE PUMP 2 RTM SECOND COUNTER
C5:32	W	.	.	X	.	.	.	.	.	DISCHARGE PUMP 2 RTM MINUTE COUNTER
C5:33	W	.	.	X	.	.	.	.	.	DISCHARGE PUMP 2 RTM HOUR COUNTER
C5:34	W	.	.	X	.	.	.	.	.	SUMP PUMP 1 RTM SECOND COUNTER
C5:35	W	.	.	X	.	.	.	.	X	SUMP PUMP 1 RTM MINUTE COUNTER
C5:36	W	.	.	X	.	.	.	.	X	SUMP PUMP 1 RTM HOUR COUNTER
C5:37	W	.	.	X	.	.	.	.	.	SUMP PUMP 2 RTM SECOND COUNTER
C5:38	W	.	.	X	.	.	.	.	X	SUMP PUMP 2 RTM MINUTE COUNTER
C5:39	W	.	.	X	.	.	.	.	X	SUMP PUMP 2 RTM HOUR COUNTER
C5:40	W	.	.	X	.	.	.	.	.	BLOWER 1 RTM SECOND COUNTER
C5:41	W	.	.	X	.	.	.	.	.	BLOWER 1 RTM MINUTE COUNTER
C5:42	W	.	.	X	.	.	.	.	.	BLOWER 1 RTM HOUR COUNTER
C5:43	W	.	.	X	.	.	.	.	.	BLOWER 2 RTM SECOND COUNTER
C5:44	W	.	.	X	.	.	.	.	.	BLOWER 2 RTM MINUTE COUNTER
C5:45	W	.	.	X	.	.	.	.	.	BLOWER 2 RTM HOUR COUNTER
C5:46		.	.	.	.	.	.	.	.	
C5:47		.	.	.	.	.	.	.	.	
C5:48		.	.	.	.	.	.	.	.	
C5:49		.	.	.	.	.	.	.	.	

Data File R6 -- CONTROL Usage

Offset	FW	EN	EU	DN	EM	ER	UL	IN	FD	LEN	POS	(Symbol)	Description
R6:0		.	.	.	.	.	.	.	.	.	.		

Data File N7 -- INTEGER Usage

Offset	0	1	2	3	4	5	6	7	8	9
N7:0	X	X	X	X	X	X	X	X	.	.
N7:10	X	X	X	X	X	X	X	.	.	.
N7:20	.	.	.	.	.	.	.	.	.	.
N7:30	X	X	X							

Data File F8 -- FLOAT Usage

Offset	0	1	2	3	4
F8:0	X	X	X	X	.
F8:5	.	.	.		

Data File N9 -- INTEGER Usage

Offset	0	1	2	3	4	5	6	7	8	9
N9:0	X	X	X	X	X	X	X	X	.	.
N9:10	.	.	.	.	.	.	X	X	X	X
N9:20	X	X	X	X	.	.	.	.	X	X
N9:30	X	X	X	X	.	.	X	X	.	.
N9:40	X	X	X	X	.	.	.	.	X	X
N9:50	X	X	X	X	.	.	.	.	X	X
N9:60	X	X	X	X	.	.	.	.	X	X

Data File N10 -- INTEGER Usage

Offset	0	1	2	3	4	5	6	7	8	9
N10:0	X	X	X	X	X	X	X	X	X	X

Data File N11 -- INTEGER Usage

Offset	0	1	2	3	4	5	6	7	8	9
N11:0	X	X	X	X	X	X	X	X	X	X
N11:10	X	X	X	X	X	X	X	X	X	X
N11:20	X	X	X	X	X	X	X	X	X	X
N11:30	X	X	X	X	X	X	X	X	X	X
N11:40	X	X	X	X	X	X	X	X	X	X
N11:50	X	X	X	X	X	X	X	X	X	X
N11:60	X	X	X	X	X	X	X	X	X	X
N11:70	.	.	.							

Address/Symbol Database

Address	Symbol	Scope	Description	Sym Group	Dev
B3:0/0			GROUNDWATER PUMPS ENABLED		
B3:0/1			FEED PUMPS ENABLED		
B3:0/2			DISCHARGE PUMPS ENABLED		
B3:0/3			FLOOR SUMP PUMPS ENABLED		
B3:0/4					
B3:0/5			AIR STRIPPER BLOWERS ENABLED		
B3:0/6			ALTERNATION CONTROL ONE-SHOT		
B3:0/7			ALARM RESET		
B3:0/8			GROUNDWATER PUMPS RUNNING		
B3:0/9			FEED PUMPS RUNNING		
B3:0/10			DISCHARGE PUMPS RUNNING		
B3:0/11			FLOOR SUMP PUMPS RUNNING		
B3:0/12					
B3:0/13			AIR STRIPPER BLOWERS RUNNING		
B3:0/14			TRAINING GROUNDS ALARM ENABLED		
B3:1/0			GROUNDWATER PUMP 1 IN HAND		
B3:1/1			GROUNDWATER PUMP 2 IN HAND		
B3:1/2			FEED PUMP 1 IN HAND		
B3:1/3			FEED PUMP 2 IN HAND		
B3:1/4			DISCHARGE PUMP 1 IN HAND		
B3:1/5			DISCHARGE PUMP 2 IN HAND		
B3:1/6			FLOOR SUMP PUMP 1 IN HAND		
B3:1/7			FLOOR SUMP PUMP 2 IN HAND		
B3:1/8					
B3:1/9					
B3:1/10			AIR STRIPPER BLOWER 1 IN HAND		
B3:1/11			AIR STRIPPER BLOWER 2 IN HAND		
B3:2					
B3:2/0			GROUNDWATER PUMP 1 IN AUTO		
B3:2/1			GROUNDWATER PUMP 2 IN AUTO		
B3:2/2			FEED PUMP 1 IN AUTO		
B3:2/3			FEED PUMP 2 IN AUTO		
B3:2/4			DISCHARGE PUMP 1 IN AUTO		
B3:2/5			DISCHARGE PUMP 2 IN AUTO		
B3:2/6			FLOOR SUMP PUMP 1 IN AUTO		
B3:2/7			FLOOR SUMP PUMP 2 IN AUTO		
B3:2/8					
B3:2/9					
B3:2/10			AIR STRIPPER BLOWER 1 IN AUTO		
B3:2/11			AIR STRIPPER BLOWER 2 IN AUTO		
B3:3/0			FEED TANK HIGH LEVEL ALARM		
B3:3/1			AIR STRIPPER SUMP HIGH LEVEL ALARM		
B3:3/2			DISCHARGE TANK HIGH LEVEL ALARM		
B3:3/3			FLOOR SUMP HIGH LEVEL ALARM		
B3:3/4			FIRE TRAINING GROUNDS PUMP STATION ALARM		
B3:3/5			24V POWER SUPPLY FAILURE ALARM		
B3:3/8			INFLUENT FLOW METER FAILURE ALARM		
B3:3/9			EFFLUENT FLOW METER FAILURE ALARM		
B3:3/10			FEED TANK ANALOG LEVEL FAILURE ALARM		
B3:3/11			DISCHARGE TANK ANALOG LEVEL FAILURE ALARM		
B3:3/12			GW TRENCH ANALOG LEVEL FAILURE ALARM		
B3:4			PUMP FAILURE ALARMS		
B3:4/0			GROUNDWATER PUMP 1 FAILURE ALARM		
B3:4/1			GROUNDWATER PUMP 2 FAILURE ALARM		
B3:4/2			FEED PUMP 1 FAILURE ALARM		
B3:4/3			FEED PUMP 2 FAILURE ALARM		
B3:4/4			DISCHARGE PUMP 1 FAILURE ALARM		
B3:4/5			DISCHARGE PUMP 2 FAILURE ALARM		
B3:4/6			FLOOR SUMP PUMP 1 FAILURE ALARM		
B3:4/7			FLOOR SUMP PUMP 2 FAILURE ALARM		
B3:4/8					
B3:4/9					
B3:4/10			AIR STRIPPER BLOWER 1 FAILURE ALARM		
B3:4/11			AIR STRIPPER BLOWER 2 FAILURE ALARM		
B3:4/12					
B3:5/0			HOUR TIMER OSR #1		
B3:5/1			HOUR TIMER OSR #2		
B3:5/2			DAY TIMER OSR		
B3:5/3			INFLUENT FLOW TOTALIZER RESET		
B3:5/4			EFFLUENT FLOW TOTALIZER RESET		
B3:5/5					
B3:5/6					
B3:6/0					
B3:6/4					
B3:6/5					
B3:6/6					
B3:6/7					
B3:6/8					
B3:6/9					
B3:6/11					
B3:100					
B3:101					
B3:103			B3/103		
C5:0			INFLUENT FLOW TOTALIZER (1000'S OF GAL)		
C5:0.ACC					

Address/Symbol Database

Address	Symbol	Scope	Description	Sym Group	Dev
C5:1			EQUIPMENT ALTERNATION COUNTER		
C5:1.ACC			EQUIPMENT ALTERNATION COUNTER #		
C5:2			EFFLUENT FLOW TOTALIZER (1000'S OF GAL)		
C5:2.ACC					
C5:2/DN					
C5:10			GW PUMP 1 RTM SECOND COUNTER		
C5:10/DN			GW PUMP 1 RTM SECOND COUNTER DONE		
C5:11			GW PUMP 1 RTM MINUTE COUNTER		
C5:11.ACC					
C5:11/DN			GW PUMP 1 RTM MINUTE COUNTER DONE		
C5:12			GW PUMP 1 RTM HOUR COUNTER		
C5:12.ACC					
C5:12/DN			GW PUMP 1 RTM HOUR COUNTER DONE		
C5:13			GW PUMP 2 RTM SECOND COUNTER		
C5:13/DN			GW PUMP 2 RTM SECOND COUNTER DONE		
C5:14			GW PUMP 2 RTM MINUTE COUNTER		
C5:14.ACC					
C5:14/DN			GW PUMP 2 RTM MINUTE COUNTER DONE		
C5:15			GW PUMP 2 RTM HOUR COUNTER		
C5:15/DN			GW PUMP 2 RTM HOUR COUNTER DONE		
C5:16			FEED PUMP 1 RTM SECOND COUNTER		
C5:16/DN			FEED PUMP 1 RTM SECOND COUNTER DONE		
C5:17			FEED PUMP 1 RTM MINUTE COUNTER		
C5:17/DN			FEED PUMP 1 RTM MINUTE COUNTER DONE		
C5:18			FEED PUMP 1 RTM HOUR COUNTER		
C5:18/DN			FEED PUMP 1 RTM HOUR COUNTER DONE		
C5:19			FEED PUMP 2 RTM SECOND COUNTER		
C5:19/DN			FEED PUMP 2 RTM SECOND COUNTER DONE		
C5:20			FEED PUMP 2 RTM MINUTE COUNTER		
C5:20/DN			FEED PUMP 2 RTM MINUTE COUNTER DONE		
C5:21			FEED PUMP 2 RTM HOUR COUNTER		
C5:21/DN			FEED PUMP 2 RTM HOUR COUNTER DONE		
C5:22					
C5:22/DN					
C5:23					
C5:23/DN					
C5:24					
C5:24.ACC					
C5:24/DN					
C5:25					
C5:25/DN					
C5:26					
C5:26/DN					
C5:27					
C5:27/DN					
C5:28			DISCHARGE PUMP 1 RTM SECOND COUNTER		
C5:28/DN			DISCHARGE PUMP 1 RTM SECOND COUNTER DONE		
C5:29			DISCHARGE PUMP 1 RTM MINUTE COUNTER		
C5:29/DN			DISCHARGE PUMP 1 RTM MINUTE COUNTER DONE		
C5:30			DISCHARGE PUMP 1 RTM HOUR COUNTER		
C5:30/DN			DISCHARGE PUMP 1 RTM HOUR COUNTER DONE		
C5:31			DISCHARGE PUMP 2 RTM SECOND COUNTER		
C5:31/DN			DISCHARGE PUMP 2 RTM SECOND COUNTER DONE		
C5:32			DISCHARGE PUMP 2 RTM MINUTE COUNTER		
C5:32/DN			DISCHARGE PUMP 2 RTM MINUTE COUNTER DONE		
C5:33			DISCHARGE PUMP 2 RTM HOUR COUNTER		
C5:33/DN			DISCHARGE PUMP 2 RTM HOUR COUNTER DONE		
C5:34			SUMP PUMP 1 RTM SECOND COUNTER		
C5:34/DN			SUMP PUMP 1 RTM SECOND COUNTER DONE		
C5:35			SUMP PUMP 1 RTM MINUTE COUNTER		
C5:35/DN			SUMP PUMP 1 RTM MINUTE COUNTER DONE		
C5:36			SUMP PUMP 1 RTM HOUR COUNTER		
C5:36/DN			SUMP PUMP 1 RTM HOUR COUNTER DONE		
C5:37			SUMP PUMP 2 RTM SECOND COUNTER		
C5:37/DN			SUMP PUMP 2 RTM SECOND COUNTER DONE		
C5:38			SUMP PUMP 2 RTM MINUTE COUNTER		
C5:38.ACC					
C5:38/DN			SUMP PUMP 2 RTM MINUTE COUNTER DONE		
C5:39			SUMP PUMP 2 RTM HOUR COUNTER		
C5:39/DN			SUMP PUMP 2 RTM HOUR COUNTER DONE		
C5:40			BLOWER 1 RTM SECOND COUNTER		
C5:40/DN			BLOWER 1 RTM SECOND COUNTER DONE		
C5:41			BLOWER 1 RTM MINUTE COUNTER		
C5:41/DN			BLOWER 1 RTM MINUTE COUNTER DONE		
C5:42			BLOWER 1 RTM HOUR COUNTER		
C5:42/DN			BLOWER 1 RTM HOUR COUNTER DONE		
C5:43			BLOWER 2 RTM SECOND COUNTER		
C5:43/DN			BLOWER 2 RTM SECOND COUNTER DONE		
C5:44			BLOWER 2 RTM MINUTE COUNTER		
C5:44/DN			BLOWER 2 RTM MINUTE COUNTER DONE		
C5:45			BLOWER 2 RTM HOUR COUNTER		
C5:45/DN			BLOWER 2 RTM HOUR COUNTER DONE		
F8:0			GW P1 DAILY FLOWRATE (10'S GPM'S)		
F8:1			GW P2 DAILY FLOWRATE (10'S GPM'S)		
F8:2			FEED P1 DAILY FLOWRATE (10'S GPM'S)		

Address/Symbol Database

Address	Symbol	Scope	Description	Sym Group	Dev
F8:3			FEED P2 DAILY FLOWRATE (10'S GPM'S)		
F8:4					
F8:5					
F8:6			DISCHARGE P1 DAILY FLOWRATE (10'S GPM'S)		
F8:7			DISCHARGE P2 DAILY FLOWRATE (10'S GPM'S)		
I:2/0			FEED TANK HIGH-HIGH LEVEL N.C. FLOAT SWITCH		
I:2/1			STRIPPER SUMP LOW LEVEL FLOAT SWITCH		
I:2/2			STRIPPER SUMP HIGH LEVEL FLOAT SWITCH		
I:2/3			STRIPPER SUMP HIGH-HIGH LEVEL N.C. FLOAT SWITCH		
I:2/4			DISCHARGE TANK HIGH-HIGH LEVEL N.C. FLOAT SWITCH		
I:2/5			FLOOR SUMP LSL PUMP OFF FLOAT SWITCH		
I:2/6			FLOOR SUMP LSH PUMP ON FLOAT SWITCH		
I:2/7			AIR STRIPPER LOW PRESSURE SWITCH		
I:2/8			GROUNDWATER PUMP 1 AUX RUN CONTACT		
I:2/9			GROUNDWATER PUMP 2 AUX RUN CONTACT		
I:2/10			FEED PUMP 1 AUX RUN CONTACT		
I:2/11			FEED PUMP 2 AUX RUN CONTACT		
I:2/12			EFFLUENT DISCHARGE PUMP 1 AUX RUN CONTACT		
I:2/13			EFFLUENT DISCHARGE PUMP 2 AUX RUN CONTACT		
I:2/14			FLOOR SUMP PUMP 1 AUX RUN CONTACT		
I:2/15			FLOOR SUMP PUMP 2 AUX RUN CONTACT		
I:3/0			AIR STRIPPER BLOWER 1 AUX RUN CONTACT		
I:3/1			AIR STRIPPER BLOWER 2 AUX RUN CONTACT		
I:3/2					
I:3/3					
I:3/4			24VDC POWER SUPPLY 2 POWER ON		
I:3/5			24VDC POWER SUPPLY 1 POWER ON		
I:3/6			FLOOR SUMP HIGH-HIGH LEVEL FLOAT SWITCH		
I:3/7			TRAINING GROUNDS PUMP STATION RF ALARM RELAY		
I:5.0	TRENCH_LEVEL	Global	GROUNDWATER TRENCH LEVEL ANALOG INPUT		
I:5.1	FEED_TANK_LEVEL	Global	FEED TANK LEVEL ANALOG INPUT		
I:5.2	AIR_TEMPERATURE	Global	INDOOR AIR TEMPERATURE ANALOG INPUT		
I:5.3	DISCHARGE_TANK	Global	DISCHARGE TANK LEVEL ANALOG INPUT		
I:6.0	INFLUENT_FLOW	Global	INFLUENT FLOWMETER ANALOG INPUT		
I:6.1	EFFLUENT_FLOW	Global	EFFLUENT FLOWMETER ANALOG INPUT		
N7:0	SCALED_INFLUENT	Global	INFLUENT FLOW RATE (GPM*10)		
N7:1	SCALED_EFFLUENT	Global	EFFLUENT FLOW RATE (GPM*10)		
N7:2			INFLUENT FLOW TOTALIZER (GAL)		
N7:3			EFFLUENT FLOW TOTALIZER (GAL)		
N7:4			GROUNDWATER SUMP LEVEL (FEET*100)		
N7:5			FEED TANK LEVEL (FEET*100)		
N7:6			DISCHARGE TANK LEVEL (FT*100)		
N7:7			INDOOR AIR TEMP (DEG*10)		
N7:10			INFLUENT FLOW RATE MINUTE TOTALIZER		
N7:11			EFFLUENT FLOW RATE MINUTE TOTALIZER		
N7:12			INFLUENT FLOW TOTALIZER - AVG GPM OVER PRIOR MINUTE		
N7:13			EFFLUENT FLOW TOTALIZER - AVG GPM OVER PRIOR MINUTE		
N7:14			EFFLUENT FLOW CURRENT HOUR RUNNING TOTAL (GAL)		
N7:15			EFFLUENT FLOW PREVIOUS HOUR TOTAL (10'S GALS)		
N7:16			EFFLUENT FLOW CURRENT DAY RUNNING TOTAL (10'S GALS)		
N7:30			GW LEVEL USER SETPOINT (FT*100) (PUMP ON)		
N7:31			GW LEVEL USER SETPOINT (FT*100) (PUMP OFF)		
N7:32			GW LEVEL REFERENCE PUMP OFF (FEET*100) (PUMP ON MINUS 20)		
N9:0			GW P1 RTM MIN YESTERDAY		
N9:1			GW P1 RTM HR YESTERDAY		
N9:2			GW P2 RTM MIN YESTERDAY		
N9:3			GW P2 RTM HR YESTERDAY		
N9:4			FEED P1 RTM MIN YESTERDAY		
N9:5			FEED P1 RTM HR YESTERDAY		
N9:6			FEED P2 RTM MIN YESTERDAY		
N9:7			FEED P2 RTM HR YESTERDAY		
N9:8					
N9:9					
N9:10					
N9:11					
N9:12			DISCHARGE P1 RTM MIN YESTERDAY		
N9:13			DISCHARGE P1 RTM HR YESTERDAY		
N9:14			DISCHARGE P2 RTM MIN YESTERDAY		
N9:15			DISCHARGE P2 RTM HR YESTERDAY		
N9:16			SUMP P1 RTM MIN YESTERDAY		
N9:17			SUMP P1 RTM HR YESTERDAY		
N9:18			SUMP P2 RTM MIN YESTERDAY		
N9:19			SUMP P2 RTM HR YESTERDAY		
N9:20			GW P1 YESTERDAY RUN TIME (MIN)		
N9:21			GW P2 YESTERDAY RUN TIME (MIN)		
N9:22			FEED P1 YESTERDAY RUN TIME (MIN)		
N9:23			FEED P2 YESTERDAY RUN TIME (MIN)		
N9:24					
N9:25					
N9:26			DISCHARGE P1 YESTERDAY RUN TIME (MIN)		
N9:27			DISCHARGE P2 YESTERDAY RUN TIME (MIN)		
N9:28			SUMP P1 YESTERDAY RUN TIME (MIN)		
N9:29			SUMP P2 YESTERDAY RUN TIME (MIN)		
N9:30			GW P1 FLOW RATE YESTERDAY (GPM*10)		
N9:31			GW P2 FLOW RATE YESTERDAY (GPM*10)		

Address/Symbol Database

Address	Symbol	Scope	Description	Sym Group	Dev
N9:32			FEED P1 FLOW RATE YESTERDAY (GPM*10)		
N9:33			FEED P2 FLOW RATE YESTERDAY (GPM*10)		
N9:34					
N9:35					
N9:36			DISCHARGE P1 FLOW RATE (GPM*10)		
N9:37			DISCHARGE P2 FLOW RATE (GPM*10)		
N9:40			GW P1 RTM HOUR MIN'S		
N9:41			GW P2 RTM HOUR MIN'S		
N9:42			FEED P1 RTM HOUR MIN'S		
N9:43			FEED P2 RTM HOUR MIN'S		
N9:44					
N9:45					
N9:46			DISCHARGE P1 RTM HOUR MIN'S		
N9:47			DISCHARGE P2 RTM HOUR MIN'S		
N9:48			SUMP P1 RTM HOUR MIN'S		
N9:49			SUMP P2 RTM HOUR MIN'S		
N9:50			GW P1 RTM MIN MIN'S		
N9:51			GW P2 RTM MIN MIN'S		
N9:52			FEED P1 RTM MIN MIN'S		
N9:53			FEED P2 RTM MIN MIN'S		
N9:54					
N9:55					
N9:56			DISCHARGE P1 RTM MIN MIN'S		
N9:57			DISCHARGE P2 RTM MIN MIN'S		
N9:58			SUMP P1 RTM MIN MIN'S		
N9:59			SUMP P2 RTM MIN MIN'S		
N9:60			GW P1 HR RUN YESTERDAY		
N9:61			GW P2 HR RUN YESTERDAY		
N9:62			FEED P1 HR RUN YESTERDAY		
N9:63			FEED P2 HR RUN YESTERDAY		
N9:64					
N9:65					
N9:66			DISCHARGE P1 HR RUN YESTERDAY		
N9:67			DISCHARGE P2 HR RUN YESTERDAY		
N9:68			SUMP P1 HR RUN YESTERDAY		
N9:69			SUMP P2 HR RUN YESTERDAY		
N10:0			CLOCK HOUR INPUT		
N10:1			CLOCK HOUR (LAST INPUT)		
N10:2			CLOCK MINUTE INPUT		
N10:3			CLOCK MINUTE (LAST INPUT)		
N10:4			CLOCK MONTH INPUT		
N10:5			CLOCK MONTH (LAST INPUT)		
N10:6			CLOCK DAY INPUT		
N10:7			CLOCK DAY (LAST INPUT)		
N10:8			CLOCK YEAR INPUT		
N10:9			CLOCK YEAR (LAST INPUT)		
N11:0			DAY 1 HISTORICAL FLOW (10'S GALS)		
N11:1			DAY 1 HISTORICAL FLOW DATE (MONTH)		
N11:2			DAY 1 HISTORICAL FLOW DATE (DAY)		
N11:3			DAY 1 HISTORICAL FLOW TOTALIZER READING (1000'S)		
N11:4			DAY 1 HISTORICAL FLOW TOTALIZER READING (100'S)		
N11:5			DAY 2 HISTORICAL FLOW (10'S GALS)		
N11:6			DAY 2 HISTORICAL FLOW DATE (MONTH)		
N11:7			DAY 2 HISTORICAL FLOW DATE (DAY)		
N11:8			DAY 2 HISTORICAL FLOW TOTALIZER READING (1000'S)		
N11:9			DAY 2 HISTORICAL FLOW TOTALIZER READING (100'S)		
N11:10			DAY 3 HISTORICAL FLOW (10'S GALS)		
N11:11			DAY 3 HISTORICAL FLOW DATE (MONTH)		
N11:12			DAY 3 HISTORICAL FLOW DATE (DAY)		
N11:13			DAY 3 HISTORICAL FLOW TOTALIZER READING (1000'S)		
N11:14			DAY 3 HISTORICAL FLOW TOTALIZER READING (100'S)		
N11:15			DAY 4 HISTORICAL FLOW (10'S GALS)		
N11:16			DAY 4 HISTORICAL FLOW DATE (MONTH)		
N11:17			DAY 4 HISTORICAL FLOW DATE (DAY)		
N11:18			DAY 4 HISTORICAL FLOW TOTALIZER READING (1000'S)		
N11:19			DAY 4 HISTORICAL FLOW TOTALIZER READING (100'S)		
N11:20			DAY 5 HISTORICAL FLOW (10'S GALS)		
N11:21			DAY 5 HISTORICAL FLOW DATE (MONTH)		
N11:22			DAY 5 HISTORICAL FLOW DATE (DAY)		
N11:23			DAY 5 HISTORICAL FLOW TOTALIZER READING (1000'S)		
N11:24			DAY 5 HISTORICAL FLOW TOTALIZER READING (100'S)		
N11:25			DAY 6 HISTORICAL FLOW (10'S GALS)		
N11:26			DAY 6 HISTORICAL FLOW DATE (MONTH)		
N11:27			DAY 6 HISTORICAL FLOW DATE (DAY)		
N11:28			DAY 6 HISTORICAL FLOW TOTALIZER READING (1000'S)		
N11:29			DAY 6 HISTORICAL FLOW TOTALIZER READING (100'S)		
N11:30			DAY 7 HISTORICAL FLOW (10'S GALS)		
N11:31			DAY 7 HISTORICAL FLOW DATE (MONTH)		
N11:32			DAY 7 HISTORICAL FLOW DATE (DAY)		
N11:33			DAY 7 HISTORICAL FLOW TOTALIZER READING (1000'S)		
N11:34			DAY 7 HISTORICAL FLOW TOTALIZER READING (100'S)		
N11:35			DAY 8 HISTORICAL FLOW (10'S GALS)		
N11:36			DAY 8 HISTORICAL FLOW DATE (MONTH)		
N11:37			DAY 8 HISTORICAL FLOW DATE (DAY)		
N11:38			DAY 8 HISTORICAL FLOW TOTALIZER READING (1000'S)		

Address/Symbol Database

Address	Symbol	Scope	Description	Sym Group	Dev
N11:39			DAY 8 HISTORICAL FLOW TOTALIZER READING (100'S)		
N11:40			DAY 9 HISTORICAL FLOW (10'S GALS)		
N11:41			DAY 9 HISTORICAL FLOW DATE (MONTH)		
N11:42			DAY 9 HISTORICAL FLOW DATE (DAY)		
N11:43			DAY 9 HISTORICAL FLOW TOTALIZER READING (1000'S)		
N11:44			DAY 9 HISTORICAL FLOW TOTALIZER READING (100'S)		
N11:45			DAY 10 HISTORICAL FLOW (10'S GALS)		
N11:46			DAY 10 HISTORICAL FLOW DATE (MONTH)		
N11:47			DAY 10 HISTORICAL FLOW DATE (DAY)		
N11:48			DAY 10 HISTORICAL FLOW TOTALIZER READING (1000'S)		
N11:49			DAY 10 HISTORICAL FLOW TOTALIZER READING (100'S)		
N11:50			DAY 11 HISTORICAL FLOW (10'S GALS)		
N11:51			DAY 11 HISTORICAL FLOW DATE (MONTH)		
N11:52			DAY 11 HISTORICAL FLOW DATE (DAY)		
N11:53			DAY 11 HISTORICAL FLOW TOTALIZER READING (1000'S)		
N11:54			DAY 11 HISTORICAL FLOW TOTALIZER READING (100'S)		
N11:55			DAY 12 HISTORICAL FLOW (10'S GALS)		
N11:56			DAY 12 HISTORICAL FLOW DATE (MONTH)		
N11:57			DAY 12 HISTORICAL FLOW DATE (DAY)		
N11:58			DAY 12 HISTORICAL FLOW TOTALIZER READING (1000'S)		
N11:59			DAY 12 HISTORICAL FLOW TOTALIZER READING (100'S)		
N11:60			DAY 13 HISTORICAL FLOW (10'S GALS)		
N11:61			DAY 13 HISTORICAL FLOW DATE (MONTH)		
N11:62			DAY 13 HISTORICAL FLOW DATE (DAY)		
N11:63			DAY 13 HISTORICAL FLOW TOTALIZER READING (1000'S)		
N11:64			DAY 13 HISTORICAL FLOW TOTALIZER READING (100'S)		
N11:65			DAY 14 HISTORICAL FLOW (10'S GALS)		
N11:66			DAY 14 HISTORICAL FLOW DATE (MONTH)		
N11:67			DAY 14 HISTORICAL FLOW DATE (DAY)		
N11:68			DAY 14 HISTORICAL FLOW TOTALIZER READING (1000'S)		
N11:69			DAY 14 HISTORICAL FLOW TOTALIZER READING (100'S)		
O:4.0			EQUIPMENT OUTPUTS		
O:4/0			GROUNDWATER PUMP 1 RUN		
O:4/1			GROUNDWATER PUMP 2 RUN		
O:4/2			FEED PUMP 1 RUN		
O:4/3			FEED PUMP 2 RUN		
O:4/4			EFFLUENT DISCHARGE PUMP 1 RUN		
O:4/5			EFFLUENT DISCHARGE PUMP 2 RUN		
O:4/6			FLOOR SUMP PUMP 1 RUN		
O:4/7			FLOOR SUMP PUMP 2 RUN		
O:4/8			AIR STRIPPER BLOWER 1 RUN		
O:4/9			AIR STRIPPER BLOWER 2 RUN		
O:4/10					
O:4/11					
S:0			Arithmetic Flags		
S:0/0			Processor Arithmetic Carry Flag		
S:0/1			Processor Arithmetic Underflow/ Overflow Flag		
S:0/2			Processor Arithmetic Zero Flag		
S:0/3			Processor Arithmetic Sign Flag		
S:1			Processor Mode Status/ Control		
S:1/0			Processor Mode Bit 0		
S:1/1			Processor Mode Bit 1		
S:1/2			Processor Mode Bit 2		
S:1/3			Processor Mode Bit 3		
S:1/4			Processor Mode Bit 4		
S:1/5			Forces Enabled		
S:1/6			Forces Present		
S:1/7			Comms Active		
S:1/8			Fault Override at Powerup		
S:1/9			Startup Protection Fault		
S:1/10			Load Memory Module on Memory Error		
S:1/11			Load Memory Module Always		
S:1/12			Load Memory Module and RUN		
S:1/13			Major Error Halted		
S:1/14			Access Denied		
S:1/15			First Pass		
S:2/0			STI Pending		
S:2/1			STI Enabled		
S:2/2			STI Executing		
S:2/3			Index Addressing File Range		
S:2/4			Saved with Debug Single Step		
S:2/5			DH-485 Incoming Command Pending		
S:2/6			DH-485 Message Reply Pending		
S:2/7			DH-485 Outgoing Message Command Pending		
S:2/15			Comms Servicing Selection		
S:3			Current Scan Time/ Watchdog Scan Time		
S:4			Time Base		
S:5/0			Overflow Trap		
S:5/2			Control Register Error		
S:5/3			Major Err Detected Executing UserFault Routine		
S:5/4			M0-M1 Referenced on Disabled Slot		
S:5/8			Memory Module Boot		
S:5/9			Memory Module Password Mismatch		
S:5/10			STI Overflow		
S:5/11			Battery Low		

Address/Symbol Database

Address	Symbol	Scope	Description	Sym Group	Dev
S:6			Major Error Fault Code		
S:7			Suspend Code		
S:8			Suspend File		
S:9			Active Nodes		
S:10			Active Nodes		
S:11			I/O Slot Enables		
S:12			I/O Slot Enables		
S:13			Math Register		
S:14			Math Register		
S:15			Node Address/ Baud Rate		
S:16			Debug Single Step Rung		
S:17			Debug Single Step File		
S:18			Debug Single Step Breakpoint Rung		
S:19			Debug Single Step Breakpoint File		
S:20			Debug Fault/ Powerdown Rung		
S:21			Debug Fault/ Powerdown File		
S:22			Maximum Observed Scan Time		
S:23			Average Scan Time		
S:24			Index Register		
S:25			I/O Interrupt Pending		
S:26			I/O Interrupt Pending		
S:27			I/O Interrupt Enabled		
S:28			I/O Interrupt Enabled		
S:29			User Fault Routine File Number		
S:30			STI Setpoint		
S:31			STI File Number		
S:32			I/O Interrupt Executing		
S:33			Extended Proc Status Control Word		
S:33/0			Incoming Command Pending		
S:33/1			Message Reply Pending		
S:33/2			Outgoing Message Command Pending		
S:33/3			Selection Status User/DF1		
S:33/4			Communicat Active		
S:33/5			Communicat Servicing Selection		
S:33/6			Message Servicing Selection Channel 0		
S:33/7			Message Servicing Selection Channel 1		
S:33/8			Interrupt Latency Control Flag		
S:33/9			Scan Toggle Flag		
S:33/10			Discrete Input Interrupt Reconfigur Flag		
S:33/11			Online Edit Status		
S:33/12			Online Edit Status		
S:33/13			Scan Time Timebase Selection		
S:33/14			DTR Control Bit		
S:33/15			DTR Force Bit		
S:34			Pass-thru Disabled		
S:34/0			Pass-Thru Disabled Flag		
S:34/1			DH+ Active Node Table Enable Flag		
S:34/2			Floating Point Math Flag Disable,Fl		
S:35			Last 1 ms Scan Time		
S:36			Extended Minor Error Bits		
S:36/8			DII Lost		
S:36/9			STI Lost		
S:36/10			Memory Module Data File Overwrite Protection		
S:37			Clock Calendar Year		
S:38			Clock Calendar Month		
S:39			Clock Calendar Day		
S:40			Clock Calendar Hours		
S:41			Clock Calendar Minutes		
S:42			Clock Calendar Seconds		
S:43			STI Interrupt Time		
S:44			I/O Event Interrupt Time		
S:45			DII Interrupt Time		
S:46			Discrete Input Interrupt- File Number		
S:47			Discrete Input Interrupt- Slot Number		
S:48			Discrete Input Interrupt- Bit Mask		
S:49			Discrete Input Interrupt- Compare Value		
S:50			Processor Catalog Number		
S:51			Discrete Input Interrupt- Return Number		
S:52			Discrete Input Interrupt- Accumulat		
S:53			Reserved/ Clock Calendar Day of the Week		
S:55			Last DII Scan Time		
S:56			Maximum Observed DII Scan Time		
S:57			Operating System Catalog Number		
S:58			Operating System Series		
S:59			Operating System FRN		
S:61			Processor Series		
S:62			Processor Revision		
S:63			User Program Type		
S:64			User Program Functional Index		
S:65			User RAM Size		
S:66			Flash EEPROM Size		
S:67			Channel 0 Active Nodes		
S:68			Channel 0 Active Nodes		
S:69			Channel 0 Active Nodes		
S:70			Channel 0 Active Nodes		

Address/Symbol Database

Address	Symbol	Scope	Description	Sym Group	Dev
S:71			Channel 0 Active Nodes		
S:72			Channel 0 Active Nodes		
S:73			Channel 0 Active Nodes		
S:74			Channel 0 Active Nodes		
S:75			Channel 0 Active Nodes		
S:76			Channel 0 Active Nodes		
S:77			Channel 0 Active Nodes		
S:78			Channel 0 Active Nodes		
S:79			Channel 0 Active Nodes		
S:80			Channel 0 Active Nodes		
S:81			Channel 0 Active Nodes		
S:82			Channel 0 Active Nodes		
S:83			DH+ Active Nodes		
S:84			DH+ Active Nodes		
S:85			DH+ Active Nodes		
S:86			DH+ Active Nodes		
T4:0	5_SECOND_TMR	Global	CLOCK - FIVE SECOND TIMER		
T4:0/DN					
T4:1	1_MINUTE_TMR	Global	CLOCK - MINUTE TIMER		
T4:1/DN					
T4:2			GROUNDWATER PUMP ON-DELAY TIMER		
T4:2/DN					
T4:2/TT			GROUNDWATER PUMP ON-DELAY TIMER TIMING		
T4:3			AIR STRIPPER BLOWER ON-DELAY TIMER		
T4:3/DN					
T4:3/TT			BLOWER ON-DELAY TIMER TIMING		
T4:4			DISCHARGE PUMP ON-DELAY TIMER		
T4:4/TT			DISCHARGE PUMP ON DELAY TIMER TIMING		
T4:5			FLOOR SUMP PUMP ON-DELAY TIMER		
T4:5/TT			FLOOR SUMP PUMP ON DELAY TIMER TIMING		
T4:6					
T4:6/DN			FEED PUMP ON DELAY TIMER DONE		
T4:7			AIR STRIPPER BLOWER OFF-DELAY TIMER		
T4:7/DN			BLOWER OFF-DELAY TIMER DONE		
T4:7/TT					
T4:10			FEED TANK HIGH LEVEL ALARM TIMER		
T4:10/DN			FEED TANK LAH TIMER DONE		
T4:11			AIR STRIPPER SUMP HIGH LEVEL ALARM TIMER		
T4:11/DN			AIR STRIPPER SUMP LAH TIMER DONE		
T4:12			DISCHARGE TANK HIGH LEVEL ALARM TIMER		
T4:12/DN			DISCHARGE TANK LAH TIMER DONE		
T4:13			FLOOR SUMP HIGH LEVEL ALARM TIMER		
T4:13/DN			FLOOR SUMP LAH TIMER DONE		
T4:14/DN					
T4:16					
T4:16/DN					
T4:17/DN					
T4:19			TRAINING GROUNDS RF RELAY ALARM TIMER		
T4:20			GROUNDWATER PUMP 1 FAILURE ALARM TIMER		
T4:20/DN			GW PUMP 1 LAH TIMER DONE		
T4:21			GROUNDWATER PUMP 2 FAILURE ALARM TIMER		
T4:21/DN			GW PUMP 2 LAH TIMER DONE		
T4:22			FEED PUMP 1 FAILURE ALARM TIMER		
T4:22/DN			FEED PUMP 1 LAH TIMER DONE		
T4:23			FEED PUMP 2 FAILURE ALARM TIMER		
T4:23/DN			FEED PUMP 2 LAH TIMER DONE		
T4:24			DISCHARGE PUMP 1 FAILURE ALARM TIMER		
T4:24/DN			DISCHARGE PUMP 1 LAH TIMER DONE		
T4:25			DISCHARGE PUMP 2 FAILURE ALARM TIMER		
T4:25/DN			DISCHARGE PUMP 2 LAH TIMER DONE		
T4:26			FLOOR SUMP PUMP 1 FAILURE ALARM TIMER		
T4:26/DN			FLOOR SUMP PUMP 1 LAH TIMER DONE		
T4:27			FLOOR SUMP PUMP 2 FAILURE ALARM TIMER		
T4:27/DN			FLOOR SUMP PUMP 2 LAH TIMER DONE		
T4:28					
T4:28/DN					
T4:29					
T4:29/DN					
T4:30			AIR STRIPPER BLOWER 1 FAILURE ALARM TIMER		
T4:30/DN			AIR STRIPPER BLOWER 1 LAH TIMER DONE		
T4:31			AIR STRIPPER BLOWER 2 FAILURE ALARM TIMER		
T4:31/DN			AIR STRIPPER BLOWER 2 LAH TIMER DONE		
T4:32			24V POWER SUPPLY FAILURE ALARM TIMER		
T4:32/DN					
T4:33			GW PUMP 1 RTM SECOND TIMER		
T4:33/DN			GW PUMP 1 RTM SECOND TIMER DONE		
T4:34			GW PUMP 2 RTM SECOND TIMER		
T4:34/DN			GW PUMP 2 RTM SECOND TIMER DONE		
T4:35			FEED PUMP 1 RTM SECOND TIMER		
T4:35/DN			FEED PUMP 1 RTM SECOND TIMER DONE		
T4:36			FEED PUMP 2 RTM SECOND TIMER		
T4:36/DN			FEED PUMP 2 RTM SECOND TIMER DONE		
T4:37					
T4:37/DN					
T4:38					

Address/Symbol Database

Address	Symbol	Scope	Description	Sym Group	Dev
T4:38/DN					
T4:39			DISCHARGE PUMP 1 RTM SECOND TIMER		
T4:39/DN			DISCHARGE PUMP 1 RTM SECOND TIMER DONE		
T4:40			DISCHARGE PUMP 2 RTM SECOND TIMER		
T4:40/DN			DISCHARGE PUMP 2 RTM SECOND TIMER DONE		
T4:41			SUMP PUMP 1 RTM SECOND TIMER		
T4:41/DN			SUMP PUMP 1 RTM SECOND TIMER DONE		
T4:42			SUMP PUMP 2 RTM SECOND TIMER		
T4:42/DN			SUMP PUMP 2 RTM SECOND TIMER DONE		
T4:43			BLOWER 1 RTM SECOND TIMER		
T4:43/DN			BLOWER 1 RTM SECOND TIMER DONE		
T4:44			BLOWER 2 RTM SECOND TIMER		
T4:44/DN			BLOWER 2 RTM SECOND TIMER DONE		
U:3			ANALOG INPUT		
U:4			GROUNDWATER PUMPS		
U:5			FEED PUMPS		
U:6			DISCHARGE PUMPS		
U:7			SUMP PUMPS		
U:8			STRIPPER PUMPS		
U:9			STRIPPER BLOWERS		
U:10			ALARMS		
U:11			FLOW TOTALIZER		
U:12			ALTERNATION LOGIC		
U:13			RUN-TIME METERS		
U:14			PUMP GPM LOGIC		
U:15			HMI PANEL CLOCK CHANGE		

Instruction Comment Database

Address	Instruction	Description

Symbol Group Database

Group_Name Description