



A Safe Fleet Brand

Form 847

Rev. 8/19



AccuMax

Multi-Point Injection System

Models 3040, 3060, 3090, 3150, 3300

INSTALLATION AND OPERATION MANUAL

Unit
Serial
Number _____

All quality FoamPro products are ruggedly designed, accurately machined, carefully assembled, thoroughly inspected and tested. In order to maintain the high quality of your unit, and to keep it in a ready condition, it is important to follow the instructions on care and operation. Proper use and good preventive maintenance will lengthen the life of your unit. ALWAYS INCLUDE THE UNIT SERIAL NUMBER IN CORRESPONDENCE.

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NOTE TO SYSTEM INSTALLERS

IMPORTANT: Please provide a copy of the FoamPro manual to the end user of the equipment. For additional FoamPro manuals, contact by FAX 816-892-3178, web site www.foampro.com, or call 800-533-9511. Request Form No. 847.

1 Safety

Before attempting to install an AccuMax Multi-Point Injection System, read all of the following safety precautions and follow carefully.

The following special notices are used to notify and advise the user of this product about procedures that may be dangerous to the user, or result in damage to the product.

NOTE: Notes are used to notify of installation, operation, or maintenance information that is important but not safety related.

CAUTION: Caution is used to indicate the presence of a hazard, which will or may cause minor injury or property damage if the notice is ignored.

WARNING: Warning denotes that a potential hazard exists and indicates procedures that must be followed exactly to either eliminate or reduce the hazard, and to avoid serious personal injury, or prevent future safety problems with the product.

DANGER: Danger is used to indicate the presence of a hazard that will result in severe personal injury, death, or property damage if the notice is ignored.

- Do not pump at pressures higher than the maximum recommended pressure. [300 PSI (20.7 BAR)]
- Do not permanently remove or alter any guarding devices or attempt to operate the system when those guards are temporarily removed.
- Always disconnect the power source before attempting to service any part of the pump.
- Release all pressure within the system before servicing any of its component parts.
- Drain all concentrate and water from the discharge system before servicing any of its component parts.
- Check all hoses for weak or worn conditions after each use. Ensure that all connections and fittings are tight and secure.
- Use only pipe, hose, and fittings from the foam pump outlet to the injection point, which are rated at or above 400 PSI (28 BAR) minimum rating, at which the water pump system operates.
- Use only pipe, hose, and fittings from the hydraulic oil pump to the foam pump hydraulic motor, which are rated at least the maximum working pressure or better as listed in Section 15, and are approved for mobile hydraulic system use.
- Any electrical system has the potential to cause sparks during service. Take care to eliminate explosive or hazardous environments during service/repair.

- Rotating drive line components may cause injury. Be careful of rotating components when adjusting load sense pump compensator.
- Slowly loosen the foam pressure line fittings and allow the pressure to escape. Protect face and eyes from any potential spray which may occur.

CAUTION: Do not attempt to operate the system at or above a temperature of 160°F (71°C).

WARNING: Ensure that the electrical source of power for the unit is a 12- or 24-Volt, negative ground DC system. Power and ground lines must come directly from the battery without any connections to other high power devices, such as primer pumps, hose reels, light bars, etc. Separate 16 AWG or larger power supply lines must be supplied for the FoamPro AccuMax components. Power required for the driver boxes and the controllers must have a minimum current rating of at least 5 AMPS.

CAUTION: Periodically inspect the pump and the system components. Perform routine preventive maintenance as required. Failure to perform routine maintenance may cause damage to the system. See the maintenance section of this manual for recommended maintenance procedures and intervals between maintenance work.

NOTE: Read and understand these installation instructions before proceeding with the equipment installation.

CAUTION: Use only approved petroleum base hydraulic fluids meeting the specifications as noted in Section 4. Never mix fluid types. Ensure all hoses and seals are compatible with fluids used. Do not use water or glycol-based fluids. Do not use phosphate ester-type fluids.

CAUTION: Dirt and contaminants are the primary causes of premature wear and failure in any hydraulic system. Use extreme care during assembly and service to keep contaminants out of the system.

Installation and Operation Manual

WARNING: Always disconnect the ground straps, electrical wires and control cables from the Digital Display Control Module and all other FoamPro equipment before electric arc welding at any point on the apparatus. Failure to do so will result in a power surge through the unit that might cause irreparable damage.

CAUTION: All DOT, SAE or other applicable standards must be followed when installing the hydraulic supply system. Pay close attention to engine and transmission manufacturer drive limitations.

CAUTION: Never attempt to cut or lengthen the molded cables. Doing so will result in RFI/EMI interference. Contact the factory if molded cables of a different length are required.

CAUTION: To ensure the integrity of fitting connections in the hydraulic system, use only SAE JIC 37° flare or equal type hose connections.

WARNING: The hydraulic pump pressure is preset at the factory for proper operation. DO NOT adjust the pump pressure relief valves.

CAUTION: The cables shipped with each FoamPro AccuMax MP system are tested at the factory with that unit. Improper handling and forcing connections may damage these cables which might result in other system damage.

CAUTION: The foam tank low-level sensor must be utilized to protect the foam pump from dry running. Failure to do so will void warranty.

CAUTION: When pouring foam concentrate directly into the foam pump, the inlet strainer is bypassed. Make sure contaminants are not poured into pump chamber. Premature pump wear or damage may result if contaminants are allowed to enter pump chamber.

CAUTION: Do not run the FoamPro AccuMax 3000 system for more than one minute deadheaded against the pressure gauge as the foam pump could be damaged.

CAUTION: When operating the FoamPro AccuMax MP System in the “Simulated Mode” function, an outlet for the foam concentrate must be provided. Otherwise dangerous excessive pressure may be built up in the apparatus water piping and/or hoses. This outlet for the foam concentrate can be provided by turning the “CAL/INJECT” valve to the “CAL” position. A suitable container must be provided to collect the foam concentrate.

2 A Quick Look At How The System Works

The FoamPro AccuMax Multi-Point injection system is an electronically controlled, hydraulically driven, foam concentrate proportioning system designed to provide the wide range of foam concentrate injection rates necessary for foam operations.

The FoamPro AccuMax Multi-Point system will accurately deliver from 0.1% to 10.0% foam concentrate to each foam discharge injection point independently. The minimum and maximum rated concentrate flow rates obtainable are shown in the system specifications in Section 15.

The FoamPro AccuMax MP system is a flow-based proportioning system that measures water flow through a particular discharge and injects the correct proportional amount of foam concentrate to maintain the desired percentage in that discharge. A basic diagram of the FoamPro system is shown in Figure 2-1. The basic system is comprised of a master control module and from 1 to 10 line control modules depending on the design of the apparatus.

The master control module operates and controls the hydraulic drive foam pump module to monitor and supply the proper amount of foam concentrate required by the line control modules. This module consists of a hydraulic pump, a hydraulic motor-driven foam pump, a foam flowmeter, a pressure transducer, a foam tank level sensor, a master driver box, and a master display controller. The master display controller is in constant communication with all line control modules to determine the correct amount of foam concentrate required and adjusts the hydraulic system to drive the foam pump to deliver the proper amount. It checks this overall requirement with the actual foam flow through the master foam flowmeter feedback loop at the discharge of the foam pump. The master control module also monitors the overall foam system pressure and not only reports it to the user via the display, but assists in control of the hydraulic circuitry to ensure that the system does not exceed the design maximum pressure. There is also a pressure relief valve in the foam pump discharge circuit for safety.

Each foam capable discharge line requires a line control module. The line control module consists of a foam flowmeter, a foam control valve, a foam injection check valve, a calibrate/inject valve, a main waterway check valve, a water flowmeter, a line driver box, and a

line display controller. The line controller displays and communicates the proper information to the master controller to ensure the proper amount of concentrate is available to the discharge it controls. The water line flowmeter measures the water flow and sends a signal to the line control display. The line foam flowmeter in the foam discharge line monitors the foam injection output. Constant comparison of these two information signals by the computer ensures the desired proportion of foam concentrate at all times based on water flow rate, independent of any variations in fire pump intake or discharge pressures. As water flow increases or decreases, the foam concentrate rate of injection is increased or decreased automatically to correspond to water flow, maintaining the proper concentrate percentage as selected on the line control module. It also controls the foam control valve to allow the proper amount of foam concentrate to be injected into its discharge line based on the input requirements supplied by the user and the information supplied by the foam flowmeter and the water flowmeter in the line module, regardless of operating pressure.

Each line control module operates independently of each other and all line control modules communicate to the master control module for total system operation. An option for each line control module is the addition of a pressure transducer for placement into the discharge water line. This feature is optional and is for monitoring the discharge pressure only.

Foam concentrate is injected directly into the water stream on the discharge side of the water pump. It is then fed as foam solution into a standard fog nozzle, an air-aspirated nozzle, a straight bore nozzle, or into a CAFS system, by the main fire pump.

Since the foam is injected on the discharge side of the fire pump, and check valves are used at installation, contamination of the booster tank, fire pump, and relief valve with foam concentrate is eliminated.

Hydraulic power to operate the foam pump is to be provided by a separate hydraulic pump driven by the apparatus system. Electrical power to operate the foam system is provided by the apparatus electrical system.

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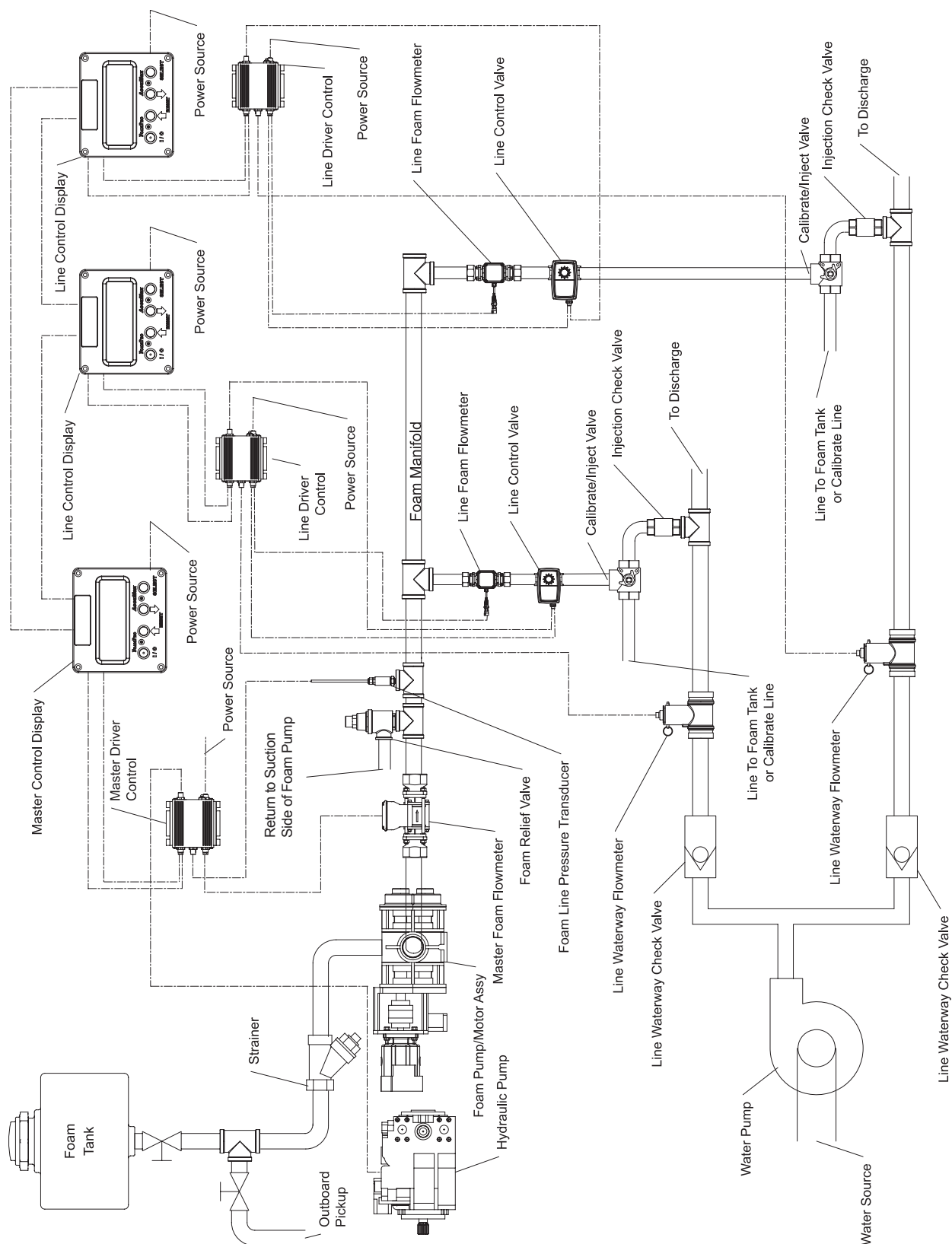
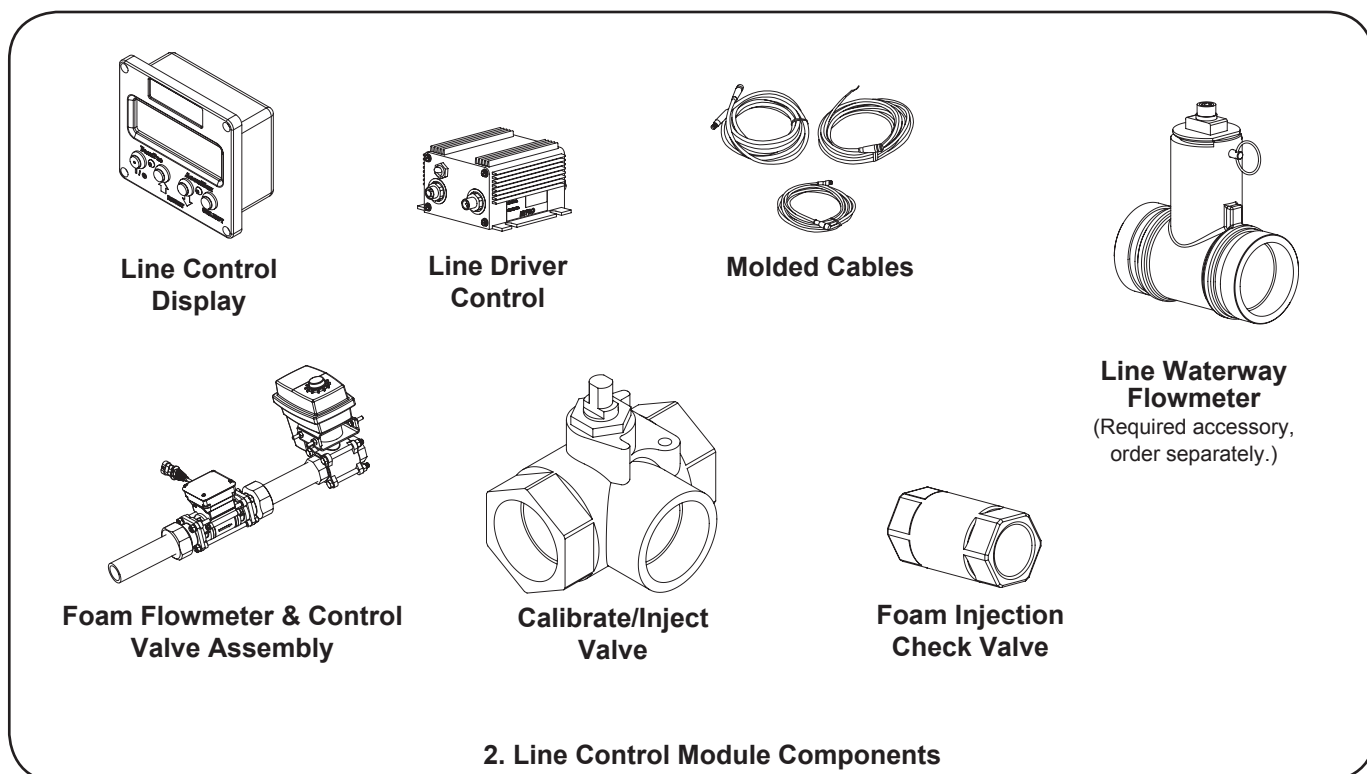
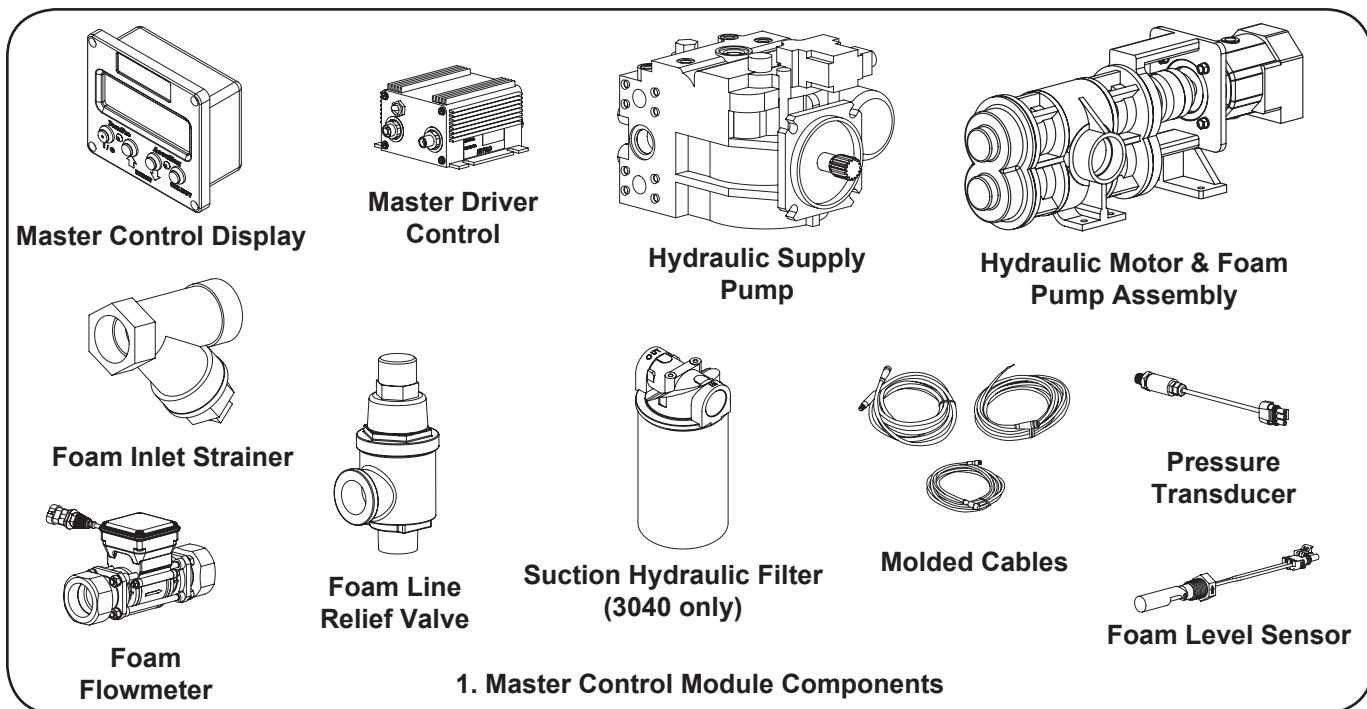


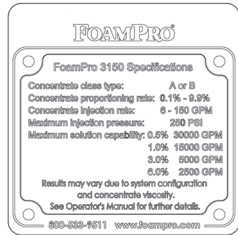
Figure 2-1 FoamPro AccuMax Multi-Point System Layout

3 System Component Description

The following components are packaged with the standard FoamPro AccuMax Multi-Point system:

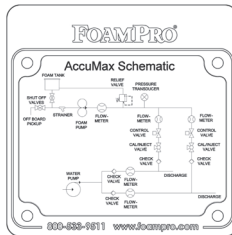


System Accessories Available

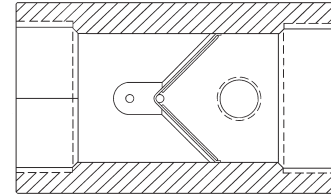


System Specification Placards

System	Part Number
3040	6032-0030
3060	6032-0032
3090	6032-0070
3150	6032-0048
3300	6032-0073

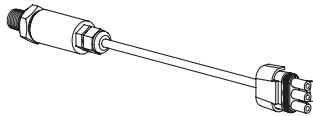


System Placard P/N 6032-0050



Main Waterway Check Valve with Drain Port

Size/ Thread	All Stainless Steel
1-1/2" NPT	P/N 3320-1001
2" NPT	P/N 3320-1002
2-1/2" NPT	P/N 3320-1003
3" NPT	P/N 3320-1004
4" NPT	P/N 3320-1005



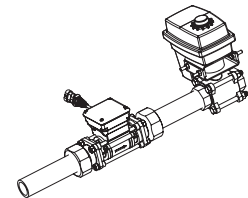
Pressure Transducer (Optional on Line Control Modules) Transducer Assy. P/N 2530-0111 Cable Assy. P/N 2520-0100R



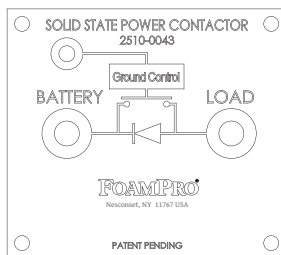
Short Data Cable (0.5 M) P/N 2520-0103R

Long Data Cable (5.0 M) P/N 2520-0110R

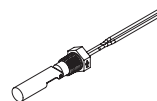
Long Extension Cable (15 M) P/N 2520-0124



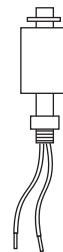
Low End Option P/N 3430-0695



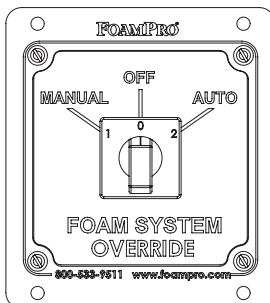
Solid State Contactor P/N 2510-0043



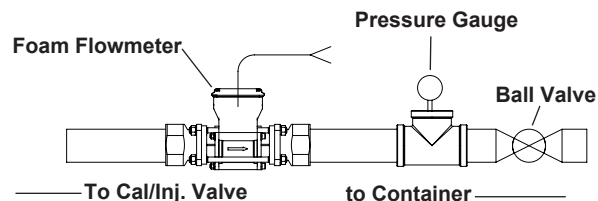
Level Sensor Side Mount (P/N 2510-0032)



Level Sensor Vertical Mount P/N 2510-0028



Manual Override P/N 3430-0764



AccuMax Calibration Kit Part Number 3430-0831

4 Installer Supplied Parts

FoamPro AccuMax MP systems are provided with major components and accessories required for installation. Due to differences in chassis and apparatus configurations, the installer must provide hydraulic coolers, fluids, reservoir, pipe, hoses, tubing, wire and fittings to satisfy installation requirements. The following section lists the specifications for selection of these components. Before beginning system installation, read this section thoroughly to make sure the proper components are selected. For detailed system installation instructions, refer to Sections 5, 6, 7, 8, and 9.

CAUTION: All DOT, SAE or other applicable standards must be followed when installing the hydraulic system. Pay close attention to engine and transmission manufacturer drive limitations.

Hydraulic Pump Drive Selection

The foam pump for the FoamPro AccuMax MP system is powered by hydraulics. Power for the system comes from hydraulic oil supplied by a hydraulic pump attached to the apparatus engine. To obtain optimum performance from the hydraulic motor-driven foam pump, FoamPro supplies the hydraulic pump and foam pump hydraulic motor as a matched pair to provide the proper flow and pressure required with reduced heat load, torque, and horsepower requirements.

The FoamPro AccuMax MP hydraulic supply pump will provide the correct fluid flow over the widest range of engine speeds. See system specifications for the required pump speed to attain maximum performance levels. By using a PTO ratio greater than 1.0, the minimum engine speed for full system performance could be idle speed.

A transmission PTO should be used to drive the hydraulic supply pump. Transmission PTOs have greater torque capabilities and provide adequate power for the hydraulic pump. Selection of a PTO transmission with a standard SAE mounting pad will allow bolting the hydraulic pump directly to the transmission. The FoamPro AccuMax 3000 hydraulic supply pump has a standard SAE mounting flange and shaft (see Section 15 for the pump mounting information). **Standard pump rotation is clockwise when viewing the hydraulic pump from the shaft end.**

Other shaft configurations are available. Check with the FoamPro factory for other configurations that may be available. See Section 15 for pump dimensions.

Control of the PTO may be provided by a manual shift lever, shift cable, or solenoid. The manual shift-type PTO can be left in gear all the time to circulate oil as soon as the engine is started since the hydraulic pump will draw less than 5 hp when operating in standby mode. The PTO shift can be labeled **"Service Disconnect"**.

When selecting a transmission PTO, it is imperative that consideration be given to frame clearances and the space in which the hydraulic supply pump is to be mounted. For new installations, initial design and planning will eliminate clearance problems. When the FoamPro AccuMax MP system is being installed as a retrofit, all clearances must be taken into account. Consult PTO and chassis manufacturers to determine dimensions and clearances required.

CAUTION: The use of an accessory drive pad is not recommended since adequate torque usually is not available to drive the hydraulic supply pump and accessories.

Oil Reservoir

A hydraulic reservoir will be required to be installed in the apparatus. See Section 15 for minimum recommended reservoir capacity. A larger reservoir may be installed and is recommended if the apparatus is to run at maximum capacity for an extended period of time and to allow air to settle out of the oil.

The reservoir must have a diffuser on the inlet to prevent entrapment of air into the system. A particle screen of 100-170 mesh on the oil outlet is recommended to help keep dirt out of the system. A baffle to separate the inlet and outlet sections should be installed in the reservoir. A vented, filtered breather of sufficient size to allow filling of oil is required and an oil drain plug is recommended.

The reservoir outlet to the pump inlet should be above the bottom of the reservoir to take advantage of the gravity separation and to prevent large particles from entering the pump. The fluid return should be

positioned so that the flow to the reservoir is discharged below the normal fluid level, and also directed into the interior of the reservoir for maximum dwell and deaeration of the fluid.

A sight gauge with thermometer is also recommended for easy checking of the oil level and to monitor oil temperature. The oil reservoir should be mounted away from heat sources, such as exhaust systems, and be in a location that allows easy access for checking and filling the oil.

Oil Cooler

An oil cooler capable of maintaining the temperature of the hydraulic oil at 160° to 220°F (71° to 104°C) is required. Use of an air-to-oil radiator-type heat exchanger should provide adequate cooling for the hydraulic system oil. An electrically or hydraulically-driven fan attached to the oil cooler permits mounting of the oil cooler anywhere fresh air circulation is available. A thermostat is required to be included for quick warm-up of the oil in cold climates. Check the system specifications page in Section 15 for minimum heat load information to properly size the cooler.

Oil-to-water heat exchangers can be installed, but they present special problems such as sediment accumulation, drainage, and overheating when running in standby mode for extended periods without discharging water. If a hydraulic oil to water heat exchanger is to be used, proper maintenance, monitoring, and pumping procedures must be followed. The oil-to-water exchangers must be installed per the manufacturer's recommendations and NFPA requirements.

Hydraulic Oil

Ratings and data for the FoamPro AccuMax systems are based on operating with premium hydraulic fluids containing oxidation, rust, and foam inhibitors. These premium fluids include premium turbine oils, API CD engine oils per SAE J183, M2C33F or G automatic transmission fluids (ATF), Dexron II (ATF) meeting Allison C-3 or Caterpillar TO-2 requirements.

The recommended hydraulic fluid operating viscosities are typically 70 to 278 SUS (12 to 60 cSt) within the recommended temperature operating range for optimum performance. The hydraulic oil should have an ISO rating of between 32 to 68 depending on climatic conditions.

Hydraulic Hoses and Fittings

High pressure hydraulic hoses and fittings are to be rated to a minimum of the maximum hydraulic pressure rating found in Section 15. To reduce the potential for leaks at the hydraulic fittings, use SAE 37° flare JIC type fittings, SAE straight thread O-ring fittings, or SAE split flange fittings. See the table for required fitting sizes, minimum hose size, and minimum hose pressure ratings for the hydraulic components in Section 15.

Foam Concentrate Suction Lines

Fittings and hoses from the foam tank to the inlet of the foam pump must be supplied. Use the minimum inside diameter or larger suction hose shown below for the corresponding system, depending on the viscosity of the foam concentrate. Many class B foams are more viscous and will require one size larger inside diameter hoses.

Model	Min. Hose ID
3040	1-1/2"
3060	2"
3090	2-1/2"
3150	3"
3300	4"

Use fittings and components that are rated for 23" Hg (584.2mm) vacuum and 50 PSI (3 BAR) pressure or better. The components used must be compatible with the foam concentrates used. Fittings used must be made of brass or 300 series stainless steel. Swept elbows and tees and a Net Positive Suction Head (NPSH) are highly recommended. If a flushing system is to be used, the pressure rating of those components subjected to main water pump pressure are to be rated to 400 PSI (28 BAR) or better.

A drain/air bleed valve should be provided to allow draining of the tank and easier priming of the foam pump.

Foam Concentrate Discharge Lines

Fittings and hoses from the discharge of the foam pump to the foam manifold must be supplied by the installer. Minimum hose and fitting sizes for the foam pump discharge lines are to be 1" (25.4 mm) ID for the 3040 and 3060, 1 1/4" (31.8 mm) for the 3090, 1 1/2" (38.1 mm) for the 3150 and 2" (50.8 mm) for the 3300 and rated at or above 400 PSI (28 BAR) working pressure. Fittings and hoses must be compatible with all foam agents to be used with the system. Use fittings of brass or 300 series stainless steel.

The foam line control assemblies supplied with the system are to be installed in the foam concentrate manifold. This requires the line sizes to be at minimum the same as the

ID of the pipe connection before the foam flowmeter of each foam discharge assembly. Hoses and fittings are to be rated at or above 400 PSI (28 BAR) working pressure. Fittings and hoses must be compatible with all foam agents to be used with the system. Use fittings of brass or 300 series stainless steel.

Foam Discharge Manifold

The discharge of the foam pump will require a manifold to disperse foam concentrate to the line discharges. Use a minimum of 1" (25.4 mm) for the 3040 and 3060, 1-1/2" (38.1 mm) ID pipe for Models 3090 and 3150. Use a minimum of 2" (50.8 mm) ID pipe for model 3300. The manifold will require the appropriate porting for the line discharge assemblies. Ports must be the same size as the line discharge.

Foam Concentrate Tank(s)

Foam concentrate tanks must be supplied to suit the capacity required for the apparatus application. The tank(s) should meet NFPA minimum standards for the design capacity, including filler size, vapor pressure venting, and drain facilities.

Check Valves

It is required to install a check valve in the foam concentrate injection line to prevent foam concentrate flow from the foam tank to the injection point (at the main waterway) due to static head pressure. The concentrate check valve is included with each line control assembly and is matched to its discharge flow requirements.

If the system is to be installed in an apparatus where potable water sources may need to be isolated from the possibility of foam contamination, there are a few methods that can be incorporated into the design of the apparatus or on the outside of the apparatus.

One of those methods is to install check valves in all water line locations such as flush lines, where foam concentrate could drain back into the water pumps or tanks of the fire apparatus, and where the water piping that will supply foam solution connects to the apparatus water pump discharge.

Another method is to install a check valve or other device to between the water pump water tank, and to the suction inlets to the water pump, or outlets of the hydrant.

These are just a few of the methods that may be available.

Drain lines must be provided from all water and foam solution piping components to prevent freezing in cold weather. Multiple drain systems that allow individual drain lines to connect with one another may allow foam or water to circumvent the check valves. Care must be taken to avoid this possibility as contamination of the water tank, foam tank, or water pump may result.

Electrical Requirements

Electrical power and wiring must be supplied from the main apparatus electrical system to the AccuMax MP system. The power must be supplied directly from the battery without any connections to other high power devices, such as primer pumps, hose reels, light bars, etc., with its own disconnect switch or a switch or contactor actuated by the battery disconnect switch, PTO switch or other device.

The system can be operated with either a 12 VDC or 24 VDC, negative ground, power source. The system should be protected with a 10 AMP fuse for 12 VDC systems and 5 AMP fuse for 24 VDC systems. All system components should all be powered from the same terminal, and ground connections should all be common. Each display and driver will require its own power and ground from the common terminals. Use a standard 14 AWG automotive hookup wire.

NOTE: See "POWER SUPPLY" (page 27) in the *Electrical Installation Section* for important installation information.

CAUTION: Always disconnect the ground straps, electrical wires, and control cables from the Control Display Modules, the Line Control Drivers, and Line Control assemblies, and any other FoamPro equipment before electric arc welding at any point on the apparatus. Failure to do so will result in a power surge through the unit causing irreparable damage and is not covered under warranty.

5 Installation Planning

Because of the potential differences in apparatus plumbing and foam system configuration, it is not practical to depict exactly how each FoamPro AccuMax Multi-Point system can best be installed onto a particular apparatus. Most of the information contained in the following sections, however, will apply to any situation.

NOTE: It is recommended that you read the following sections thoroughly before beginning installation of the FoamPro AccuMax MP system. It is also recommended that you spend time planning and designing where and how you intend to install this unit in the apparatus before beginning the actual installation.

Determine the locations of the components to be installed such as foam tank(s), foam pump, oil reservoir, oil cooler, foam strainers, tank valves, flowmeter(s), discharge line control assemblies, and hydraulic pump. Try to place components in locations that require the least amount of hoses and fittings.

Locate the FoamPro AccuMax system components in an area that is protected from road debris and excessive heat buildup. Since the master power switch and CAL/INJECT valve are components you may need to access, it is recommended that they be installed in an accessible location in the vicinity of the operator's panel.

The foam pump unit must be mounted below the discharge of the foam tank(s) to provide for gravity feed to the foam pump. Locate the foam tank(s) where the refilling can be easily done with 5 gallon (19 liter) pails, an appropriate refill system, or other methods suitable to the end user. Most water tank manufacturers will build foam tanks into the booster tank. When specifying integral foam tank(s), make sure provisions are made for installation of the low tank level sensor as well as foam suction connections and tank drainage.

Determine a location on the operator panel of the apparatus for the Control Display Modules. Consideration must be given for routing the control cables from the Control Display Modules to the control drivers, the line control assemblies, and the waterway flowmeters. If necessary, order longer or shorter cable assemblies to suit the location demands.

CAUTION: Never attempt to cut or lengthen the molded cables. Doing so will result in RFI/EMI interference. Contact the factory if molded cables of a different length are required.

High viscosity foam concentrates (2000 centipoise and higher), or inlet lines longer than 10 feet, will require the foam intake to be one size larger. When larger inlet piping is used, a larger foam strainer is required to reduce the pressure drop.

Like any hydraulic system, the FoamPro AccuMax MP will require cooling and hydraulic fluid filtration. An oil cooler must be provided for the system and consideration must be given to the location. The cooler must be mounted in an area where adequate cool air can flow over the cooler fins. The ideal location for an oil cooler is in front of the apparatus engine radiator. Consult the chassis manufacturer to ensure adequate fan capacity is available to provide the proper air flow. Fluid filtration is vital to a hydraulic system. A suction strainer in the reservoir is required. A filter is provided on the hydraulic pumps on the 3060 thru the 3300 systems. The 3040 system will require a separate suction filter as supplied.

When planning the installation, consideration must also be given to the hydraulic supply pump location, drive configuration and hose routing.

6 Foam Pump/Motor Installation

Hydraulic-Driven Foam Pump Assembly

The AccuMax systems are designed to be used with various gear type foam pumps currently in use in the industry. The standard foam pump used in the systems are manufactured by Fire Lion. Optional approved gear type foam pumps designed into the system are manufactured by Aurora (Edwards) and Trident (Titan). **Specifications for these options can be found in Section 15.**

The foam pump assembly must be mounted in a horizontal position. The base of the foam pump must be anchored to a surface or structure that is rigid and of adequate strength to withstand the vibration and stresses of apparatus operation. **Mounting dimensions for the FoamPro AccuMax foam pump and motor assemblies can be found in Section 15.**

CAUTION: Flexible hose connections are required between the major FoamPro components and the main water system. Do not hard plumb the system.

Be sure the hydraulic hoses and the foam concentrate hoses can be properly routed to the inlets and outlets on the foam pump. Foam concentrate must gravity feed to the foam pump inlet from the foam tank(s). The foam pump must be mounted in an area to avoid excessive exhaust system heat buildup.

Protection must be provided for the hoses and wiring to prevent chafing and abrasion during operation of the foam system.

Protect the foam pump base from excessive road spray and debris. Although the system is sealed and designed to be resistant to the harsh environment of firefighting apparatus, a protected location with easy operator access is the recommended installation location.

Choosing the Proper PTO

It is important to turn the hydraulic pump at the proper speed to ensure that the correct hydraulic pressure is produced over the full operating range of the foam system. When selecting a PTO to drive the hydraulic pump, compare the maximum RPM for the water pump with the maximum RPM (3,600 RPM) for the hydraulic pump. Then select a PTO that will provide the best performance at a lower RPM.

For Example: the maximum speed you can turn the water pump is 1,800 RPM. For the 3150 system hydraulic pump, the minimum speed is 1,375 RPM, and the maximum speed is 3,600 RPM. It is recommended to choose a PTO with a range of 1 - 1.60 conversion rate (or higher).

According to this example, the following table shows the Engine Speed with the corresponding Hydraulic Pump Speed:

Engine Speed	Hydraulic Speed
800 RPM	1280 RPM
900 RPM	1440 RPM
1000 RPM	1600 RPM
1100 RPM	1760 RPM
1200 RPM	1920 RPM
1300 RPM	2080 RPM
1400 RPM	2240 RPM
1500 RPM	2400 RPM
1600 RPM	2560 RPM
1700 RPM	2720 RPM
1800 RPM	2880 RPM

7 Hydraulic Plumbing Installation

Figure 7-1 provides some recommended guidelines for the location of the hydraulic system components. When making hydraulic component connections, ensure all applicable DOT and SAE standards are followed. Use hoses and fittings rated at least the maximum working pressure listed in Section 15 for the hydraulic oil high pressure lines. See Section 15 for required fitting sizes, minimum hose size, and minimum pressure ratings.

The fittings required to connect the hydraulic hoses to the FoamPro AccuMax MP foam pump motor and hydraulic supply pump are SAE ORB (O-Ring Boss) fittings with SAE JIC 37° flare swivel, and SAE Split Flange port connections.

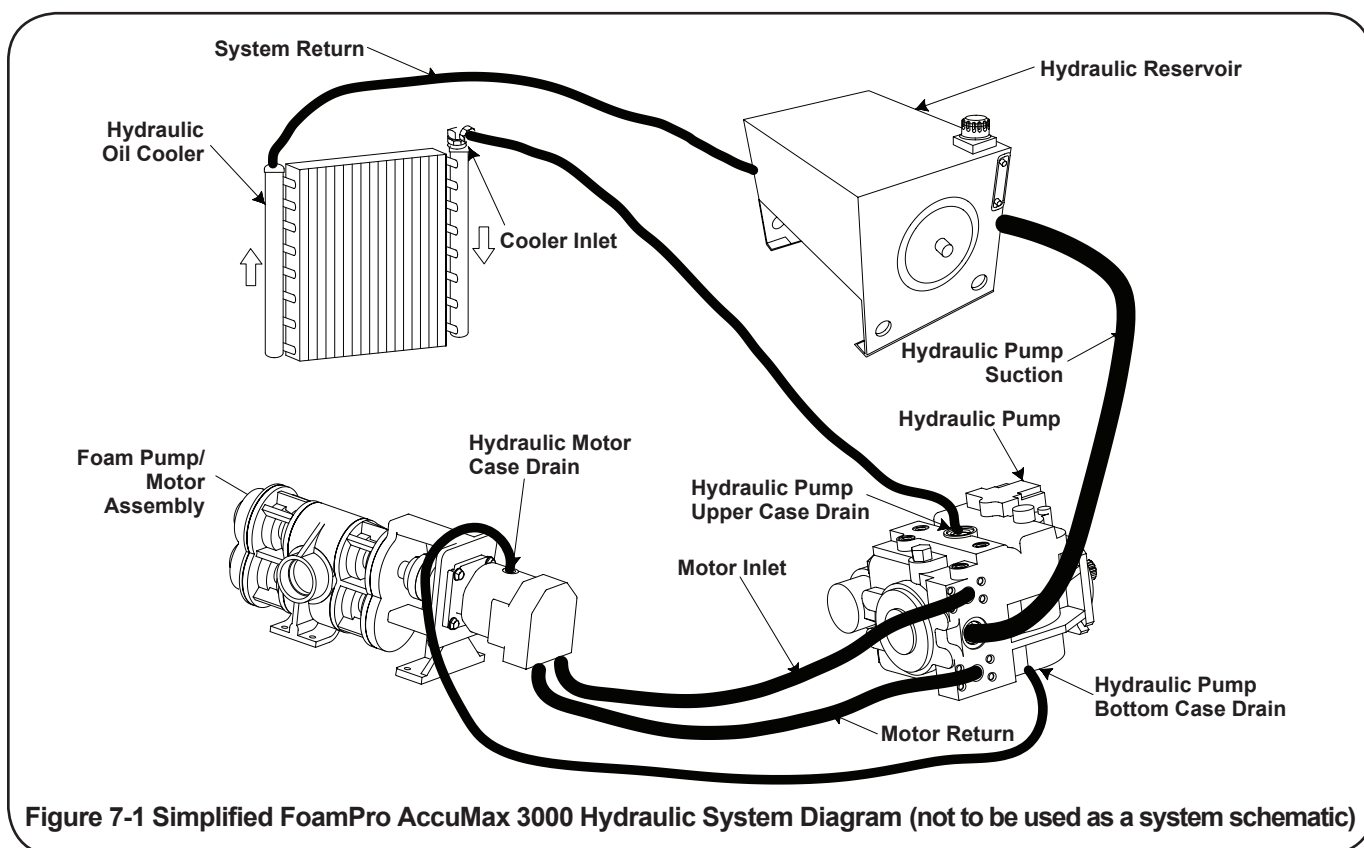
CAUTION: To ensure the integrity of fitting connections in the hydraulic system, use only SAE JIC 37° flare, SAE O-Ring Boss, or SAE Split Flange-type hose connections.

CAUTION: Use only approved petroleum-based hydraulic fluids as described in Section 4. Never mix fluid types. Ensure all hoses and seals are compatible with fluids used. Do not use water or glycol-based fluids. Do not use phosphate ester-type fluids. Other hydraulic fluids such as SAE 10W-40HD motor oil are too viscous for proper pump performance.

Hydraulic Power Source

The hydraulic power for the FoamPro AccuMax MP system is supplied by a hydraulic pump mounted on the fire apparatus engine, transmission, or auxiliary PTO. The hydraulic pump supplied with the system has been chosen to provide the required flow and pressure to drive the FoamPro AccuMax system.

Refer to Section 4 of this manual for further pump and PTO information and Section 15 for detail dimensions of the pump. See the table in Section 15 for all proper hose sizes, pressure ratings, and fittings for the various hydraulic components supplied by FoamPro.



Hydraulic Reservoir

The reservoir for the hydraulic system is to conform to the description in Section 4 and to all SAE and DOT standards. See table in Section 15 for minimum reservoir capacity for the unit being installed.

Hydraulic Oil Filtration

Hydraulic fluid filtration is vital to the performance and life of any hydraulic system. The AccuMax systems are no different. A suction strainer of 100 to 170 mesh is required in the outlet of the reservoir and should be sized to accommodate the charge pump flow of the system without significant pressure drop.

Model 3060 thru 3300 hydraulic pumps have a spin on filter already installed for that particular pumps protection. This filter has a Beta 10 rating of 10 to 20.

The Model 3040 system requires a suction filter with a Beta 10 rating of 10 to 20. The flow rating on the filter should be at least 25 gpm when used for suction. A filter is supplied with the system.

CAUTION: Ensure all hydraulic hoses and components are clean and free of debris.

CAUTION: Ensure hydraulic fluid is clean and free from contamination when filling and changing the fluid in the system.

Hydraulic Oil Cooler

An oil cooler is required in the hydraulic system to ensure proper oil temperature for optimum performance and to avoid damage to the hydraulic components. The actual cooler size required will depend on the system requirements, the location of the cooler, and the manufacturer of the cooler. Typical oil to air cooler connections are shown in Figure 7-2. The cooling requirements for the system being installed are listed in the table in Section 15.

If an oil-to-water exchanger is used, proper maintenance, mounting, and operating procedures must be maintained. A method to circulate cool fresh water must be provided when the hydraulic pump is engaged. A drain port must also be provided to prevent freezing and to allow flushing.

Hydraulic Supply Pump Connections

After completion of the mounting of all hydraulic system components, hose connections must be made. A table in Section 15 shows the connector and minimum hose sizes, and drawings in Section 15 show the connection ports to use for the hydraulic supply pump. **Always use the uppermost case drain port available.**

Pump Adjustment

The supplied hydraulic pump does not require any adjustment. The pump is adjusted to give you maximum performance throughout the entire operating range, and has been factory tested with your system.

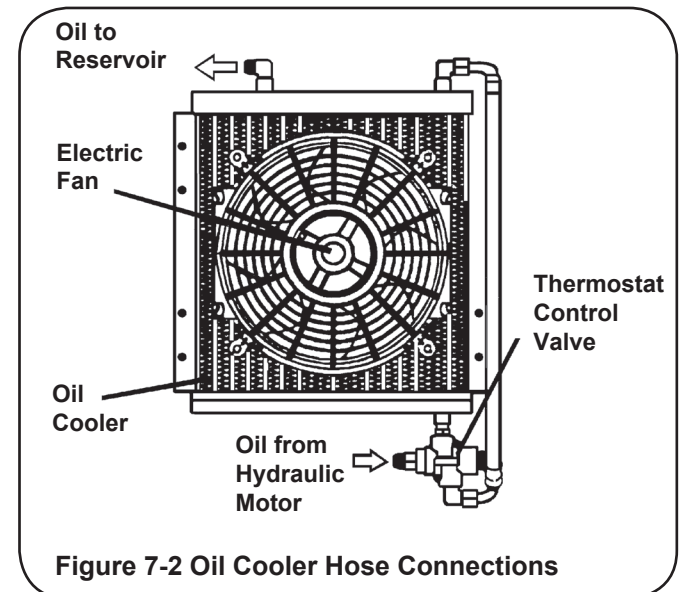


Figure 7-2 Oil Cooler Hose Connections

The diagram illustrates a complex foam system. At the bottom, a 'Water Source' feeds into a 'Water Pump'. The output of the water pump goes to a 'Line Waterway Check Valve' and then to a 'Line Waterway Flowmeter'. From there, it continues to another 'Line Waterway Check Valve' and then to a 'Line To Foam Tank or Calibrate Line'. This line also branches off to a 'Line Waterway Flowmeter' and another 'Line Waterway Check Valve'. The main line then goes to a 'Foam Pump/Motor Assy' and a 'Hydraulic Pump'. The 'Foam Pump/Motor Assy' has a 'Strainer' and an 'Outboard Pickup' connected to its suction side. The 'Hydraulic Pump' is connected to a 'Foam Tank'. The output of the foam pump goes to a 'Foam Line Pressure Transducer' and then to a 'Foam Relief Valve'. The 'Foam Relief Valve' is connected to a 'Foam Manifold'. The 'Foam Manifold' has three outlets, each leading to a 'Line Foam Flowmeter' and a 'Line Control Valve'. Each of these is connected to a 'Line Driver Control' and a 'Power Source'. The 'Line Driver Control' is also connected to a 'Line Control Display'. The 'Line Control Display' is connected to a 'Master Control Display'. The 'Master Control Display' is connected to a 'Master Driver Control' and a 'Power Source'. The 'Master Driver Control' is connected to a 'Return to Suction Side of Foam Pump'. The 'Return to Suction Side of Foam Pump' is connected to the suction side of the 'Foam Pump/Motor Assy'. The 'Foam Manifold' also has a 'Calibrate/Inject Valve' and an 'Injection Check Valve' connected to it. The 'Injection Check Valve' is connected to a 'Line To Foam Tank or Calibrate Line'. The 'Line To Foam Tank or Calibrate Line' is connected to a 'Calibrate/Inject Valve' and an 'Injection Check Valve'. The 'Injection Check Valve' is connected to a 'Line To Discharge'.

CAUTION: Flexible hose connections are required between the major FoamPro components and the main water system. Do not hard plumb the system.

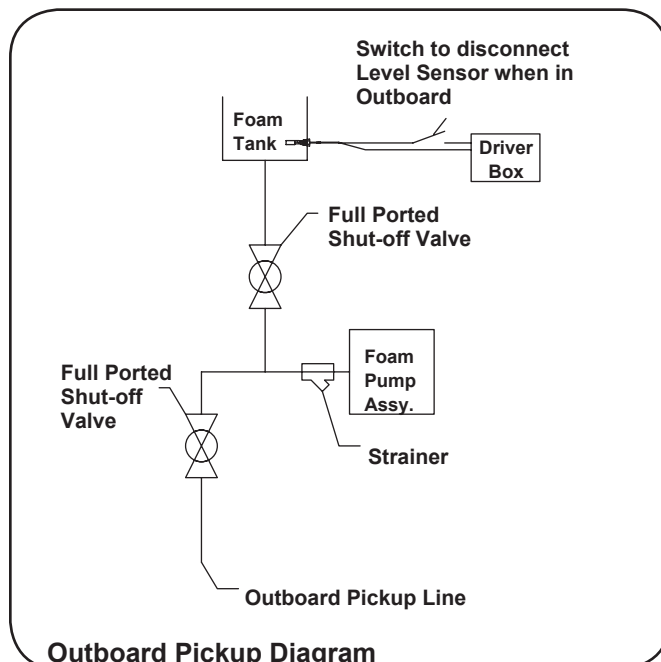
Foam Pump Suction

The inlet hose from the foam tank should be a minimum of 1-1/2" (38.1 mm) for the 3040, 2" (50.8 mm) for the 3060, 2-1/2" (63.5 mm) ID for the 3090, 3" (76.2 mm) ID for the 3150, and 4" (101.6 mm) ID for the 3300 and have adequate wall stiffness to withstand the vacuum of the foam pump while it is running without collapsing [23" Hg (584 mm HG)].

Outboard Pickup

An outboard pickup may be adapted to the foam pump inlet. The pickup should be positioned between the foam tank shut off valve and the foam inlet line strainer. A tee the same size as the tank to pump line may be placed in the suction line with the side leg of the tee going to the outboard pickup shut-off valve at the panel. A sealed quick connect-type fitting may be mounted to the panel for easy access. The outboard pickup line should not exceed 10 feet and the same line size and specifications as the tank to pump line should be utilized. The shut-off valves must be full ported valves and be air tight. A switch must be provided to disengage the low level sensor when using the outboard pickup. This switch may be a separate panel mount or one that is tied into the pickup valve actuator.

NOTE: The tank shut-off valve must be closed before opening the outboard valve when switching to the off-board pickup. The off-board pickup valve must be closed before opening the tank valve when switching to the foam tank operation.



Line Strainer

The line strainer provided with the FoamPro AccuMax MP system is sized properly for most applications. See Section 4 for further information. The appropriate strainer is to be installed on the inlet side of the foam pump.

CAUTION: If a pressurized water flush system is incorporated, the plumbing exposed to this pressure must be rated at or above the operating pressure, or a minimum of 400 PSI (28 BAR).

Master Foam Flowmeter Connection

The Master Foam Flowmeter is to be installed in a position after the foam pump discharge, as shown in Figure 8-1, with a minimum of 12 inches (305 mm) straight run before and 4-inch straight run after the device. Ensure the flow direction is the same as the arrow on the side of the flowmeter. Mount the flowmeter per Figure 8-4.

Pressure Sensor Connection

The pressure transducer used in the master line is to be mounted in the position shown in Figure 8-1. Note that the positioning of the sensor should be the same as found in Figure 8-6. The sensor has a 1/4" NPT connection into the main foam line.

Foam Pump Discharge Relief Valve

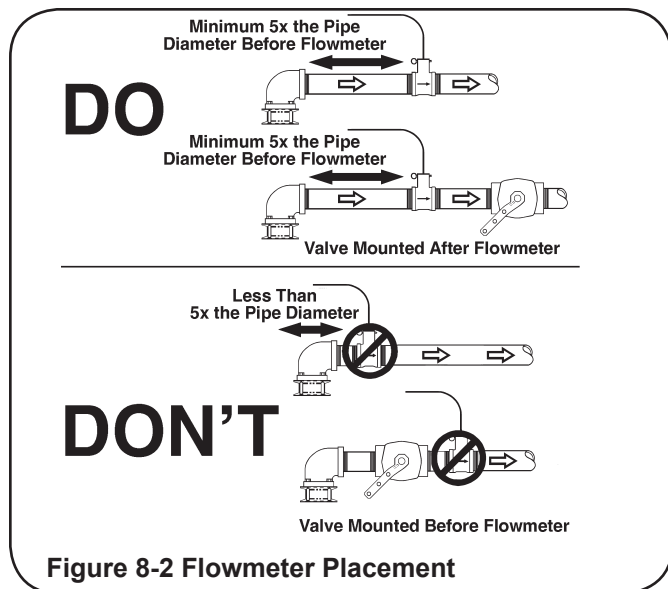
NOTE: To prevent possible foam cell contamination, if the system is plumbed with an off-board pickup you must plumb the Discharge Relief Valve back to the suction side of the foam pump as per the instructions. The discharge relief valves on the outlet port of the hydraulically-driven foam pump is preset at the factory to ensure optimum performance of the FoamPro AccuMax system. The bypass line from the hydraulically-driven foam pump relief must return to either the foam concentrate tank or a minimum of 5 feet from the inlet port of the foam pump. This will lessen the aerating of the foam in the event of an over-pressurization of the system.

Foam Discharge Manifold

The discharge of the foam pump will require a manifold to disperse foam concentrate to the line discharges. Use a minimum of 1" (25.4 mm) for the 3040 and 3060, 1-1/2" (38.1 mm) ID pipe for Models 3090 and 3150. Use a minimum of 2" (50.8 mm) ID pipe for model 3300. The manifold will require the appropriate porting for the line discharge assemblies. Ports must be the same size as the line discharge.

Line Waterway Flowmeters

The FoamPro AccuMax MP system is designed to accept flow reading signals from the FoamPro paddlewheel-style flowmeter. Proper flowmeter sizing is critical to system accuracy.



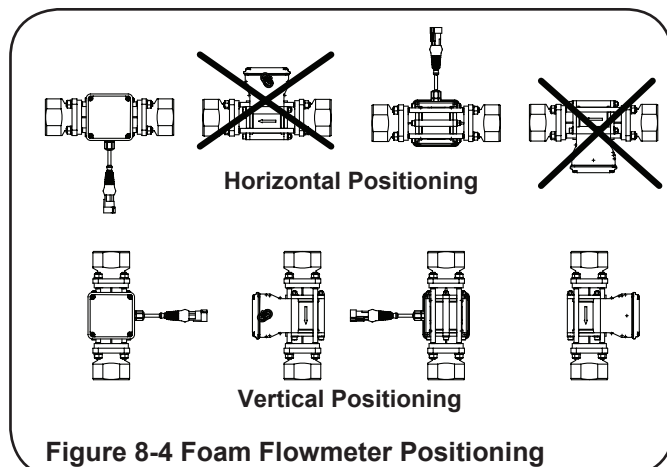
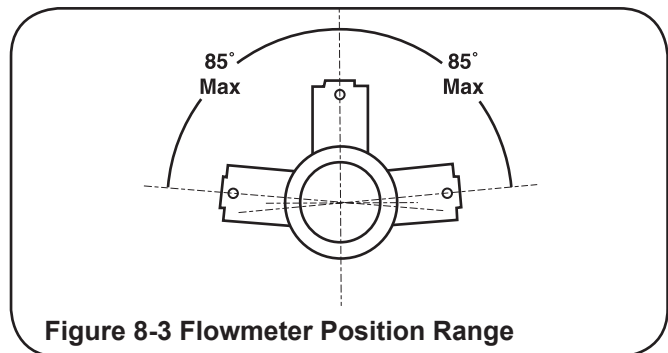
Select a flowmeter size based on actual flows required, not standard pipe sizes. Refer to the installation drawing in Section 15 for proper flowmeter sizing.

The flowmeters require that the amount of turbulence in the pipe being monitored is as low as possible. Excessive turbulence produces unstable and inaccurate flow readings. The following installation guidelines will help attain the best readings and maintain accuracy of the FoamPro AccuMax MP system.

1. A minimum **5 times the pipe diameter** of straight run pipe without any fittings is necessary upstream of the flowmeter. **10 times** is better. The following are the recommended straight run lengths for given pipe sizes:

Pipe Size	Recommended Straight Run Pipe
1-1/2" (38 mm)	7-1/2 to 15" (191 to 381 mm)
2" (50 mm)	10 to 20" (254 to 508 mm)
2-1/2" (64 mm)	12-1/2 to 25" (317 to 635 mm)
3" (76 mm)	15 to 30" (381 to 762 mm)
4" (100 mm)	20 to 40" (511 to 1016 mm)

2. The downstream plumbing of the water flowmeter is not as critical, but straight runs without fittings help maintain accurate repeatable flow readings.
3. **Do not mount a flowmeter directly after an**



elbow or valve. Valves create severe turbulence when they are "gated down" as shown in Fig. 8-2.

4. Try to mount the flowmeters in a position that is accessible for routine inspection and maintenance.

The FoamPro paddlewheel-style flowmeter fittings are specially designed tees that make inspection and maintenance of the flow sensor easy. The threads of the tees are available in NPT with grooved victaulic ends, or BSP with grooved victaulic ends. In horizontal runs, the tees should be mounted as close to upright as possible within the range shown in Figure 8-3.

Foam Line Discharge Assemblies

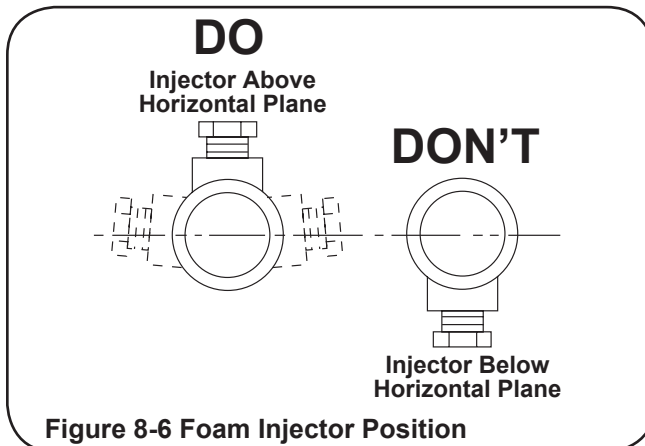
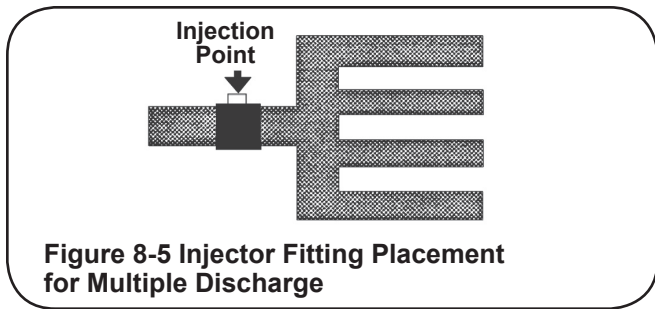
The foam line discharge assemblies shipped with the unit are designed to give maximum performance and accuracy over the full range of operations for each line and the system. The foam line discharge assemblies include stainless steel fittings, a foam flowmeter, and a foam control valve. The foam flowmeters in the assemblies are to be mounted in the orientation as shown in Figure 8-4. A straight run of hard piping before and after the flowmeter is required and is built into each line assembly with stainless steel fittings.

Calibrate/Inject Valve

The calibrate/inject valve supplied is to be positioned on the discharge side of each line control valve as shown in Figure 8-1. This valve must be accessible. The valve is a 3-way directional control valve that selects where the output of the foam system will go.

Check to make sure the valve is installed properly. Look at the ports as you move the selector handle. The flow should go from the center port to each of the end ports.

The hoses to and from the valve should be the minimum line control size and be pressure rated to 400 PSI (28 BAR) minimum working pressure, or the maximum

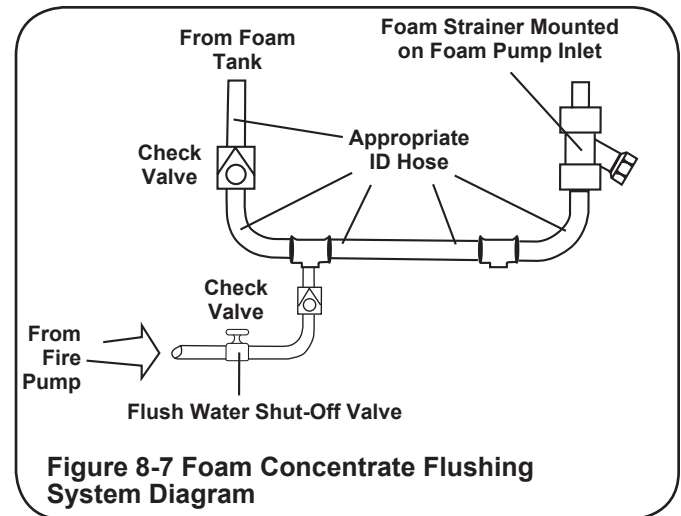


discharge pressure of the fire pump. Fittings are to be NPT and made of brass or 300 series stainless steel with the same minimum pressure rating as the hoses. The hose(s) from the calibrate side of the valve(s) may have a lower pressure rating since it is used for system calibration only and is always vented to the atmosphere. The hose(s) from this port must be long enough to reach a container outside the apparatus and may be coiled for storage when not in use.

Injection Point

The position of the injection point for each discharge **MUST** be in a place that is common to all discharges which require foam capability, or controlled from that line water flowmeter, but not within the straight run distance required before the flowmeter as previously described, as shown in Figure 8-5. A separate injection point is not possible for each discharge that is tied into a selected line control system.

Most foam concentrates by nature mix with water very quickly, so each discharge from a manifold will receive equal amounts of foam concentrate if the manifold is properly designed and installed. A static mixer or special mixing considerations may need to be designed into the system, especially when using thicker foam concentrates and those that may not readily mix with water.



Foam Concentrate Check Valves

Check valves are provided to prevent foam concentrate flow from the concentrate tank through the injection point and into the main waterway when the system is not in use. This is a NFPA requirement. A check valve of the proper size is supplied with each line control assembly. See Figure 8-1 for component placement. The concentrate check valves have a minimum cracking pressure of 10-12 PSI (0.7-0.8 BAR) and are pressure rated to 400 PSI (28 BAR) minimum working pressure. It is a good idea to inject foam concentrate at a horizontal or higher angle to allow water and debris in the water line to drain away from the check valve(s) as shown in Figure 8-6. This will avoid sediment deposits or formation of an ice plug in cold weather applications.

Main Waterway Check Valves

If the system is to be installed in an apparatus where potable water sources may need to be isolated from the possibility of foam contamination, there are a few methods that can be incorporated into the design of the apparatus or on the outside of the apparatus.

One of those methods is to install check valves in all water line locations such as flush lines, where foam concentrate could drain back into the water pumps or tanks of the fire apparatus, and where the water piping that will supply foam solution connects to the apparatus water pump discharge.

Another method is to install a check valve or other device between the water pump water tank, and to the suction inlets to the water pump, or outlets of the hydrant.

These are just a few of the methods that may be available.

CAUTION: The usage of check valves or other means isolation are not to be used as a substitute for proper flushing of apparatus lines after usage.

Flushing System

Depending on the corrosiveness of the foam concentrates used, or when changing foam concentrate types or manufactures, a flushing system must be installed. Generally all Class B foam concentrates should be flushed from the system after usage with fresh water. See Figure 8-7 for a typical flushing system plumbing schematic.

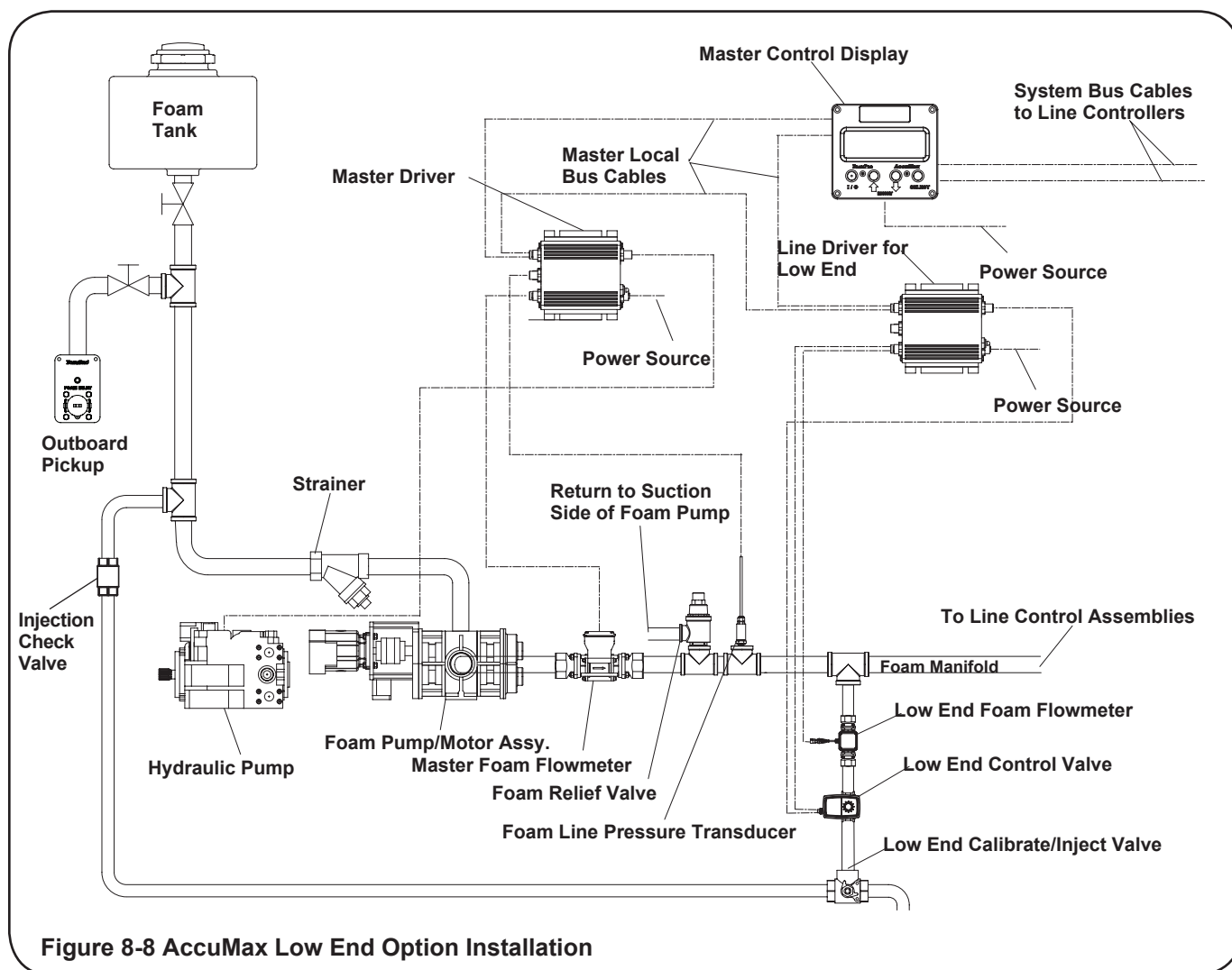
Drain Lines

On apparatus with multiple drain lines, the drains from the foam solution discharge line should not be piped into a multi-drain system before the check valves. The standard multi-drain system from most manufacturers will allow cross talk between the drain lines and the apparatus water tank, resulting in contamination of the

water tank with foam. A separate drain system should be provided for the foam solution piping to prevent contamination of the water tank and fire pump.

Low End Option

The AccuMax Low End Option will allow the operator to run the system below the stall point of the foam pump and deliver foam at a lower rate than normal, especially when running one discharge. The option diagram is plumbed into the foam manifold as shown below with a separate return line to the pump suction line. This line is required to be the same size as the selected low end controller size at minimum and should be returned to the inlet plumbing of the pump at least 3-5 feet before the pump inlet. A calibration valve is required for the calibration of the option.



Calibration/Test Manifold

It may be advantageous to install a Calibration/Test manifold into the AccuMax system for ease of calibration of the system and testing the system. It can also be used to pump foam from the foam tank into an outside container or to exercise the system and pump the foam back into the foam tank. Designs of this manifold will vary from one installation to the next, but the schematic provided depicts what the manifold may look like.

Things to keep in mind for construction of the manifold are:

- Manifold, hoses and fittings are to be rated at or above 400 PSI (28 BAR) working pressure.
- Manifold, fittings and hoses must be compatible with all foam agents used with the system. Use brass or 300 series stainless steel.
- Manifold is to be at least one pipe size larger than the largest Line Control assembly pipe size.
- All lines and valves are to be properly identified with the Line Control assembly and/or discharge that they service.
- It is not recommended to permanently install the Calibration/Test Kit into the system. Use quick connections of proper size, material, and pressure rating for inserting the kit into and removal from the system.
- Pressure gauge used is to be rated to at least 600 PSI.
- A drain line may be required in the manifold.

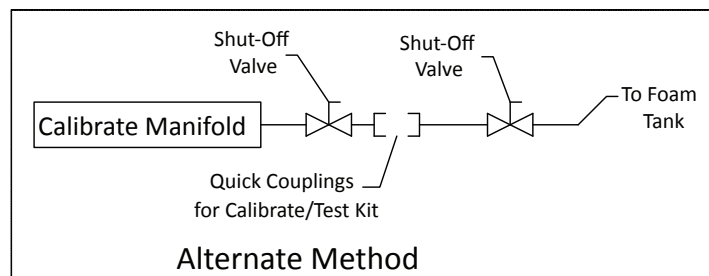
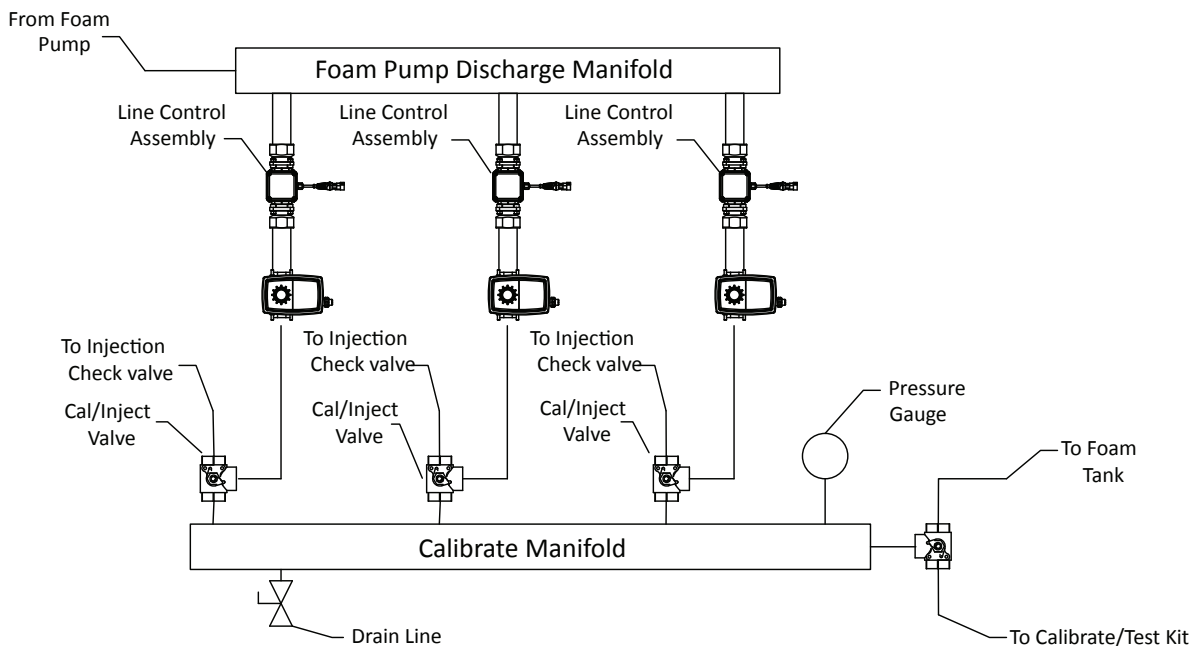


Figure 8-9 Calibration/Test Manifold

9 Electrical Equipment Installation

Electrical Connections

Follow the system electrical diagram (Figure 9-1) for proper hookup of each of the electrical components. Complete molded cable sets are provided with each FoamPro AccuMax MP System Module to make all the necessary connections.

The cables are color coded by cable jacket color and connector molding color. The cables are tested with the components shipped and are color coded with the Control Display and Control Driver they were tested with. A color tab is placed on the cable and on the display and driver that the parts were tested with. **DO NOT force mismatched connections.** The system can only perform when the electrical connections are sound, so make sure each one is correct and tight.

Some Things to Keep in Mind

- Do not hookup the main power cables until all connections are made to each of the electrical components. The last connections should be the power cables to the Control Display Modules and the Control Driver Modules.

CAUTION: Never attempt to cut or lengthen the molded cables. Doing so will result in RFI/EMI interference. Contact the factory if molded cables of a different length are required.

- Although an electronic circuit breaker and current limiter is provided in each line control driver and master driver, it is recommended to protect the main system circuit that supplies power to the displays and drivers with a 10 amp fuse.
- This system is designed for use on 12- or 24-Volt negative ground systems only.

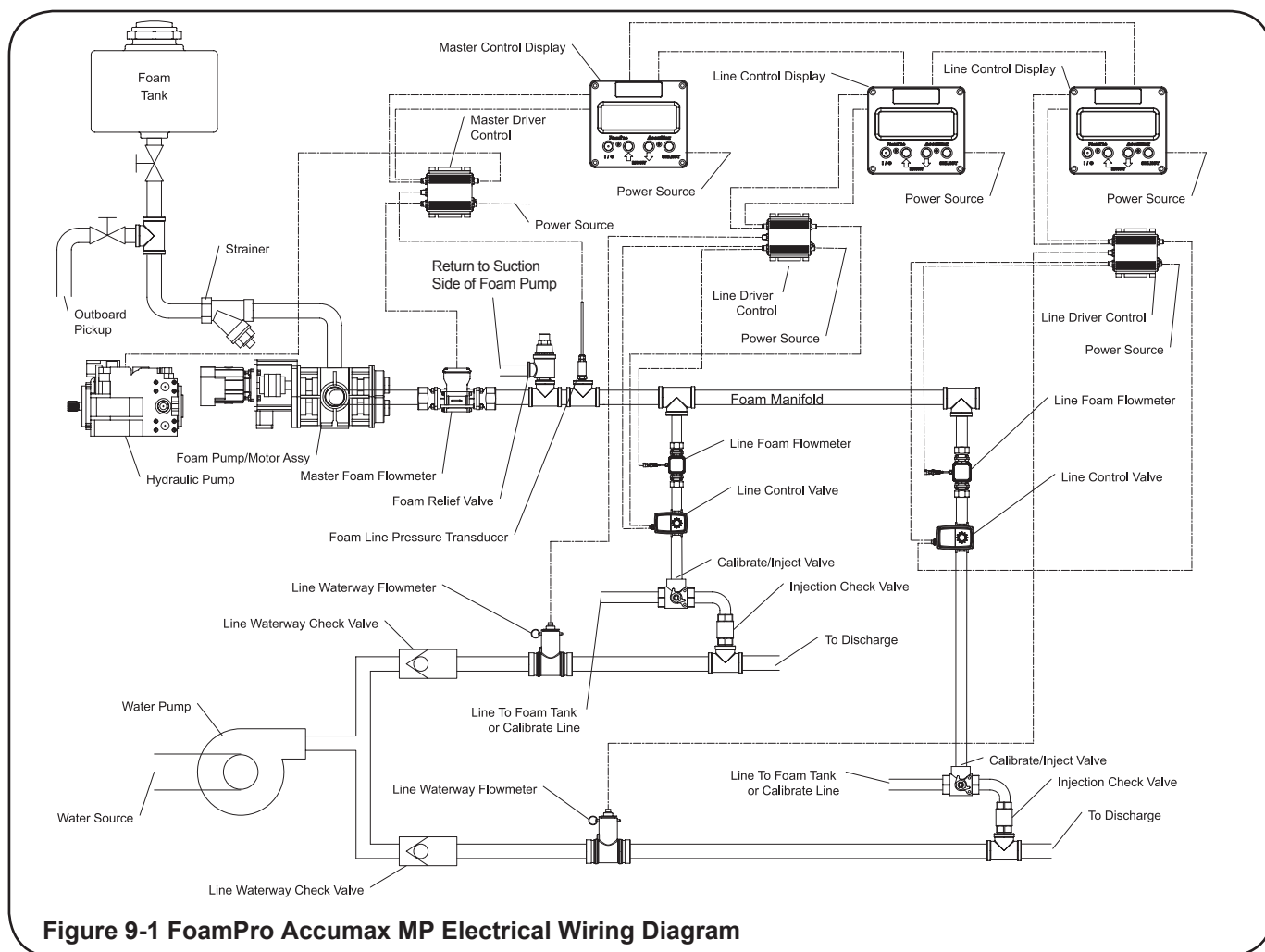


Figure 9-1 FoamPro AccuMax MP Electrical Wiring Diagram

NOTE: Do not mount radio transmitter or transmitter cables in direct or close contact with the FoamPro units.

- Use care when installing molded cables. Count pins or check color codes before connecting. Bent pins caused by improper hookup can prevent proper operation even when cables are reattached properly.
- Before connecting the molded cables, inspect the seal washer in the female connector. If the seal washer is missing, or damaged water can enter the connector and cause corrosion of the pins and terminals, it will cause system failure.

CAUTION: The cables shipped with each FoamPro system are tested at the factory with the unit. Improper handling and forcing connections may damage these cables and might result in other system damage.

CAUTION: Always disconnect the ground straps, electrical wires and control cables from the Control Display Module and other FoamPro equipment BEFORE electric arc welding at any point on the apparatus. Failure to do so will result in a power surge through the unit that might cause irreparable damage.

Master Control Display Module

The Master Control Display Module is designed to be mounted in the operator panel of the apparatus. The cutout that will be needed in the operator panel is a 5-11/16 inch (144.5 mm) L X 4-3/16 inch (106.4 mm) H hole. The display is secured with four #10 socket head screws in the four holes in the face (see Section 15 for a mounting template). The display requires 5 inches (127 mm) minimum clearance from the back of the operator panel to clear wires and connectors. Make sure there is enough clearance behind the operator's panel for the cables. Once the Master Control Display Module is mounted, connect the local bus cables (blue cable jacket with black molded ends) from the local bus terminals on the back of the Master Control Display to the black coded terminals (See Figures 9-2 and 9-3) on the Master Control Driver.

NOTE: Ensure that the panel where the Control Display Module is mounted has an adequate ground. For stainless steel and vinyl-coated panels, a ground strap must be attached from one of the four screws holding the Control Display Module in place to the frame of the fire truck to ensure adequate grounding.

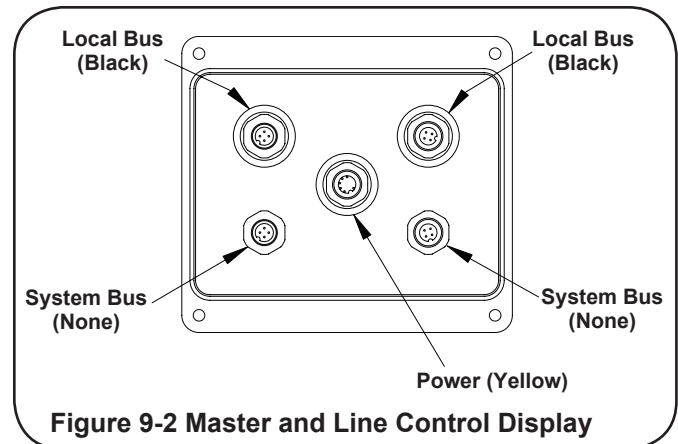


Figure 9-2 Master and Line Control Display

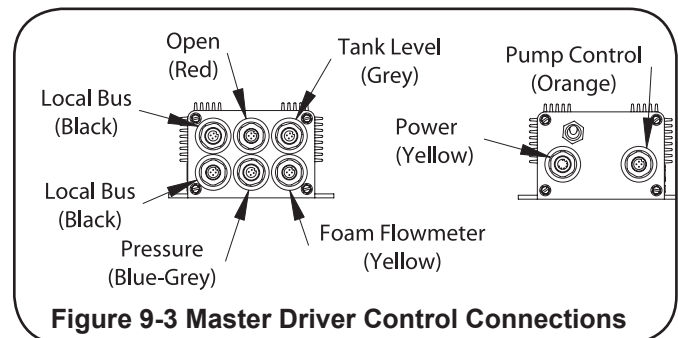


Figure 9-3 Master Driver Control Connections

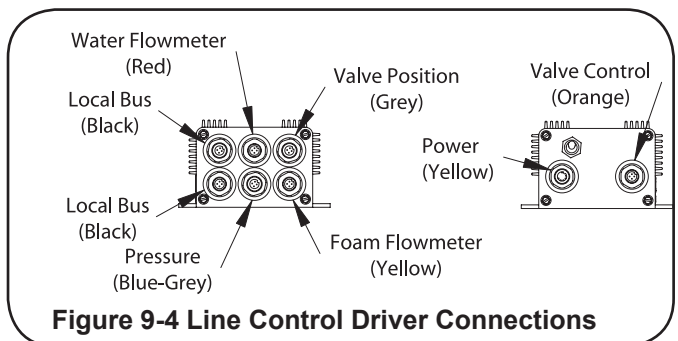


Figure 9-4 Line Control Driver Connections

Master Foam Flowmeter Connection

The Master Foam Flowmeter is to be installed in a position after the foam pump discharge with a minimum of 12 inches (305 mm) straight run before and 4-inch straight run after the device. The cable connection will connect to the Master Control Driver in the position shown in Figure 9-3. The cable will have a grey jacket color with yellow molded end at the driver connection and will have a 3-pin in-line connector on the other to match the flowmeter connection.

The cable connections for the 3040 thru the 3150 systems are shown in Figures 9-3 and 9-9. The 3-pin molded end connects to the Master Control Driver in the position shown. The other end with the AMP connector attaches to the flowmeter.

The connections for the foam flowmeter used on the 3300 system are shown in Fig. 9-10. The 3-pin molded end connects to the Master Control Driver in the position shown. The other end with the AMP connector attaches to the flowmeter. This foam flowmeter will also need a separate power and ground line that will connect with the 2-pin WeatherPack connector as shown in Figure 9-10. The wiring on the power connection is: PIN A to + power, PIN B to ground. Be sure to install a 5 amp fuse to the + power supply.

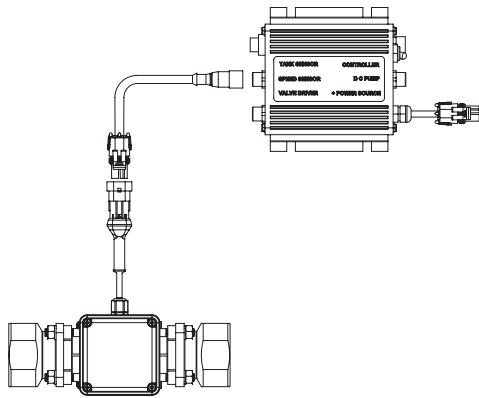


Figure 9-9 3040 thru 3150 Foam Flowmeter Connections

2-Pin WeatherPack connector for power and ground

Pin A + 12 or 24 VDC
Pin B Ground

3-Pin AMP connector for connection to driver box

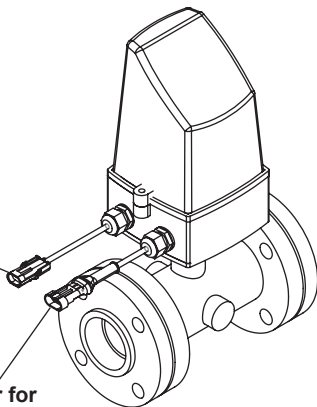


Figure 9-10 3300 Foam Flowmeter Connections

Pressure Sensor Connection

The pressure transducer used in the master line is to be mounted in the position shown in Figure 9-1. The cable is a yellow color with a blue/grey molding on the end. This cable is to be attached to the Master Control Driver in the position shown in Figure 9-3 and the other end to the 3-pin WeatherPack connector on the transducer.

Hydraulic Pump Control Connection

The Hydraulic Pump Control cable is a purple-colored jacket cable with an orange molded end. Connect the molded end to the Master Control Driver in the position shown in Figure 9-3 and the other end to the 4-pin WeatherPack connector on the hydraulic pump.

Foam Tank Low-Level Sensor

The foam level sensor must be mounted in the foam tank to monitor low foam concentrate level. The cable is a black jacketed cable with a grey molded end. Attach the cable to the appropriate position on the Master Control Driver as shown in Figure 9-3. The other end of the cable will have a 2-pin WeatherPack connector to match with the low-tank sensor. Figure 9-5 shows the optimal mounting positions for the foam tank low-level sensors.

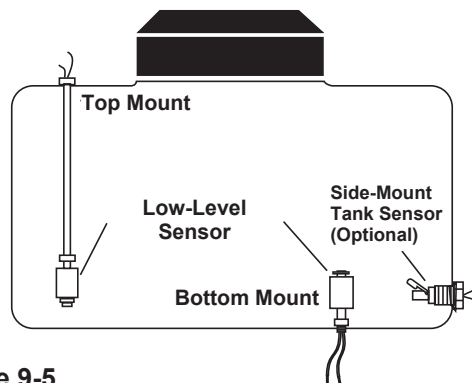
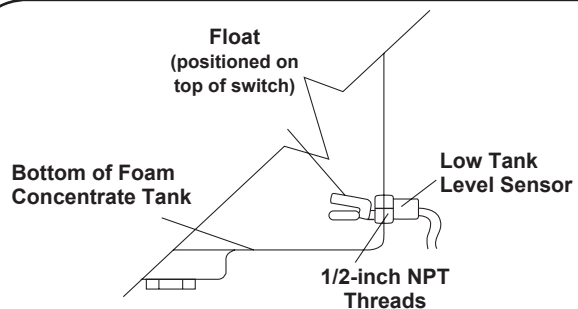


Figure 9-5 Foam Tank Low-Level Sensor Mounting Options

The standard side-mount foam tank low-level sensor has 1/2" NPT threads. The float must be positioned on top of the switch to move up and down (arrow on side of switch). The distance from the bottom of the foam tank to the center of the switch should allow sufficient foam concentrate volume for two minutes of pump run time at maximum flow rate (see Figure 9-6).



Note: Distance from bottom of foam tank to center of switch should allow sufficient foam concentrate volume for two minutes of pump run time.

Figure 9-6 Side-Mount Foam Tank Low-Level Sensor Installation

Installation and Operation Manual

The side-mount foam tank low-level sensor must be sealed with a suitable sealant to prevent concentrate leakage. After installation, check operation of the side-mount foam tank low-level sensor with a powered test light. With no foam in the tank, the light should be on. If the light does not come on, rotate the side-mount low-level sensor until the test light is on. The float should be allowed to swing up and down freely.

There is an optional low-level tank sensor available. This is a top/bottom mount level sensor and its mounting options are shown in Figure 9-5. This sensor has 1/8" NPT threads for mounting in the bottom of the tank. Use a suitable sealant to prevent concentrate leakage.

NOTE: There must be space under the tank for the cable to be routed to the Master Control Driver.

When the bottom of the tank is not accessible, the foam tank low-level sensor can be hung from a long pipe nipple attached to the top of the tank. Ensure the pipe nipple is rigid enough to withstand the force of the sloshing foam when the vehicle is in motion.

Make sure the low-level sensor does not contact the side of the foam tank when the vehicle is in motion. Because the wire connections must be made inside the pipe nipple, a 3/8" NPT pipe nipple with a 3/8" by 1/8" NPT reducer at the lower end is the minimum size recommended. When the foam tank low-level sensor is suspended from the top of the tank, the float must be reversed for proper operation.

CAUTION: The foam tank low-level sensor must be utilized to protect the foam pump from dry running. Failure to do so will void the warranty.

Using a powered test light, check the foam tank low-level sensor operation after installation. With no foam in the tank, the light should be on. If this is not the case, remove the clip from the end of the sensor; then remove the float and reinstall it 180° out of position. Reinstall the clip.

Connect the sensor wires to the low-tank sensor cable.

NOTE: When the foam tank low-level sensor senses a low concentrate condition, the system will operate for two minutes before shutting down, unless the concentrate level is restored.

Line Control Assemblies

The Line Control Assemblies are tested together at the factory, and the cables, control displays, control drivers, and control flowmeter/control valve assemblies are all color coded to keep them together during assembly.

Matching these color codes together will ensure the compatibility of these components together.

Line Control Display Module

The Line Control Display Module is designed to be mounted in the operator panel of the apparatus. The cutout that will be needed in the operator panel is a 5-11/16 inch (144.5 mm) L X 4-3/16 inch (106.4 mm) H hole. The display is secured with four #10 socket head screws in the four holes in the face (see Section 15 for a mounting template). The display requires 5 inches (127 mm) minimum clearance from the back of the operator panel to clear wires and connectors. Make sure there is enough clearance behind the operator's panel for the cables. Once the Line Control Display Module is mounted, connect the local bus cables (blue cable jacket with black molded ends) from the local bus terminals on the back of the Line Control Display to the black coded terminals (See Figures 9-2 and 9-4) on the Line Control Driver.

NOTE: Ensure that the panel where the Control Display Module is mounted has an adequate ground. For stainless steel and vinyl-coated panels, a ground strap must be attached from one of the four screws holding the Control Display Module in place to the frame of the fire truck to ensure adequate grounding.

Line Foam Flowmeter Connection

The Line Foam Flowmeter is to be installed in a position after the foam pump discharge with a minimum straight run before and after the device. These runs have been included in the piping supplied in the assembly. The cable connection will connect to the Line Control Driver in the position shown in Figure 9-4. The cable will have a grey jacket color with yellow molded end at the driver connection and will have a 3-pin in-line connector on the other to match the flowmeter connection.

The cable connections for the 3040 thru the 3150 systems is shown in Figures 9-3 and 9-9. The 3-pin molded end connects to the Line Control Driver in the position shown. The other end with the AMP connector attaches to the flowmeter.

The connections for the foam flowmeter used on the 3300 system are shown in Figure 9-10. The 3-pin molded end connects to the Line Control Driver in the position shown. The other end with the AMP connector attaches to the flowmeter. This foam flowmeter will also need a separate power and ground line that will connect with the 2-pin WeatherPack connector as shown in

Figure 9-10. The wiring on the power connection is: PIN A to + power, PIN B to ground. Be sure to install a 5 amp fuse to the + power supply.

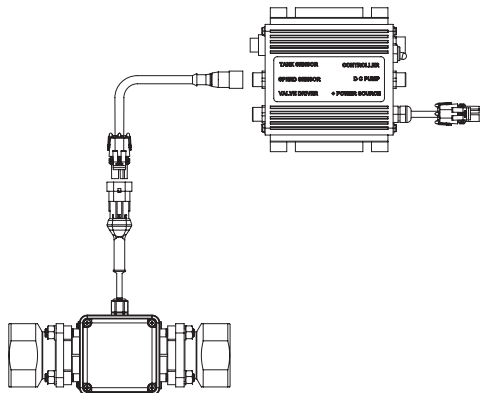


Figure 9-9 3040 thru 3150 Foam Flowmeter Connections

2-Pin WeatherPack connector for power and ground

Pin A + 12 or 24 VDC

Pin B Ground

3-Pin AMP connector for connection to driver box

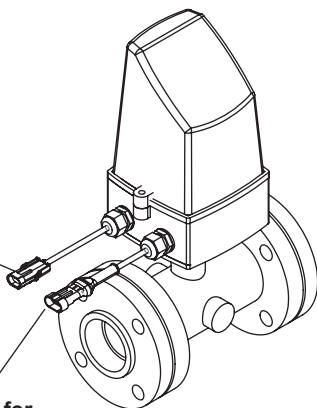


Figure 9-10 3300 Foam Flowmeter Connections

Line Control Valve Connections

There are two connections required for the Line Control Valve. One connection is for the power to the valve and the other is to sense the position of the Line Control Valve. The power cable is a grey jacketed cable with an orange molded end. The orange molded end will connect to the Line Control Driver in the position shown in Figure 9-4. The other end has a 2-pin WeatherPack connector to match with the connector on the valve.

The position cable is a grey jacketed cable with a grey molded end. The grey molded end of the cable connects to the Line Control Driver in the position shown in Figure 9-4. The other end of the cable is a 3-pin WeatherPack connector to match with the 3-pin connector on the valve.

Line Water Flowmeter Connections

A FoamPro paddlewheel-type flowmeter is to be used. A yellow jacketed cable with red molded ends is supplied, which connects from the flowmeter sensor end with a 3-pin connector to the 4-pin connector on the Control Driver Module (See Figure 9-4).

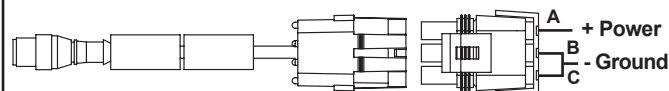
System Bus Connections

The last cables to connect before attaching the power cables are the System Bus cables. These cables are blue jacketed with black molded ends. They attach the Master Control Display to the Line Control Displays. The cables will attach to the displays in a series or "daisy chain" manner. The first cable will attach to one of the System Bus terminals on the back of the Master Display and the other end to the first Line Display System Bus terminal. The next cable will attach from the first Line Display to the next Line Display and so on. The last connection will be from the last Line Display to the Master Display. (See Figures 9-1 and 9-2.)

Power Supply

Electrical devices can be damaged, or operate intermittently when powered by a weak or erratic power supply. The FoamPro AccuMax MP system is not any different – the better the power supply, the better the system will perform. Following the instructions below will ensure the AccuMax system will perform at its best.

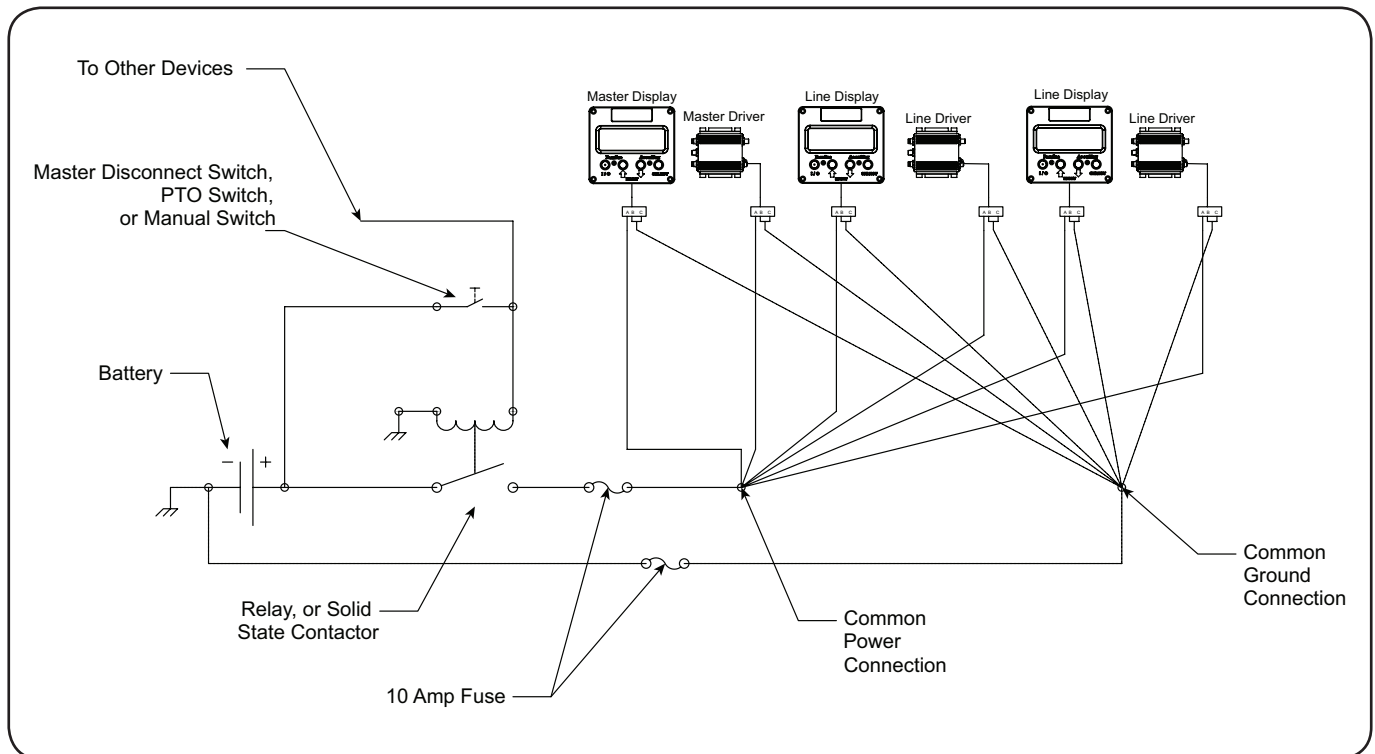
The power cords supplied with each unit should be used. They are a grey colored cable with a 6-pin DIN connector on one end that will connect to the display or driver box and a 3-pin Weatherpack connector on the other end. A mating 3-pin Weatherpack connector is supplied with the unit for connections to the power supply and ground. Pin A is to be connected to the power supply and pins B and C are to be connected to ground. It is recommended to connect pins B and C together at the connector to reduce wiring runs. See the following diagram.



Power and ground for the system must come directly from the battery without any connections to other high power devices such as primer pumps, hose reels, sirens, light bars, etc., with its own disconnect switch, Solid State Contactor, or a switch or contactor actuated by the master disconnect switch, PTO switch, or other device.

CAUTION: Connecting other high power devices to the power or ground supply to the FoamPro system will cause component damage.

The system will draw an approximate maximum of 5 Amperes and must be protected with a 10 Amp fuse in the main power line to the system and provides enough power and protection for all displays, drivers, and associated components. It is also recommended to install a 10 Amp fuse on the main ground lead. All component power and ground connections must be common for all AccuMax components. See the diagram below.

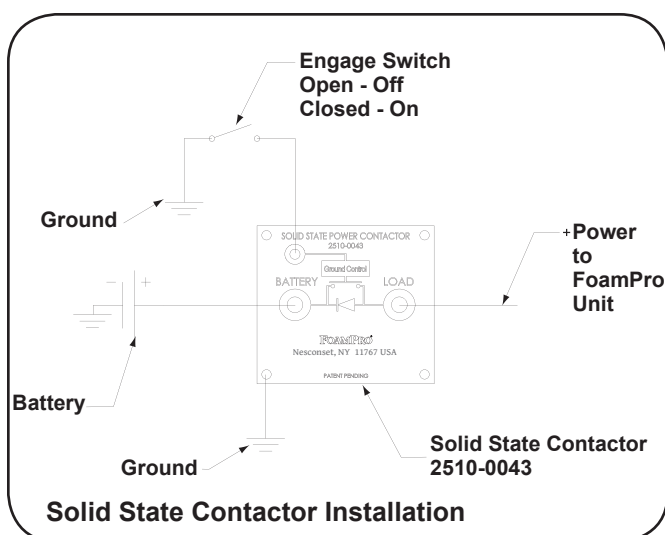


- **Always** connect the primary 12 or 24 VDC positive (+) lead for the system directly back to the battery or power relay using 14 or 16 AWG chemical resistant wire protected with a wire loom. Install a 10 amp fuse in the line that supplied the main power to the system.
- **It is recommended** to connect the ground lead (-) for the system directly back to the battery using 14 or 16 AWG chemical resistant wire protected with a wire loom. Install a 10 amp fuse in the line that supplies the ground to the system.
- **Never** connect the main power or ground leads to other leads connected to high power components such as primer pumps, hose reels, etc.
- **Always** make the connection to the primary power supply the last step.
- **Always** use the Weatherpack connectors supplied for a positive solid connection with power and ground. Ensure the connections are sound and tight to avoid erratic or poor power and ground connections to the components.
- **Always** make sure the Control Displays and the Control Drivers are grounded to the chassis. Use ¼" (6 mm) wide flat ground straps instead of battery cables to reduce potential RFI emitted by these connections.

Solid State Contactor Option

The usage of the optional solid state contactor is recommended to help protect the FoamPro system from excessive voltage surges that can take place in fire apparatus systems. The solid state contactor also has a higher life expectancy than mechanical relay options typically used for this application.

The SSC allows the operator to easily power the system up and to shut it down with the use of a simple switch. The following diagram depicts the installation of this accessory.



RFI/EMI

The following steps on grounding will help limit radio interference caused by the unit. In addition to adequate grounding, make sure radio cables and hardware are not located in the immediate area where the FoamPro AccuMax MP equipment is mounted.

Round coils of extra cable in the pump compartment can act as an antenna. While the cables cannot be shortened, various lengths of premolded cable are available to minimize the "extra" cable in the truck. Refer to the parts list in Section 15 for part numbers of different size control and flowmeter cables.

When routing control cables, take care to avoid routing them next to antenna cables, radio power cables, and radio components. When there is extra cable, double the cable back on itself and secure it with plastic wire ties in a flat bundle instead of making a round coil, as shown in Figure 9-8.

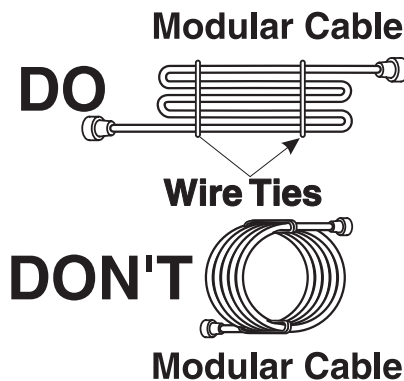


Figure 9-8 Extra Cable Storage

Manual Override

The Manual Override option allows the operator to disengage the automatic proportioning system and control the foam pump manually. The manual override will allow the usage of the hydraulically-driven foam pump to deliver foam to the water lines. The metering of the foam, however, will need to be done manually.

The system works in the following way. When switching from 'AUTO' mode to 'OFF' mode, the electrical power to the AccuMax display and drivers is cut off via a relay (not supplied) connected to the 2520-0131 cable. This will cause the AccuMax display to go blank.

When switching from the 'OFF' position to the 'MANUAL' position, the foam pump will start to pump foam into the foam manifold until the pressure in the manifold is maintained at 218 psi (15 BAR). If foam is drained from the manifold, the foam pump will run to ensure the pressure is maintained. The foam pump will maintain the set pressure in the manifold until the system is switched to the 'OFF' position.

Installation is very simple, and the following schematic in Figure 9-11 should be followed. It should be noted that any foam discharge off of the foam pump should not be plumbed into the foam discharge line until after the pressure relief valve, pressure transducers, and foam flowmeter. Failure to follow this could cause damage to the system.

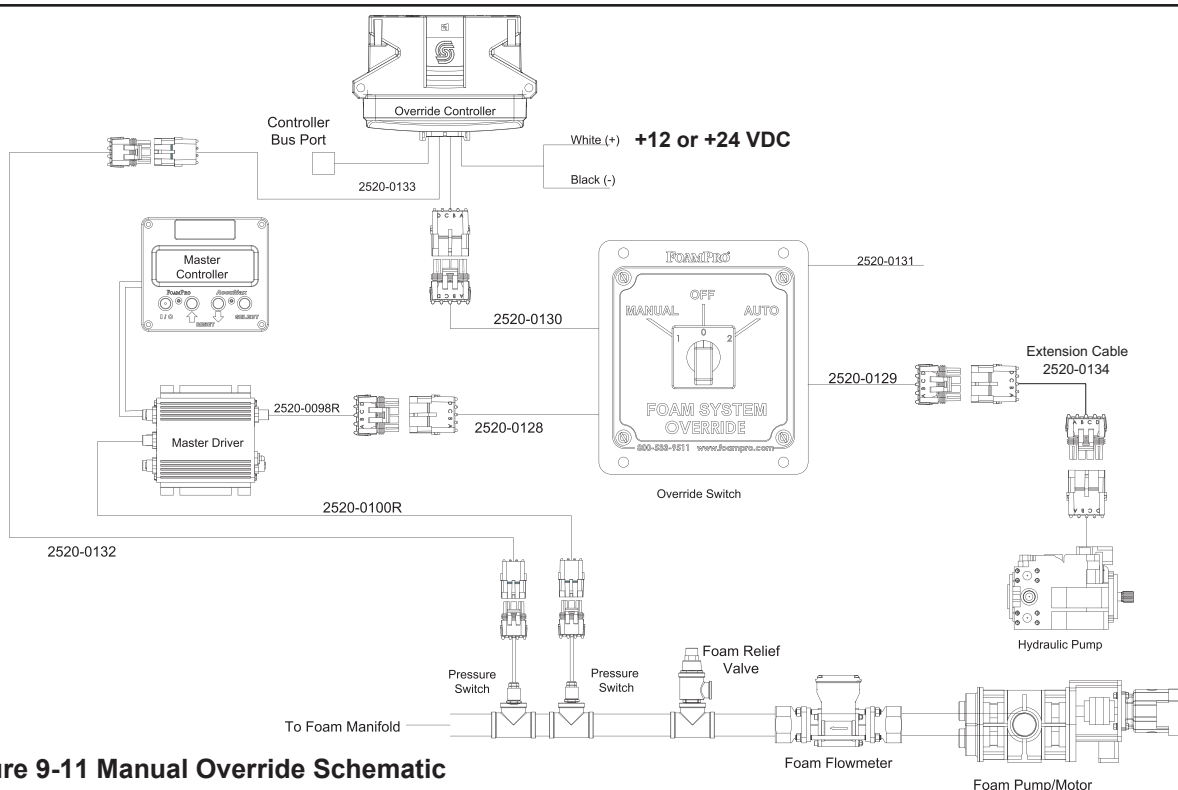
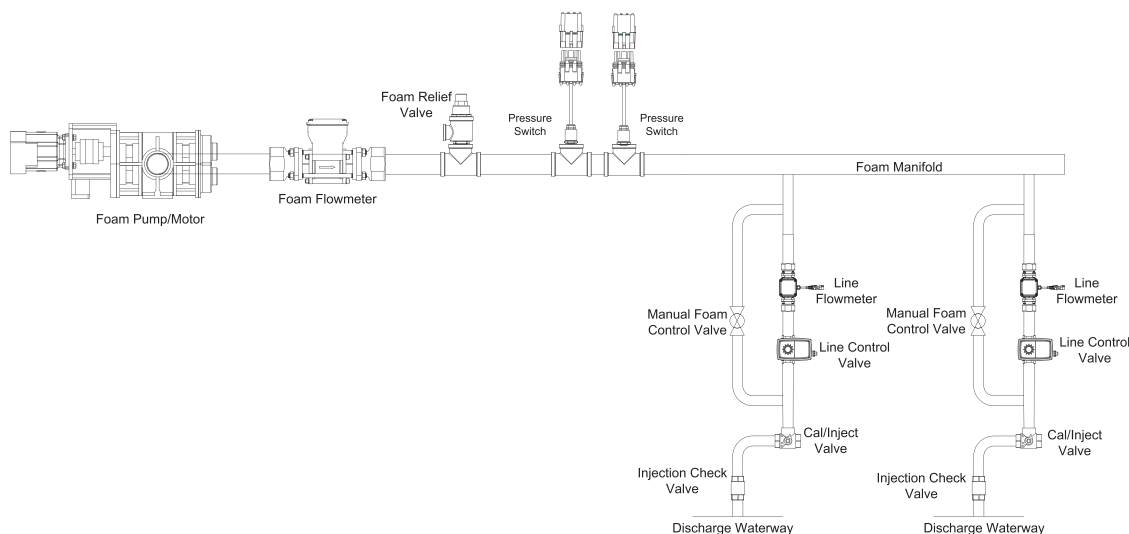


Figure 9-11 Manual Override Schematic

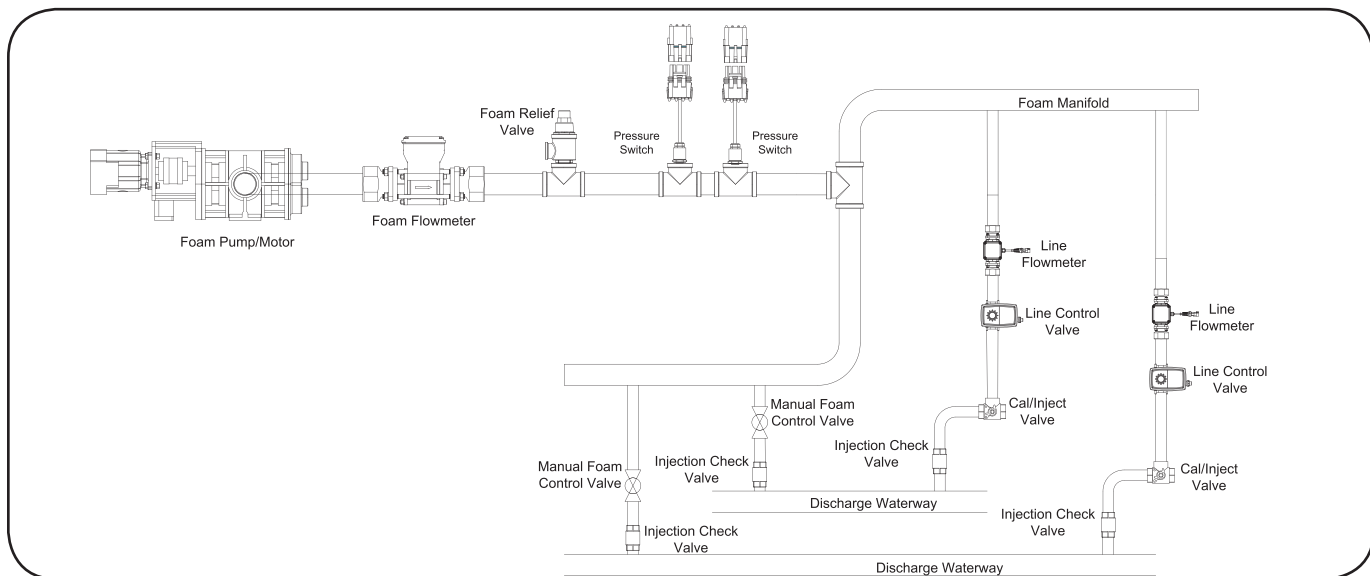
A manual means of metering foam into the waterway will need to be provided. This can be done using a few different methods as described.

- The control valves used on the multi-point AccuMax systems have accommodations for a handle or wrench. With the power turned off to the AccuMax system, it is possible to manually adjust the control valves to meter the flow. Do not try to manually adjust the control valves with the power on or damage to the components will occur.
- Adding a bypass line to the control valve assembly can be done as shown in the following schematic. This involves a bypass line with a ball valve in-line to be used for metering the foam flow. Caution must be taken to close the manual foam control valve when returning to the AUTO mode.



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- Adding a separate foam manifold with a 3-way ball valve leading to individual foam metering ball valves to control the foam flow as shown.



- There may be alternative methods to use for the plumbing for manual operation. Please check with the factory for assistance.

The following procedure should be used when engaging this operation:

1. Turn off AccuMax Master Controller.
2. Turn the Manual Override Switch to the 'OFF' position. The AccuMax displays should not be illuminated.
3. Open the 2-way manual foam control valves feeding the discharge lines being used.
4. Turn the Override Switch from 'OFF' to 'MANUAL'.
5. The foam pump will deliver foam to the override manifold and injection lines. The foam pump will deliver enough foam to maintain a maximum of 218 PSI (15 BAR).
6. Manually adjust the 2-way valves feeding the discharges to deliver the amount of foam required to each discharge being used.
7. When finished, turn the Manual Override Switch to the 'OFF' position and close the 2-way manual foam control valves.

System Power Check

Turn on the main power to the FoamPro AccuMax MP System and turn the Control Driver switches to the on position on both the master and line controllers. Check the display readouts. The Master Display will read **HIFLO MASTER / FP.XXXX** should appear for a few seconds while the computer checks itself; then **DISCHARGE PR / 0** should appear on the display (See Figure 10-1).

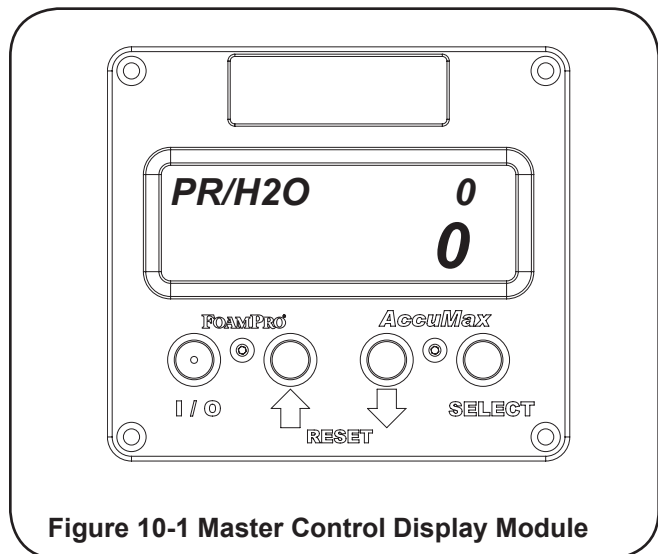


Figure 10-1 Master Control Display Module

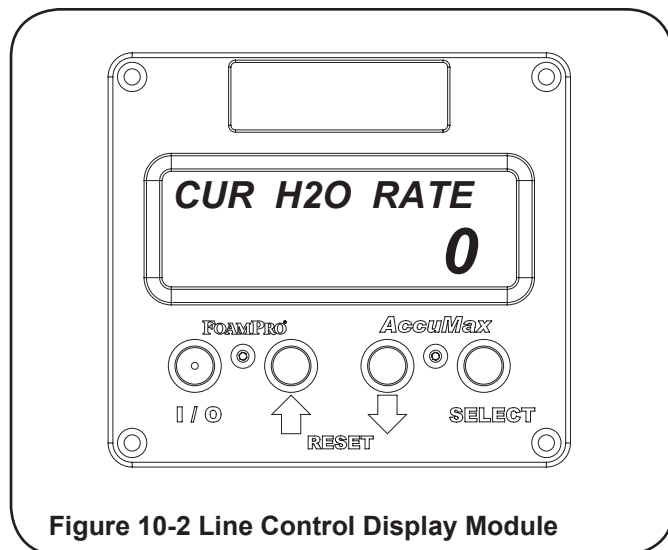


Figure 10-2 Line Control Display Module

The Line Control Display will read **HIFLO DISCHG / FP.XXXX** should appear for a few seconds while the computer checks itself; then **CUR H2O RATE / 0** should appear on the display (See Figure 10-2). If this does not appear, refer to Troubleshooting (Section 14) for possible causes and solutions.

Note: If **ERR 3** is displayed on any screen after power-up, inspect all Local and System Bus cables for correct routing.

10 Make Sure Everything Is Working Right

Hydraulic Supply (Refer to Sections 4 & 7)

- Hydraulic pump is properly mounted to the PTO.
- Hydraulic oil lines are properly routed and tight.
- Filter(s) are installed and tight.
- Oil reservoir is filled with correct fluid.
- Oil primed to hydraulic pump.
- Adequate oil cooler reservoir capacity.

Electrical (Refer to Section 9)

- Tank level sensor is connected and connections are sealed from moisture.
- Control Display Module connections are correct and tight.
- Cable connections at Control Drivers are correct and tight.
- Local and System Bus cables are properly connected to the Control Display and Control Driver Modules as required.
- All cables are secured and protected with loom from damage during operation.
- Control and component cables are properly folded and secured; radio antennas, power lines, and equipment are away from control cables and component cables.
- All components, Control Display Modules and Control Drivers are properly grounded using flat ground straps.
- Adequate current is available; 5 AMP minimum for each Control Display and each Control Driver and 10 AMP fuse in main power supply line.
- Switch on the Control Drivers are in the ON position.

Liquid (Refer to Section 8)

- All water flowmeters are mounted with flow arrow in the correct direction for water flow.
- Check valves are properly mounted in water and foam concentrate lines.
- Strainer is properly mounted for direction of concentrate flow in the foam tank and pump line.
- Foam tank to foam pump valve is in place and open.
- Injector fitting lines are properly sized and connections are tight.
- CAL/INJECT valve is properly mounted and oriented for direction of concentrate flow.
- Foam concentrate is gravity fed to foam pump.
- Foam concentrate flowmeters are properly installed with the flow arrow in the correct direction.

Foam Pump (Refer to Section 6)

- Foam pump inlet and discharge ports are properly sized and installed.

11 Calibration and Setup

System Setup Procedures

FoamPro AccuMax MP system permits easy calibration of the foam proportioning unit to assure accurate operation. The calibration process will make adjustments to the water flowmeters, the foam flowmeters, the foam control valves, and display readings.

NOTE: FoamPro systems can be calibrated to any unit of measure, i.e., U.S., Metric, Imperial, etc. It is necessary to use the same unit of measure throughout the calibration process to ensure proper proportioning by the system.

NOTE: All flowmeters and control valves must be calibrated as part of the initial setup after installation.

NOTE: Calibration can be accomplished by using a calibrated external flowmeter, such as provided in the AccuMax Calibration Kit (P/N 3430-0381) or by pumping into a container that is marked for volume or by using the weight of the material pumped. In the case of using a container, ensure that it has enough volume capacity to at least calibrate one line. It is recommended to use a container that is at least 300 gallons (1140 liters).

Recalibration should only need to be done after major repairs or changes to the foam system.

To enter the configuration or the setup/calibration modes, remove the appropriate cover screw with a 3/32" Allen wrench. See Figure 11-1. Remove the O-ring with the screw and place in a safe place for replacement when finished. To enter the mode, use the Allen wrench to depress the internal switch inside the display. To exit the mode, depress the same internal switch. To enter/exit configuration modes, use the left switch, and to enter/exit the setup/calibration modes, use the right switch. Replace the O-ring and cover screws when finished.

CAUTION: Always replace the O-ring and cover screws to keep dirt and water from entering the display, or serious damage to the components may occur.

Master Configuration Mode

The Master Control Display Module is used to configure its settings. By removing the left cover screw and depressing the internal switch, the display will read **HIFLOW MSTR / CONF 19**. The following can be set and read from the display by pressing the select button:

- **GROUP / 0**
Typically this will always remain at 0.

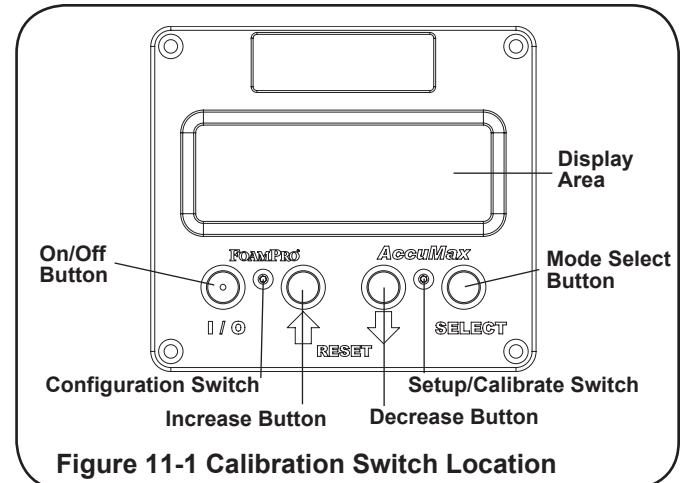


Figure 11-1 Calibration Switch Location

- **AUTO - START / No**
This is an auto start feature that will allow the system to start up in the ON mode when powered up. **No** means this feature is disabled. To enable this feature, press the down button once and the display will read **YES**. This option is then enabled.
 - **TEMPERATURE / F**
This is the temperature of the circuit in the control driver. Depressing the down button once will toggle the units of this temperature to °C or °F.
 - **PRESSURE FMT / UNUSED**
This will set the usage of the pressure transducer for master and the format of measurement. By depressing the down button once, the display will change the pressure units to **PSI**. Depressing the down button again will change the units to **BAR**. Again the default is unused, but either **PSI** or **BAR** must be selected for proper system operation.
- If using the Low End option, return to the **HIFLOW MSTR / CONF 19** screen by pressing the select button. Press both up and down buttons together and the screen should display **SYSTEM OPTN / CONF 19**. The following can be set or read from the display by pressing the select button:
- **PRODUCT CODE / 4000**
This should remain at 4000.
 - **MAX PR VOLTS / 2.65**
This is factory set for the maximum pressure of the system relief at approx 2.65.

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USING BYPASS / No

This is to select the low end option. **No** means this feature is disabled. To enable this feature, press the down button once and the display will read **YES**. This option is then enabled.

Line Configuration Mode

Each discharge control circuit will require configuration. The Line Control Display Module will be used to configure its settings. By removing the left cover screw and depressing the internal switch, the display will read **HIFLOW LINE / CONF 19**. The following can be set and read from the display by pressing the select button:

- **DISCHARGE NO. / X**
Denotes the position assigned by the Master.
- **GROUP NUMBER / 0**
Typically this will always remain at 0.
- **AUTO - START / No**
This is an auto start feature that will allow the system to start up in the ON mode when powered up. **No** means this feature is disabled. To enable this feature, press the down button once and the display will read **YES**. This option is then enabled.
- **TEMPERATURE / F**
This is the temperature of the circuit in the control driver. Depressing the down button once will toggle the units of this temperature to °F or °C.
- **PRESSURE FMT / UNUSED**
This will set the usage of a pressure transducer for that particular line and the format of measurement. By depressing the down button once, the display will change the pressure units to **PSI**. Depressing the down button again will change the units to **BAR**. Again the default is unused.

Pressing the select button again will return you to the initial configuration display. To exit this mode, depress the internal switch once and the display will return to the ready mode.

Master Setup and Calibration Modes

The Master Control Module will need to be setup and calibrated to run the system. To enter this mode, depress the right internal switch once. The display will read **MASTER PUMP / SETUP**.

Master Foam Flowmeter Calibration

NOTE: It is important to accurately calibrate the Master foam flowmeter, as all other lines and Low End option foam flowmeters must be calibrated to the Master to ensure the system will operate correctly.

Depress the SELECT button until **TOT CHEM USED / 0.00** is displayed. Since any one of the lines needs to be open to run the foam pump, pick one of the lines to calibrate at this time. Enter the Setup Calibration mode of the chosen Line Control Display Module by depressing the right internal switch once.

- Depress the SELECT button until **AUTOCAL BALL / rEAdY** is displayed.
- Depress the green I/O button and the display will operate the ball from closed to open and return to close. The display will show the position of the ball in these positions. When the display shows **done**, continue to the next step.
- Depress the SELECT button until **TOT CHEM USED / 0.00** is displayed.
- Open the calibrate/inject valve to divert foam to a calibrated flowmeter or to a collection container of known volume with a ball or gate valve for setting the calibration back pressure.

NOTE: If using a container, ensure that it has enough volume capacity to at least calibrate one line. It is recommended to use a container that is at least 300 gallons (1140 liters).

- Press the green I/O button on the Line Control Display. The green light will illuminate and the Line Control Valve will open.
- Press the green I/O button on the Master Control Display to start the foam pump. The value shown on the Master Display will start to rise along with the value on the chosen Line Control Display. Adjust the back pressure valve so that a back pressure of 50 to 70 psi is shown.
- Run the system for a short period of time with the flowmeter in the totalize mode or until the foam container reaches the volume of foam expected. Depressing the I/O button on the Master Control Display will shut off the foam pump. The longer the system runs or the more foam that is collected, the more accurate the calibration.

NOTE: It is recommended when calibrating the foam flowmeters to run a small volume of fluid, approximately 25 gallons (95 liters) for the first run to make any large adjustments. The second run should be for at least 50 gallons (190 liters) to start to get the calibration closer. The third and every run after should be for at least 100 gallons (379 liters) until the differential between the Master and the "control" is within at least ½ gallon (1.9 liters). It should be noted that the more accurate the Master and "control" are, the better the calibration will be on the rest of the system.

- Compare the readout on the Master Control Display with the value shown on the flowmeter totalizer or with the volume collected in the container.
- Increase or decrease the value on the Master Control Display to match the pumped amount.
- Compare the readout on the Master Control Display with the Line Control Display being calibrated. Increase or decrease the value on the Line Control Display to match the value on the Master Control Display.
- Exit the setup/calibration mode on both displays by pressing the internal button on the right on both displays.

Master Low End Option Calibration

The Master Control Module will need to be set up and calibrated to run the system. To enter this mode, depress the right internal switch once. The display will read **MASTER PUMP / SETUP**.

- Depress the SELECT button until **TOT CHEM USED / 0.00** is displayed. If a number other than 0.00 is displayed, press both up and down buttons together to reset value to 0.00.
- Return to **MASTER PUMP / SETUP** by pressing the select button twice.
- Depress the up or down button once and the display will read **BYPASS VALVE / SETUP**.
- Depress the SELECT button until **AUTOCAL BALL / rEAdY** is displayed.
- Depress the green I/O button and the display will operate the ball from closed to open and return to close. The display will show the position of the ball in these positions. When the display shows **done**, continue to the next step.
- Depress the SELECT button until **TOT CHEM USED / 0.00** is displayed.
- Open the calibrate/inject valve to divert foam to the foam tank or to a collection container.
- Press the green I/O button on the Master Control Display. The green light will illuminate and the Low End Control Valve will open. The foam pump will start to run and value shown will start to rise.
- Run the system for a short period of time (approximately 5 minutes is sufficient).

NOTE: It is recommended when calibrating the foam flowmeters to run a small volume of fluid, approximately 25 gallons (95 liters) for the first run to make any large adjustments. The second run should be for at least 50 gallons (190 liters) to start to get the calibration closer. The third and every run after should be for at least 100 gallons (379 liters) until the differential between the Master and the Line is within

at least ½ gallon (1.9 liters). It should be noted that the more accurate the Master and “control” are, the better the calibration will be on the rest of the system.

- Press the green I/O button and the foam pump will stop and the valve will close.
- Press the select button twice to the **BYPASS VALVE / SETUP** readout, then press the up or down button to the **MASTER PUMP / SETUP** readout.
- Press the select button to the **TOT CHEM USED** screen and note the number displayed.
- Return to the **BYPASS VALVE / SETUP** screen and the **TOT CHEM USED** screen.
- Adjust the number on the display to match the number noted on the **MASTER PUMP / SETUP - TOT CHEM USED** screen by using the up or down buttons.
- Repeat the run and adjust cycle until the numbers are the same without adjustment.
- Close the calibrate/inject valve to the normal operating position, and exit the calibration mode by depressing the right-side internal button once.

Line Setup and Calibration Modes

Calibration and Setup is done by using the Control Display Module function buttons. Remove the right cover screw and O-Ring and depress the internal switch to enter the Calibration and Setup Mode. The display will read **HIFLOW LINE / SETUP**. The following can be set and read from the display by pressing the select button:

- **SIM H2O RATE / XXXX**
By using the up and down buttons, the desired simulated flow rate for that line can be set.
- **PRESET RATE1 / X.X**
By using the up and down buttons, the first of three desired injection preset rates can be entered.
- **PRESET RATE2 / X.X**
By using the up and down buttons, the second of three desired injection preset rates can be entered.
- **PRESET RATE3 / X.X**
By using the up and down buttons, the last of three desired injection preset rates can be entered.

Depressing the SELECT button again will return you back to the line setup screen.

Line Control Calibration

Depress the up or down button once and the display will read **DISCHG VALVE / SETUP**. The control line module is now ready to calibrate.

Line Water Flowmeter

NOTE: It is critical that an accurate flow measuring device be used to measure water flow to calibrate the flowmeter(s). Use a suitable size smooth bore nozzle and an accurate Pitot Gauge instrument. Determine the water flow normally expected from that flowmeter discharge outlet. For example, actually establish a flow of 150 gpm (568 L/min.) of water through a nozzle and Pitot system.

To calibrate the discharge line water flowmeter for each line, depress the SELECT button once or twice, depending on the method of calibration. If using a pitot gauge or a master flowmeter instrument, depress the SELECT button until **CUR H2O RATE / 0** is displayed. Run the discharge line until a steady reading is taken. Compare that value with the one displayed. If the two are not the same, adjust the rate on the display with the up or down buttons. When the values are the same, shut down the discharge line and go to the next calibration mode.

Line Control Valve Calibration

Depress the SELECT button until **AUTOCAL BALL / rEAdY** are displayed. Depress the green I/O button and the display will operate the ball from closed to open and return to close. The display will show the position of the ball in these positions. After the control valve has cycled through its self calibration, the display will show **done**, and the Foam Flowmeter can be calibrated.

Line Foam Flowmeter Calibration

Depress the SELECT button until **TOT CHEM USED** is displayed. Since one of the lines was calibrated with the Master Foam Flowmeter, the calibration of the rest of the line foam flowmeters is not difficult.

- Open the calibrate/inject valve to divert foam to the foam tank or to a collection container with a ball or gate valve for adjusting back pressure.
- Press the green I/O button on the Line Control Display. The green light will illuminate and the metering ball valve will open.
- Place the Master Control Display in the **MASTER PUMP / SETUP** operating mode and press the SELECT button until **TOT CHM USED** is displayed.
- Reset the number displayed by pressing both the up and down buttons simultaneously. The value will read **0**.
- Press the green I/O button on the Master Control Display to start the foam pump. The value shown on the Master Display will start to rise. Adjust the back pressure to 50 to 70 psi.
- Run the system for a short period of time (approximately 5 minutes is sufficient).

NOTE: It is recommended when calibrating the foam flowmeters to run a small volume of fluid, approximately 25 gallons (95 liters) for the first run to make any large adjustments. The second run should be for at least 50 gallons (190 liters) to start to get the calibration closer. The third and every run after should be for at least 100 gallons (379 liters) until the differential between the Master and the Line is within at least ½ gallon (1.9 liters). It should be noted that the more accurate the Master and “control” are, the better the calibration will be on the rest of the system.

- Compare the readout on the Master Control Display with the Line Control Display being calibrated. Increase or decrease the value on the Line Control Display to match the value on the Master Control Display.

DO NOT change the value on the Master Control Display or recalibration of all foam flowmeters will need to be redone.

- Return the calibrate/inject valve back to the inject position.
- Exit the setup/calibration mode by pressing the internal button on the right.

This process will need to be repeated for each Line Control Module on the apparatus.

NOTE: The viscosity of different foam concentrates may have an effect on the amount of foam concentrate that is injected into the water stream. When calibrating the foam pump, use the foam concentrate that will be used most frequently during normal operations. When different viscosity foam concentrates are used, the actual concentrate injection may vary by as much as 15%.

Master Pressure Sensor Calibration

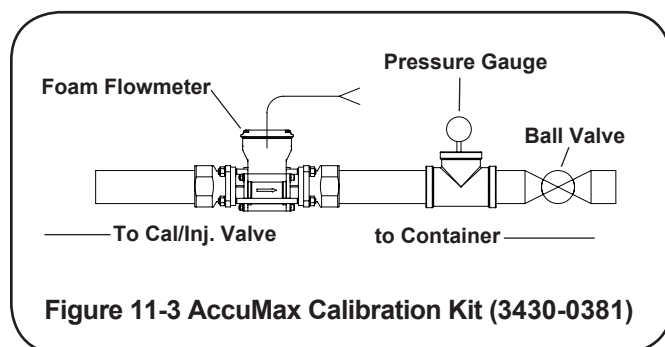
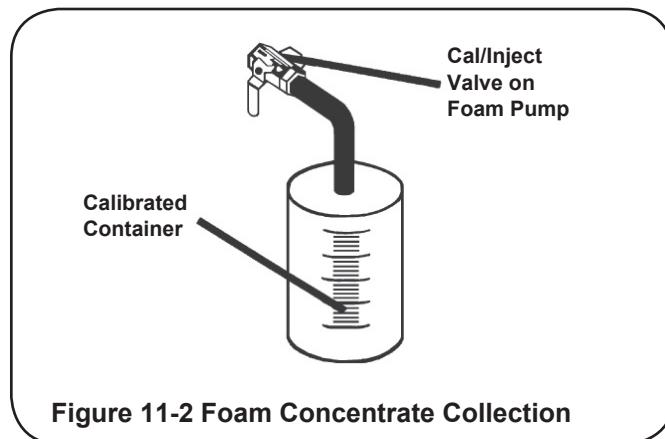
Place the Master Control Display in the **MASTER PUMP / SETUP** operating mode. Press the SELECT button until **LO PR ADJUST/XX** is displayed. Using the UP and DOWN buttons, adjust this number to **0**. Exit the setup mode.

System Reset

During calibration procedures, it may be necessary to return the system to the original factory default settings if errors are made and the system locks up. To return to the factory default values, enter calibration and setup mode as previously described. Immediately after entry into calibration and setup mode, prior to pressing any other button, depress the up and down buttons simultaneously. This action will return the system to the factory default settings. Proceed with calibration and setup after performing this reset.

These Setup and Calibration procedures complete the adjustment of the system. Before the system is ready for operation, turn off the electrical power to the system. Wait for 15 to 30 seconds, and turn the power on. The FoamPro AccuMax 3000 system is now ready to be placed in service.

If this system is installed and calibrated by an apparatus manufacturer or dealer, the end user may wish to adjust the default Foam Concentrate Injection Rate and/or Simulated Flow rate to their special needs. These changes can be made without altering the calibration by using the procedures described for those functions only.



12 Operation Instructions

Normal System Operation

Once the system has been set up and calibrated, operation is very simple and is controlled by the buttons on the Control Display Modules (See Figure 12-1). For setup and calibration instructions, see Section 11.

When the I/O button is pressed, the green I/O status lamp will illuminate, indicating that the system is ready. The FoamPro AccuMax 3000 system will monitor the water flows and control foam injection at the specified concentrate injection rate. The system responds to variations in water flow by increasing or decreasing the speed of the foam pump. When the I/O button is again pressed, the green status lamp will extinguish, indicating that the system is in Standby mode and that particular line will stop, but other lines and system monitoring functions will continue. Even when there's no foam concentrate being injected, the water flowmeter will display the current flow rate of the water.

If water flow requirements exceed the capacity of the pump to deliver foam concentrate, the pump will run at maximum rate and **HI.FLO** will flash on the Line Control Display so that the operator realizes that the system capacity is being exceeded and is running **lean** on foam concentrate percentage.

If the flow decreases so the required injection rate is less than the lowest rating of the pump, the pump will run at its minimum rate and **LO.FLO** will flash on the display to let the operator know the system is running **rich** on foam percentage.

If the low end option is being used, it will function as required by the system without intervention from the operator. The control circuit will work seamlessly with the rest of the system when required.

Display Information

The eighteen-digit display on the Control Display Modules show the function and value of the selected function or provides warnings to the operator when the system is operating. A function is selected by pressing the white **SELECT** button in the lower right-hand corner of the Control Display Module. Each time the button is pressed, a new function mode is selected and displayed. Pressing the **SELECT** button changes the function and displays its value, but does not alter system operation.

The Master Control Display Functions include:

PR/H2O X / Y

The **X** value is the injection pressure and the **Y** value is the total water or foam solution rate.

DISCHARGE PR / XX: The display shows the current foam injection pressure.

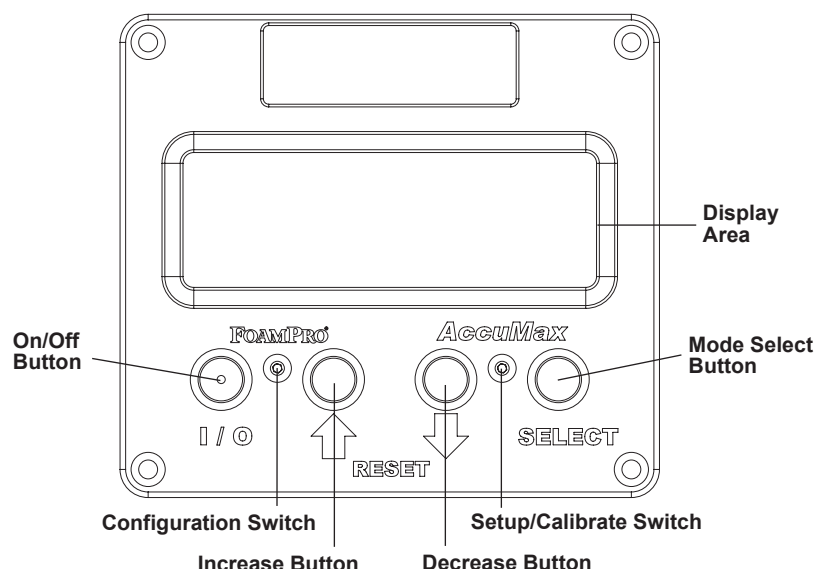


Figure 12-1 Control Display Module Operation

CUR H2O RATE / XX: The display shows the accumulated water or foam solution rate being pumped. This totaled value is accumulated from the Line Control Modules.

TOT H2O USED / X.XXX: This displays the total water discharged through that line.

TOT CHM USED / X: This displays the total foam injected through that line.

The Line Control Display Functions include:

CUR H2O RATE / XX: The display shows the current water discharge flow rate for that line.

TOT H2O USED / X.XXX: This displays the total water discharged through that line.

TOT CHM USED / X: This displays the total foam injected through that line.

PRESET RATEX / X.X: This displays the current rate at which foam is being injected in that line.

Reset Functions

The totaled values for water and foam concentrate pumped can be cleared from memory by performing a **RESET** function. Using the **SELECT** button, select either **TOT H2O USED** or **TOT CHM USED**. By pressing and holding both the UP and DOWN buttons at the same time, the value shown is cleared and displayed as **zero**. This may be utilized to keep a record of how many units of water and/or foam is used per incident.

Foam Percentage (PRESET RATE)

When the concentrate percentage (**PRESET RATE**) is selected, the UP and DOWN buttons will respectively increase or decrease foam concentrate percentage. The percentage can be changed anytime during normal operation. Whenever the up or down buttons are momentarily pressed, the display will switch to the % display and show the current percentage that is set, in any display mode. If either button is held down for a period of two seconds, the value will increase or decrease accordingly. Once released, the display will return to the last selected display. When a reset is performed in the **PRESET RATE** display mode (pressing both the UP and DOWN buttons at the same time) the foam concentrate injection rate is returned to the default value.

By pressing the UP or DOWN buttons, it is possible to change this value to another one of the three preset values, or by holding the UP or DOWN button in for a few seconds, it will change the injection rate to any rate in 0.1 increments. The system will store this new value as a new fourth preset value while the unit is powered up.

Display Messages

Several safety features are provided to protect the foam concentrate pump and the hydraulic drive system.

Low Foam Tank Level

The foam pump is interlocked with the foam concentrate tank level switch. If the tank is empty, the pump will not run for more than two minutes. A low foam concentrate tank level is denoted by **CHEM IS LOW** blinking on the Master Control Display. This code will alternate with the normal display value shown. If two consecutive minutes of low concentrate level is detected, the display will show **OUT OF CHEM**, the pump will stop, and the system will go to Standby mode until the foam level is restored and the system is restarted.

Pump Error

Pump stall protection is provided. In the event the pump fails to flow concentrate for 13 seconds, the display will show **NO CHEM FLOW** on the Master Control Display to indicate the foam pump is producing no feedback to the control signal. The system will return to the foam off status.

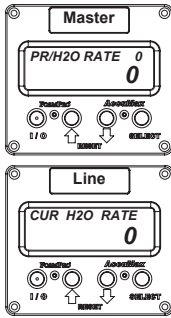
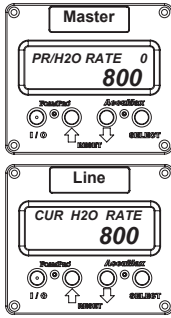
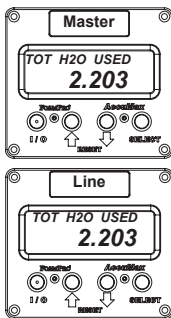
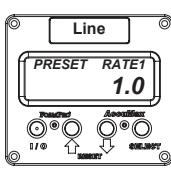
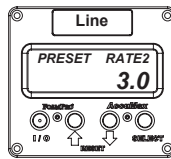
High/Low Flow Condition

Whenever the foam pump cannot reach the selected level, an indication of the status will blink in the background as:

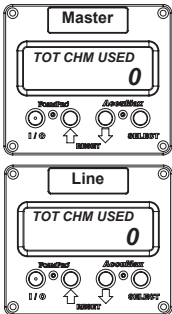
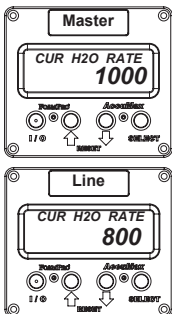
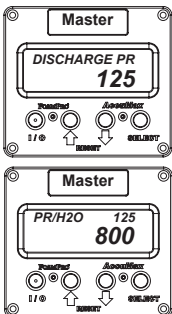
H2O FLOW LOW - Foam delivery is not able to go below a set rate for each different size discharge. See the Valve rating chart in Section 15. The system will continue to operate at the minimum value of concentrate rate for that discharge. If the water flow goes lower, the concentrate will be proportioned at a constant rate, causing the solution to be rich.

H2O FLOW HI - Foam delivery is not able to go above a set rate based on the foam pump size, hydraulic pump size and rpm. When this message is displayed, it means that the hydraulic pump is at maximum stroke and cannot drive the foam pump any faster to produce more flow. This can be corrected by increasing the hydraulic pump PTO speed until the desired flow is reached. Caution must be used when doing this, as overspeeding of the foam pump may cause damage to the pump and the related equipment. See the system capacities chart in Section 15. If nothing is done, the system will continue to operate at the maximum value and the resulting foam mixture will be lean.

Normal Operation Summary

How to	Display	Action
1. Turn on system.		1. Operate the apparatus engine and engage PTO to hydraulic pump. Turn on the electrical power to the FoamPro AccuMax 3000 system. After a system check, the Master and Line display will read as shown.
2. Make foam solution.		2. Establish water flow to the foam capable discharge. The Line Control Display Module will indicate the water flow rate. Press the I/O button (green lower-left button) on the Line Control Display. The I/O button will illuminate. Press the I/O button on the Master Control Display. The I/O button will illuminate. The Foam pump will start to deliver foam and the Line Control Display will control the rate preset by the operator.
3. Read the total amount of water flowed during the operation.		3. To read the total water flowed on the Master Control Display, press the SELECT button until the display shows TOT H2O USED / X.XXX as shown. The total amount of water will be displayed. To read the total water flowed on the Line Control Display, press the SELECT button until the display reads TOT H2O USED / X.XXX as shown. Reset this value to zero on either display by pressing the UP and DOWN buttons at the same time.
4. Read % of concentrate.		4. Press the SELECT button on the Line Control Display until the display reads the current rate. The display will read either PRESET RATEX / X.X or CUSTOM RATE X.X .
5. Change the % of concentrate.		5. Press the UP or DOWN button on the Line Control Display on the line you wish to change the injection rate. The display will show the new concentrate injection rate chosen. Pressing the UP or DOWN button again will toggle the rate to the next preset value. Holding the UP/ DOWN button down will change the rate in 0.1 increments until the button is released. This new value will become the custom rate until changed.

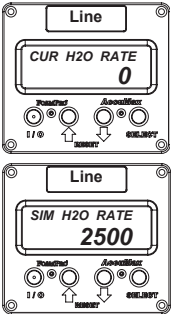
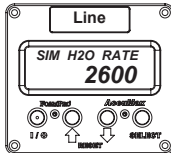
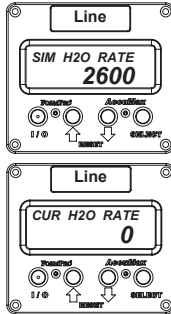
Normal Operation Summary

How to	Display	Action
6. Read the total amount of foam concentrate used.	 <p>The diagram shows two control displays. The top display is labeled 'Master' and the bottom is labeled 'Line'. Both displays show 'TOT CHM USED' followed by the number '0'. Each display has buttons for 'I/O', 'RESET', and 'SELECT'.</p>	6. To read the total foam used on the Master Control Display, press the SELECT button until the display shows TOT CHM USED / X as shown. The total amount of foam will be displayed. To read the total foam used on the Line Control Display, press the SELECT button until the display reads TOT CHM USED / X as shown. Reset this value to zero on either display by pressing the UP and DOWN buttons at the same time.
7. Read water flow with or without foam injection.	 <p>The diagram shows two control displays. The top display is labeled 'Master' and the bottom is labeled 'Line'. Both displays show 'CUR H2O RATE' followed by a number. The Master display shows '1000' and the Line display shows '800'. Each display has buttons for 'I/O', 'RESET', and 'SELECT'.</p>	7. To read the total water flow rate on the Master Control Display, press the SELECT button until the display shows CUR H2O RATE / X as shown. The total water flow rate will be displayed. To read the water flow rate on a specific Line Control Display, press the SELECT button until the display reads CUR H2O RATE / X as shown. This can be done with the I/O button pushed off (the green light not illuminated).
8. Read foam injection pressure.	 <p>The diagram shows two control displays, both labeled 'Master'. The top display shows 'DISCHARGE PR' followed by the number '125'. The bottom display shows 'PR/H2O' followed by '125' and '800'. Each display has buttons for 'I/O', 'RESET', and 'SELECT'.</p>	8. To read the injection pressure on the Master Control Display, press the SELECT button until the display shows DISCHARGE PR / X as shown. The foam injection pressure will be displayed. To read the total water flow rate and the injection pressure, press the SELECT button until the display reads PR/H2O as shown. The top number on the right on the display will be the injection pressure and the larger low right number will be the total water flow rate.

Simulated Flow Operation

The Simulated Flow function of the system allows the operator to control the line injection and foam pump manually. The water flow rate and the concentrate injection percentage rate can be set by using the display readout and the rate adjustment buttons on the Line Control Display Module. This function provides the manual control requirement of NFPA. This function also allows the operator to empty the foam concentrate tank for cleaning or changing foam types. It also provides a means of checking the operation of the foam pump at all normal rates of flow and injection without running the water pump.

Warning: When operating the FoamPro AccuMax 3000 system in the Simulated Flow function, an outlet for the foam concentrate injection must be provided. Otherwise, dangerous excessive pressure may be built up in the apparatus water piping and/or hoses. This outlet for the foam concentrate can be provided by turning the CAL/ INJECT valve to the CAL position. A suitable container must be provided to collect the foam concentrate.

How to	Display	Action
1. Begin Simulated Flow Function.		1. To start the Simulated Flow Function on the Line Control Display, press the SELECT button until the display shows CUR H2O RATE / X as shown. Then press the UP and DOWN buttons simultaneously. The display will read SIM H2O RATE / X as shown. Then start the system by pressing both the I/O buttons on the Master Control Display and the Line Control Display.
2. Change the simulated flow rate.		2. With the display reading SIM H2O RATE / X , press the UP button to increase the flow rate or the DOWN button to decrease the flow rate. The rate will change in increments of 100.
3. Exit Simulated Flow Function.		3. To exit the Simulated Flow Function, press the select button until SIM H2O RATE / X is displayed on the Line Control Display. Press both the UP and DOWN buttons simultaneously and the display will read CUR H2O RATE / X . The Line Control is now in the normal operating mode.

Flushing Foam Pump

When returning the apparatus to ready condition after foam operations, the FoamPro foam pumps should be flushed with fresh water. The following procedures can be used to flush the foam pumps. Refer to Figure 12-4 and do the following:

1. Energize apparatus and establish water flow through the foam solution discharge to be flushed.
2. Close foam concentrate tank shut-off valve and open flush water supply valve.
3. Energize FoamPro AccuMax 3000 system and allow hydraulic motor-driven foam pump to run until discharge is clear.
4. Shut off FoamPro AccuMax 3000 system by depressing the I/O button on the Control Display Module. Close flushing water supply valve.
6. Close foam solution discharge and shut down apparatus.
7. Open foam concentrate tank shut-off valve.
8. Perform required maintenance checks on the FoamPro AccuMax 3000 system.

Priming the Foam Pump when Foam Tank has Run Dry

In some instances, the foam tank may run dry while operating the FoamPro AccuMax system. The foam pumps are designed to pump liquid. When the fire pump is running, the foam pumps cannot pump air efficiently against 100 to 150 PSI (7 to 10 BAR) back pressure. To re-establish foam concentrate flow quickly, the following procedure can be used:

1. Turn the CAL/INJECT valve on the foam pump that was running when the foam tank ran dry to the CAL/INJECT position.
2. With the fire pump flowing water from the foam discharge and the FoamPro AccuMax 3000 system energized, make sure the proper foam pump is running.
3. Observe the hose from the CAL/INJECT valve.
4. When foam concentrate flows from the hose, turn the CAL/INJECT valve back to the INJECT position. The pump is now primed and ready for normal operation.
5. If the fire pump is not running, place the FoamPro AccuMax 3000 system into the simulated flow mode and proceed with above steps.

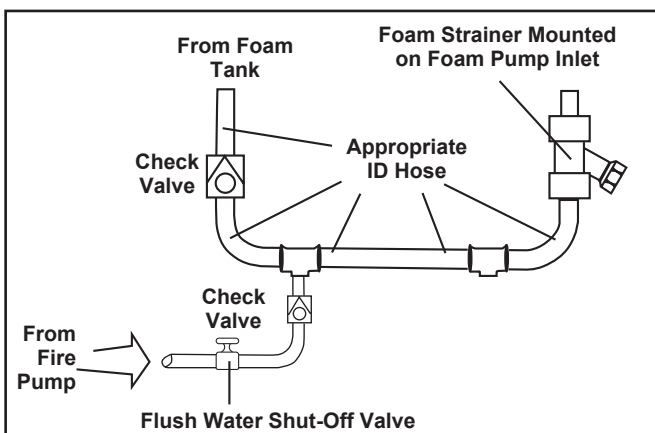


Figure 12-4
Foam Concentrate Flushing System Diagram


13 Maintenance

Maintenance Procedures

1. After each use: It is recommended as good practice to flush the FoamPro AccuMax 3000 system foam pump after each use. The system is compatible with most foam concentrates and will not significantly damage the pump or system components if left in the system. Some concentrates, however, can gel or solidify if left in the system for extended periods of time.
2. **After Each Use:** Remove and clean the foam strainer screen(s). Flush as required.
3. **Monthly:** Inspect wiring, hoses, flowmeters, and connections for tightness, corrosion, leaks and/or damage.
4. **Monthly:** Check and top off the hydraulic oil reservoir as needed.

NOTE: The hydraulic oil should not require refilling. If the system requires oil regularly, an undetected leak is present in the system.

5. **Monthly:** Ensure oil cooler intake and cooler surface is free of obstructions.
6. **Bi-Annually:** Drain and refill the hydraulic oil reservoir with proper hydraulic oil as noted in Section 4.

 **CAUTION:** Use only approved petroleum base hydraulic fluids meeting the specifications as noted in Section 4. Never mix fluid types. Ensure all hoses and seals are compatible with fluids used. Do not use water or glycol-based fluids. Do not use phosphate ester-type fluids.

7. **Bi-Annually:** Change hydraulic oil filter.
3040 Filter 3800-0100
3060 thru 3300 3800-0101

8. **Annually:** Grease bearings and seals in foam pump. **(Required only on the Edwards and Trident foam pump products.)**

NOTE: Dirt is the “enemy” of any hydraulic system. Use care when installing and maintaining system to keep dirt particles from entering the hydraulic system.

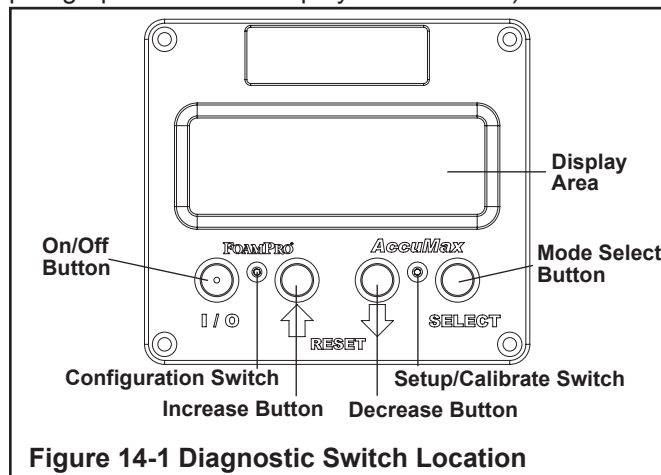
WARNING: Release all pressure within the system before servicing any of its components.

14 Troubleshooting

The majority of troubleshooting can be done by accessing the diagnostics mode. In this mode, it is possible to display the operating parameters of the system and the components to ensure that they are working properly.

Entering Diagnostic Mode

Diagnostic mode is entered by removing the Cover Screws and O-rings on the front of the Control Display Module (See Figure 14-1) using a 3/32-inch Allen wrench. Once the screws are removed, press and release both the buttons simultaneously located under the screws. The displayed verbiage will identify what section of the diagnostics you are in (see specific paragraphs on actual displayed characters).



Exit from diagnostic mode is accomplished by pressing and releasing either of the switches again. The word **NORMAL MODE** will flash and the display will read **CUR H2O RATE / 0**. This returns the system to the normal operating mode. **Replace the Cover Screws and O-rings when done.**

NOTE: Always replace the Cover Screws and O-rings to keep water and dirt from entering the Control Display Module as it may cause serious damage to the components.

The system will provide a full complement of diagnostic functions to enable verification of all sub-systems. See diagram in Figure 14-2.

Master Diagnostic Mode Functions

On entry to diagnostic mode, the display will be illuminated with **HIFLOW MSTR / dIAG**. Depressing

the UP or DOWN button will select either the **HIFLOW MSTR**, the **MASTER PUMP**, or the **BYPASS VALVE** (if selected) diagnostics. The **HIFLOW MSTR / dIAG** mode will check out the system bus, the software version, and the circuitry temperature. The following are the diagnostic modes:

Pressing the SELECT button will display the firmware version. The display will read **FIRMWARE VER / X.XX**.

- Pressing the UP button will show the local bus firmware version by displaying **LOC BUS FW / XX**.
- Pressing the DOWN button will display the display firmware version by displaying **DISPLAY FW / X.XX**.

Pressing the SELECT button will show the current circuit board temperature by displaying **CURRENT TEMP / XX.X**.

- Pressing the UP button will display the maximum circuit board temperature that has occurred by displaying **MAXIMUM TEMP / XX.X**.
- Pressing the DOWN button will display the minimum circuit board temperature that has occurred displaying **MINIMUM TEMP / XX.X**.

Pressing the SELECT button will return you to **HIFLOW MSTR / dIAG**.

Pressing the DOWN button will place the diagnostics in the **MASTER PUMP / dIAG** mode. This mode will perform diagnostics on the Master Control Driver. The following diagnostics modes in this section are as follows:

Pressing the SELECT button will display the firmware version. The display will read **FIRMWARE VER / X.XX**.

- Pressing the UP button will reveal the local bus firmware by displaying **LOC BUS FW / X.XX**.
- Pressing the DOWN button at this point does nothing.

Pressing the SELECT button will show the current temperature of the master driver circuitry by displaying **CURRENT TEMP / XX.X**.

- Pressing the UP button will display the maximum circuit temperature that has occurred by displaying **MAXIMUM TEMP / XX.X**.
- Pressing the DOWN button will display the minimum circuit board temperature that has occurred displaying **MINIMUM TEMP / XX.X**.

Pressing the SELECT button will allow diagnostics of the power supply voltage and display **POWER SUPPLY / XX.X**.

- Pressing the UP button will show the voltage in the logic circuitry by displaying **LOGIC POWER / XX.X**. The value should be 5 volts.
- Pressing the DOWN button will display **ACC VOLTAGE / XX.X**. This is the voltage supplied to the various sensors. The value should be 11.5-12.5 volts.

Pressing the SELECT button will reveal the voltage through the tank level sensor by displaying **FLOAT VOLTS / XX.X**. The value when the tank is full should be < 1 volt and when empty > 4 volts.

Pressing the SELECT button again will enter the pump control circuitry displaying the % of load current being supplied to the hydraulic pump, displaying **CNTRL OUTPUT / XX**. This is done with the I/O button on and the system running. The operation is as follows:

- Pressing the UP button will increase the load % to be applied and pressing the DOWN button will decrease the load % to be applied.

Pressing the SELECT button will then show the current in the pump control circuit. The display will read **LOAD CURRENT / X.XX**. Pressing the UP or DOWN button will toggle the mode to the % load mode and increase or decrease the load %, then automatically toggle back to the current mode and display the new current value. Pressing the SELECT button again will move the mode to read the pressure transducer voltage. The display will read **PRESSURE VLT / X.XX**. This value will depend on the pressure in the foam discharge line, but should be 0.5 to 4.5 volts.

Pressing the SELECT button will now move the diagnostics to the foam flowmeter pulses per second mode. The display will read **CHM PULS/SEC / XXX**. This mode is also a running mode, and by pressing the UP or DOWN button, the display will toggle to the % load mode and increase or decrease the % load applied to the hydraulic pump. The display will automatically toggle back to the flowmeter pulses per second mode and display the new value.

Pressing the SELECT button again will return the display to the **MASTER PUMP / dIAg** mode.

Pressing the DOWN button again will place the diagnostics in the **BYPASS VALVE / dIAg** mode. This mode will perform diagnostics on the Low End Control Driver. The following diagnostics modes in this section are as follows:

Pressing the SELECT button will display the firmware version. The display will read **FIRMWARE VER / X.XX**.

- Pressing the UP button will reveal the local bus firmware by displaying **LOC BUS F/W / X.XX**.
- Pressing the DOWN button at this point does nothing.

Pressing the SELECT button will show the current temperature of the master driver circuitry by displaying **CURRENT TEMP / XX.X**.

- Pressing the UP button will display the maximum circuit temperature that has occurred by displaying **MAXIMUM TEMP / XX.X**.
- Pressing the DOWN button will display the minimum circuit board temperature that has occurred displaying **MINIMUM TEMP / XX.X**.

Pressing the SELECT button will allow diagnostics of the power supply voltage and display **POWER SUPPLY / XX.X**.

- Pressing the UP button will show the voltage in the logic circuitry by displaying **LOGIC POWER / XX.X**. The value should be 5 volts.
- Pressing the DOWN button will display **ACC VOLTAGE / XX.X**. This is the voltage supplied to the various sensors. The value should be 11.5-12.5 volts.

Pressing the SELECT button again will enter the control valve circuitry displaying the % of open condition of the control valve by displaying **CNTRL OUTPUT / XX**. This is done with the I/O button on. The system may or may not be running to test this feature. The operation is as follows:

- Pressing the UP button will increase the open % of the valve and pressing the DOWN button will decrease the open % position of the valve.

Pressing the SELECT button will place the display in the control valve voltage mode. The display will read **BALL VOLTAGE / XX.X**. This value will change slightly in the operation of the control valve. Pressing the UP or DOWN buttons will toggle the display to the load current mode. Increasing or decreasing the value will open or close the valve. The display will toggle back to the control valve voltage mode and display the voltage applied.

Pressing the SELECT button will place the display in the control valve current mode. The display will read **LOAD CURRENT / XX.X**. This value will change slightly in the operation of the control valve. Pressing the UP or DOWN buttons will toggle the display to the load current mode. Increasing or decreasing the value will open or close the valve. The display will toggle back to the control valve current mode and display the current applied.

Pressing the SELECT button will now move the diagnostics to the foam flowmeter pulses per second

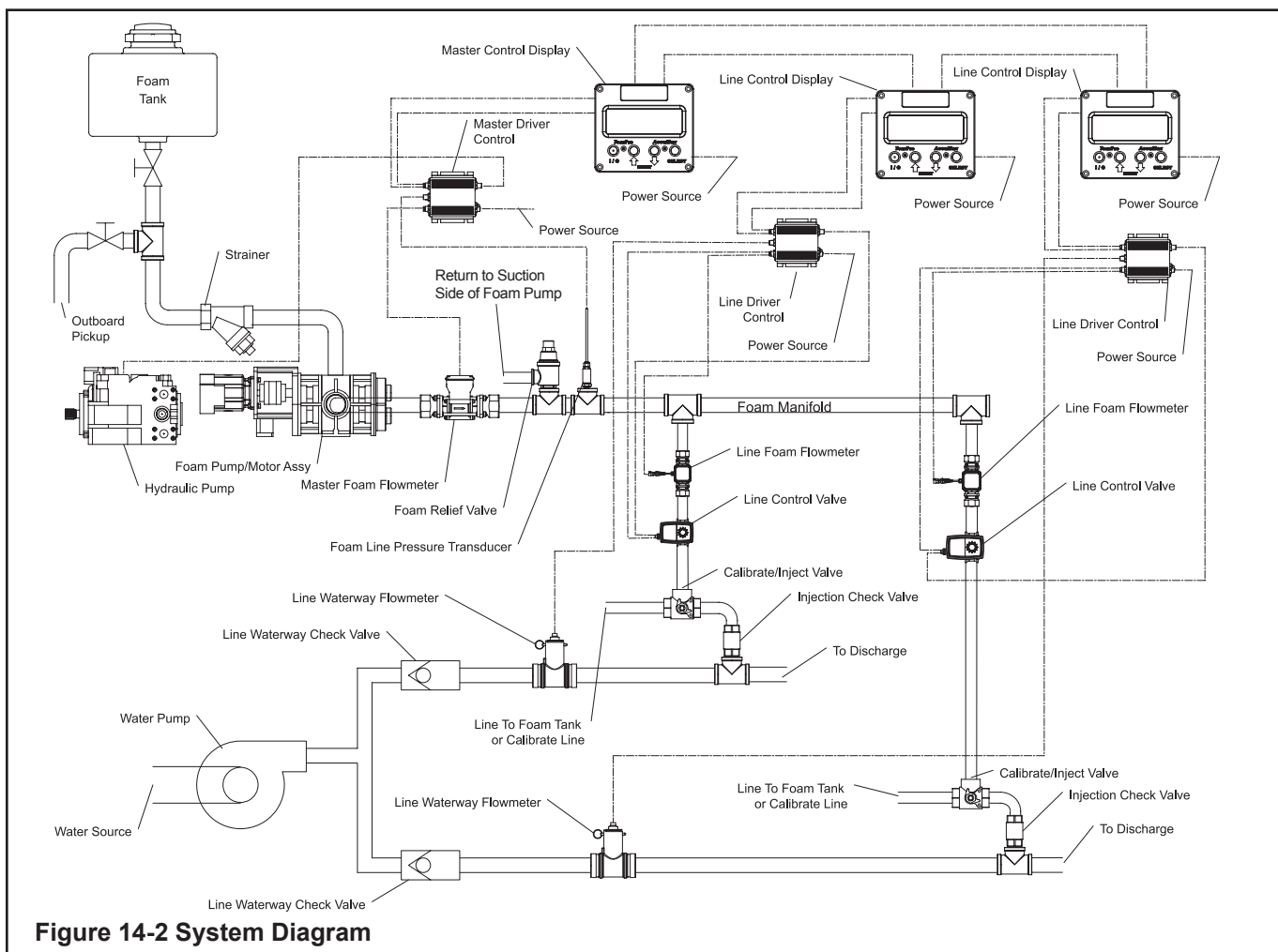


Figure 14-2 System Diagram

mode. The display will read **CHM PULS/SEC / XXX**. This mode is also a running mode, and by pressing the UP or DOWN button, the display will toggle to the % load mode and increase or decrease the % load applied to the hydraulic pump. The display will automatically toggle back to the flowmeter pulses per second mode and display the new value. Pressing the SELECT button again will return the display to the **BYPASS VALVE / dIAG** mode.

Line Control Module Diagnostics

The Line Control Module diagnostics are very similar to the Master Control Module diagnostics. On entry to diagnostic mode, the display will be illuminated with **HIFLOW LINE / dIAG**. Depressing the UP or DOWN button will select either the HIFLOW LINE or the DISCHG VALVE diagnostics. The **HIFLOW LINE / dIAG** mode will check out the system bus, the software version, and the circuitry temperature. The following diagnostic modes include:

Pressing the SELECT button will display the firmware version. The display will read **FIRMWARE VER / X.XX**.

- Pressing the UP button will show the local bus firmware version by displaying **LOC BUS F/W / XX**.
- Pressing the DOWN button will display the firmware version by displaying **DISPLAY F/W / X.XX**.

Pressing the SELECT button will show the current circuit board temperature by displaying **CURRENT TEMP / XX.X**.

- Pressing the UP button will display the maximum circuit board temperature that has occurred by displaying **MAXIMUM TEMP / XX.X**.
- Pressing the DOWN button will display the minimum circuit board temperature that has occurred displaying **MINIMUM TEMP / XX.X**.

Pressing the SELECT button will return you to **HIFLOW LINE / dIAG**.

Pressing the UP or DOWN button will place the diagnostics in the **DISCHG VALVE / diAg** mode. This mode will perform diagnostics on the Line Control Driver. The following diagnostics modes in this section are as follows:

Pressing the SELECT button will display the firmware version. The display will read **FIRMWARE VER / X.XX**.

- Pressing the UP button will reveal the local bus firmware by displaying **LOC BUS F/W / X.XX**.
- Pressing the DOWN button at this point does nothing.

Pressing the SELECT button will show the current temperature of the master driver circuitry by displaying **CURRENT TEMP / XX.X**.

- Pressing the UP button will display the maximum circuit temperature that has occurred by displaying **MAXIMUM TEMP / XX.X**.
- Pressing the DOWN button will display the minimum circuit board temperature that has occurred displaying **MINIMUM TEMP / XX.X**.

Pressing the SELECT button will allow diagnostics of the power supply voltage and display **POWER SUPPLY / XX.X**.

- Pressing the UP button will show the voltage in the logic circuitry by displaying **LOGIC POWER / XX.X**. The value should be 5 volts.
- Pressing the DOWN button will display **ACC VOLTAGE / XX.X**. This is the voltage supplied to the various sensors. The value should be 11.5-12.5 volts.

Pressing the SELECT button again will move the mode to read the pressure transducer voltage. The display will read **PRESSURE VLT / X.XX**. This value will depend on the pressure in the foam discharge line, but should be 0.5 to 4.5 volts.

Pressing the SELECT button again will place the diagnostics in the water flowmeter pulse mode. The display will read **H2O PULS/SEC / XXX**. This will display the pulses per second that the water line flowmeter is sending the control. Opening or closing the water discharge line will increase or decrease this value.

Pressing the SELECT button again will enter the control valve circuitry displaying the % of open condition of the control valve by displaying **CNTRL OUTPUT / XX**. This is done with the I/O button on. The system may or may not be running to test this feature. The operation is as follows:

- Pressing the UP button will increase the open % of the valve and pressing the DOWN button will decrease the open % position of the valve.

Pressing the SELECT button will place the display in the control valve voltage mode. The display will read **BALL VOLTAGE / XX.X**. This value will change slightly in the operation of the control valve. Pressing the UP or DOWN buttons will toggle the display to the load current mode. Increasing or decreasing the value will open or close the valve. The display will toggle back to the control valve voltage mode and display the voltage applied.

Pressing the SELECT button will place the display in the control valve current mode. The display will read **LOAD CURRENT / XX.X**. This value will change slightly in the operation of the control valve. Pressing the UP or DOWN buttons will toggle the display to the load current mode. Increasing or decreasing the value will open or close the valve. The display will toggle back to the control valve current mode and display the current applied.

Pressing the SELECT button will now move the diagnostics to the foam flowmeter pulses per second mode. The display will read **CHM PULS/SEC / XXX**. This mode is also a running mode, and by pressing the UP or DOWN button, the display will toggle to the % load mode and increase or decrease the % load applied to the hydraulic pump. The display will automatically toggle back to the flowmeter pulses per second mode and display the new value.

Pressing the SELECT button again will return the display to the **DISCHG VALVE / diAg** mode.

Symptom	Probable Cause(s)	Corrective Action
Pump does not run. No change in message on Master Display.	Line Control not on.	Engage Line Control.
	Line Control not requiring any foam concentrate.	Open discharge line to establish water flow. Check injection rate for value greater than "0".
Pump does not run. MSTR NOT RDY flashes on Line Control Display.	Master Control not turned on.	Engage Master Control.
Pump does not run. NO CHEM FLOW flashes on Master Display. MSTR NOT RDY flashes on Line Display.	Truck hydraulic pump PTO not engaged.	Engage truck hydraulic PTO.
	Pump Control cable not properly connected.	Check cable for loose fittings or bent pins, and correct connection port.
	Not sufficient hydraulic fluid.	Check hydraulic fluid level in reservoir.
	Hydraulic suction line obstruction.	Open shut-off valve and check hydraulic line strainer.
Pump runs for a short time and shuts down. NO CHEM FLOW flashes on Master display. MSTR NOT RDY flashes on Line display.	Pump Control cable not properly connected.	Check cable for loose fittings or bent pins, and correct connection port.
	Foam flowmeter cable not properly connected.	Check cable for loose fittings or bent pins, and correct connection port.
	Foam flowmeter not functioning.	Check diagnostics (see Section 14) and replace flowmeter if required.
Foam pump capacity below rating.	Foam does not flow freely.	Modification of the plumbing may be required to eliminate cavitation. Use swept elbows and tees. Increase inlet pipe diameter.
	PTO not running at proper rpm for full performance.	Check and increase PTO rpm, if necessary.

Symptom	Probable Cause(s)	Corrective Action
Foam pump runs but no foam being pumped. NO CHEM FLOW flashes on Master Display. MSTR NOT RDY flashes on Line Display.	Obstruction in suction line.	Remove suction line and check for loose liner or debris. Avoid all unnecessary bends. Do not kink hose.
	Clogged suction strainer.	Clean strainer.
	Pump not primed.	Prime pump (see Section 11 for priming procedures).
	Pump turning wrong direction.	Reverse hydraulic lines on hydraulic motor.
Pump loses prime, chattering noise, pressure fluctuations.	Air leak in suction hose or fittings.	Remove suction hose and test for leaks. Make sure thread sealant has been used on all fittings.
	Suction line is collapsed or blocked.	Remove suction line and check for loose liner or debris. Avoid all unnecessary bends. Do not kink hose.
	Clogged suction strainer.	Clean strainer.
	Suction line to pump too small.	Check hose size and replace with larger if required.
Pump runs, but cycles and diverts foam through relief valve to tank. Pump then shuts down with display messages: NO CHEM FLOW flashes on Master Display. MSTR NOT RDY flashes on Line Display.	Obstruction in discharge line.	Remove foam discharge line and check for loose liner or debris. Avoid all unnecessary bends. Do not kink hose.
	Line Control Valve not opening.	Check wiring and cables to valve. Check valve diagnostics for possible problem.
System running, H2O FLOW LOW flashes on Line Control Display.	Water flow rate is below the system's ability to maintain fixed proportional rate chosen.	Ignore signal and the system will run at the minimum value. See Section 15.
		Increase proportional rate of injection.
		Increase water flow rate.
System running, H2O FLOW HI flashes on Line Control Display.	System has exceeded its ability to maintain the fixed proportional rate to water flow ratio.	Ignore signal and the system will run at the maximum value. See Section 15. Decrease proportional rate of injection and/or water flow rate.

Installation and Operation Manual

Symptom	Probable Cause(s)	Corrective Action
Nothing shows on any of the displays.	The main power switch is not on.	Turn on main power switch on apparatus.
One or more displays do not show anything or partial display is illuminated.	Cables not properly connected.	Inspect and secure connections. Check for bent pins in power cables to Control Display(s).
	Defective power cable or bent pins.	Replace power cable.
	Control Display damaged.	Replace Display.
	Insufficient voltage.	Check voltage to display through diagnostics.
System is powered up and the Master I/O button is pushed, and NO MAIN PUMP flashes on the Master Display.	Bus connections to the control driver are not correct.	Inspect and secure connections. Check for bent pins in power cables to Control Display(s).
	Power switch on control driver not in the on position.	Turn on driver switch.
	Defective power cable or bent pins.	Inspect and secure connections. Check for bent pins in power cables to Control Driver(s).
	Insufficient voltage.	Check voltage to driver through diagnostics.
System is powered up and the Line I/O button is pushed, and NO VALVE DPV flashes on the Line Display.	Bus connections to the control driver are not correct.	Inspect and secure connections. Check for bent pins in power cables to Control Display(s).
	Power switch on control driver not in the on position.	Turn on driver switch.
	Defective power cable or bent pins.	Inspect and secure connections. Check for bent pins in power cables to Control Driver(s).
	Insufficient voltage.	Check voltage to driver through diagnostics.
System running, Master Control flashing CHEM IS LOW .	Low-level sensor has indicated a low level of concentrate in tank.	Refill concentrate tank.
		Switch to outboard pickup.
System not running or stops running, Master Control flashing OUT OF CHEM .	Low-level sensor has run for 2 minutes in low condition or is at low condition on start up.	Refill concentrate tank and restart system.
		Switch to outboard pickup and restart system.

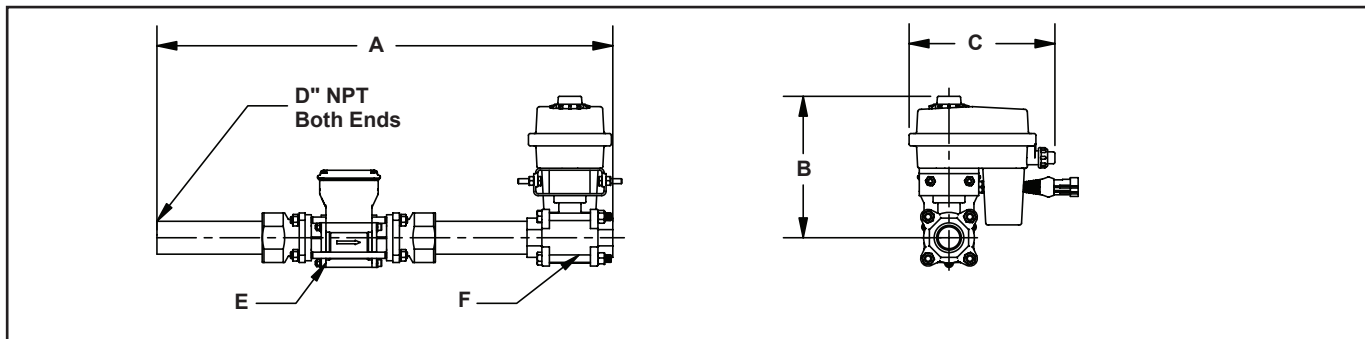
15 Specifications

Specifications Contents

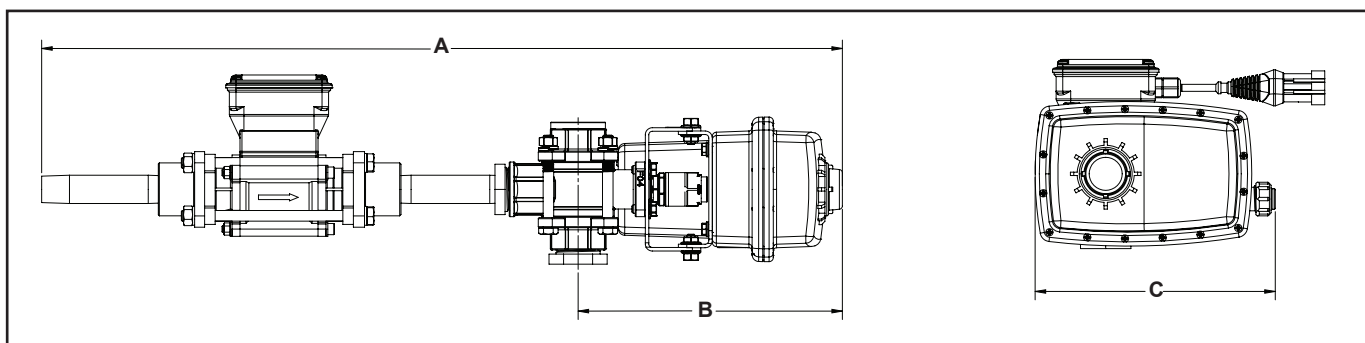
The following section includes:

- Standard part information
 - ▶ Standard part identification.....Pages 53 - 55
 - ▶ Standard part performance.....Page 56
 - ▶ Standard part dimensional information..... Page 57 - 58
 - ▶ Hydraulic pump dimensional information.....Pages 59 - 62
- System specifications for each Foam Pump configuration
 - ▶ **Fire Lion**
 - System Specifications.....Page 63
 - Hydraulic connection specifications.....Page 64
 - Pump/Motor assembly part identification.....Page 65
 - Pump/Motor assembly dimensional information.....Pages 66 - 68
 - ▶ **Edwards**
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 - Hydraulic connection specifications.....Page 70
 - Pump/Motor assembly part identification.....Page 71
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 - ▶ **Trident**
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 - Hydraulic connection specifications.....Page 76
 - Pump/Motor assembly part identification.....Page 77
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Line Control Assembly Dimensions and Flow Capacities



Part Number	A	B	C	D	Flow Range	E Flowmeter	F Control Valve
3430-0727	16 5/8"	7 3/16"	5"	1/2" NPT	2.6-26 GPM	2660-0058	2590-0026
3430-0627	18 3/4"	6 15/16"	7 3/8"	1" NPT	6-60 GPM	2660-0041	2590-0015
3430-0628	23 1/16"	7 3/16"	7 3/8"	1 1/4" NPT	10-100 GPM	2660-0042	2590-0016
3430-0629	23 7/16"	7 9/16"	7 3/8"	1 1/2" NPT	16-150 GPM	2660-0043	2590-0017
3430-0698	28 15/16"	13 1/8"	7 3/8"	2 NPT	24-300 GPM	2660-0038	2590-0023
3430-0695 Low Flow Option	18 3/4"	6 13/16"	5 7/8"	3/4" NPT	N/A	2660-0040	2590-0014

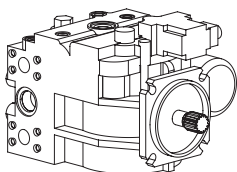


Part Number	A	B	C	D	Flow Range	E Flowmeter	F Control Valve
3430-0769	25 3/16"	7 7/8"	7 3/16"	1" NPT	1.8-60 GPM	2660-0041	2590-0027
3430-0822	23 4/5"	7 7/8"	7 1/8"	1/2" NPT	1.0-26 GPM	2660-0058	2590-0027

Note:

Caution should be used not to remove actuators from control valves. Especially on the 3430-0769, 3430-1016, and 3430-0822 as the control timing is preset at the factory, and any field adjustments can cause the valves to leak or not run properly.

Standard Misc. Components



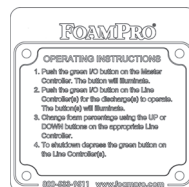
Hydraulic Pump

3040	2500-0071
3060	2500-0063
3090, 3150	2500-0030
3300	2500-0133



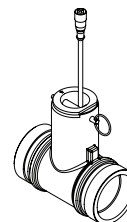
Foam Relief Valve

3300-0101



**Operating Instruction
Placard**

6032-0051

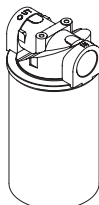


Line Waterway Flowmeter

(See page 57)

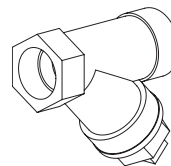
**Hydraulic Pump
Suction Filter**

3350-0178
(3040 system only)



Waterway Flowmeter Cable

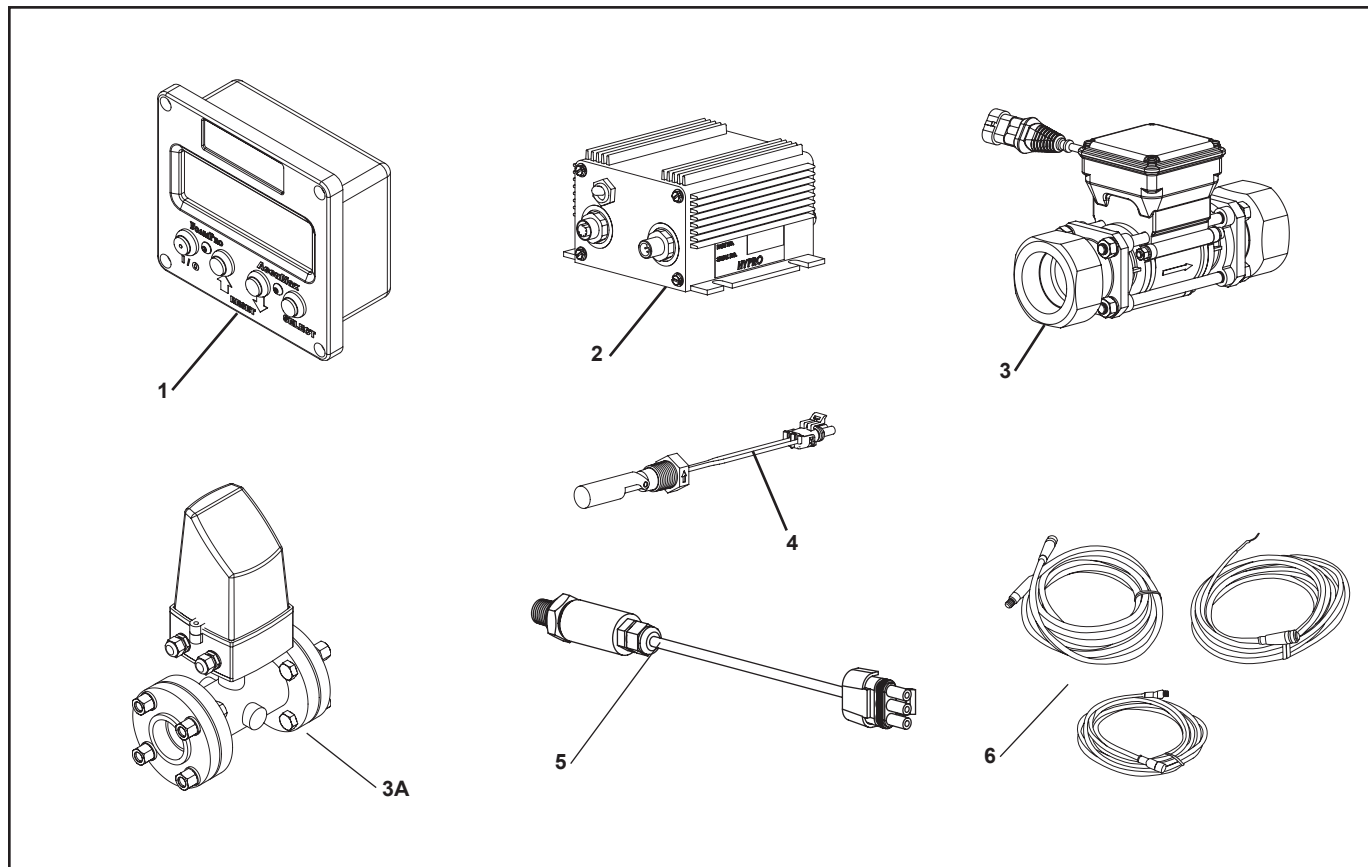
2520-0101



Foam Pump Y Strainer

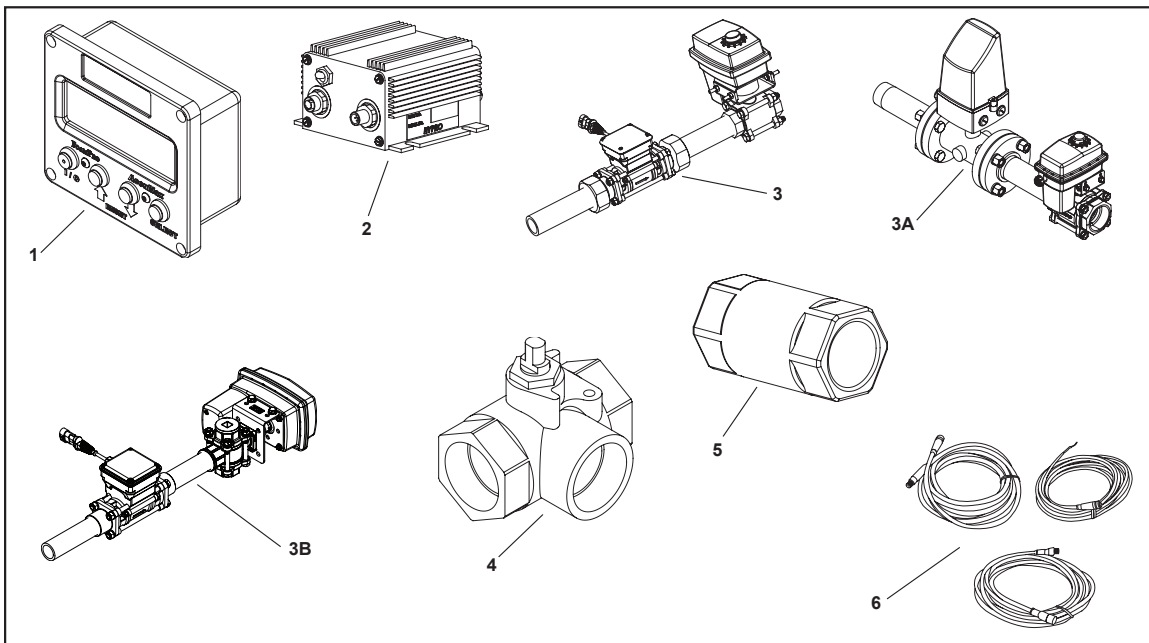
3040	3350-0145
3060	3350-0146
3090, 3150	3350-0147
3300	3350-1000

Master Control Module Parts



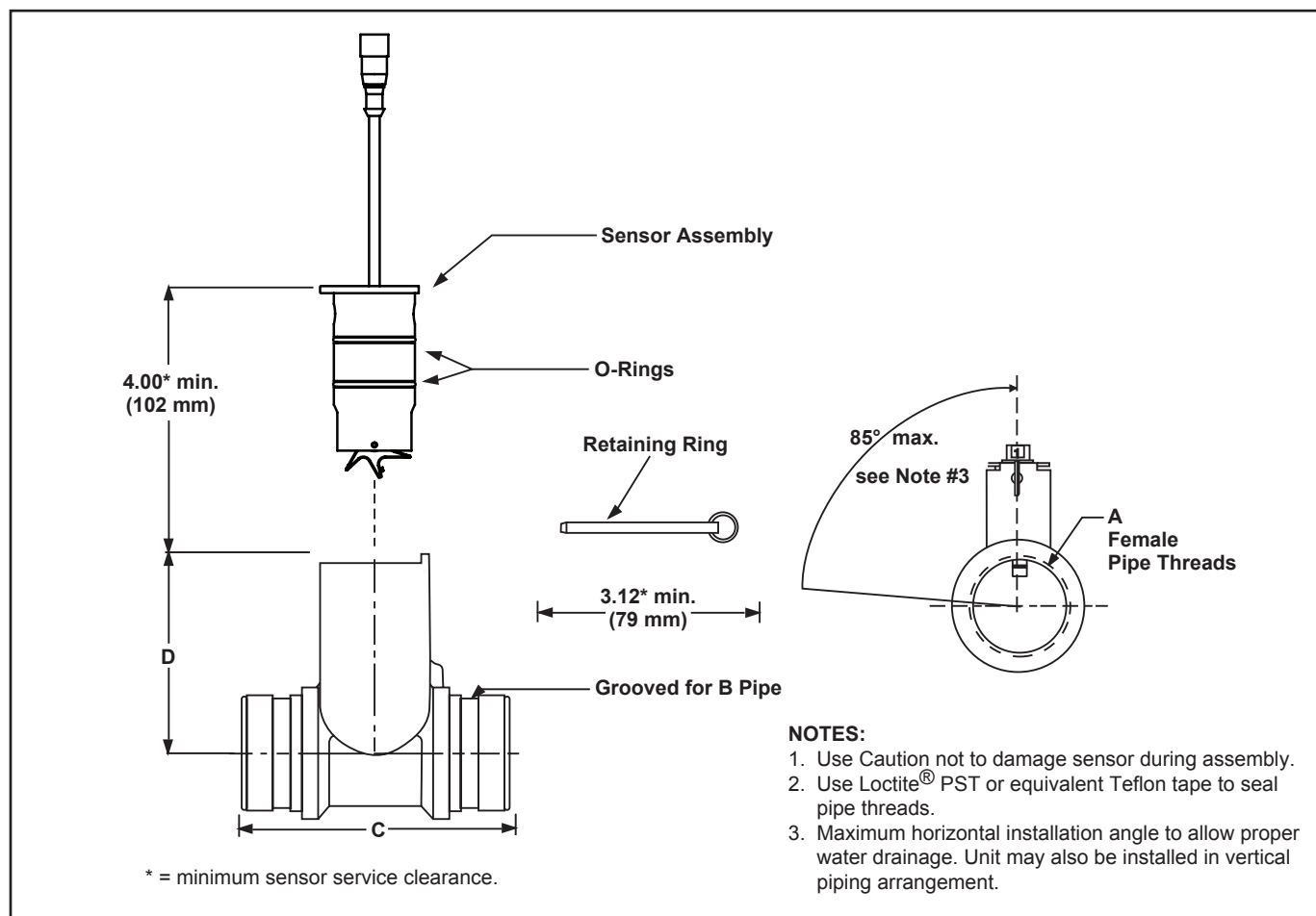
Ref.	Part No.	Description	Qty.
1	2527-0080	Master Control Display	1
2	2527-0082	Master Control Driver	1
3	2660-0040	Foam Flowmeter: 3/4" - 3040	1
	2660-0041	Foam Flowmeter: 1" - 3060	1
	2660-0042	Foam Flowmeter: 1-1/4" NPT - 3090	1
	2660-0043	Foam Flowmeter: 1-1/2" NPT - 3150	1
3A	2660-0038	Foam Flowmeter: 2" NPT - 3300	1
4	2510-0039	Low Level Sensor- Side Mount	1
	2510-0028	Low Level Sensor- Vertical Mount (optional)	1
5	2530-0111	Pressure Transducer	1
6	2520-0094R	Data Bus Cable	2
	2520-0095R	Foam Flowmeter Cable	1
	2520-0098R	Pump Control Cable	1
	2520-0099R	Power Cable	2
	2520-0100R	Pressure Transducer Cable	1
	2520-0102R	Low Level Sensor Cable	1
	2520-0114	Foam Flowmeter Power Cable (for 2660-0038 only)	1
	2520-0103R	Short Data Cable	1

Line Control Module Parts



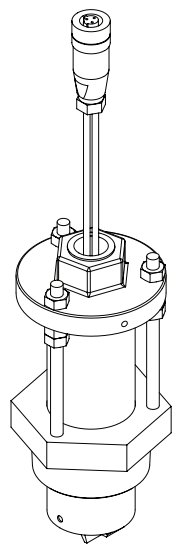
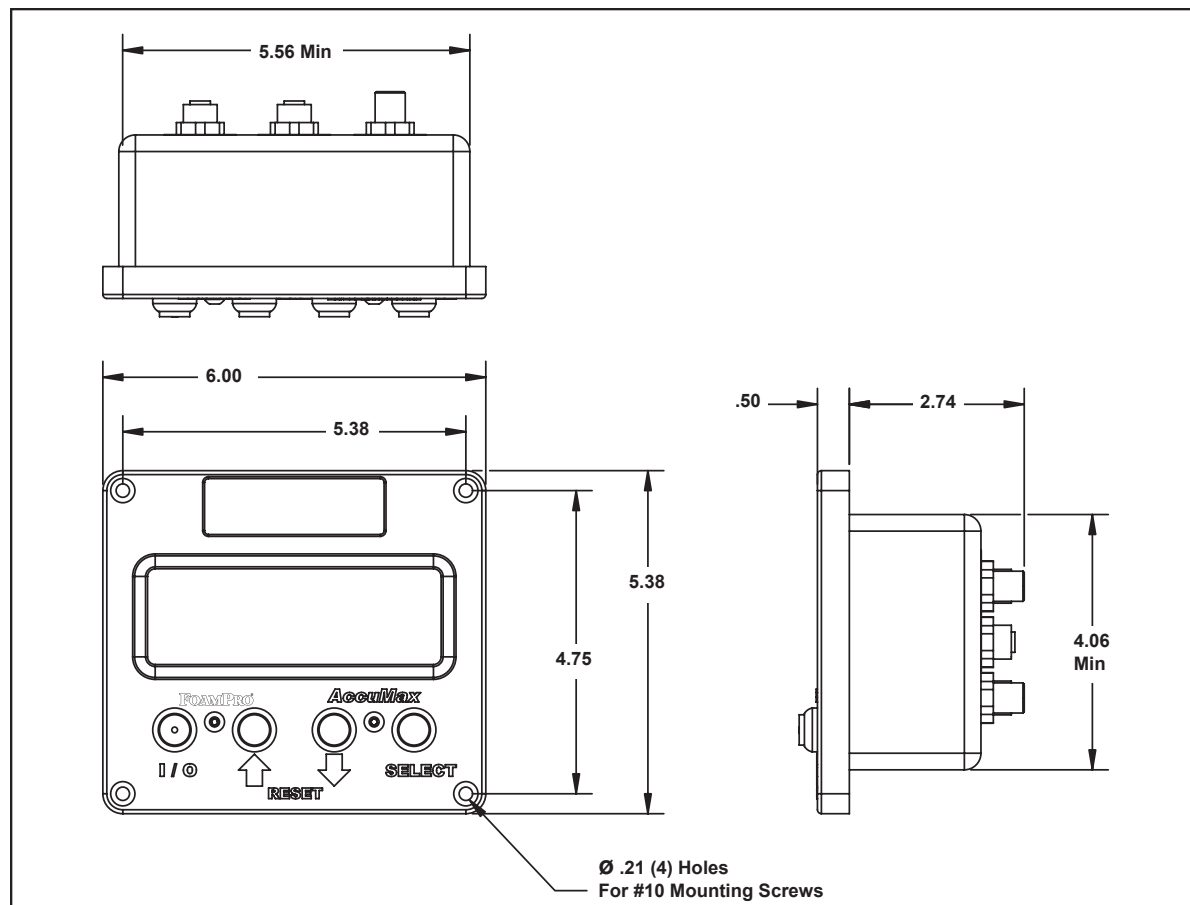
Ref.	Part No.	Description	Qty.
1	2527-0081	Line Control Display	1
2	2527-0083	Line Control Driver	1
3	3430-0727	1/2" Line Control Assembly	1
4	3304-0027	1" Calibrate / Inject Valve (Bushings included to 1/2")	1
5	3320-0029SS	3/4" Injection Check Valve (Bushings included to 1/2")	1
3	3430-0627	1" Line Control Assembly	1
4	3304-0027	1" Calibrate / Inject Valve	1
5	3320-0041	1" Injection Check Valve	1
3	3430-0628	1-1/4" Line Control Assembly	1
4	3304-0026	1-1/4" Calibrate / Inject Valve	1
5	3320-0047	1-1/4" Injection Check Valve	1
3	3430-0629	1-1/2" Line Control Assembly	1
4	3304-0029	1-1/2" Calibrate / Inject Valve	1
5	3320-0048	1-1/2" Injection Check Valve	1
3A	3430-0698	2" Line Control Assembly	1
4	3304-0030	2" Calibrate/Inject Valve	1
5	3320-0050	2" Injection Check Valve	1
3B	3430-0822	1/2" Ultra Low Line Control Assembly	1
4	3304-0027	1" Calibrate / Inject Valve (Bushings included to 1/2")	1
5	3320-0029SS	3/4" Injection Check Valve (Bushings included to 1/2")	1
3B	3430-0769	1" Ultra Low Line Control Assembly	1
4	3304-0027	1" Calibrate / Inject Valve	1
5	3320-0041	1" Injection Check Valve	1
6	2520-0094R	Data Bus Cable	2
	2520-0095R	Foam Flowmeter Cable	1
	2520-0096R	Valve Power Cable	1
	2520-0097R	Valve Feedback Cable	1
	2520-0099R	Power Cable	2
	2520-0101R	Water Flowmeter Cable	1
	2520-0114	Foam Flowmeter Power Cable (for 2660-0038 only)	1
	2520-0103R	Short Data Bus Cable	1

Line Waterway Flowmeter Specifications



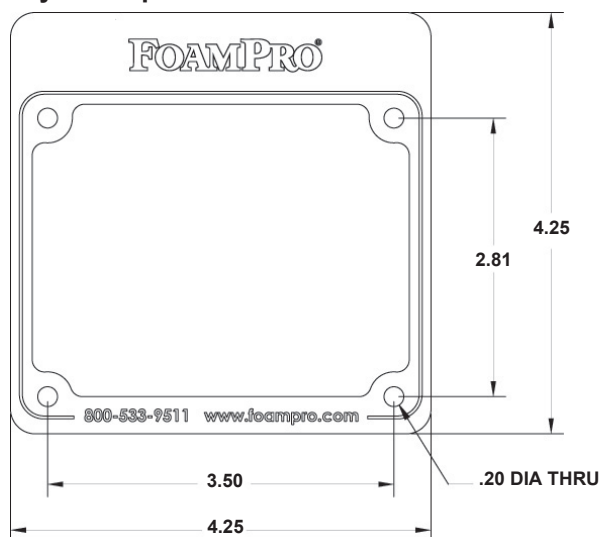
Assy. Part Number	A	B	C	D	Max. Accuracy Flow Range (GPM)	Max. Operating Flow range (GPM)
2660-0031	1-1/2"—11-1/2" NPT	2" Pipe	5-3/8" (137 mm)	4-1/8" (105 mm)	10-320	3-380
2660-0031B	1-1/2"—11" BSP	2" Pipe	5-3/8" (137 mm)	4-1/8" (105 mm)	10-320	3-380
2660-0032	2"—11-1/2" NPT	2-1/2" Pipe	5-3/8" (137 mm)	4-3/8" (111 mm)	15-520	5-625
2660-0032B	2"—11" BSP	2-1/2" Pipe	5-3/8" (137 mm)	4-3/8" (111 mm)	15-520	5-625
2660-0033	2-1/2"—8" NPT	3" Pipe	5-3/8" (137 mm)	4-9/16" (116 mm)	20-750	8-900
2660-0033B	2-1/2"—11" BSP	3" Pipe	5-3/8" (137 mm)	4-9/16" (116 mm)	20-750	8-900
2660-0034	3"—8" NPT	4" Pipe	5-1/2" (140 mm)	4-7/8" (124 mm)	30-1150	12-1380
2660-0034B	3"—11" BSP	4" Pipe	5-1/2" (140 mm)	4-7/8" (124 mm)	30-1150	12-1380
2660-0035	4"—8" NPT	5" Pipe	5-1/2" (140 mm)	5-3/8" (137 mm)	55-1980	20-2380
2660-0035B	4"—11" BSP	5" Pipe	5-1/2" (140 mm)	5-3/8" (137 mm)	55-1980	20-2380

Cutout Dimensions for Master and Line Control Display Module



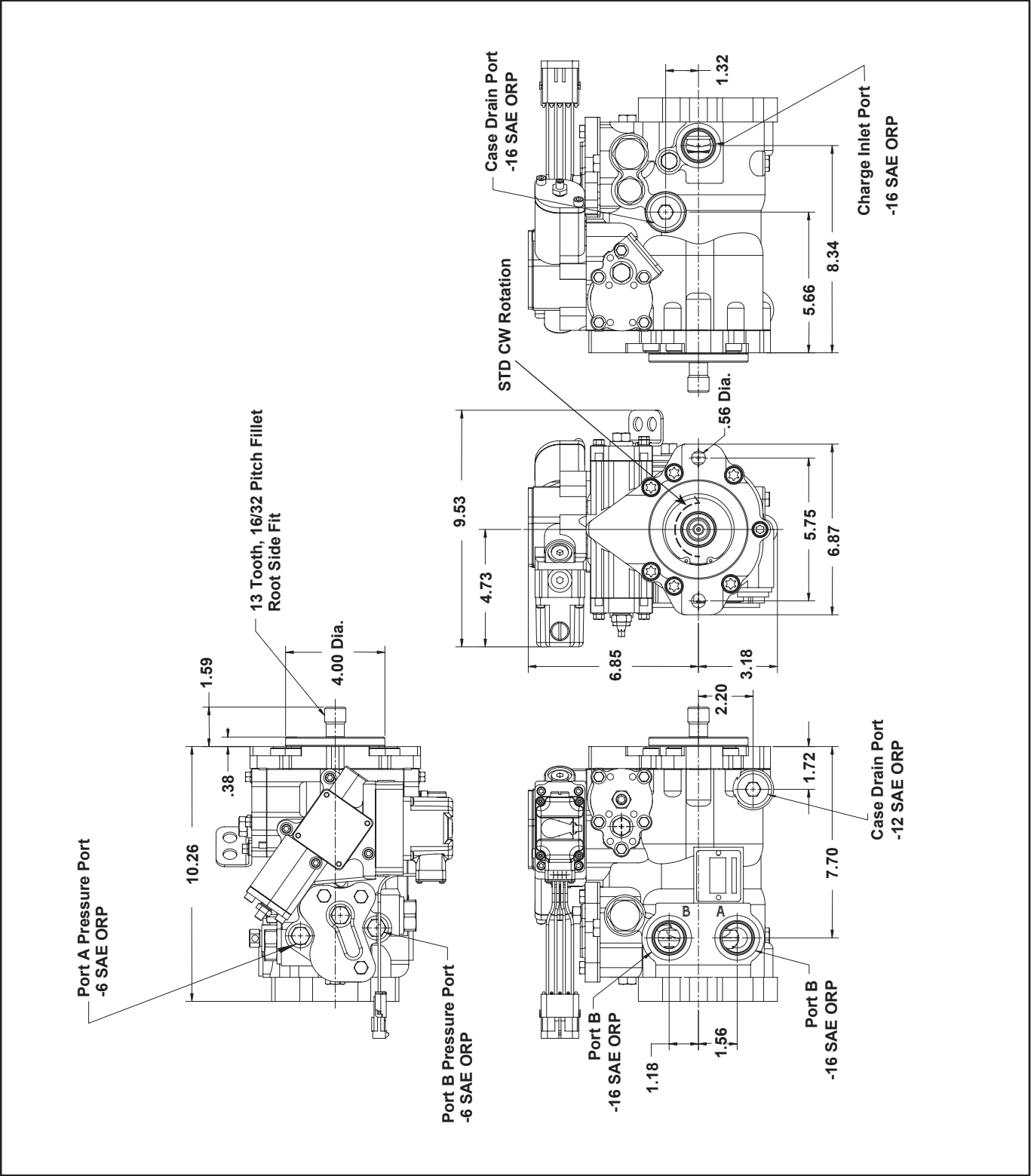
**Model 2660-0044
Insertion Flowmeter**

Cutout Dimensions for Instruction, System, System Spec. Placards

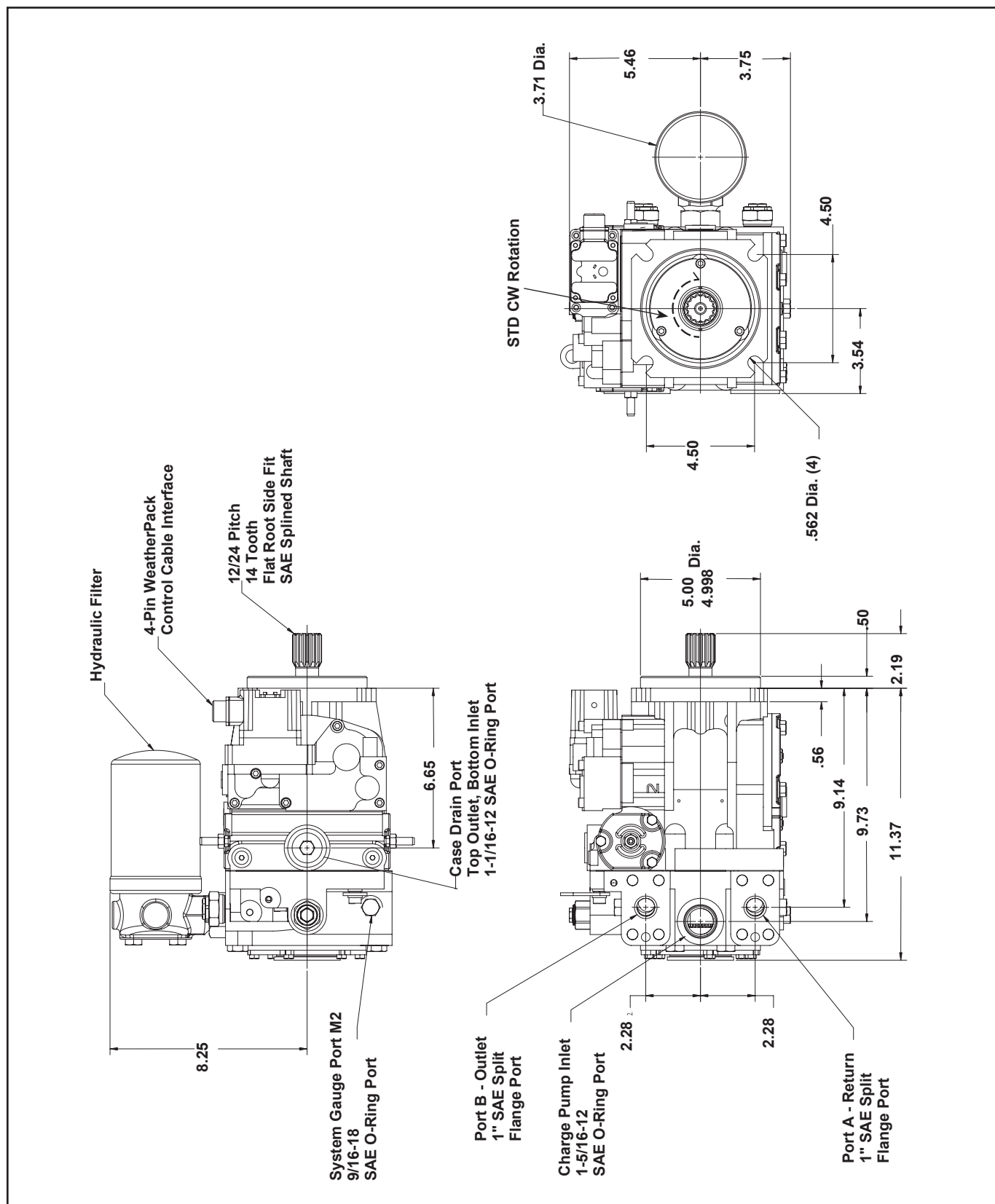


Pipe Size	Maximum Accuracy Flow Range	Maximum Operating Flow Range
5"	80 - 3050 gpm (303 - 11546 Lpm)	60 - 3670 gpm (227 - 13893 Lpm)
6"	117 - 4500 gpm (443 - 17035 Lpm)	90 - 5400 gpm (340 - 20441 Lpm)
8"	200 - 7800 gpm (757 - 29526 Lpm)	155 - 9360 gpm (587 - 35431 Lpm)

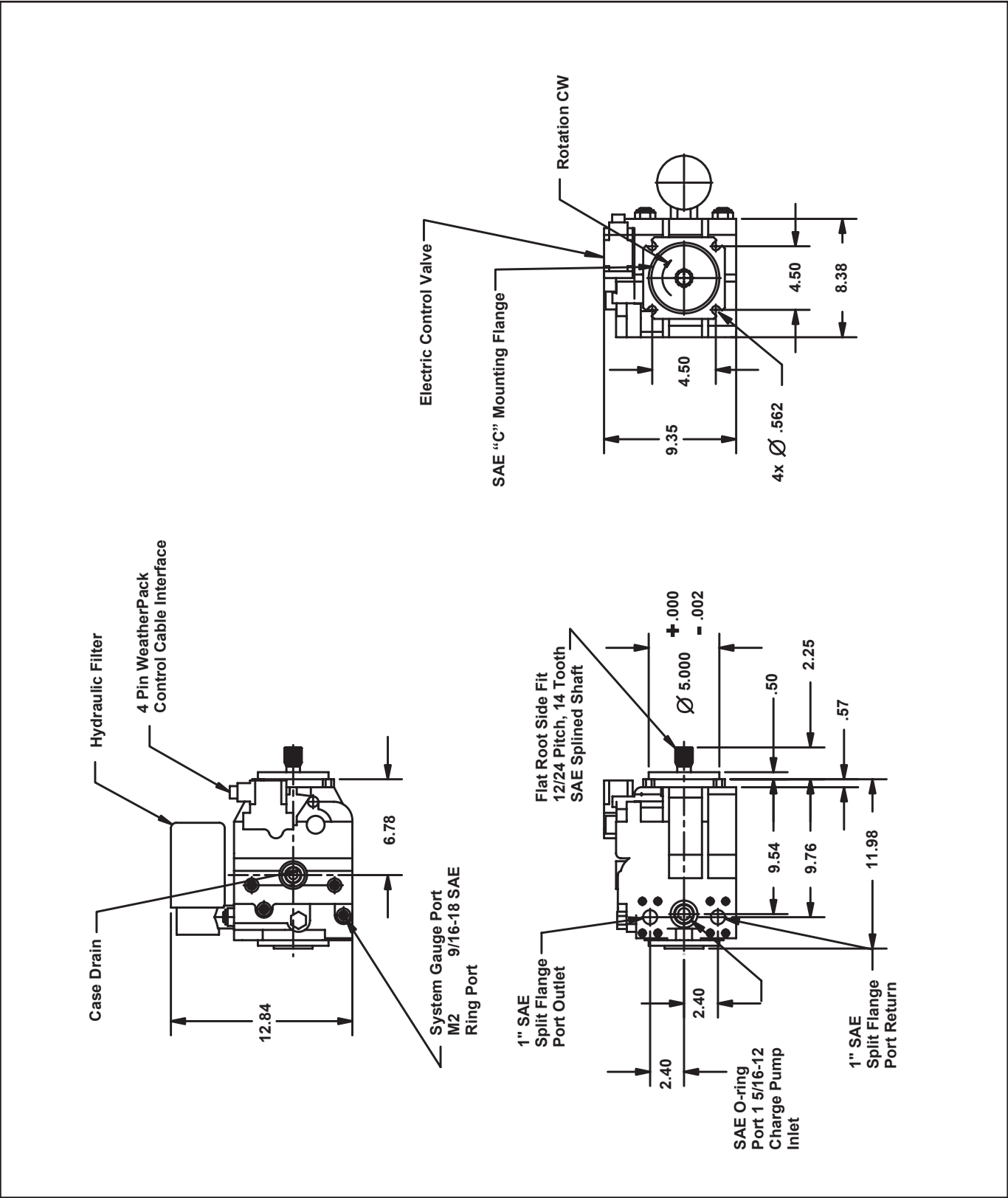
Hydraulic Pump 3040



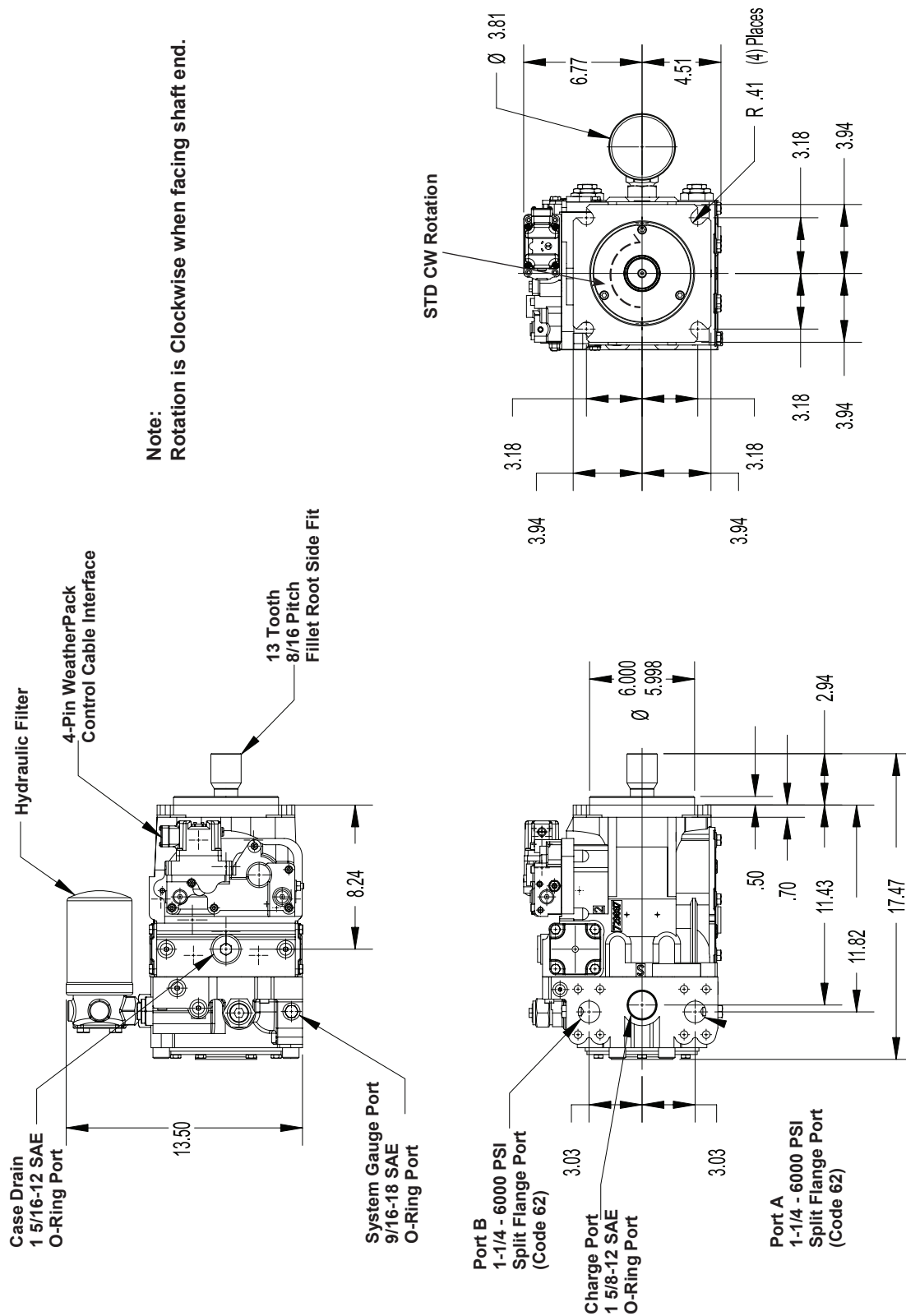
Hydraulic Pump 3060



Hydraulic Pump 3090 and 3150



Hydraulic Pump 3300



Specifications for Fire Lion Pump Systems

System Capacity	Maximum Water Flow GPM (LPM)				
Foam Concentrate Rate	3040	3060	3090	3150	3300
1%	4,000 (15,142)	6,000 (22,712)	9,000 (34,069)	15,000 (56,781)	30,000 (113,563)
3%	1,333 (5,046)	2,000 (7,571)	3,000 (11,356)	5,000 (18,927)	10,000 (37,854)
6%	667 (2,525)	1,000 (3,785)	1,500 (5,678)	2,500 (9,464)	5,000 (18,927)
System Specifications					
Max. Foam Output GPM (LPM)	40 (151.4)	60 (227.1)	90 (340.7)	150 (567.8)	300 (1,135.6)
Max. Operating Pressure PSI (BAR)	300 (20.7)	300 (20.7)	300 (20.7)	300 (20.7)	300 (20.7)
Max. Operating Temp. F (C)	160 (71)	160 (71)	160 (71)	160 (71)	160 (71)
Max. Hydraulic Oil Pressure PSI (BAR)	2,931 (202.1)	3,624 (249.9)	3,923 (270.5)	5,522 (380.8)	5,819 (401.2)
Max. Hydraulic Oil Flow GPM (LPM)	17.4 (65.9)	20.6 (78.0)	24.3 (92.0)	27.3 (103.4)	40.7 (154.1)
PTO Pump RPM for Min. Performance RPM	1,432	1,418	1,221	1,375	1,185
PTO HP-HP (kW) at Max. Performance	34 (25.4)	49.6 (37.0)	62.9 (46.9)	99.1 (73.9)	155.1 (115.7)
PTO Torque at Max. Performance Lbf-ft (Nm)	124.6 (169.0)	182.9 (248.0)	270.2 (366.4)	378.3 (512.9)	688 (932.8)
Hyd. Pump Mounting Flange	SAE 'B' Flange	SAE 'C' Flange	SAE 'C' Flange	SAE 'C' Flange	SAE 'D' Flange
Hyd. Pump Input Shaft	13 Tooth 16/32 Pitch	14 Tooth 12/24 Pitch	14 Tooth 12/24 Pitch	14 Tooth 12/24 Pitch	13 Tooth 8/16 Pitch
Max. PTO Speed RPM	4,000	3,600	3,600	3,600	3,100
Minimum Hydraulic Reservoir Size Gal. (Liter)	8 (30.3)	8 (30.3)	8 (30.3)	8 (30.3)	15 (56.8)
Minimum Hydraulic Cooler Heat Load BTU/Min. @ Minimum Return Line Flow GPM (LPM)	425 5.3 (20)	620 5.2 (20)	792 5.5 (20.8)	1252 6.2 (23.5)	1966 8.2 (31.1)
Maximum Hydraulic Oil Temp. F (C)	220 (104)	220 (104)	220 (104)	220 (104)	220 (104)
Maximum Amp Draw	5	5	5	5	5

Fire Lion Hydraulic Fittings and Hose Specifications

Connection	Model	Minimum Hose ID	Pump Port Fitting & Pressure Rating	Motor Port Fitting & Type
Hydraulic Reservoir to Hydraulic Charge Pump Inlet	3040	1" Suction	#16 SAE O-Ring	N/A
	3060	1" Suction	#16 SAE O-Ring	N/A
	3090	1" Suction	#16 SAE O-Ring	N/A
	3150	1" Suction	#16 SAE O-Ring	N/A
	3300	1-1/4" Suction	#20 SAE O-Ring	N/A
Hydraulic Pump Port B to Motor Port A	3040	3/4" - 3000 PSI	#16 SAE O-Ring	#12 SAE O-Ring
Hydraulic Pump Port B to Motor Port B	3060	1" - 3600 PSI	1" SAE Split Flange	#12 SAE O-Ring
	3090	1" - 4500 PSI	1" SAE Split Flange	3/4" SAE Split Flange
	3150	1" - 4500 PSI	1" SAE Split Flange	3/4" SAE Split Flange
	3300	1" - 6000 PSI	1-1/4" SAE Split Flange	1" SAE Split Flange
Hydraulic Pump Port A to Motor Port B	3040	3/4" - 3000 PSI	#16 SAE O-Ring	#12 SAE O-Ring
Hydraulic Pump Port A to Motor Port A	3060	1" - 3600 PSI	1" SAE Split Flange	#12 SAE O-Ring
	3090	1" - 4500 PSI	1" SAE Split Flange	3/4" SAE Split Flange
	3150	1" - 4500 PSI	1" SAE Split Flange	3/4" SAE Split Flange
	3300	1" - 6000 PSI	1-1/4" SAE Split Flange	1" SAE Split Flange
Hydraulic Motor Case Drain to Hydraulic Pump Case Drain	3040	3/4" - 1500 PSI	#12 SAE O-Ring	#10 SAE O-Ring
	3060	3/4" - 1500 PSI	#12 SAE O-Ring	#10 SAE O-Ring
	3090	3/4" - 1500 PSI	#12 SAE O-Ring	#10 SAE O-Ring
	3150	3/4" - 1500 PSI	#12 SAE O-Ring	#10 SAE O-Ring
	3300	3/4" - 1500 PSI	#16 SAE O-Ring	#10 SAE O-Ring
Hydraulic Motor Case Drain to Hydraulic Cooler	3040	3/4" - 1500 PSI	#12 SAE O-Ring	N/A
	3060	3/4" - 1500 PSI	#12 SAE O-Ring	N/A
	3090	3/4" - 1500 PSI	#12 SAE O-Ring	N/A
	3150	3/4" - 1500 PSI	#12 SAE O-Ring	N/A
	3300	3/4" - 1500 PSI	#16 SAE O-Ring	N/A

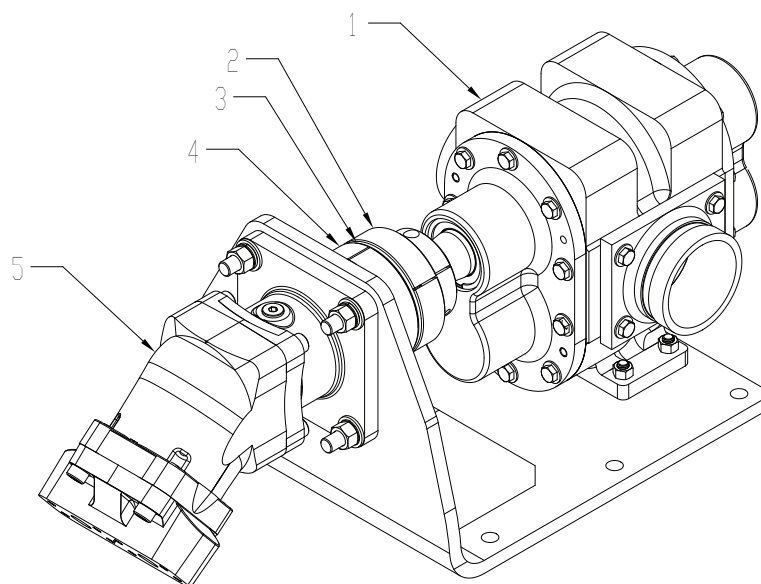
Notes:

SAE O-Ring Ports are per SAE J514

SAE Split Flange Ports are to SAE J518 code 62

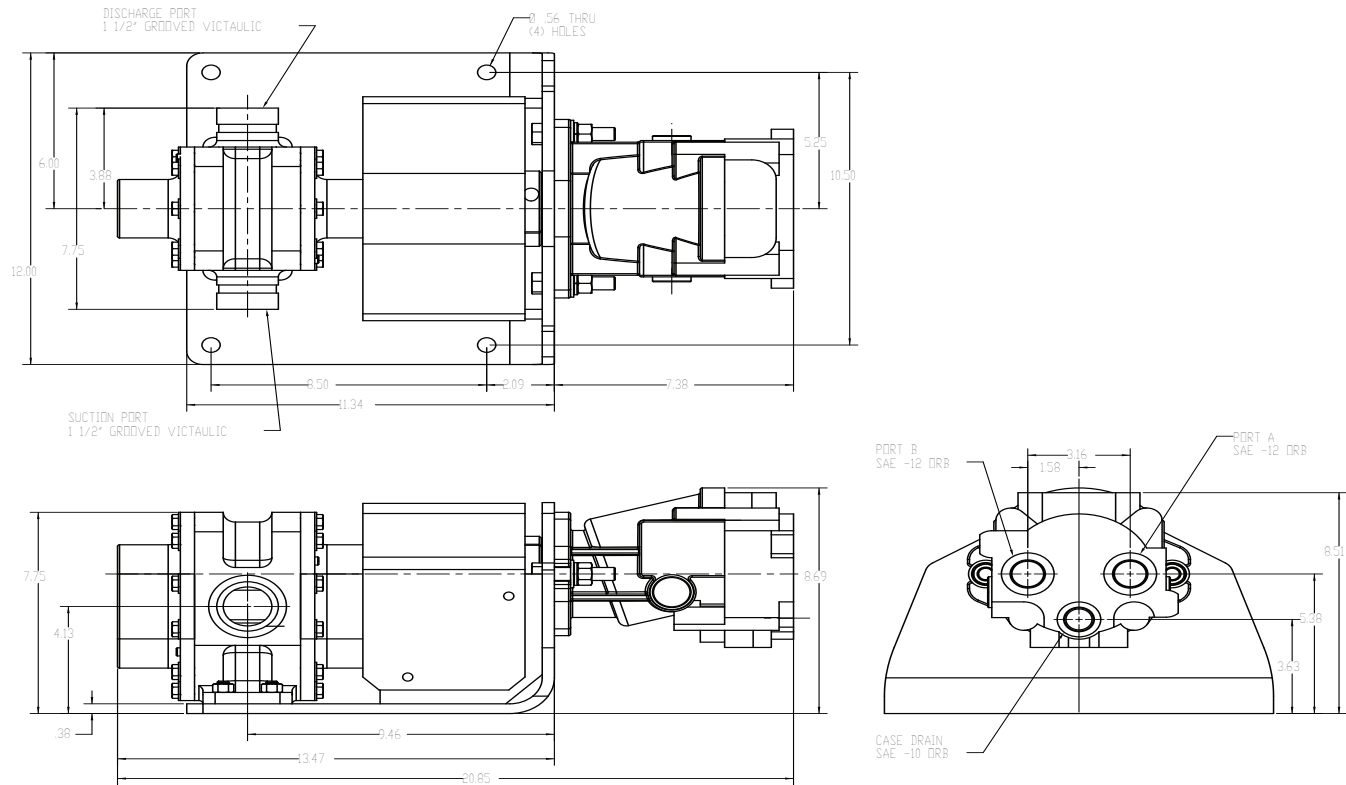
Hydraulic pump inlet hose to conform to SAE 100R4

Fire Lion Pump/Motor Assembly Parts

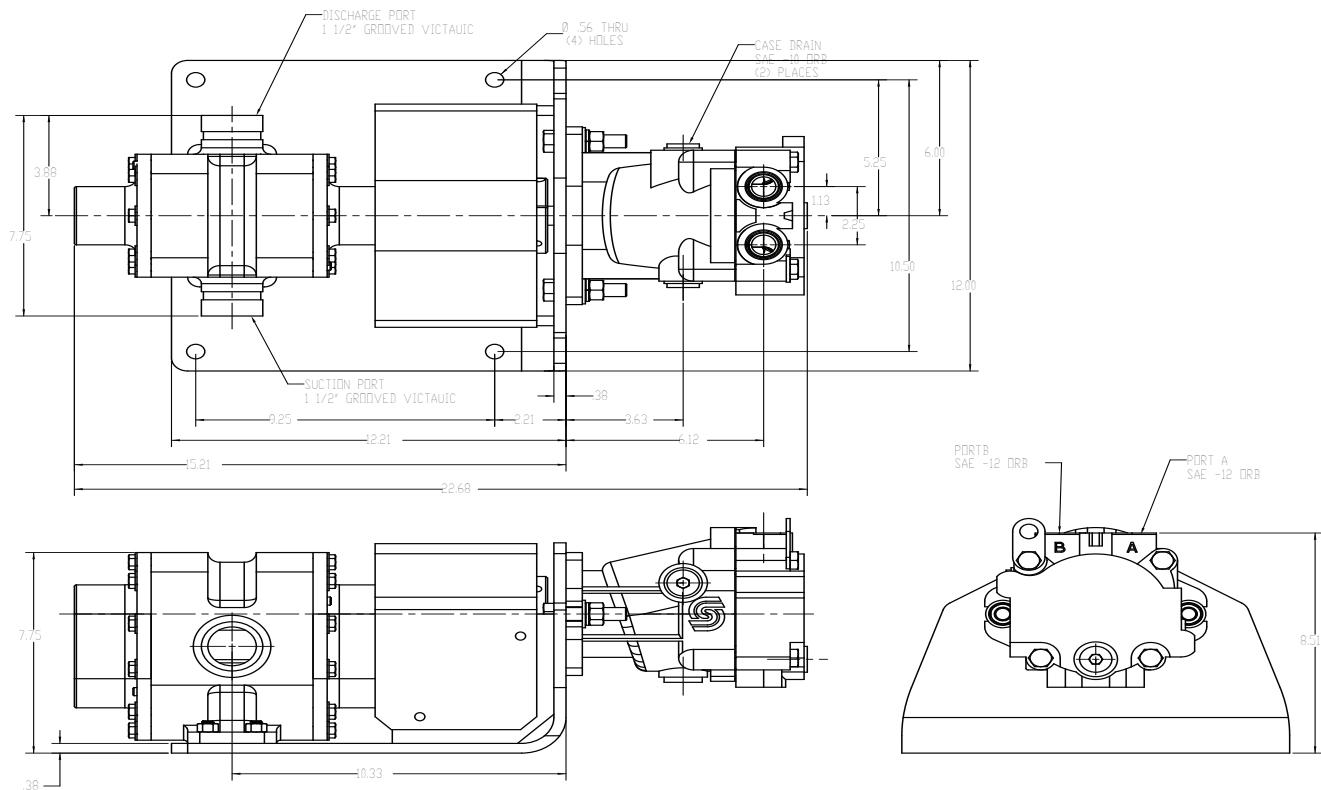


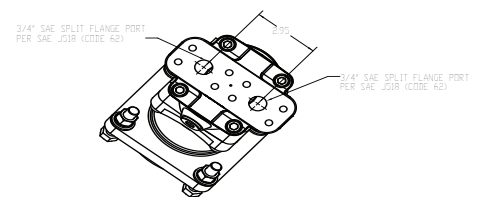
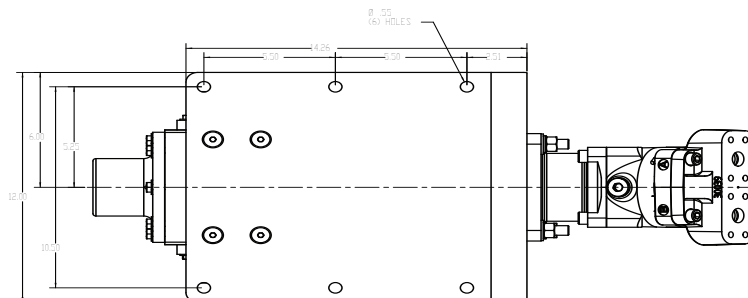
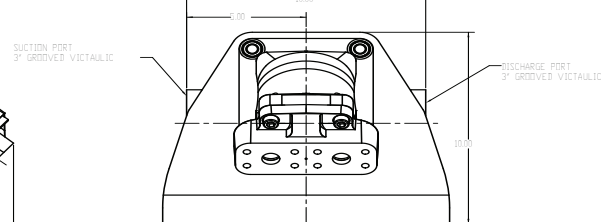
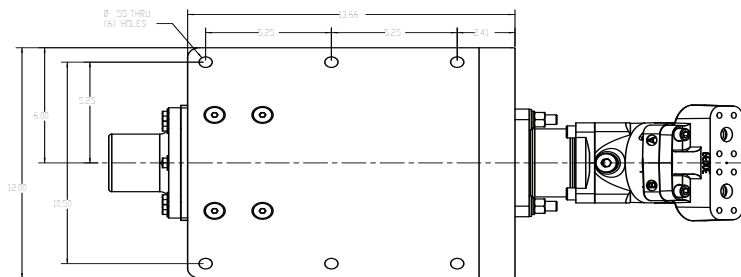
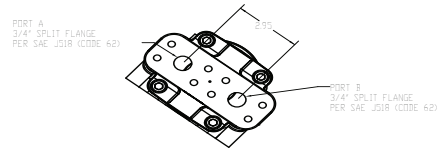
ITEM	Part No.	Description	Qty.
1	8000-1011	Foam Pump - 3040	1
	8000-1012	Foam Pump - 3060	1
	8000-1013	Foam Pump - 3090	1
	8000-1014	Foam Pump - 3150	1
	8000-1015	Foam Pump - 3300	1
2	2740-1002	Coupling Half - 3040 & 3060 Pump	1
	2740-1004	Coupling Half - 3090 & 3150 Pump	1
	2740-1006	Coupling Half - 3300 Pump	1
3	2729-1002	Coupling Insert - 3040 & 3060	1
	2729-1003	Coupling Insert - 3090 & 3150	1
	2729-1004	Coupling Insert - 3300	1
4	2740-1001	Coupling Half - 3040 & 3060 Hyd Motor	1
	2740-1003	Coupling Half - 3090 & 3150 Hyd Motor	1
	2740-1005	Coupling Half - 3300 Hyd Motor	1
5	2500-0026	Hyd Motor - 3040	1
	2500-0064	Hyd Motor - 3060	1
	2500-1004	Hyd Motor - 3090 & 3150	1
	2500-1005	Hyd Motor - 3300	1

3040 – Fire Lion Pump/Motor Assembly (P/N 3450-1036)

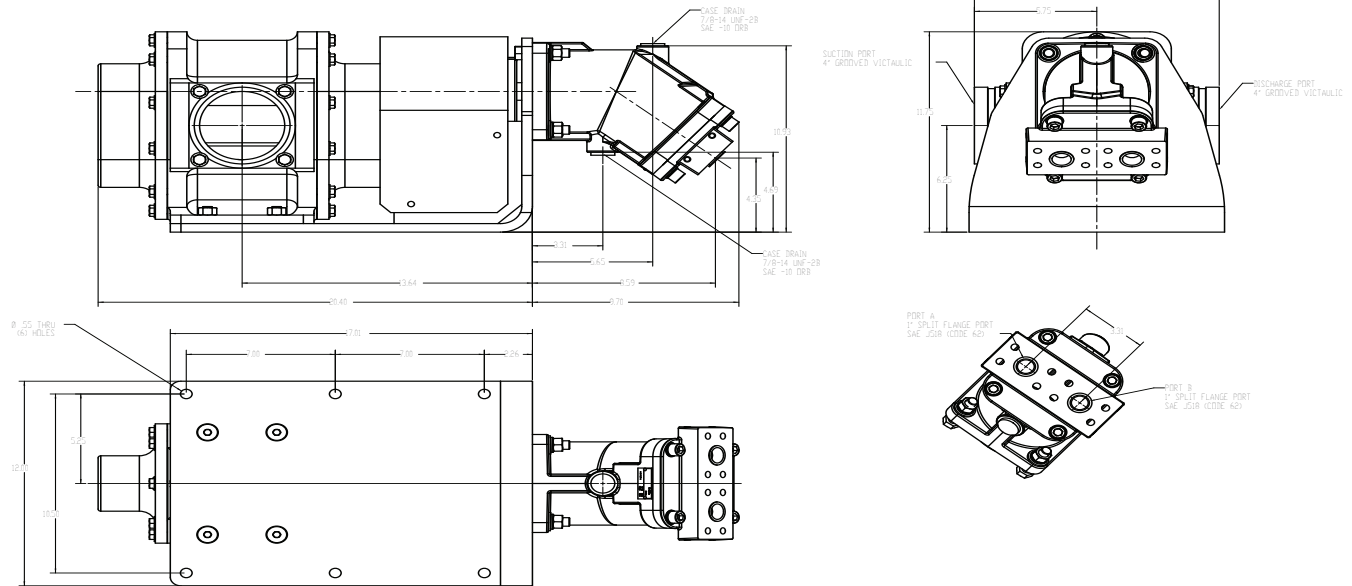


3060 – Fire Lion Pump/Motor Assembly (P/N 3450-1037)





3300 – Fire Lion Pump/Motor Assembly (P/N 3450-1040)



Specifications for Edwards Pump Systems

System Capacity	Maximum Water Flow GPM (LPM)				
Foam Concentrate Rate	3040	3060	3090	3150	3300
1%	4,000 (15,142)	6,000 (22,712)	9,000 (34,069)	15,000 (56,781)	30,000 (113,563)
3%	1,333 (5,046)	2,000 (7,571)	3,000 (11,356)	5,000 (18,927)	10,000 (37,854)
6%	667 (2,525)	1,000 (3,785)	1,500 (5,678)	2,500 (9,464)	5,000 (18,927)
System Specifications					
Max. Foam Output GPM (LPM)	40 (151.4)	60 (227.1)	90 (340.7)	150 (567.8)	300 (1,135.6)
Max. Operating Pressure PSI (BAR)	300 (20.7)	300 (20.7)	300 (20.7)	300 (20.7)	300 (20.7)
Max. Operating Temp. F (C)	160 (71)	160 (71)	160 (71)	160 (71)	160 (71)
Max. Hydraulic Oil Pressure PSI (BAR)	2,649 (182.7)	3,484 (240.2)	4,479 (308.8)	4,378 (301.9)	5,873 (405.0)
Max. Hydraulic Oil Flow GPM (LPM)	16.3 (61.7)	22.9 (86.7)	23.7 (89.7)	29.5 (112)	47.4 (180)
PTO Pump RPM for Min. Performance RPM	1,336	1,579	1,200	1,485	1,387
PTO HP (kW) at Max. Performance	29.5 (22.0)	53.3 (39.8)	70.5 (52.6)	85.3 (63.6)	185.1 (138.1)
PTO Torque at Max. Performance Lbf-ft (Nm)	116 (157.3)	177.3 (240.4)	308.6 (418.4)	301.7 (409.1)	701 (950.1)
Hyd. Pump Mounting Flange	SAE 'B' Flange	SAE 'C' Flange	SAE 'C' Flange	SAE 'C' Flange	SAE 'D' Flange
Hyd. Pump Input Shaft	13 Tooth 16/32 Pitch	14 Tooth 12/24 Pitch	14 Tooth 12/24 Pitch	14 Tooth 12/24 Pitch	13 Tooth 8/16 Pitch
Max. PTO Speed RPM	4,000	3,600	3,600	3,600	3,100
Minimum Hydraulic Reservoir Size Gal. (Liter)	8 (30.3)	8 (30.3)	8 (30.3)	8 (30.3)	15 (56.8)
Minimum Hydraulic Cooler Heat Load BTU/Min. @ Minimum Return Line Flow GPM (LPM)	359 5.0 (19.0)	663 5.9 (22.3)	886 5.4 (21)	1073 6.7 (25)	2312 9.5 (36)
Maximum Hydraulic Oil Temp. F (C)	220 (104)	220 (104)	220 (104)	220 (104)	220 (104)
Maximum Amp Draw	5	5	5	5	5

Edwards Hydraulic Fittings and Hose Specifications

Connection	Model	Minimum Hose ID	Pump Port Fitting & Pressure Rating	Motor Port Fitting & Type
Hydraulic Reservoir to Hydraulic Charge Pump Inlet	3040	1" Suction	#16 SAE O-Ring	N/A
	3060	1" Suction	#16 SAE O-Ring	N/A
	3090	1" Suction	#16 SAE O-Ring	N/A
	3150	1" Suction	#16 SAE O-Ring	N/A
	3300	1-1/4" Suction	#20 SAE O-Ring	N/A
Hydraulic Pump Port B to Motor Port A	3040	3/4" - 3000 PSI	#16 SAE O-Ring	#12 SAE O-Ring
Hydraulic Pump Port B to Motor Port B	3060	1" - 3600 PSI	1" SAE Split Flange	1" SAE Split Flange
	3090	1" - 4500 PSI	1" SAE Split Flange	1" SAE Split Flange
	3150	1" - 4500 PSI	1" SAE Split Flange	1" SAE Split Flange
	3300	1" - 6000 PSI	1-1/4" SAE Split Flange	1" SAE Split Flange
Hydraulic Pump Port A to Motor Port B	3040	3/4" - 3000 PSI	#16 SAE O-Ring	#12 SAE O-Ring
Hydraulic Pump Port A to Motor Port A	3060	1" - 3600 PSI	1" SAE Split Flange	1" SAE Split Flange
	3090	1" - 4500 PSI	1" SAE Split Flange	1" SAE Split Flange
	3150	1" - 4500 PSI	1" SAE Split Flange	1" SAE Split Flange
	3300	1" - 6000 PSI	1-1/4" SAE Split Flange	1" SAE Split Flange
Hydraulic Motor Case Drain to Hydraulic Pump Case Drain	3040	3/4" - 1500 PSI	#12 SAE O-Ring	#10 SAE O-Ring
	3060	3/4" - 1500 PSI	#12 SAE O-Ring	#10 SAE O-Ring
	3090	3/4" - 1500 PSI	#12 SAE O-Ring	#10 SAE O-Ring
	3150	3/4" - 1500 PSI	#12 SAE O-Ring	#12 SAE O-Ring
	3300	3/4" - 1500 PSI	#16 SAE O-Ring	#12 SAE O-Ring
Hydraulic Motor Case Drain to Hydraulic Cooler	3040	3/4" - 1500 PSI	#12 SAE O-Ring	N/A
	3060	3/4" - 1500 PSI	#12 SAE O-Ring	N/A
	3090	3/4" - 1500 PSI	#12 SAE O-Ring	N/A
	3150	3/4" - 1500 PSI	#12 SAE O-Ring	N/A
	3300	3/4" - 1500 PSI	#16 SAE O-Ring	N/A

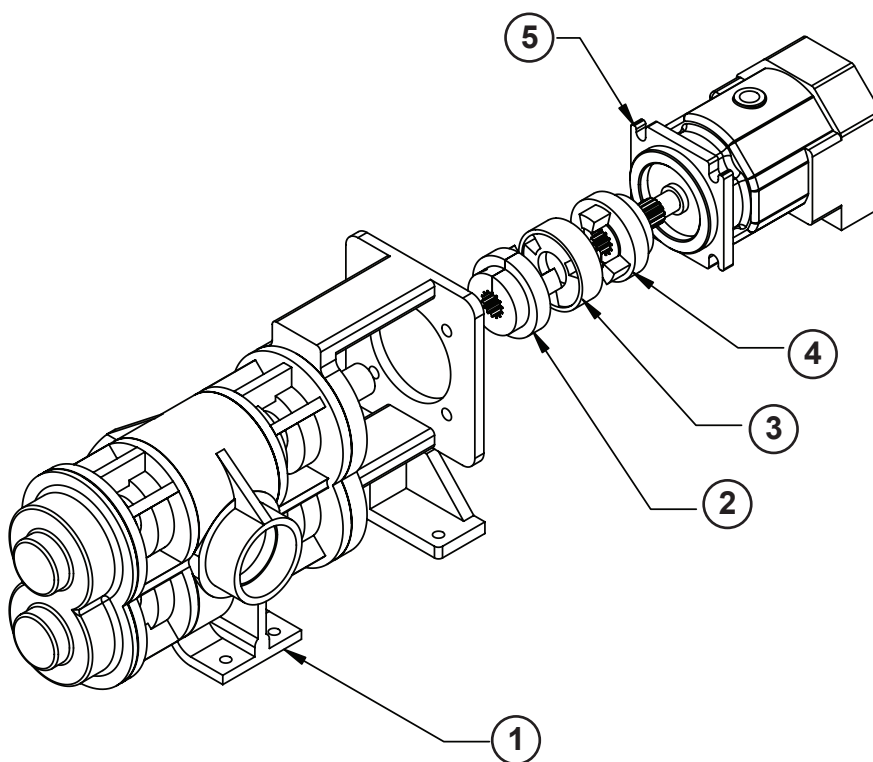
Notes:

SAE O-Ring Ports are per SAE J514

SAE Split Flange Ports are to SAE J518 code 62

Hydraulic pump inlet hose to conform to SAE 100R4

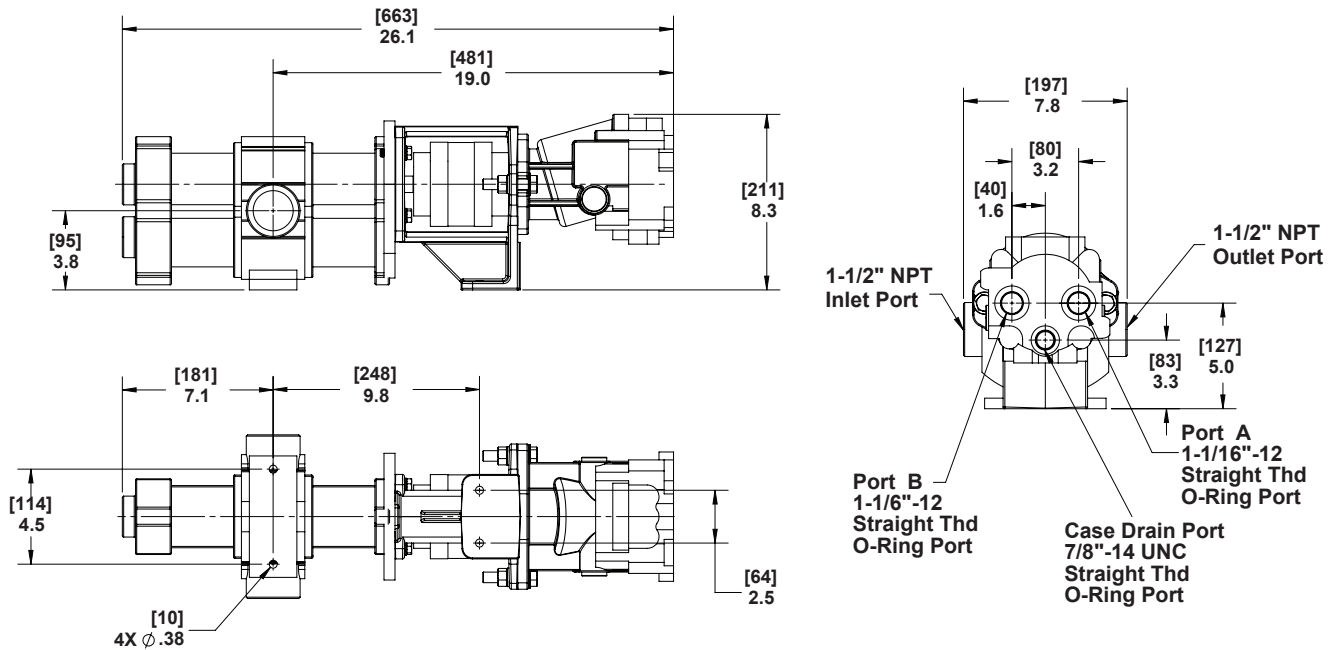
Edwards Parts Identification Pump/Motor Assembly



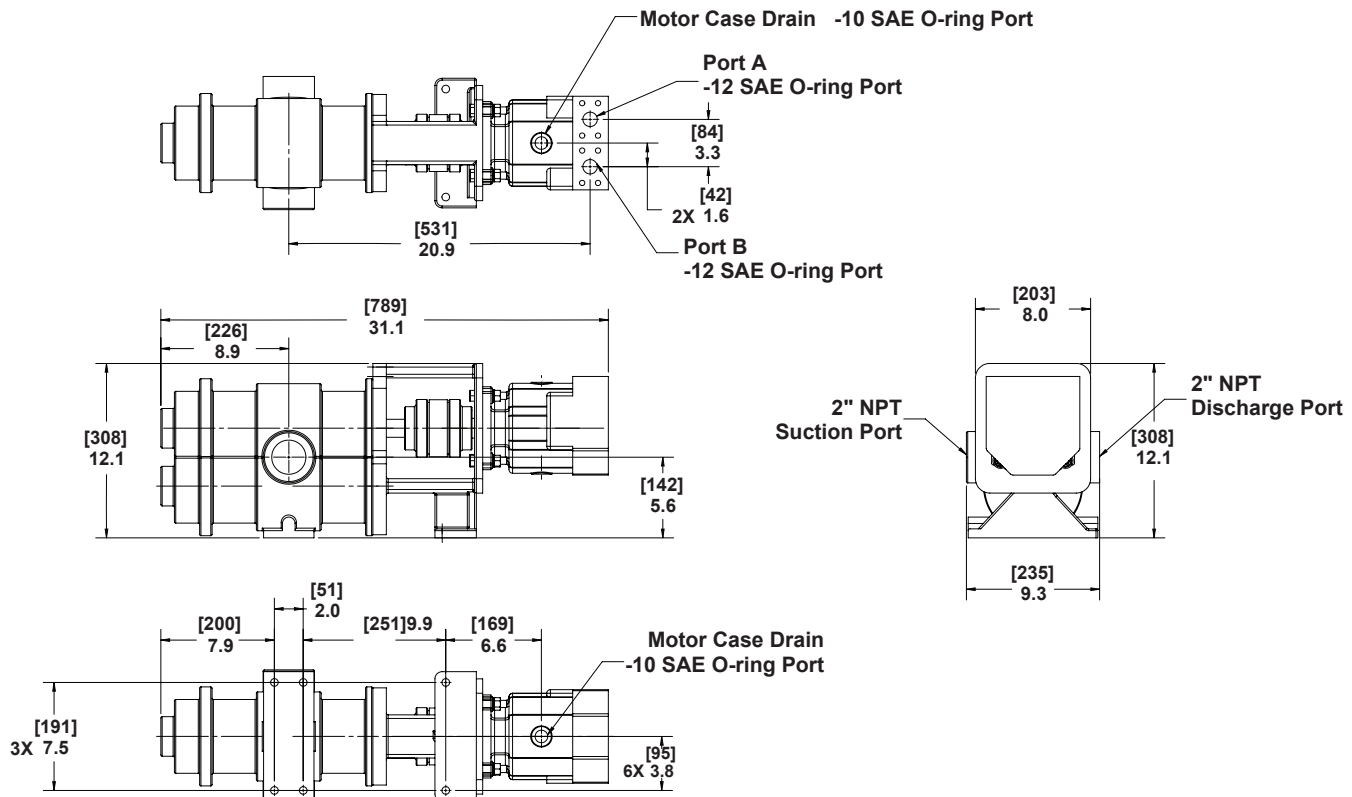
ITEM	Part No.	Description	Qty.
1	8000-0076	Foam Pump - 3040	1
	8000-0077	Foam Pump - 3060	1
	8000-0078	Foam Pump - 3090	1
	8000-0079	Foam Pump - 3150	1
	8000-0080	Foam Pump - 3300	1
2	2740-0014	Coupling Half - 3040 Pump	1
	2740-0008	Coupling Half - 3060 Pump	1
	2740-0012	Coupling Half - 3090, 3150 & 3300 Pump	1
3	2729-0007	Coupling Insert - All	1
4	2740-0013	Coupling Half - 3040 Hyd Motor	1
	2740-0009	Coupling Half - 3060 & 3090 Hyd Motor	1
	2740-0012	Coupling Half - 3150 & 3300 Hyd Motor	1
5	2500-0026	Hyd Motor - 3040	1
	2500-0022	Hyd Motor - 3060 & 3090	1
	2500-0031	Hyd Motor - 3150 & 3300	1

Installation and Operation Manual

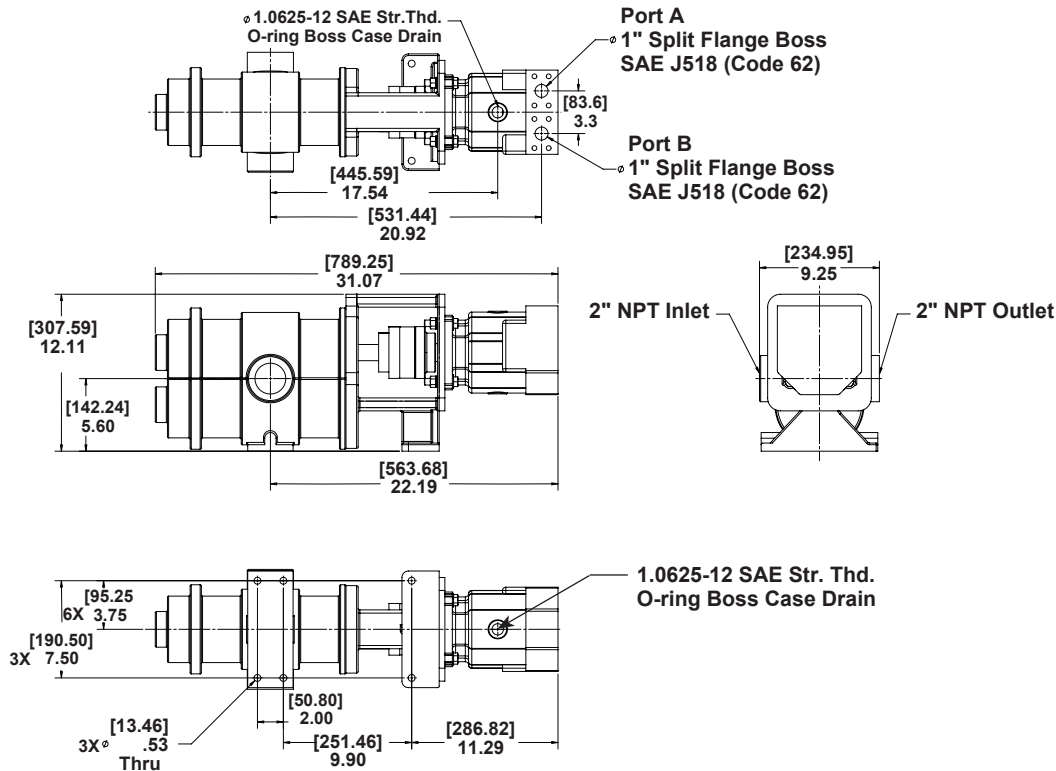
3040 – Edwards Pump/Motor Assembly (3450-0072)



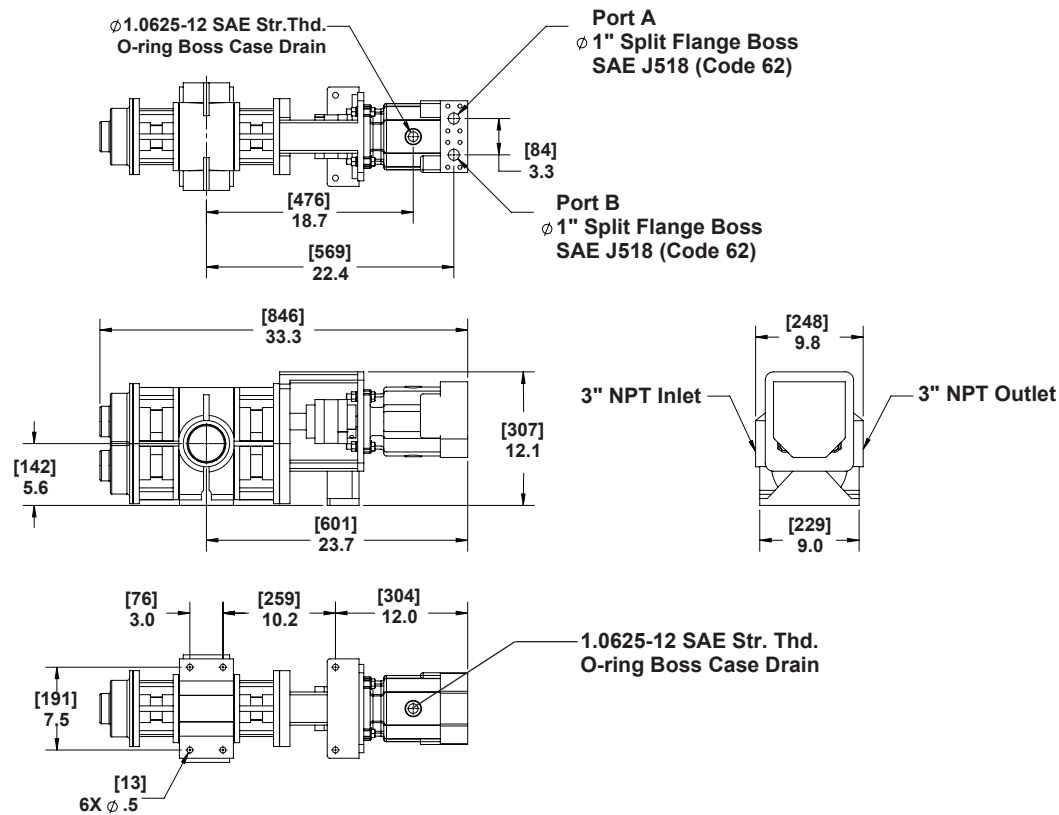
3060 – Edwards Pump/Motor Assembly (3450-0073)



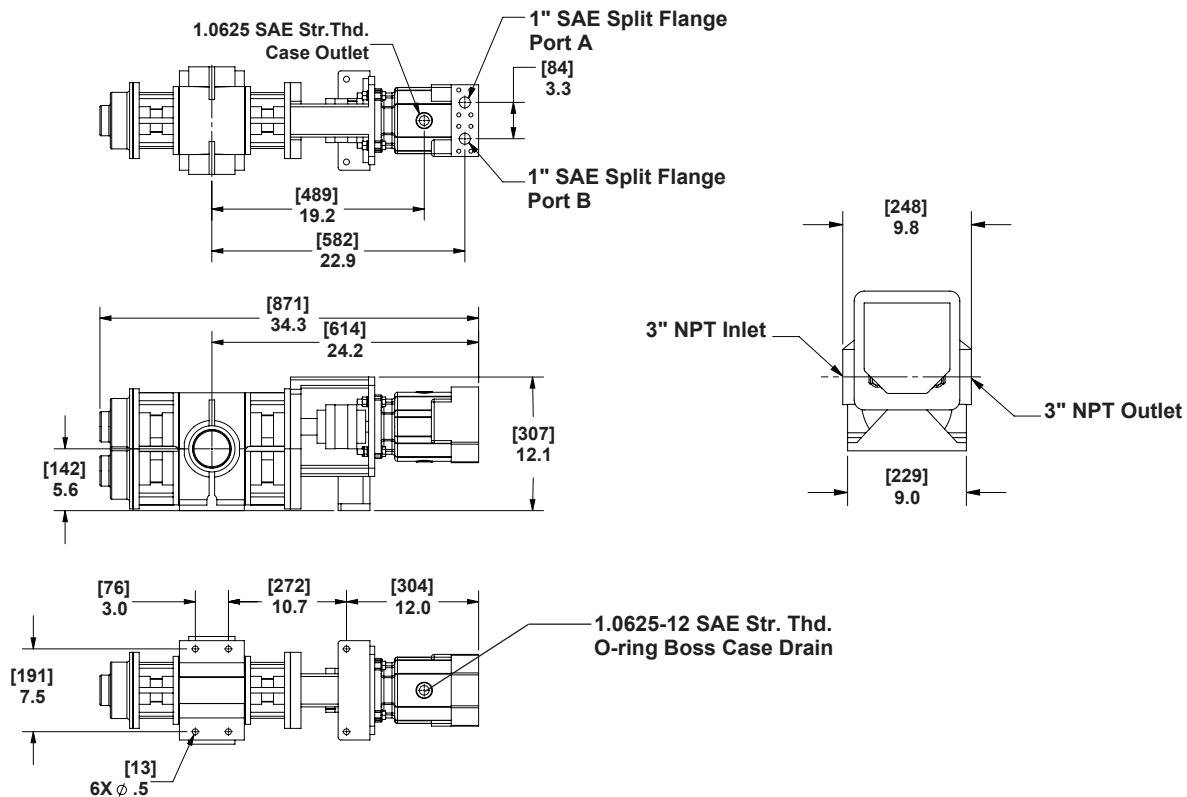
3090 – Edwards Pump/Motor Assembly (3450-0074)



3150 – Edwards Pump/Motor Assembly (3450-0075)



3300 – Edwards Pump/Motor Assembly (3450-0076)



Specifications for Trident Pump Systems

System Capacity	Maximum Water Flow GPM (LPM)				
Foam Concentrate Rate	3040	3060	3090	3150	3300
1%	4,000 (15,142)	6,000 (22,712)	9,000 (34,069)	15,000 (56,781)	30,000 (113,563)
3%	1,333 (5,046)	2,000 (7,571)	3,000 (11,356)	5,000 (18,927)	10,000 (37,854)
6%	667 (2,525)	1,000 (3,785)	1,500 (5,678)	2,500 (9,464)	5,000 (18,927)
System Specifications					
Max. Foam Output GPM (LPM)	40 (151.4)	60 (227.1)	90 (340.7)	150 (567.8)	300 (1,135.6)
Max. Operating Pressure PSI (BAR)	300 (20.7)	300 (20.7)	300 (20.7)	300 (20.7)	300 (20.7)
Max. Operating Temp. F (C)	160 (71)	160 (71)	160 (71)	160 (71)	160 (71)
Max. Hydraulic Oil Pressure PSI (BAR)	2,689 (185)	2,711 (187)	3,505 (241.7)	5,374 (370.6)	5,662 (390.4)
Max. Hydraulic Oil Flow GPM (LPM)	12.4 (46.9)	15.8 (59.8)	27.2 (103)	25.5 (96.6)	41 (156)
PTO Pump RPM for Min. Performance RPM	1,136	1,210	1,367	1,283	1,194
PTO HP (kW) at Max. Performance	25 (18.6)	32.1 (23.9)	63 (47)	90 (68)	153 (114)
PTO Torque at Max. Performance Lbf-ft (Nm)	115 (156)	138 (187)	242 (328)	369 (501)	670 (909)
Hyd. Pump Mounting Flange	SAE 'B' Flange	SAE 'C' Flange	SAE 'C' Flange	SAE 'C' Flange	SAE 'D' Flange
Hyd. Pump Input Shaft	15 Tooth 16/32 Pitch	14 Tooth 12/24 Pitch	14 Tooth 12/24 Pitch	14 Tooth 12/24 Pitch	13 Tooth 8/16 Pitch
Max. PTO Speed RPM	4,000	3,600	3,600	3,600	3,100
Minimum Hydraulic Reservoir Size Gal. (Liter)	8 (30.3)	8 (30.3)	8 (30.3)	8 (30.3)	15 (56.8)
Minimum Hydraulic Cooler Heat Load BTU/Min. @ Minimum Return Line Flow GPM (LPM)	N/A	N/A	792 6.2 (24)	1137 5.8 (22)	1916 8.2 (31)
Maximum Hydraulic Oil Temp. F (C)	220 (104)	220 (104)	220 (104)	220 (104)	220 (104)
Maximum Amp Draw	5	5	5	5	5

Trident Hydraulic Fittings and Hose Specifications

Connection	Model	Minimum Hose ID	Pump Port Fitting & Pressure Rating	Motor Port Fitting & Type
Hydraulic Reservoir to Hydraulic Charge Pump Inlet	3090	1" Suction	#16 SAE O-Ring	N/A
	3150	1" Suction	#16 SAE O-Ring	N/A
	3300	1-1/4" Suction	#20 SAE O-Ring	N/A
Hydraulic Pump Port B to Motor Port B	3090	1" - 4500 PSI	1" SAE Split Flange	3/4" SAE Split Flange
	3150	1" - 4500 PSI	1" SAE Split Flange	3/4" SAE Split Flange
	3300	1" - 6000 PSI	1-1/4" SAE Split Flange	1" SAE Split Flange
Hydraulic Pump Port A to Motor Port A	3090	1" - 4500 PSI	1" SAE Split Flange	3/4" SAE Split Flange
	3150	1" - 4500 PSI	1" SAE Split Flange	3/4" SAE Split Flange
	3300	1" - 6000 PSI	1-1/4" SAE Split Flange	1" SAE Split Flange
Hydraulic Motor Case Drain to Hydraulic Pump Case Drain	3090	3/4" - 1500 PSI	#12 SAE O-Ring	#10 SAE O-Ring
	3150	3/4" - 1500 PSI	#12 SAE O-Ring	#10 SAE O-Ring
	3300	3/4" - 1500 PSI	#16 SAE O-Ring	#10 SAE O-Ring
Hydraulic Pump Case Drain to Hydraulic Cooler	3090	3/4" - 1500 PSI	#12 SAE O-Ring	N/A
	3150	3/4" - 1500 PSI	#12 SAE O-Ring	N/A
	3300	3/4" - 1500 PSI	#16 SAE O-Ring	N/A

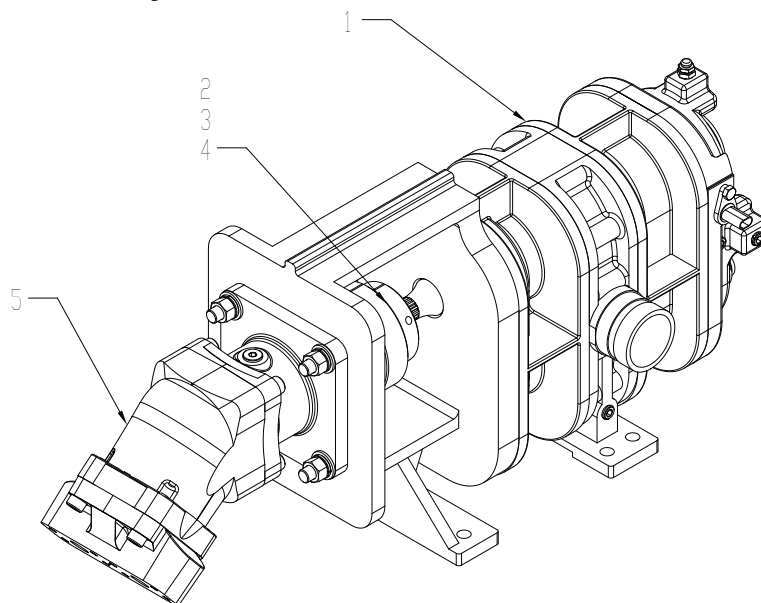
Notes:

SAE O-Ring Ports are per SAE J514

SAE Split Flange Ports are to SAE J518 code 62

Hydraulic pump inlet hose to conform to SAE 100R4

Trident Pump/Motor Assembly Parts



ITEM	Part No.	Description	Qty.
1	8000-1019	Foam Pump - 3040	1
	8000-1019	Foam Pump - 3060	1
	8000-1020	Foam Pump - 3090	1
	8000-1021	Foam Pump - 3150	1
	8000-1022	Foam Pump - 3300	1
2	2740-1008	Coupling Half - 3040 & 3060 Pump	1
	2740-1009	Coupling Half - 3090 Pump	1
	2740-1003	Coupling Half - 3150 Pump	1
	2740-1005	Coupling Insert - 3300	1
3	2929-1002	Coupling Insert - 3040, 3060	1
	2729-1003	Coupling Insert - 3090, 3150	1
	2729-1004	Coupling Insert - 3300	1
4	2740-1001	Coupling Half - 3040 & 3060 Hyd Motor	1
	2740-1003	Coupling Half - 3090 & 3150 Hyd Motor	1
	2740-1005	Coupling Insert - 3300 Hyd Motor	1
5	2500-0026	Hyd Motor - 3040	1
	2500-0026	Hyd Motor - 3060	1
	2500-0026	Hyd Motor - 3090 & 3150	1
	2500-1005	Hyd Motor - 3300	1

Technical drawings of the 1000 Series Hydraulic Pump, showing front, side, and rear views with dimensions and port labels.

Front View (Top Left): Shows the pump housing with a discharge port (4" GROOVED VICTALIC) and a suction port (4" GROOVED VICTALIC). Dimensions include a width of 14.00 and a height of 10.00.

Side View (Top Middle): Shows the pump housing with a case drain (SAE -10 ORB) and a case drain (SAE -10 ORB). Dimensions include a width of 14.00 and a height of 10.00.

Rear View (Top Right): Shows the pump housing with a case drain (SAE -10 ORB) and a case drain (SAE -10 ORB). Dimensions include a width of 14.00 and a height of 10.00.

Front View (Bottom Left): Shows the pump housing with a discharge port (4" GROOVED VICTALIC) and a suction port (4" GROOVED VICTALIC). Dimensions include a width of 14.00 and a height of 10.00.

Side View (Bottom Middle): Shows the pump housing with a case drain (SAE -10 ORB) and a case drain (SAE -10 ORB). Dimensions include a width of 14.00 and a height of 10.00.

Rear View (Bottom Right): Shows the pump housing with a case drain (SAE -10 ORB) and a case drain (SAE -10 ORB). Dimensions include a width of 14.00 and a height of 10.00.

16 Limited Warranty

Fire Research Corp. (FRC), as supplier of FoamPro, warrants to the original purchaser, each new pump, system or other product of its own manufacture, for a period of two years from the date of shipment from the factory, to be free from defects in material and workmanship under normal use and service. "Normal use and service" means not in excess of recommended maximum speeds, pressures, and temperatures, or handling fluids not compatible with components materials, as noted in applicable FoamPro product catalogs, technical literature, and instructions. This warranty shall not apply to any pump, system or other product which shall have been repaired or altered to adversely affect the performance or reliability of the pump, system or other product.

Neither this warranty nor any implied warranty apply to damage or harm caused by any or all of the following: (1) Freight damage; (2) Freezing damage; (3) Damage caused by parts and/or accessories or components not obtained from or approved by FRC; (4) ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES, OTHER THAN INJURY TO THE PERSON, ARISING FROM THE USE OF ANY PUMP OR OTHER PRODUCT MANUFACTURED BY FRC EXCEPT in states that do not allow the exclusion or limitation of incidental or consequential damages; (5) Damage due to misapplication and/or misuse; (6) Normal wear of moving parts or components affected by moving parts.

The liability of FRC under the foregoing warranty is limited to the repair or replacement at FRC's option without charge for labor or materials of any parts upon return of the entire pump, system or other product or of the particular part to the FRC factory within the warranty period, at the sole expense of the purchaser, which part shall upon examination appear to FRC's satisfaction to have been defective in material and workmanship. The liability of FRC under any theory of recovery (except any express warranty where the remedy is set forth in the above paragraph) for loss, harm or damage, shall be limited to the lesser of the actual loss, harm or damage or the purchase price of the involved pump, system or other product when sold by FRC to its customer.

FRC expressly warrants its pumps and other products as above stated. THERE ARE NO OTHER EXPRESS WARRANTIES. ANY IMPLIED WARRANTIES, INCLUDING IMPLIED WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO TWO YEARS FROM THE DATE OF PURCHASE BY THE ORIGINAL PURCHASER EXCEPT in states that do not allow time limitations on implied warranties. THERE IS NO IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY WHEN THIS PRODUCT IS PUT TO RENTAL USE.

No person including any dealer or representative of FoamPro is authorized to make any representation or warranty concerning FRC's FoamPro products on behalf of FRC, or to assume for FRC the obligations contained in this warranty. FRC reserves the right to make changes in design and other changes and improvements upon its products without imposing any obligations upon itself to install the same, upon its existing products then in process or manufacture.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

IMPORTANT NOTICE

It is imperative to package all FoamPro components properly, before shipment (with Return Goods Authorization attached) back to FRC. The FoamPro contains electronic components that may receive damage from improper shipping procedures! All FoamPro components shipped back to FRC will pass through Quality Control Inspection, and will be photographed after the box is opened. Any shipping damage, such as superficial scratches, nicks, etc., to the unit makes it unusable (even after the internal warranty problem is repaired) and thus must be refinished to "like-new" condition during the warranty process. You are responsible for any physical damage occurring to FoamPro components at your facility and during shipment back to FRC.

Package the FoamPro, complete with all the recommended parts the Customer Service representative requires (i.e., Digital Display control with all premolded wire cables etc.) in its original carton with the Styrofoam and other packaging materials, as it was received at your facility. FRC appreciates your attention in this matter, as we feel it will help us to serve you in a better fashion, while keeping the cost of the FoamPro product competitive. Thank you.

FOAMPRO®

A Safe Fleet Brand

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FRC

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