FOAMPRO®

A Safe Fleet Brand

Form 836
6/19

System 3012
Model 3012

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.

FoamPro • 26 Southern Blvd. • Nesconset, NY 11767 USA • 800-533-9511 • FAX 816-892-3178

TABLE OF CONTENTS

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. 836.

1 Safety

Before attempting to install a FoamPro System 3012, 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 of 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 can 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. [400 PSI (28 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 3000 psi (207 BAR) minimum working pressure or better 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 can 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. Power required for the valve driver box on the hydraulic motor-driven foam pump 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 contaminant's are the primary causes of premature wear and failure in any hydraulic system. Use extreme care during assembly and service to keep contaminant's out of the system.

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 could 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.

CAUTION: To prevent damage to the hydraulic motor seal, the motor case drain must have its own 1/4 inch (6.3 mm) inside diameter hose installed to return hydraulic oil to the reservoir.

WARNING: The load sense pump compensator is preset at the factory for proper operation. DO NOT adjust the load sense compensator.

CAUTION: The cables shipped with each FoamPro 3012 are tested at the factory with that unit. Improper handling and forcing connections can damage these cables which could 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: The input power wire is not protected by the system circuit breaker. Be careful not to damage or short circuit this wire.

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

CAUTION: Do not run the FoamPro 3012 for more than one minute deadheaded against the pressure gauge, as the foam pump could be damaged.

CAUTION: When operating the FoamPro 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.

CAUTION: Do not mount electronics where they will be exposed to direct water spray.

2 A Quick Look at How the System Works

The FoamPro 3012 system is an electronic and hydraulic foam concentrate proportioning system designed to provide the wide range of foam concentrate injection rates necessary for both Class A and Class B foam operations.

The FoamPro system will accurately deliver from 0.1% to 10.0%, or from 0.1 to 12.0 gpm of foam concentrate to the foam injection point. The maximum rated concentrate flow rates obtainable are shown in the system specifications in Section 15.

The FoamPro 3012 system is a flow-based proportioning system that measures water flow and then injects the correct proportional amount of foam concentrate to maintain the desired percentage. The basic FoamPro system is shown in Figure 2-1. The flowmeter measures the water flow and sends a signal to the Digital Display Control Module. A speed-sensing device monitors the foam pump output. Constant comparison of these two information signals by the controller ensures maintenance of 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 Digital Display Control Module.

CAUTION: If the power to the FoamPro unit fails or is shut off during operation, the system will remain in operation at the last setting. DO NOT close the discharge to the system until the hydraulics are disengaged. To turn the system off, it is required to disengage the hydraulic drive PTO.

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 systems is provided by the apparatus electrical system.

Order optional system components listed in Section 3 to accommodate system design and requirements. The components listed have been tested with the FoamPro systems and provide for optimum system performance.

FoamPro Model 3012 systems will pump Class A and Class B (Aqueous Film Forming Foam, AFFF, and Alcohol-Resistant Aqueous Film Forming Foam, AR-AFFF) to capacity. Many brands of AR-AFFF exhibit higher viscosity characteristics due to chemical composition and polymers. As viscosity increases, diminished flow may affect pump performance. Because of numerous variables; including pump design, foam cell configuration, inlet piping/components and system layout; please contact FoamPro at 800-533-9511 for application-specific recommendations when foam viscosities of 2000 cps (Brookfield #3 spindle @ 30 rpm) or higher are used.

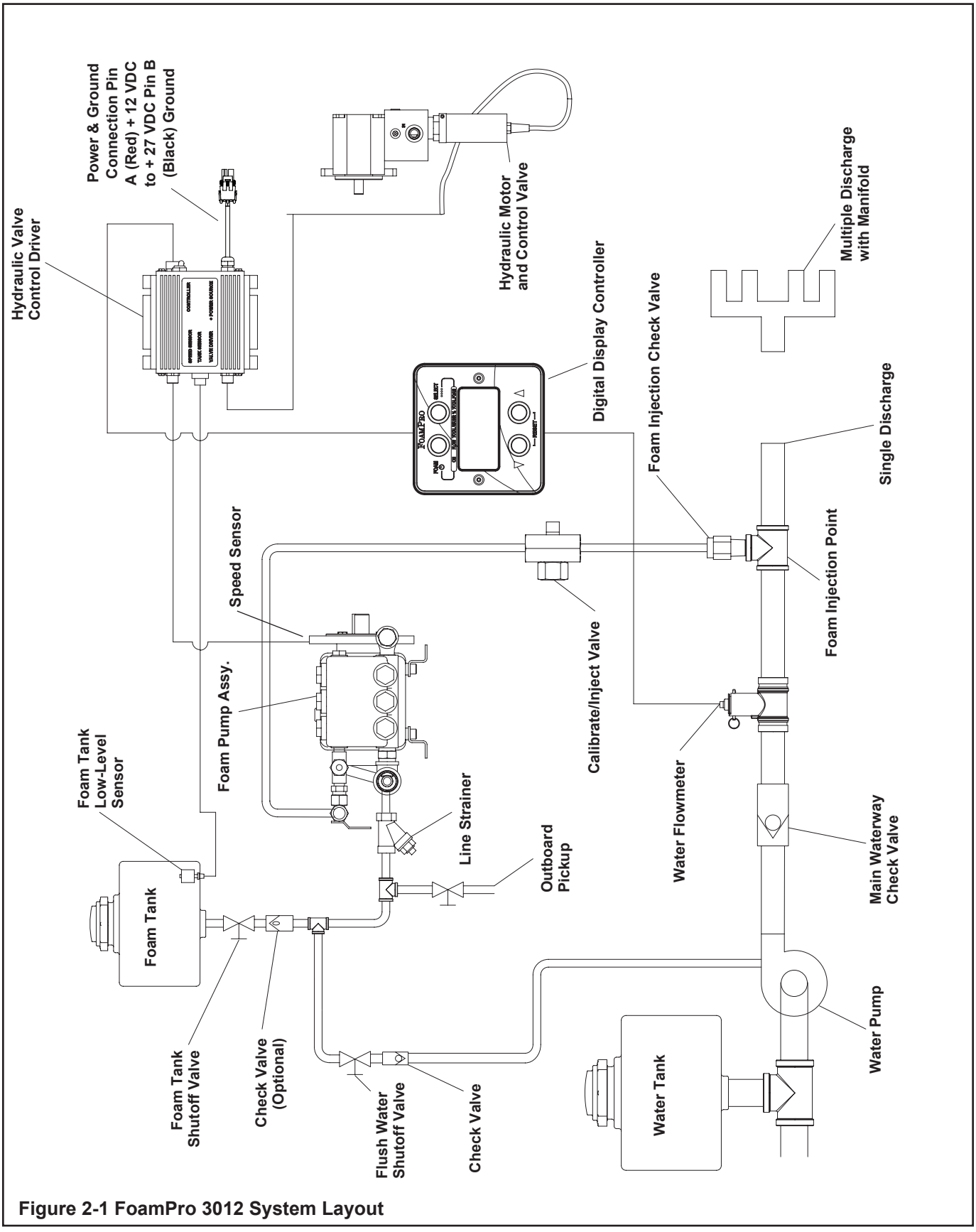
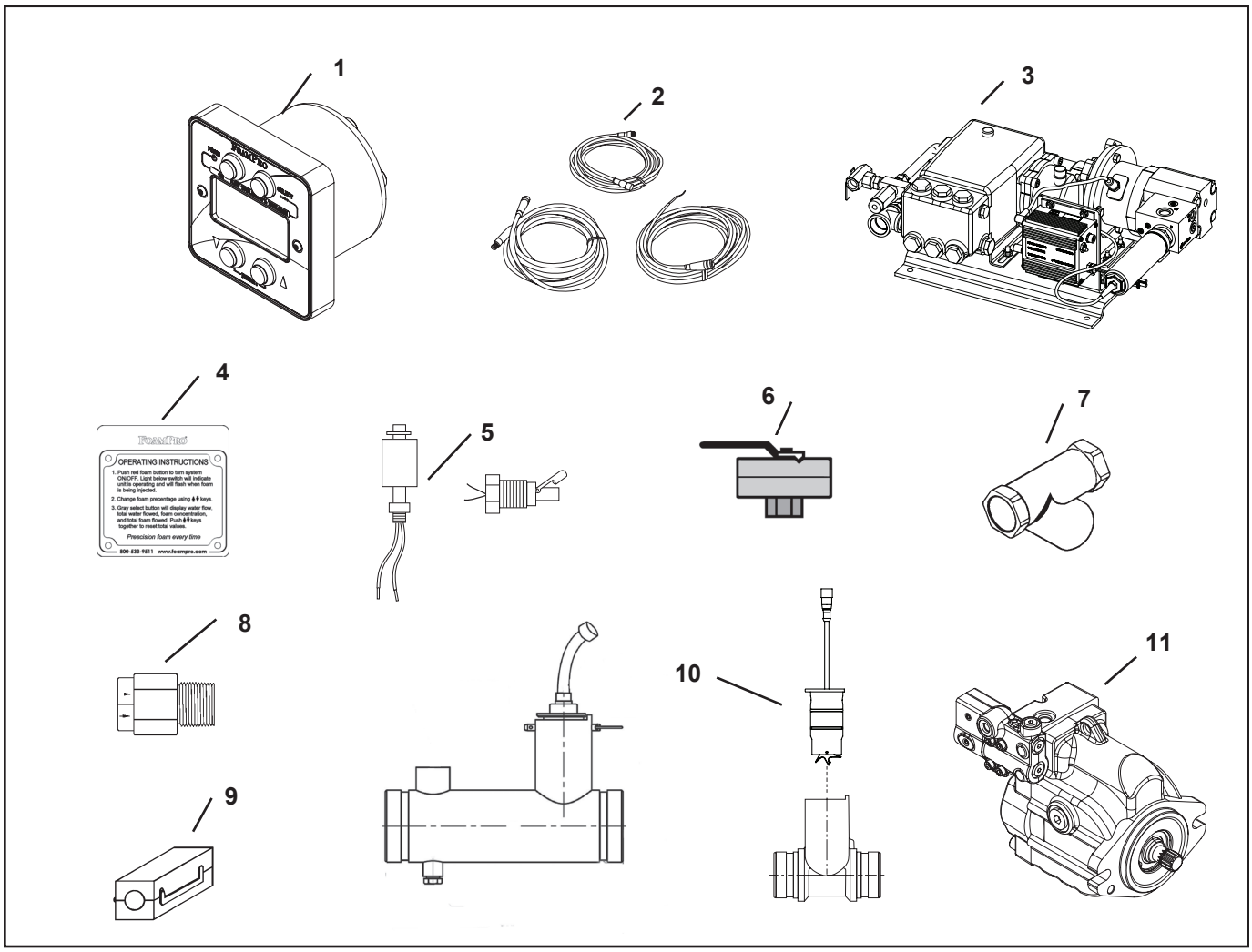


Figure 2-1 FoamPro 3012 System Layout

3 System Component Description

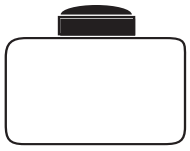
The following components are packaged with the standard FoamPro 3012 system:

1. Digital Display Control Module
2. Molded Cables
3. Foam Pump and Hydraulic Control Valve Assembly
4. Instruction Placard
5. Low-Level Sensor (One required. Not packaged with the unit. Order separately.)
6. Calibrate/Inject Valve
7. Inlet Line Strainer
8. Check Valve 1/2"' NPT Foam Injection. This NFPA 1906 (draft) required check valve prevents water back flowing into foam system.
9. RFI/EMI Suppression Beads
10. FoamPro Paddlewheel Flowmeter or Manifold (The flowmeter is a required component. The size is specified and ordered under a separate part number when the FoamPro is ordered. The flowmeters are available with 1-1/2", 2", 2-1/2", 3", and 4" NPT threads; or manifolds with Victaulic-grooved ends in 1-1/2", 2", 2-1/2", 3" and 4" pipe sizes. All flowmeters have grooved victaulic ends. Insert-style flowmeters are available for larger pipe diameters. Part numbers for the various flowmeters can be found in Section 15. Up to 4 flowmeter sensors can be used with the FoamPro System when a MultiFlo interface is used.)
11. Hydraulic Load-Sensing Pump

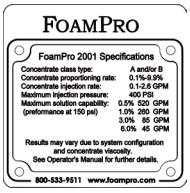


SYSTEM ACCESSORIES AVAILABLE

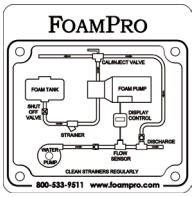
For more information on these accessories, please see publications 856 and PL-21.



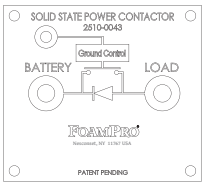
Polypropylene Foam Tank(s)
8, 12 or 20 gallon capacity



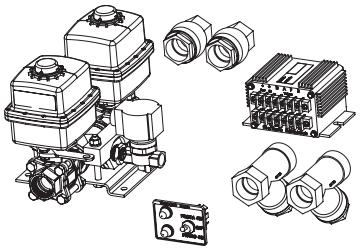
System Specification Placards



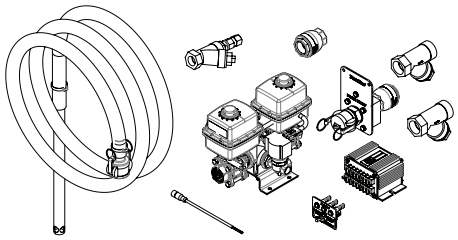
System Placard



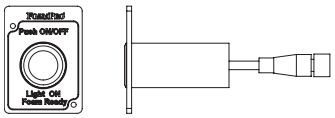
Solid State Contactor
P/N 2510-0043



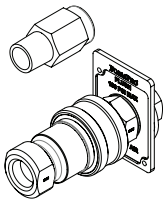
Electronic Concentrate Management System
Electronic control for Dual Tank Systems with interface to controller



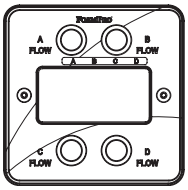
Electronic Concentrate Management System
Electronic control of single or dual tank onboard systems and an off-board pickup.
2002 Series and larger only



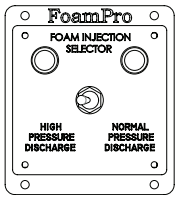
Remote Start/Stop



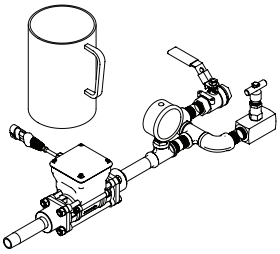
Single Tank Flush Kits
Both Internal and External flushing kits



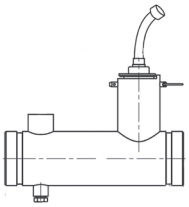
FoamPro MultiFlo Interface
Combines 2 to 4 flowmeters for single point systems



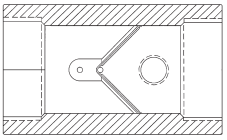
Dual Injection Management System
Provides capability for switching between two injection points



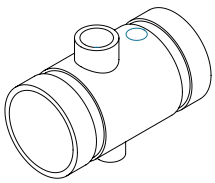
NFPA Calibration and Test Kit
For use with 1600 thru 3012 systems



Foam Manifold
All stainless steel with main waterway check valve, water flowmeter, injection port, and drain port. Victaulic grooved ends



Main Waterway Check Valve with Drain Port
Available in stainless steel.
NPT threaded ends with injection and drain ports



Main Waterway Check Valve
All stainless steel with Victaulic ends and injection and drain ports

4 Installer Supplied Parts

FoamPro 3012 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 paragraphs list 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 3012 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 has designed the 3012 system to use a load-sensing, pressure-compensated hydraulic pump. The FoamPro load-sensing hydraulic pump provides proper hydraulic fluid flow with reduced heat load, torque and horsepower requirements.

The FoamPro load-sensing hydraulic supply pump will provide the correct fluid flow over the widest range of engine speeds. See system specifications for the maximum 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 load-sensing hydraulic supply pump has a standard 2-bolt SAE “B” mounting flange and a 13 tooth, 16/32-pitch splined shaft. Other shaft configurations are available. The shaft rotation of the pump is clockwise when looking at the pump shaft, or counterclockwise when facing the rear of the pump. 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 may be left in gear all the time to circulate oil as soon as the engine is started, since the load-sensing hydraulic pump will draw less than 2 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 3012 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.

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 (2,500 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 3012 system hydraulic pump, the minimum speed is 1,350 RPM, and the maximum speed is 2,500 RPM. It is recommended to choose a PTO with a range of 1 - 1.35 conversion rate (or higher).

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

Engine Speed	Hydraulic Speed
800 RPM	1080 RPM
900 RPM	1215 RPM
1000 RPM	1350 RPM
1100 RPM	1385 RPM
1200 RPM	1620 RPM
1300 RPM	1755 RPM
1400 RPM	1890 RPM
1500 RPM	2025 RPM
1600 RPM	2160 RPM
1700 RPM	2295 RPM
1800 RPM	2430 RPM

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 on the oil outlet to the hydraulic pump of 150 mesh (125um) 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.

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.

The return line from the cooler to the reservoir should have a replaceable type oil filter with at least a 10 microm absolute rating and sized to at least a 15 gpm flow rate. Note the larger the flow rate capacity of the filter, the longer the maintenance interval can be (minimum replacement is annually).

Oil Cooler

An oil cooler capable of maintaining the temperature of the hydraulic oil at 140° to 180°F (60° to 82°C) is required. Use of an air-to-oil radiator-type heat exchanger mounted in front of the apparatus radiator should provide adequate cooling for the hydraulic system oil. An electric 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 3012 system 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 (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 at 3000 PSI (207 BAR) minimum working pressure. To reduce the potential for leaks at the hydraulic fittings, use SAE 37° flare JIC type fittings or SAE straight thread O-ring 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 1-1/2" (38 mm) minimum inside diameter or larger clear suction hose depending on the viscosity of the foam concentrate. Many Class B foams are more viscous and may require 1-1/2" (38 mm) minimum or larger inside diameter hoses.

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. 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 injection point must be supplied by the installer. Hoses and fittings are to be 1/2" (12.7 mm) minimum inside diameter, 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.

WARNING: Do not use air brake tubing for foam systems as the tubing is not compatible with most foam concentrates.

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 by NFPA 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 system.

It is recommended that check valves be installed 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. As a minimum, one check valve should be installed where the water piping that will supply foam solution connects to the apparatus water pump discharge.

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 FoamPro 3012 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 5 AMP fuse for 12 VDC or 24 VDC systems.

All system components should all be powered from the same terminal and ground connections should all be common. Use a standard 14 AWG automotive hookup wire.

NOTE: See "POWER SUPPLY" on pages 24-25 in the Electrical Installation Section for important installation information.

CAUTION: Always disconnect the ground straps, electrical wires and control cables from the Digital Display Control Module, the control valve driver box, 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 unit 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 3012. 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) and hydraulic pump. Try to place components in locations that require the least amount of hoses and fittings.

Locate the FoamPro 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 should 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 and 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 Digital Display Control Module. Consideration must be given for routing the control cable from the Digital Display Control Module to the hydraulic control valve and the main 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. A 1-1/2" strainer is supplied with the unit. If smaller line sizes are used, use reducer bushings to reduce the fitting size down. Do not use a smaller strainer, especially when using class B and AR-AFFF foams.

Like any hydraulic system, the FoamPro 3012 will require cooling. 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.

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

6 Foam Pump and Hydraulic Control Valve Installation

Hydraulic-Driven Foam Pump Assembly

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. Figure 6-1 provides the mounting dimensions for the FoamPro 3012 foam pump and motor assemblies.

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

Position the hydraulic control valve and foam pump assembly so the circuit breaker/on-off switch is easily accessible. 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 should 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.

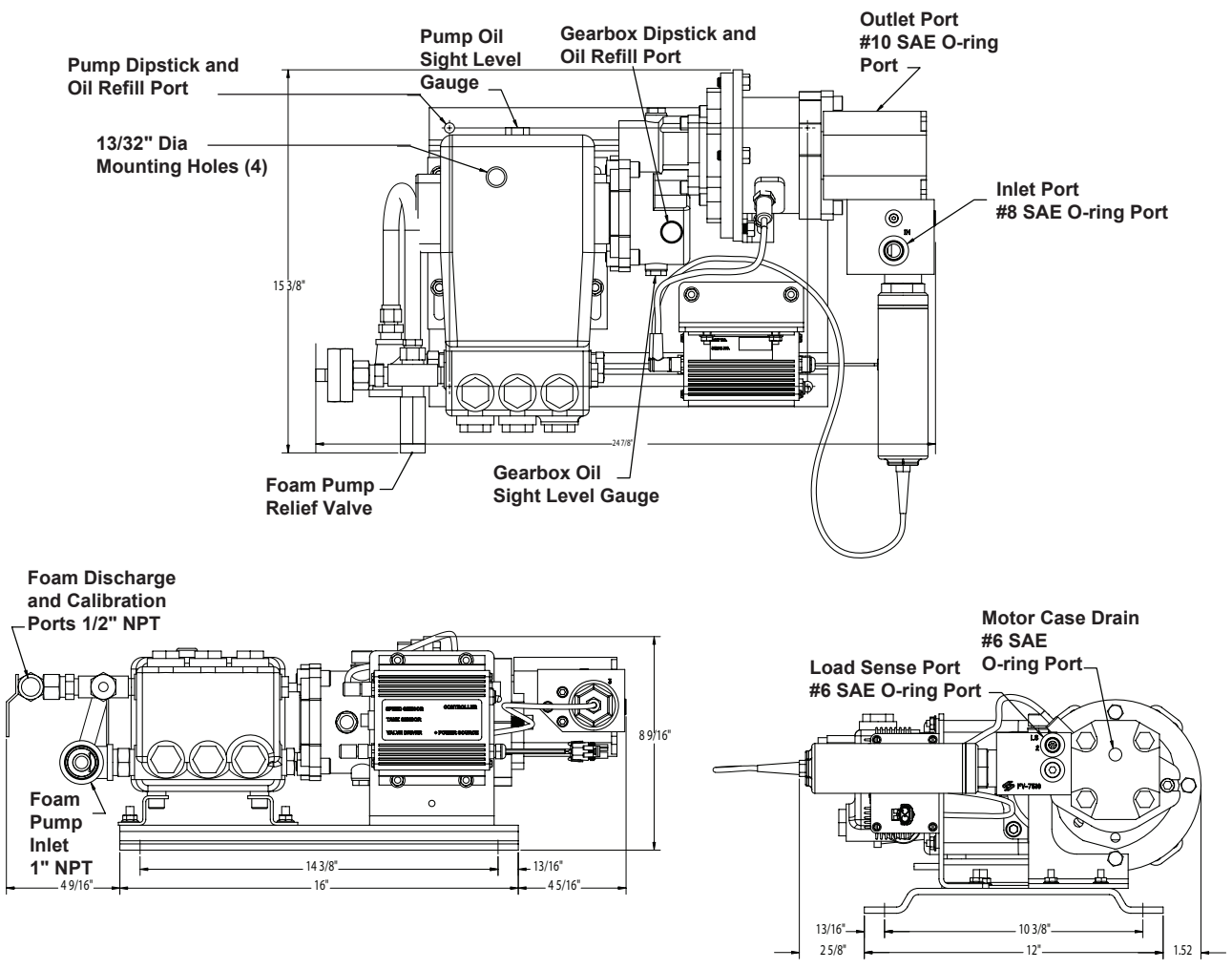


Figure 6-1 Pump/Motor Assembly Dimensions

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 3000 PSI (207 BAR) working pressure 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 3012 and hydraulic supply pump are SAE ORB (O-Ring Boss) fittings with SAE JIC 37° flare swivel connections.

CAUTION: To ensure the integrity of fitting connections in the hydraulic system, use only SAE JIC 37° flare, SAE O-Ring Boss, or equal 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 load-sense pump performance.

Hydraulic Power Source

The hydraulic power for the FoamPro 3012 system is supplied by a hydraulic load-sensing 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 3012 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.

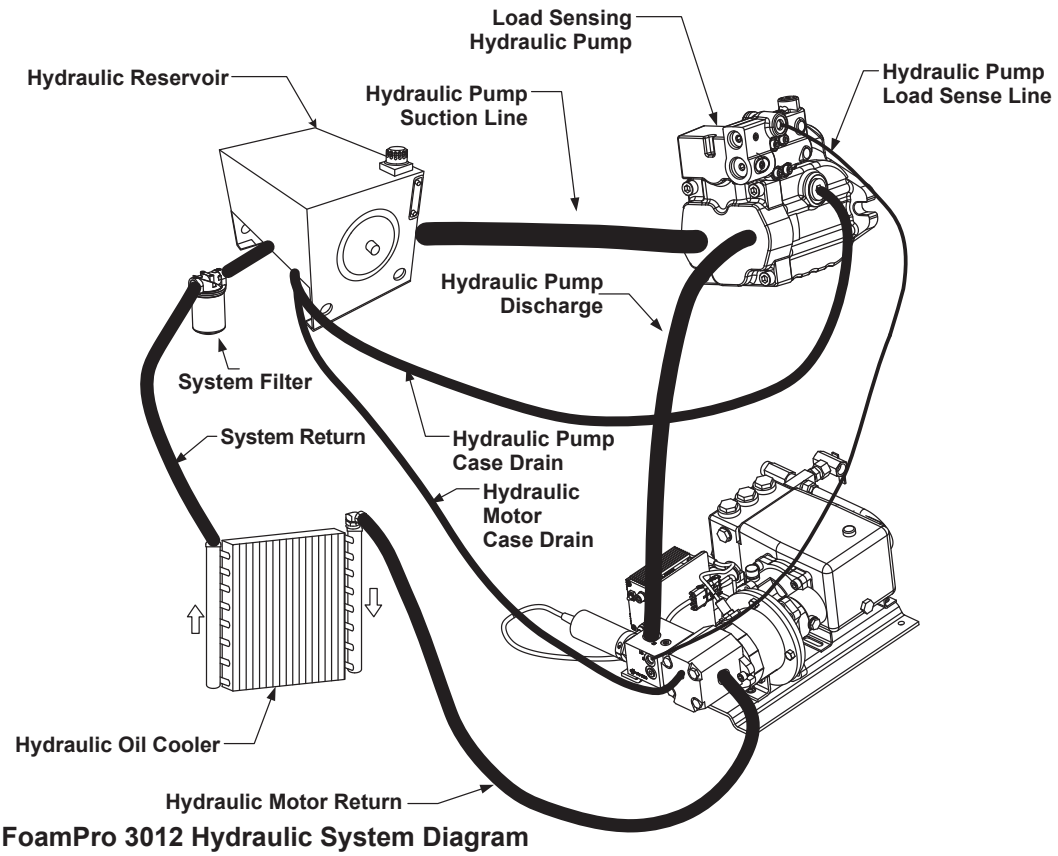


Figure 7-1 FoamPro 3012 Hydraulic System Diagram

Hydraulic Reservoir

The hydraulic reservoir for the 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 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.

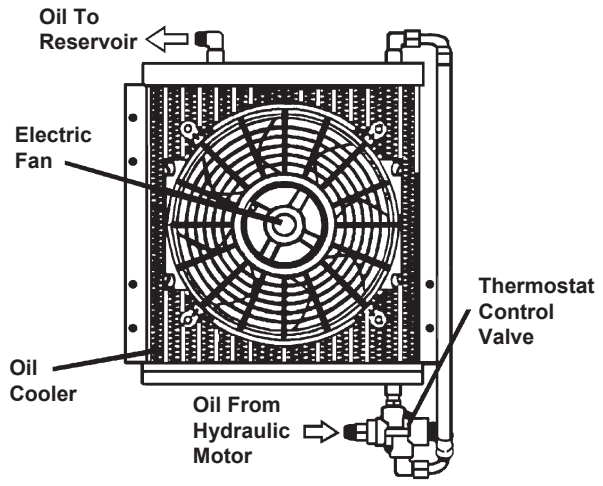


Figure 7-2 Oil Cooler Hose Connections

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 Figure 7-3 shows the connection ports to use for the hydraulic supply pump. **Always use the uppermost case drain port available.**

Load-Sense Pump Adjustment

The supplied load-sensing hydraulic pump does not require any adjustment. The load-sensing compensator is adjusted to give you maximum performance throughout the entire operating range. The adjustment is set with the hydraulic pump engaged and the FoamPro 3012 turned off. The hydraulic pressure will be 700 PSI (48 BAR) and output flow rate will be 2 to 4 GPM (7.5 to 15.2 lpm). When the FoamPro 3012 system is engaged, the load-sensing pump will supply the required hydraulic flow and pressure to operate the system.

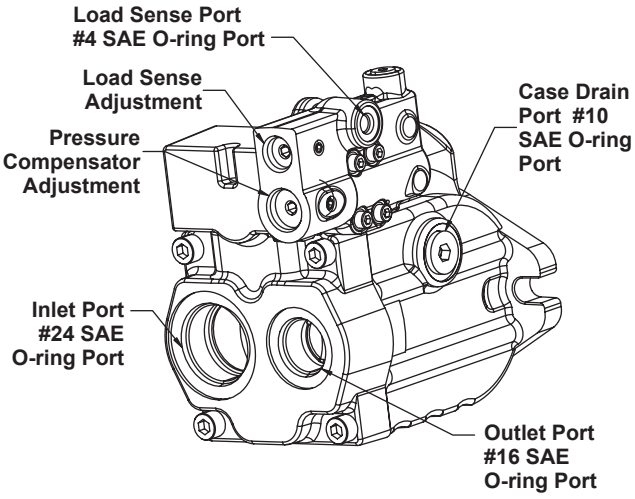


Figure 7-3
Hydraulic Supply Pump Connection Ports

Hydraulic Motor Control Valve

The hydraulic motor control valve is adjusted at the factory for optimum performance. The valve is not to be removed or adjusted.

8 Water and Foam Plumbing Component Installation

Figure 8-1 provides recommended guidelines for the installation of the system components that handle water, foam concentrate and foam solution. Note that additional options such as dual-tank system, multiple flowmeters, etc., are covered by the individual manuals included with those systems and consideration must be given to potential interferences.

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

Foam Pump Discharge Relief Valve

The discharge relief valve on the outlet port of the hydraulically-driven foam pump is preset at the factory to ensure optimum performance of the FoamPro 3012 system.

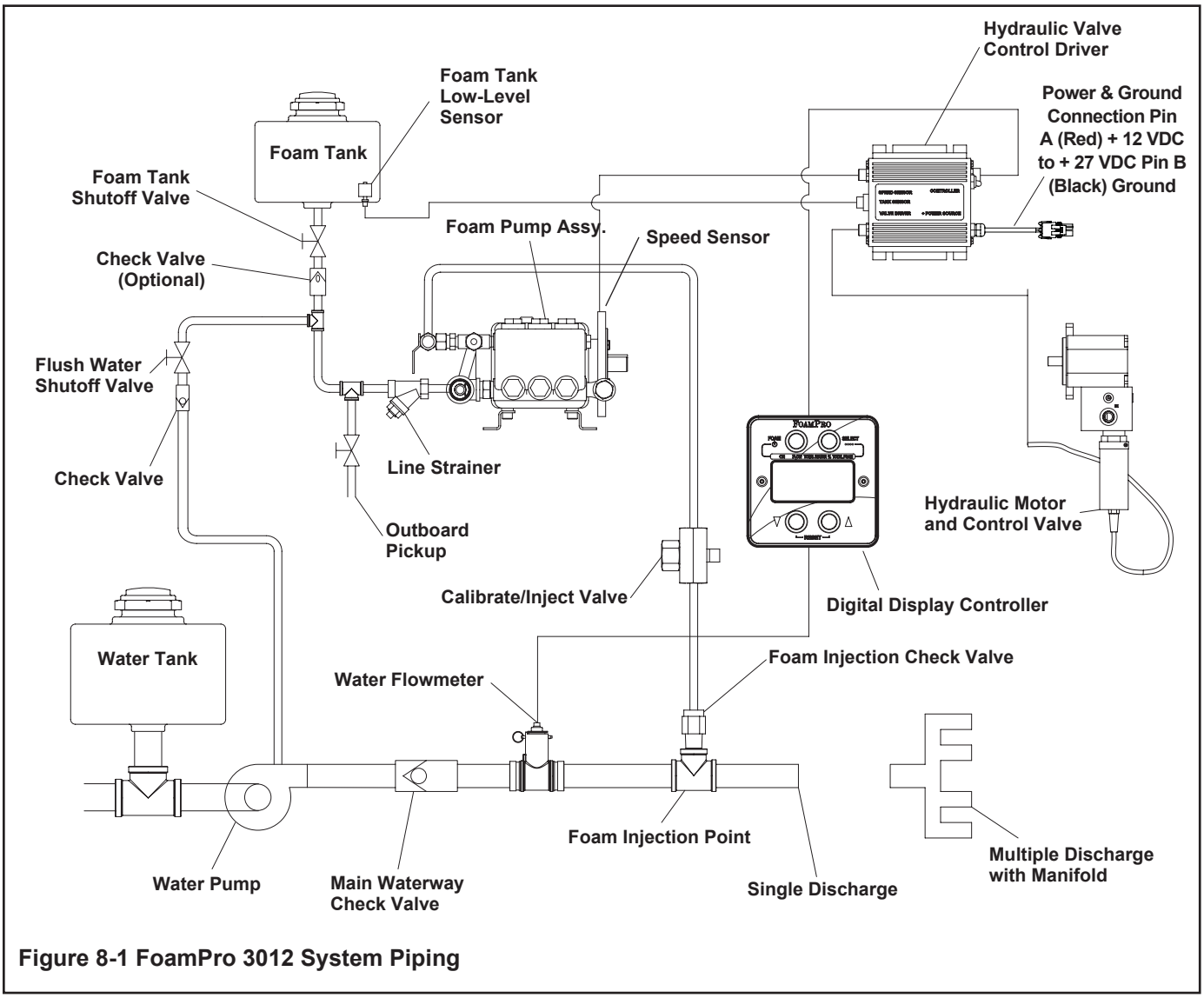


Figure 8-1 FoamPro 3012 System Piping

Calibrate/Inject Valve

The calibrate/inject valve is supplied in the fitting kit and is to be positioned as shown in Figure 8-1 in the system. This valve must be accessible by the pump operator during normal operations. 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 1/2" (12.7 mm) inside diameter 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 1/2" NPT and made of brass or 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. If the system is to be tested to NFPA standards, the calibrate side hoses must be rated to 400 PSI (28 BAR). 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.

Line Strainer

The line strainer provided with the FoamPro 3012 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. The hose from the foam tank should have adequate wall stiffness to withstand the vacuum of the foam pump while it is running without collapsing [23" Hg (584 mm HG)].

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).

Main Waterway Flowmeters

The FoamPro 3012 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 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 longer the straight run, the lower the turbulence. 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 flowmeter is not as critical, but straight runs without fittings help maintain accurate flow readings. A minimum 5 times the pipe diameter is recommended.

3. **Do not mount a flowmeter directly after an elbow or valve**. Valves create severe turbulence when they are “gated down” as shown in Figure 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.

With the use of a MultiFlo interface, two to four flowmeters may be monitored simultaneously. A single injection point that will supply foam agent to all foam discharge outlets is required. See Form 880 provided with the MultiFlo System for further information

Injection Point

The position of the injection point MUST be in a place that is common to all discharges which require foam capability. This position may be before or after the main water flowmeter, but not within the straight run distance required for the flowmeter as previously described. A separate injection point is not possible for each discharge. If multiple flowmeters are used, the injection point must be installed before the flowmeters at the inlet to their common manifold (See Figure 8-4).

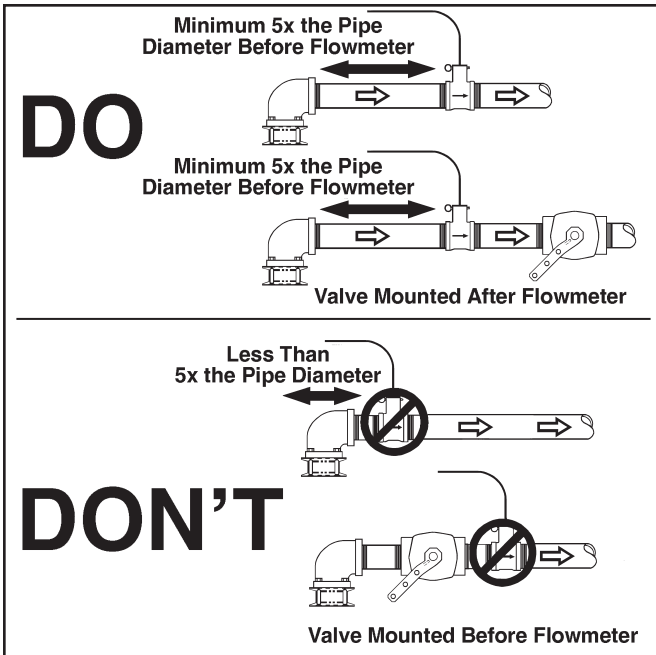


Figure 8-2 Flowmeter Placement

NOTE: 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.

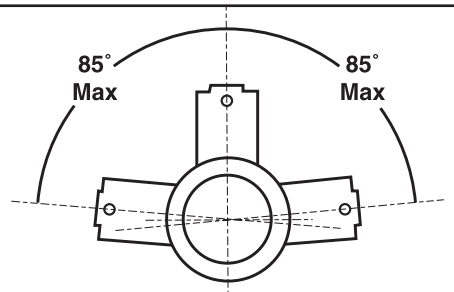


Figure 8-3 Flowmeter Position Range

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. See Figure 8-1 for component placement. The concentrate check valves have a minimum cracking pressure of 12 PSI (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 8-5. This will avoid sediment deposits or formation of an ice plug in cold weather applications.

Main Waterway Check Valves

A check valve positioned in the main waterway prior to the injection point must be installed. This will prevent foam solution in the waterway from entering the pump, the main water tank, and other clean water suction connections as shown in Figure 8-6.

CAUTION: The check valve is not to be used as a substitute for proper flushing of apparatus lines after usage.

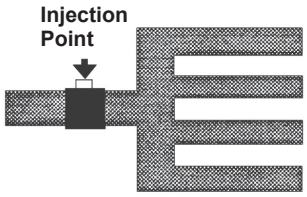


Figure 8-4 Injector Fitting Placement for Multiple Discharge

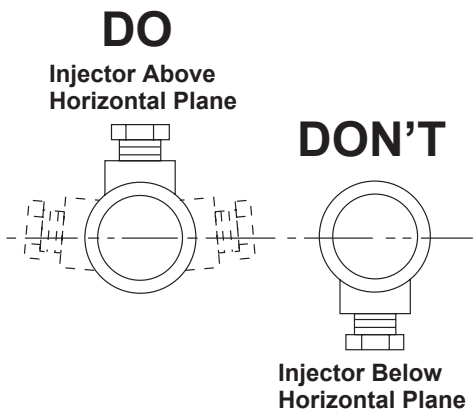


Figure 8-5 Foam Injector Position

Flushing System

Depending on the corrosiveness of the foam concentrates used, or when changing foam concentrate types or manufacturers, a flushing system must be installed. Generally all Class B foam concentrates must be flushed from the system after usage. Most Class A foam concentrates are less corrosive and do not require flushing after each usage. See Figure 8-7 for a typical flushing system plumbing schematic.

Flushing Foam Pumps

When returning the apparatus to ready condition after foam operations, the FoamPro foam pumps should be flushed. The following procedures can be used to flush the foam pumps. Refer to Figure 8-7 and do the following:

1. Energize apparatus and establish water flow through foam solution discharge.
2. Close foam concentrate tank shut-off valve and open flush water supply valve.
3. Energize FoamPro 3012 and allow electric motor driven foam pump to run until discharge is clear.
4. Shut off FoamPro 3012 system by depressing the FOAM button on the Digital Display Control Module. Close flushing water supply valve.
5. Close foam solution discharge and shut down apparatus.
6. Open foam concentrate tank shut-off valve.
7. Perform required maintenance checks on the FoamPro 3012.

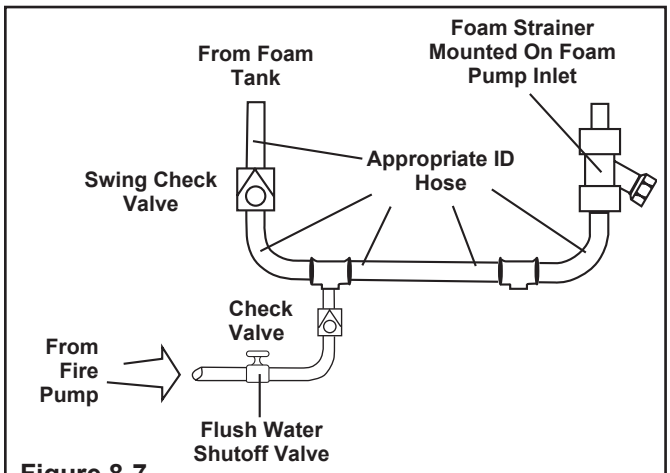


Figure 8-7
Foam Concentrate Flushing System Diagram

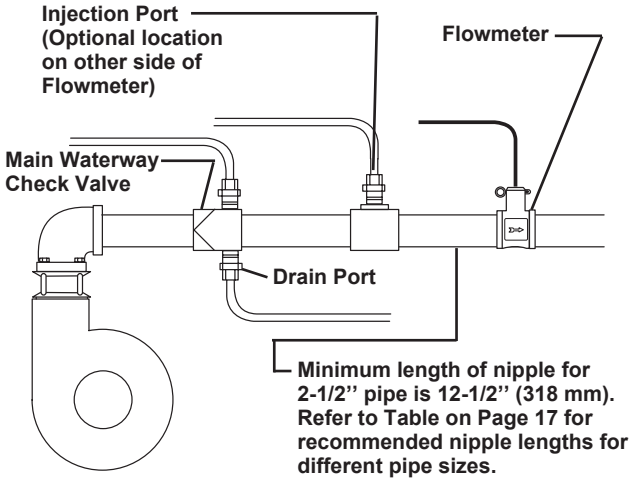


Figure 8-6
Recommended Pump Installation

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.

Outboard Pickup

An outboard pickup may be adapted to the foam pump inlet. The pickup should be positioned between the foam tank shutoff 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 shutoff 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 shutoff 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 shutoff 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.

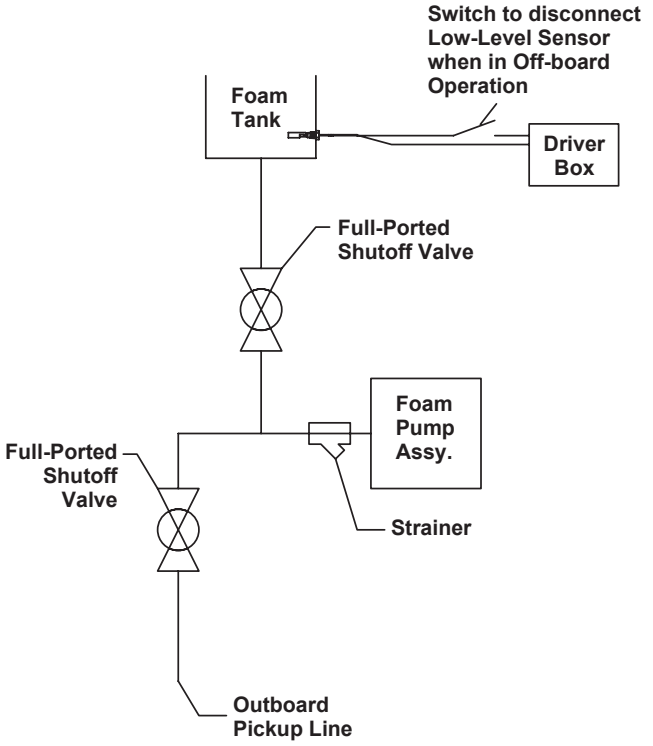


Figure 8-8
Outboard Pickup Diagram

9 Electrical Equipment Installation

Electrical Connections

Figure 9-1 provides guidelines for proper hookup of each of the electrical components. Complete molded cable sets are provided with each FoamPro system to make all the necessary connections. The cables are color coded and "indexed" so they can only go in one way. **DO NOT force mismatched connections.** The system can only perform when the electrical connections are sound, so make sure each one is right.

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 connection should be the power and ground cables to foam pump/motor base assembly.

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.

- The FoamPro 3012 requires one electrical power connection. The connection for the valve driver box on the hydraulic drive foam pump utilizes a standard Weatherpak connector that connects both power and ground. The system requires 5 AMPS minimum. 14 AWG or larger power connection to battery or master switch is recommended.
- Although an electronic circuit breaker is provided in the valve driver box, it is recommended to protect the main system circuit that supplies power to the system with a 5 amp fuse.
- This system is designed for use on 12- or 24-Volt negative ground systems only.

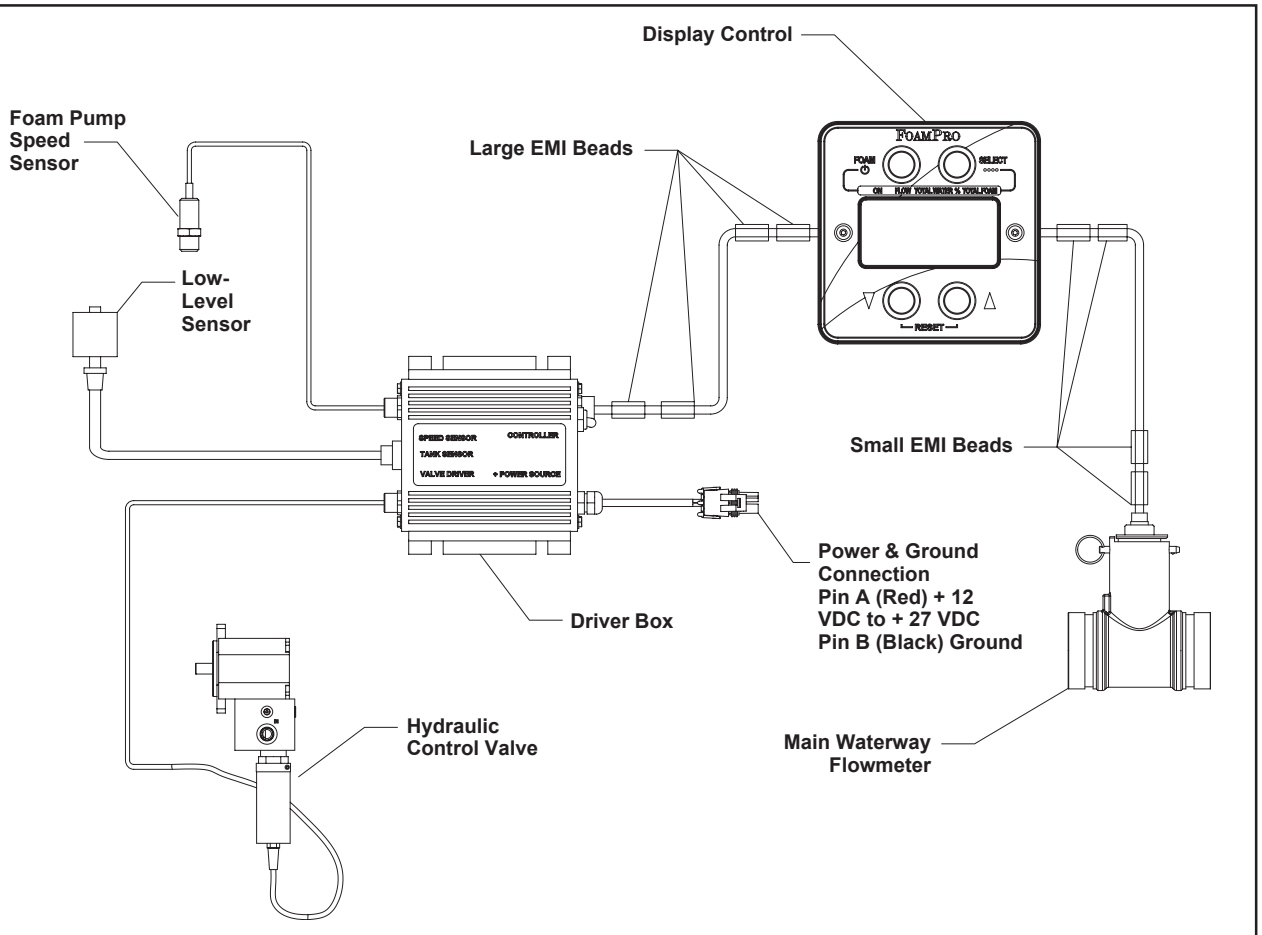


Figure 9-1 FoamPro 3012 Electrical Wiring Diagram

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 that 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 Digital Display Control 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.

Digital Display Control Module

The Digital Display Control 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 3-7/8 inch (98 mm) diameter hole (the same as a 3-1/2 inch (89 mm) pressure gauge). 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 Digital Display Control Module is mounted, connect the control cable (red coded cable ends) from the hydraulic valve driver box terminal (See Figure 9-1) to the 5-pin connector on the back of the Digital Display Control Module (See Figure 9-3). A color coded decal on the valve driver box identifies each cable connection.

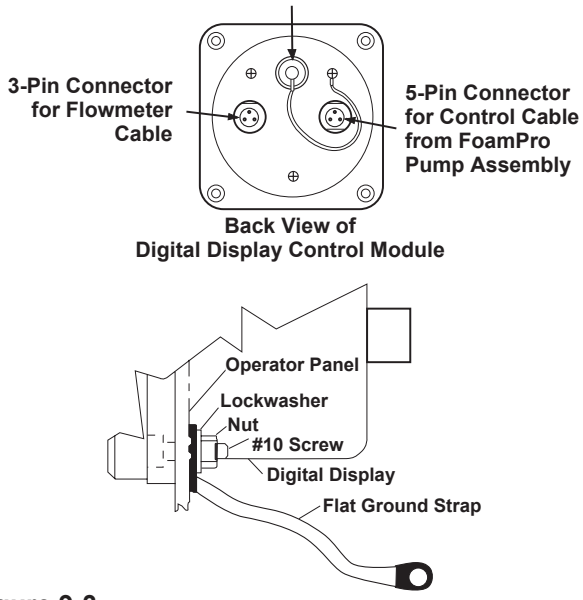


Figure 9-3
Digital Display Control Module Cable Connections

NOTE: Ensure that the panel where the Digital Display Control 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 Digital Display Control Module in place to the frame of the fire truck to ensure adequate grounding (See Figure 9-3).

Flowmeter Connections

FoamPro Flowmeter

If a single FoamPro paddlewheel-type flowmeter is to be used, a molded cable is supplied which connects from the flowmeter sensor to the 3-pin connector on the Digital Display Control Module (See Figure 9-3).

MultiFlo Flowmeter Interface Modules

Refer to the MultiFlo Interface instructions for installations requiring multiple FoamPro Flowmeters. Figure 9-4 shows the connection of the flowmeters and MultiFlo Interface with the Digital Display Control Module.

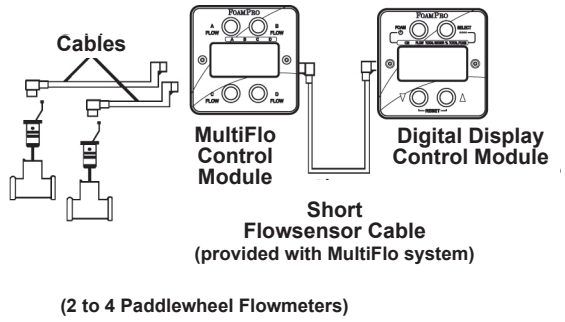


Figure 9-4
MultiFlo and Flowmeter Connections

Foam Tank Low-Level Sensor

The foam level sensor must be mounted in the foam to monitor low-foam concentrate level. Figure 9-5 shows the optimal mounting positions for the foam tank low-level sensors. The standard top or bottom-mount switch has 1/8" NPT threads. Mount the sensor in the bottom of the foam tank in an upright position. Use suitable sealant to prevent concentrate leakage.

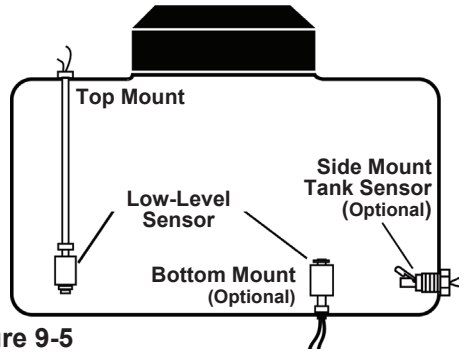


Figure 9-5
Foam Tank Low-Level Sensor Mounting Options

NOTE: There must be space under the tank for the cable to be routed to the hydraulic valve driver box.

Do not remove the float from the shaft on the sensor assembly. If it is installed in the reverse position, **LO CON** and **NO CON** will appear on the Digital Display Control Module and the system will automatically shut down, even if there is foam in the tank.

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.

NOTE: Install low-level sensor not to interfere with tank discharge.

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-level sensor cable. The low-level switch sensor cable may be shortened. It has pigtails at both ends and is not polarity sensitive. Connect the other cable end (blue coded cable end) to the hydraulic valve driver box on the hydraulic valve assembly as shown in Figure 9-1.

A side-mount foam tank low-level sensor is available to be used if both the top and bottom of the tank are not accessible. The 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

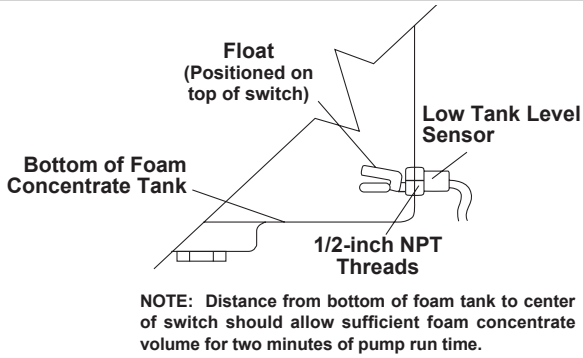


Figure 9-6
Side-Mount Foam Tank
Low-Level Sensor Installation

to the center of the switch should allow sufficient foam concentrate volume for two minutes of pump run time (See Figure 9-6).

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.

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.

When locating the foam tank low-level sensor in the foam tank, sufficient foam volume must be present for two minutes of operation. This determination will be made using the most frequent foam concentrate injection rate and water flow.

Power Supply

Electrical devices can be damaged, or operate intermittently when powered by a weak or erratic power supply. The FoamPro 3012 system is not any different – the better the power supply, the better the system will perform. Following the instructions below will ensure the 3012 system will perform at its best.

The power connection supplied is a 2-Pin Weatherpack connector and the mating end is supplied with the unit and should be used. Pin A is to be connected to the + power supply, and pin B is to be connected to ground.

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.

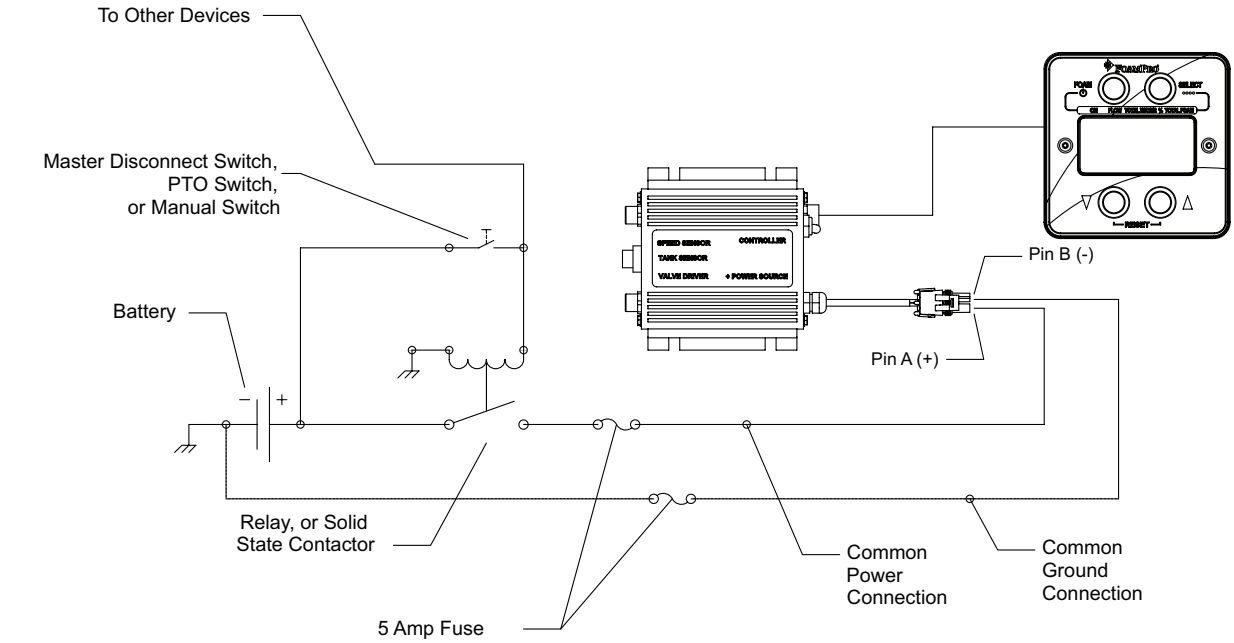
The system will draw an approximate maximum of 5 Amperes and must be protected with a 5 Amp fuse in the main power line to the system and provides enough power and protection for the display, driver, and associated components. It is also recommended to install a 5 Amp fuse on the main ground lead.

All component power and ground connections must be common for all AccuMax components.

See the diagram for the Electrical Power Supply Schematic on page 25.

- **Always** connect the primary 12 or 24 VDC positive (+) lead for the system directly back to the battery or power relay using 14 AWG chemical resistant wire protected with a wire loom. Install a 5 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 AWG chemical resistant wire protected with a wire loom. Install a 5 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 Display and the Control Driver 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.

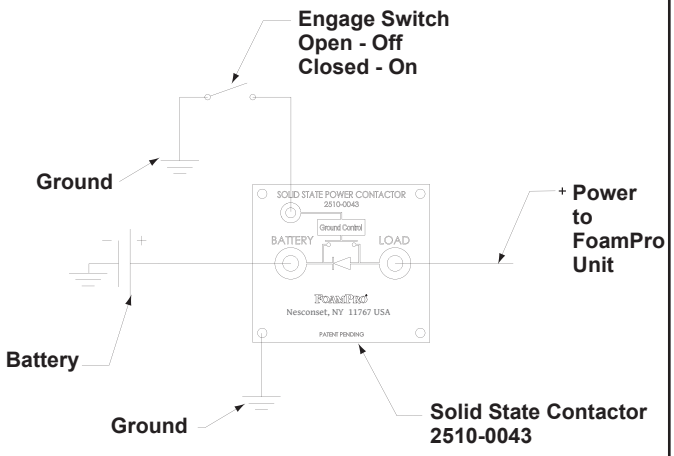
Electrical Power Supply Schematic



SOLID STATE CONTACTOR (SSC)

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

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.



Solid State Contactor Installation

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 3012 equipment is mounted.

RFI/EMI beads supplied with the FoamPro 3012 components must be mounted on the control cables and flowmeter cables. An RFI/EMI suppression kit is supplied with the FoamPro 3012. Install the clamp-on beads at the locations indicated in Figure 9-7. Silicone caulk, electrical tape, plastic wire ties, or heat shrink tubing may be used to ensure the beads do not move after installation. Two clamp-on beads are required at each connector, and they must be slid as close as possible to the connector.

Round coils of extra control and flowmeter cables in the pump compartment can act as an antenna. While the flowmeter and control 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 and flowmeter cables, take care to avoid routing them next to antenna cables, radio power lines, 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 (See Figure 9-8).

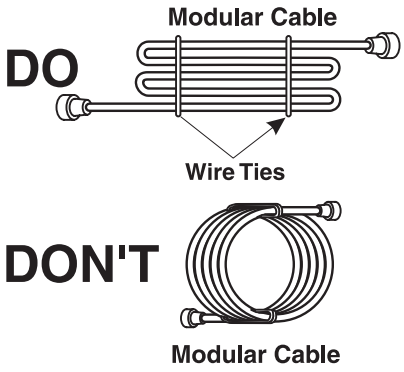


Figure 9-8 Extra Cable Storage

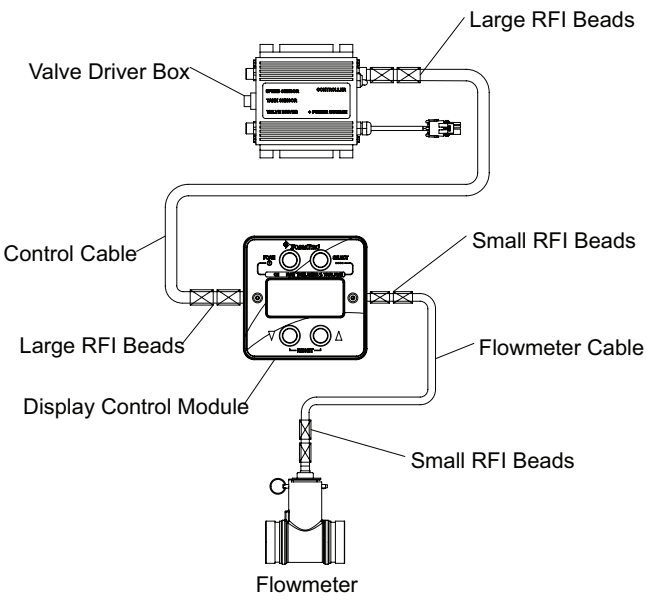


Figure 9-7 RFI/EMI Bead Installation

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.
- Digital Display Control Module connections are correct and tight.
- Cable connections at valve drive box are correct and tight.
- Flowmeter cable(s) are properly connected to the Digital Display Control Module as required.
- All cables are secured and protected with loom from damage during operation.
- RFI/EMI beads are installed; control and flowmeter cables are properly folded and secured; radio antennas, power lines, and equipment are away from control cables and flowmeter cables.
- All components, Digital Display Control Module, flowmeter tee, and pump base are properly grounded using flat ground straps.
- Adequate voltage is available; + 12 VDC to + 27 VDC as measured at driver box power connection.
- Switch on the valve driver box is in the ON position.

Liquid (Refer to Section 8)

- Water flowmeter is 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 Pump (Refer to Section 6)

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

System Power Check

Turn the main power switch on the Hydraulic Valve Driver Module to **ON** and check the digital display readout. **HYPRO** should appear for a few seconds while the controller checks itself; then a **0** should appear on the digital readout (See Figure 10-1). If the **0** does not appear on the digital readout, refer to Troubleshooting (Section 14) for possible causes and solutions.

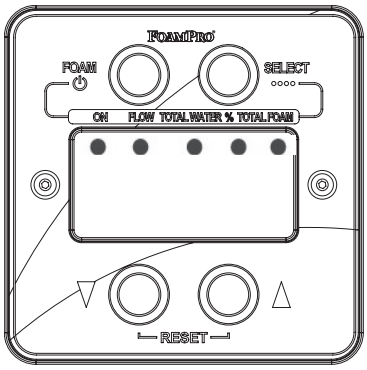


Figure 10-1 Digital Display Control Module

Foam Pump Priming Check

Turn the **CAL/INJECT** valve on the foam pump to the **CALIBRATE** or **FLUSH** position. Provide containers to collect the output that will be coming from the foam pump.

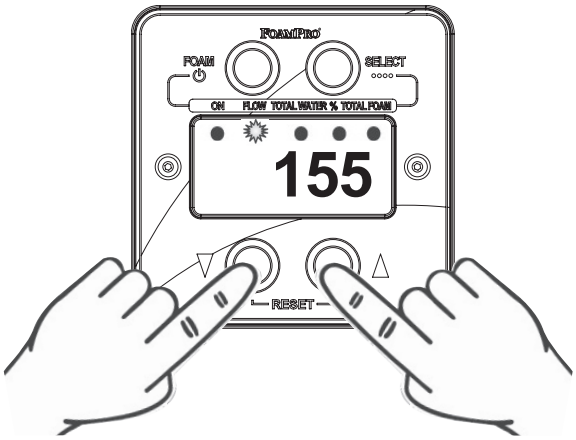


Figure 10-2 Simulated Flow Indication

- Operate the fire truck engine so that hydraulic oil pressure is available. Put the system in "Simulated Flow Mode" by selecting the **FLOW** display and depressing **RESET** (both UP and DOWN buttons simultaneously). Increase simulated flow by pressing the UP button to permit easier priming (above 250). The display will show ☰ to indicate the simulated flow (See Figure 10-2).

- Engage the FoamPro system by pressing the red **FOAM** button.

- The hydraulic motor-driven foam pump should begin to operate and foam concentrate should begin flowing into the container. If concentrate is not being pumped, first check to make sure the hydraulic motor-driven foam pump is running. If the pump is running, but no concentrate is being delivered, the pump probably is not completely primed. If the pump does not prime within 10 to 15 seconds, the system must be shut down.

- If the system has been properly installed, foam concentrate should flow readily to the pump. Look at the clear foam suction line to see if foam is flowing.

- Once foam flow is established through the foam pump, turn the system off and turn the CAL/INJECT valve back to the inject position.

- If you are still having difficulty priming the foam pump in your FoamPro 3012 System, do the following:

  1. Make sure the foam concentrate tank shutoff valve is open.

  2. Check that there are no restrictions from the concentrate tank(s) to the inlet of the foam pumps.

  3. Make sure there are no leaks in the plumbing that could allow air to enter the foam pumps.

- Perform Steps **1** through **3** to wet the foam pumps to speed the priming operation.

    1. Remove one of the valve caps from the head of the foam pump; then remove the check valve under it (See Figure 10-3).

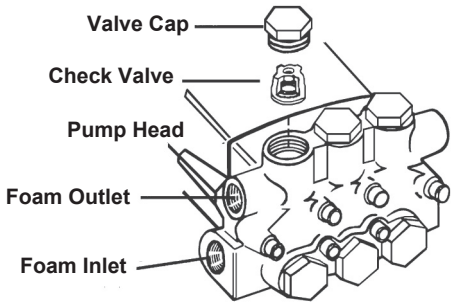


Figure 10-3 Foam Pump Manual Priming

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

    2. Pour a small amount of concentrate into the opening where the valve was to fill the pumping chamber in the pump head.

    3. Replace and securely tighten the check valve and cap. Run the pump again. The pump should prime right away.

Proceed to Calibration, Section 11 as the System must be recalibrated.

11 Calibration and Setup

System Setup Procedures

FoamPro systems permit easy calibration of the foam proportioning unit to assure accurate operation. The calibration process will make adjustments to the flowmeter(s) and foam pump display readings.

NOTE: FoamPro systems may 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: Both the foam pump and flow meter readings must be calibrated as part of the initial setup after installation.

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

Setup for Dual-Tank Operation

The FoamPro controller is factory defaulted to the dual-tank option. If you are installing a remote start/stop system, you must change the default setting for proper system operation. The procedure for this new setting starting from the operation mode is as follows:

- Remove the cover screws and O-rings to enter the setup and diagnostic modes (See Figure 11-1).
- Enter the setup mode by pressing the internal button on the left side of the controller.
- Enter the diagnostics mode by pressing the internal button on the right side of the controller.
- The display will flash **CONF** and **DUAL.T** alternately.
- Press the DOWN button once. The display will now flash **CONF** and **RSTART**.
- Press the left internal button once. This puts you back into the operational mode.
- Replace cover screws and o-rings.

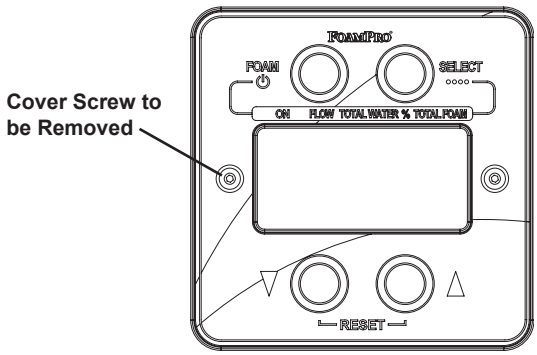


Figure 11-1 Calibration Switch Location

Calibration and Setup Mode

Calibration and Setup is done by using the Digital Display Control Module function buttons. To enter or exit the Calibration and Setup Mode, use a 3/32" Allen wrench to remove the cover screw and O-Ring to left of the Display Readout Panel on the Digital Display Control Module (See Figure 11-1).

To enter the Calibration and Setup Mode, use the Allen wrench to depress and release the switch inside the screw opening. The display will show **Hyd Setup** until any function button is pressed.

Exit from Calibration and Setup Mode by pressing and releasing the switch inside the screw opening again. The word **HYPro** will appear followed several seconds later by a **0**. Replace the O-Ring and cover screw when finished.

CAUTION: Always replace the O-Ring and cover screw to keep dirt and water from entering the Digital Display Control Module, or serious damage to the components may occur.

Flowmeter Calibration

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. Hand-held Pitot gauges are usually not very accurate. At the first available opportunity, make sure the system is calibrated with an accurate flow measuring device. 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.

Enter Calibration and Setup mode using the method previously described. Press the **SELECT** button and Illuminate the light under **FLOW**. The current water flow rate will be displayed. Press the UP or DOWN button to set the reading to match the actual flow calculated from the Pitot Gauge reading. Decrease fire pump pressure by approximately one half and recalculate water flow rate. Verify that reading on the Digital Display Control Module is the same as the calculated value. Stop the water flow when the reading adjustments are completed.

To lock the settings, exit Calibration and Setup mode by depressing and releasing the switch inside the cover screw opening. The display will show a **0** until any function button is pressed.

Simulated Flow

The default Simulated Flow value should be adjusted while operating in Calibration and Setup mode. Enter Calibration and Setup Mode using the method previously described. Press the **SELECT** button until the light under **FLOW** is illuminated. Pressing both the UP and DOWN buttons simultaneously will display the default simulated flow reading. Adjust the setting by pressing the UP or DOWN buttons to set the desired rate; i.e., ☰ **100**. After the rate has been set, press the UP and DOWN buttons simultaneously again to return to Calibration and Setup mode. This setting will remain in the computer memory and be the default rate for all future Simulated Flow operations.

Exit Calibration and Setup mode as previously described.

Foam Concentrate Injection Rate

When power is supplied to the FoamPro 3012 system, the foam concentrate injection rate in memory will be the default injection rate setting. The default concentrate injection rate can be adjusted by entering Calibration and Setup Mode as previously described.

Use the **SELECT** button to illuminate the lamp below **%.** The display will show the current default concentrate injection rate stored in the computer memory as **PC x.x**. The UP and DOWN buttons can be used to set the desired concentrate injection rate. Set this rate to the foam concentrate injection rate used most frequently in operations.

Exit Calibration and Setup mode as previously described.

Foam Pump Calibration

The following procedures explain how to calibrate the foam pump.

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%.

Make sure the apparatus engine is energized and hydraulic power is available to operate the system. Enter Calibration and Setup mode using the method previously described. Press the **SELECT** button to illuminate the light below **TOTAL FOAM** on the Digital Display Control Module.

The display will alternately flash **HYDR** and **0.00**. If the display shows a reading other than **0.00,** reset the value to **0.00** by pressing both the UP and DOWN buttons simultaneously.

Turn the **CAL/INJECT** valve on the hydraulic motor-driven foam pump to the Cal/Flush position. Place a graduated measure container of at least 30 gallons (114 liters) beneath the outlet from the **CAL/INJECT** valve that may contain the expected volume of foam concentrate, which will be approximately 50% of the full flow rating of the system (See Figure 11-2). If an accurate calibrated container is not available, a scale can be used to weigh the foam concentrate pumped. The total volume of foam concentrate pumped can then be calculated from this weight and the density of the foam concentrate from the MSDS sheet.

Start the FoamPro 3012 hydraulic motor-driven foam pump by pressing the red **FOAM** button. The foam pump will operate and pump foam concentrate into the container. Stop the hydraulic motor-driven foam pump and measure precisely the amount of foam concentrate collected in the container. Adjust the reading on the Digital Display Control Module to the measured volume by pressing the UP or DOWN button. Turn the **CAL/INJECT** valve back to the **INJECT** position.

Exit Calibration and Setup mode as previously described.

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. The FoamPro 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 may be made without altering the calibration by using the procedures described for those functions only.

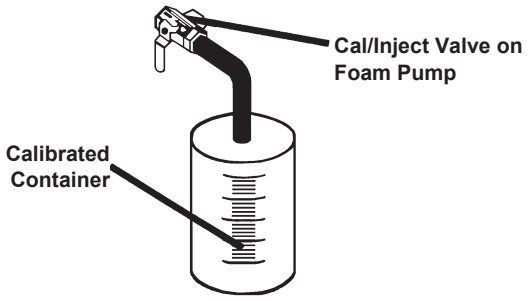


Figure 11-2 Foam Concentrate Collection

12 Operating Instructions

Normal System Operation

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

When the **FOAM** button is pressed, the **ON** status lamp will illuminate, indicating that the system is ready. The **ON** status lamp will **flash** when foam is being injected. The FoamPro 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 **FOAM** button is again pressed, the **ON** status lamp will extinguish, indicating that the system is in Standby mode. The foam pump will stop, but other 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 digital display, so that the operator realizes that the system capacity is being exceeded and is running **lean** on foam concentrate percentage.

CAUTION: If the power to the FoamPro unit fails or is shut off during operation, the system will remain in operation at the last setting. DO NOT close the discharge to the system until the hydraulics are disengaged. To turn the system off, it is required to disengage the hydraulic drive PTO.

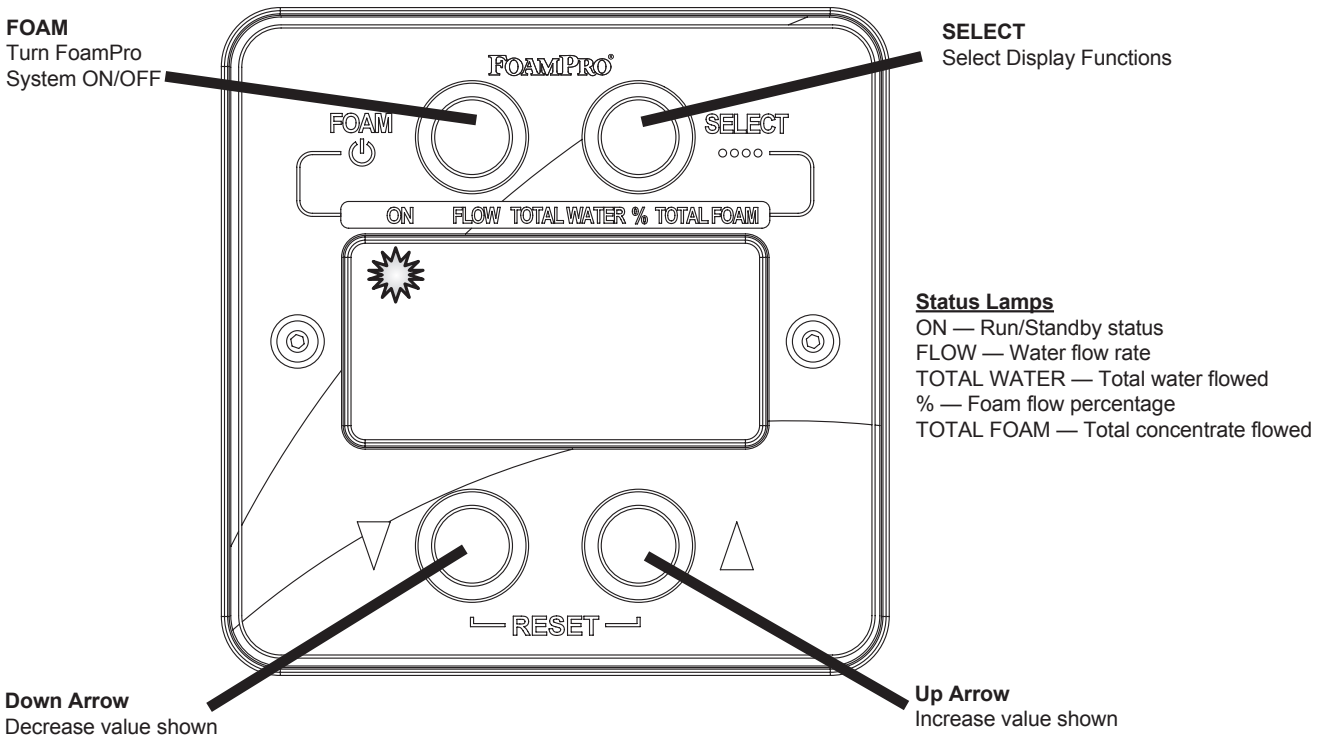


Figure 12-1 Digital Display Control Module Operation

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.

Display Information

The five-digit display on the Digital Display Control Module shows the value of the selected display function or provides warnings to the operator when the system is operating. A function is selected by pressing the gray **SELECT** button in the upper right-hand corner of the Digital Display Control Module. Each time the button is pressed, a new function mode is selected and displayed. A LED lamp above the digital display denotes which function is being displayed. Pressing the **SELECT** button changes the value displayed, but does not alter system operation.

The Display Functions include:

Flow

The display shows the current flow rate of water per minute.

Total Water

The display shows the total amount of water pumped. This totalized value may be reset. See "Reset Functions" paragraph.

% (Percent)

The display will show the foam concentrate injection rate setting in the % mode.

Total Foam

The display shows the total amount of foam concentrate pumped. The value will be in the same unit of measure as the water flow. This totalized value may be reset. See "Reset Functions" paragraph.

Reset Functions

The totalized values for water and foam concentrate pumped can be cleared from memory by performing a **RESET** function. Using the **SELECT** button, select either **TOTAL WATER** or **TOTAL FOAM**. 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 (%)

When the concentrate percentage (**%**) 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 **%** display mode (pressing both the UP and DOWN buttons at the same time), the foam concentrate injection rate is returned to the default value.

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 **LO.CON** blinking on the 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 **NO.CON**. The pump will stop, and the system will go to Standby mode until the foam level is restored and the on button is depressed.

Pump Error

Motor stall protection is provided. In the event the pump stalls for 10 seconds, the display will show **ERR.HY** to indicate the foam pump is producing no feedback to the control signal. The system will return to the foam off status.

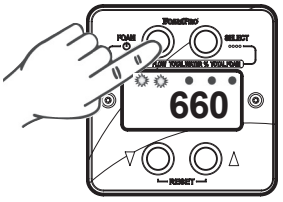
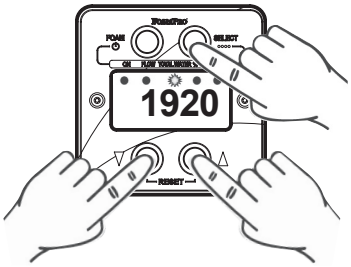
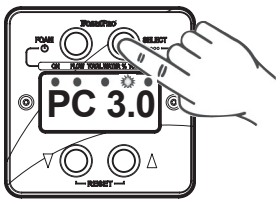
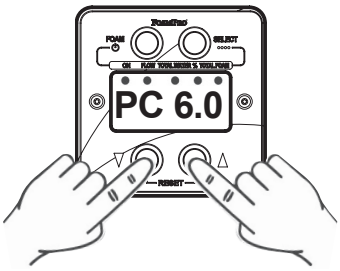
High/Low Flow Condition

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

LO.FLO—Foam delivery rate is below foam pump capability.

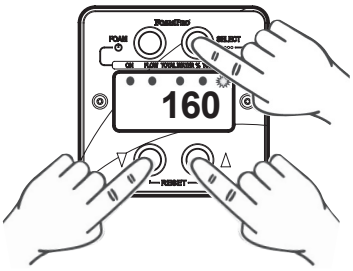
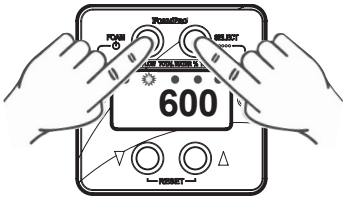
HI.FLO—Foam delivery rate is above foam pump capacity.

Normal Operation Summary

1 Turn FoamPro system on.	**Display**	**Action**
		1. Operate the apparatus engine to develop hydraulic pressure. Turn the FoamPro Main Power circuit breaker switch on. **HYPRO** will appear on the display momentarily.
2. Make foam solution.		2. Establish water flow to the foam capable discharge. The Digital Display Control Module will indicate the water flow rate. Press the **FOAM** button (red upper-left button). The LED lamps below the **ON** and **FLOW** labels will illuminate and the lamp below the **ON** label will flash. The rate of water flow will be displayed in units per minute.
3. Read the total amount of water flowed during the operation.		3. Press the **SELECT** button (black upper-right button) until the LED lamp below the **TOTAL WATER** label is illuminated. The total amount of water will be displayed. Reset this value to zero by pressing the UP and DOWN buttons at the same time.
4. Read % of concentrate.		4. Press the **SELECT** button (black upper-right button) until the LED lamp below the **%** label is illuminated. The display will read percentage of foam concentration. Foam will continue to be injected.
5. Change the % of concentrate.		5. Press the UP or DOWN button. The display will show the new concentrate injection rate chosen. The proportion of concentrate injected will change immediately.

Normal Operation Summary Continued on Next Page

Normal Operation Summary

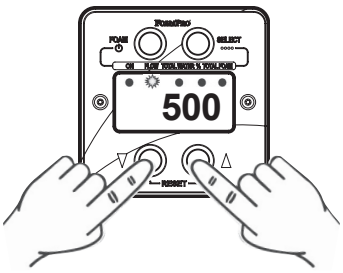
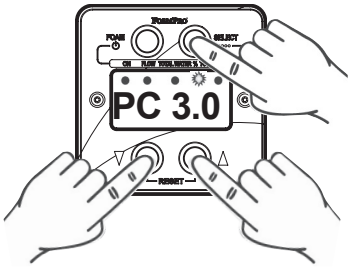
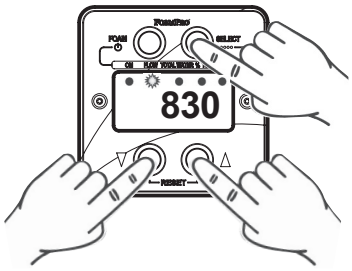
How to	Display	Action
6. Read the total amount of foam concentrate used.		6. Press the **SELECT** button (black upper-right button) until the LED lamp below the **TOTAL FOAM** label is illuminated. The total amount of foam concentrate used will be displayed. Reset this value to zero by pressing the UP and DOWN buttons at the same time.
7. Read water flow without foam injection.		7. If on, press the **FOAM** button, and the foam injection will stop. Press the **SELECT** button (black upper-right button) until the LED lamp below **FLOW** is illuminated. The water flow rate through the foam discharge(s) will be displayed whether foam is being pumped or not.
8. Turn the FoamPro system off.		8. Turn the apparatus Master or Battery switch off. The system can also be turned off by using the circuit breaker switch on the valve driver box. **NOTE: Any of these changes can be made at anytime during, before, or after water is flowing.**

Simulated Flow Operation

The Simulated Flow function of the system allows the operator to control the 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 Digital Display Control 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.

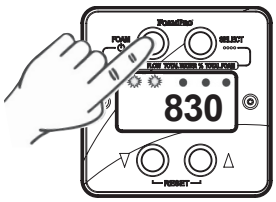
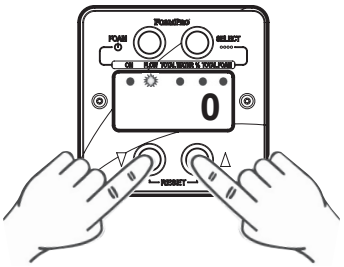
Warning: When operating the FoamPro in the Simulated Flow function, an outlet for the foam concentrate injection must be provided. Otherwise, dangerous excessive pressure may be built up in the apparatus water piping and/or hoses. This outlet for the foam concentrate can be provided by turning the CAL/INJECT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

Simulated Flow Operation Summary

How to	Display	Action
1. Begin Simulated Flow function.		1. Make sure the lamp below **FLOW** is illuminated. Press both the UP and DOWN buttons at the same time. The FoamPro Display will read ≡ to the left of the flow, meaning the system will "simulate" the displayed water flow rate. (The default value of flow may be set to any value, see Section 11). **CAUTION: Be certain that an outlet is provided for the foam concentrate when the foam pump is started.**
2. Change the injection rate while in Simulated Flow function.		2. Press the **SELECT** button (black upper-right button) until the LED lamp below the **%** label is illuminated. The display will read the current percent setting. Press the UP or DOWN buttons to select the desired injection rate. The FoamPro will respond and immediately begin injecting concentrate at the new rate.
3. Change the Simulated Flow rate while in the Simulated Flow function.		3. Press the **SELECT** button (black upper-right button) until the LED lamp below the **FLOW** label is illuminated. The display will show ≡ and current flow rate. Press the UP or DOWN to select the desired simulated water flow rate. The FoamPro will respond and immediately begin operating at the new flow rate.

Simulated Flow Operation Summary Continued on Next Page

Simulated Flow Operation Summary

How to	Display	Action
4. Empty the foam tank.		4. Place a suitable container under the CAL/FLUSH outlet tube. Place the CAL/INJECT valve in the CAL/FLUSH position. Press the **FOAM** button. The foam pump will operate and foam concentrate will be discharged from the outlet tube. **NOTE: FoamPro must be in Simulated Flow mode**.
5. Turn the Simulated Flow function off and return to automatic operation.		5. Press both rate adjustment buttons at the same time. The ≡ symbol will leave the display, and the FoamPro will operate automatically from the flow sensor signal. Turning the apparatus Master or Battery switch off will also turn off the Simulated Flow function. The next time the power is turned on, the FoamPro will return to the original automatic default settings.

Flushing Foam Pump

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

1. Energize apparatus and establish water flow through foam solution discharge.
2. Close foam concentrate tank shutoff valve and open flush water supply valve.
3. Energize FoamPro 3012 and allow hydraulic motor-driven foam pump to run until discharge is clear.
4. Shut off FoamPro 3012 system by depressing the FOAM button on the Digital Display Control Module. Close flushing water supply valve.
5. Close foam solution discharge and shut down apparatus.
6. Open foam concentrate tank shutoff valve.
7. Perform required maintenance checks on the FoamPro 3012.

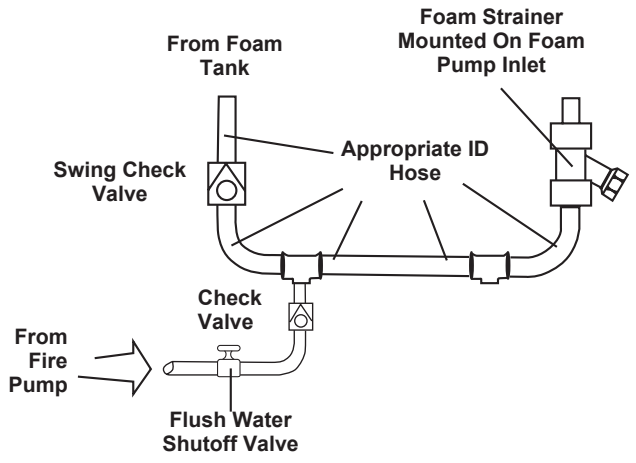


Figure 12-4
Foam Concentrate Flushing System Diagram

Priming the Foam Pump When Foam Tank Has Run Dry

In some instances, the foam tank may run dry while operating the FoamPro 3012 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 3012 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 3012 system into the simulated flow mode and proceed with above steps.

13 Maintenance

Maintenance Procedures

1. **After each use:** Flush the FoamPro 3012 foam pump (required if using other than Class A foam concentrate).

2. **Monthly**: Inspect wiring, hoses, flowmeters, and connections for tightness, corrosion, leaks and/or damage.

3. **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.

4. **Monthly**: Ensure oil cooler intake and cooler surface is free of obstructions.

5. **Monthly**: Remove and clean the foam strainer screen(s). Flush as required.

6. **Monthly:** Check crankcase oil level on the hydraulic-driven foam pump and foam pump gearbox, and refill as necessary with SAE 30 weight non-detergent oil (See Figure 13-1).

7. **Annually**: Drain oil from hydraulic-driven foam pump and foam pump gearbox, and refill with SAE 30 weight non-detergent oil. Check for foam concentrate or water in the drained oil.

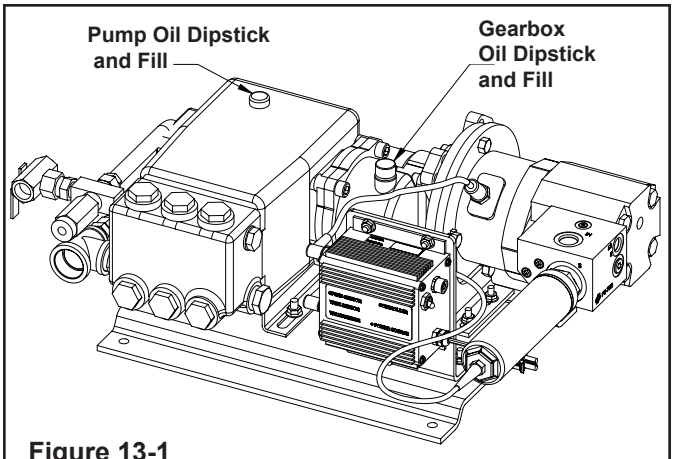


Figure 13-1
FoamPro 3012 Foam Pump and Gearbox Oil Level Check

8. **Bi-Annually**: Drain and refill the hydraulic oil reservoir with proper hydraulic oil as noted in Section 4.

NOTE: Other types of hydraulic fluids are too viscous for proper load-sense compensator operation. Do not mix hydraulic fluid types.

9. **Bi-Annually or When Hydraulic Fluid is changed**: Replace the hydraulic filter element. After filter element has been changed, energize the system and check filter housing for leaks. At this time, also clean and/or replace all other filters and screens in the hydraulic system.

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

Entering Diagnostic Mode

Diagnostic mode is entered by removing the cover screw and O-Ring on the right-hand side of the Digital Display Control Module (See Figure 14-1) using a 3/32'' Allen wrench. Once the screw is removed, press and release the button located under the screw. The word **HELLO** will appear on the display.

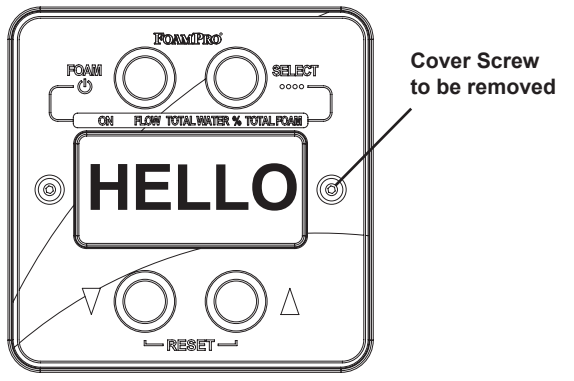


Figure 14-1
Diagnostic Switch Location

Exit from diagnostic mode is accomplished by pressing and releasing the switch again. The word **HYPRO** will appear on the display followed by a zero after several seconds. **Replace the cover screw and O-Ring when done.**

NOTE: Always replace the cover screw and O-Ring to keep water and dirt from entering the Digital Display Control 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 electrical diagram in Figure 14-2.

Diagnostic Mode Functions

On entry to diagnostic mode, the display will be illuminated. **SELECT** will select the various modes, each indicated by the status indicator light by the label. These diagnostic modes include:

None

Pressing the UP button will illuminate all display segments and status indicator lights.

Flow

The value shown is the current number of flow pulses being received each second. If no water is flowing, the value should be zero. This is a function test for the flowmeter. Removing the flowmeter sensor from its tee and spinning the paddlewheel should produce a reading other than zero on the display.

Total Water

The value shown reflects the level of the liquid foam concentrate in the tank.
Lo.Con indicates that the tank is empty.
Hi.Con indicates a satisfactory level for operation. This is a test of the low-tank level sensor and wiring.

% (Percent)

The value shown reflects the duty cycle to run the foam pumps. If **FOAM** is pressed, the hydraulic-driven foam pump will run at the selected rate and the **ON** status indicator lamp will be illuminated. The value may be altered with UP or DOWN buttons. This is a test of the hydraulic-driven foam pump driver box and pump hook-up. Depressing the UP button will increase pump speed, which should be audible and visible on the **TOTAL FOAM** display.

Total Foam

The value shown is the current number of pump pulses being received each second. Upon initial entry to the diagnostic mode, the display will alternately flash **hydr** and **0**. If the foam pump is not running, the value should be zero. Depressing the **FOAM** button will start the hydraulic motor-driven foam pump. By pressing the UP or DOWN button, the display will show the duty cycle at which the pump is running. The duty cycle value can be changed by pressing and holding the UP or DOWN buttons, and the speed of the hydraulic motor-driven foam pump should change accordingly. When the UP or DOWN button is released, the display will alternately flash **hydr** and the value at which the hydraulic motor-driven foam pump is turning.

CAUTION: If the power to the FoamPro unit fails or is shut off during operation, the system will remain in operation at the last setting. DO NOT close the discharge to the system until the hydraulics are disengaged. To turn the system off, it is required to disengage the hydraulic drive PTO.

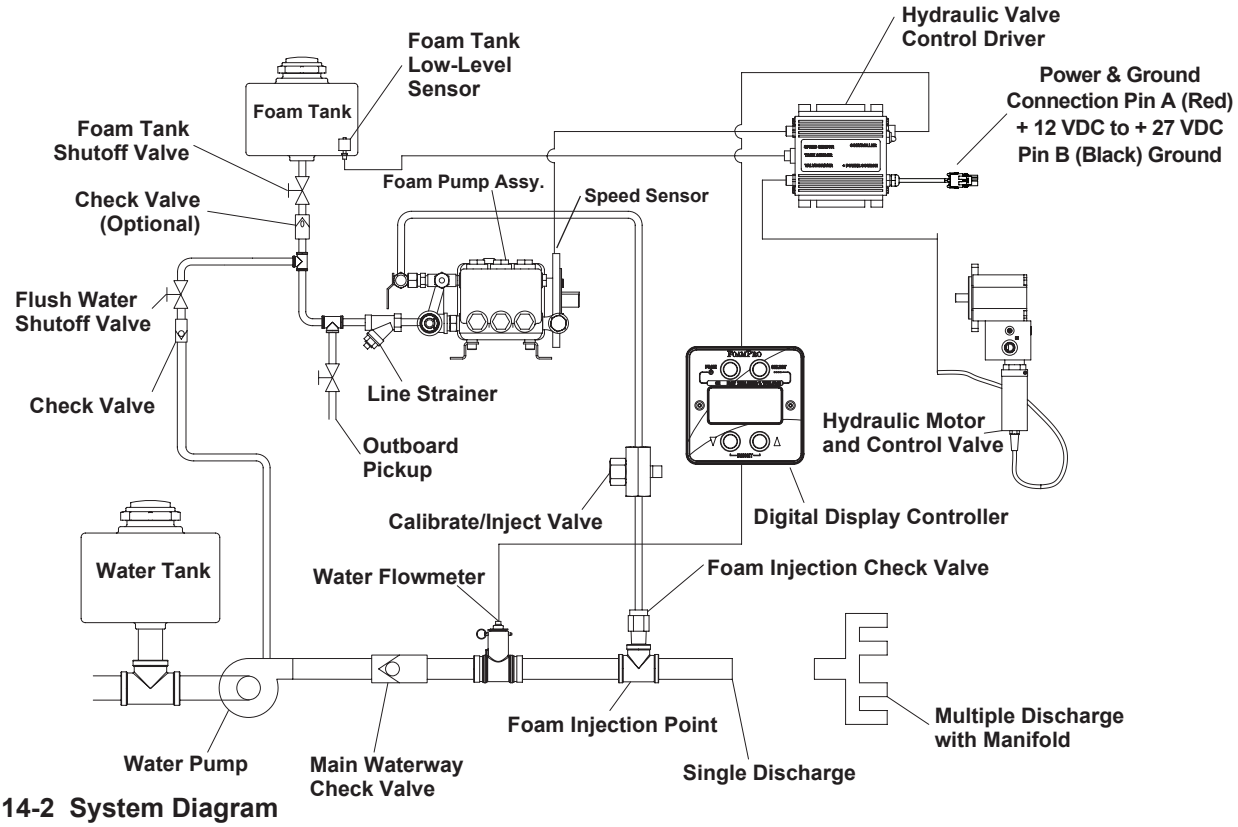


Figure 14-2 System Diagram

Symptom	Probable Cause(s)	Corrective Action
Pump does not run. **ERR.HY** flashes on display.	Load-sense pump compensator not properly adjusted.	Adjust load-sense pump. See Section 7.
	Truck hydraulics not running.	Engage hydraulic PTO.
Pump runs but produces no flow.	Pump is not primed.	See Foam Pump Priming procedures in Section 10.
Pump loses prime, chattering noise, pressure fluctuates.	Air leak in suction hose or inlet fittings.	Remove suction hose and test for leaks by pressurizing hose with water. Make sure thread sealant has been used on all fittings.
	Suction line is blocked, collapsed.	Remove suction line and inspect it for a loose liner or debris lodged in hose. Avoid all unnecessary bends. Do not kink hose.
	Clogged suction strainer.	Clean strainer.
Pump runs for 8 to 10 seconds, then shuts down. **ERR.HY** may be flashed on display.	Defective control cable or bent pins.	Replace control cable.

Troubleshooting Continued on Next Page

Symptom	Probable Cause(s)	Corrective Action
Pump runs for 8 to 10 seconds, then shuts down. **ERR.HY** may be flashed on display.	Foam pump speed sensor circuit open.	Inspect wiring and connection to speed sensor.
	Foam pump speed sensor position incorrect.	Check to ensure that the speed sensor is within the proper sensing distance of .005 to .020 inches (0.13 to 0.51 mm) from the pulley teeth (1/8 to 1/4 of one full turn of the sensor being fully bottomed out against the top of a gear).
	Foam pump speed sensor not functioning.	Replace sensor.
Pump runs full speed whenever the circuit breaker switch is **ON**.	Poor ground to valve driver box on pump/motor bracket.	Make sure screws are tight and a good ground is maintained.
No characters are displayed on the digital display.	The main power switch is not **ON**.	Turn on the main power switch on the valve driver box.
	Cables not correctly connected.	Inspect and secure connections. Check for bent pins in control cable connections.
	Defective control cable or bent pins.	Replace control cable.
	Digital display has been damaged.	Replace the digital display.
	Poor ground on system or controller.	Make sure screws are tight and a good ground is maintained.
System is powered up and the **FOAM** button has been pressed, but the foam pump does not run.	No water is flowing in any of the foam discharges.	Flow water.
	Flowmeter wiring not correct.	Inspect wiring & connection to flowmeter.
	Flowmeter obstructed.	Clear flowmeter of debris.
	Float is on plunger wrong, indicating tank is low.	Remove snap ring at the top of plunger and remove float; turn it over, reinstall.
	Float stuck on plunger, indicating tank is low.	Inspect and clean float switch.
	Truck hydraulics not running.	Engage hydraulic PTO.
System returns to standby mode while pumping, or **HYPRO** appears momentarily while pumping.	Low electric power.	Ensure 12- or 24-volts DC at 5 AMPS is available at driver box.
		Troubleshooting Continued on Next Page

Symptom	Probable Cause(s)	Corrective Action
System returns to standby mode while pumping, or **HYPRO** appears momentarily while pumping	Poor ground to valve driver box on pump/motor bracket.	Make sure screws are tight and a good ground is maintained.
	Low hydraulic oil pressure.	Clean or replace filters.
	Low hydraulic oil level.	Refill the reservoir and check for oil leaks.
Lo.Con appears on display.	Concentrate level in tank is low.	Fill concentrate tank.
	Low-tank level sensor or wiring is inoperative.	Repair or replace defective components.
Err.Su on power up.	Setup parameter memory is not functioning.	Contact FoamPro for replacement. **NOTE: This unit will continue to operate using factory set-up values**.
Display shows **?** for flow.	Flowmeter is sensing water flow, but the flow rate is too low for precise proportioning.	Check flowmeter.
		Check flowmeter calibration.
Foam pump capacity below rating.	Inlet strainer obstructed.	Remove and clean inlet strainer.
	Inlet plumbing obstructed.	Check all piping, valves and hoses for debris such as wire ties that can obstruct flow.
	Foam does not gravity feed to pump.	Open drain/air bleed valve on foam pump suction. If foam does not flow freely, modification of piping and pump position is required.
	Foam too viscous.	Above 2000 centipoise increase suction on foam pump is required.
		Increase strainer size and pump inlet line size to allow for less pressure drop and better flow.
	Inadequate hydraulic pump speed.	Increase engine RPM.
CAL/INJECT valve is leaking.	Valve seat is loose.	Remove hose and fitting from inject port of valve, and tighten seat. Reconnect fitting and hose.
		Troubleshooting Continued on Next Page

Symptom	Probable Cause(s)	Corrective Action
System cannot be calibrated.	Calibration values selected are out of range of system or setup memory is full.	Perform system reset as described in Calibration Section and recalibrate.
Cannot enter Hydraulic Calibration mode.	Electric motor-driven pump is not turned on.	Make sure the power switch on the electric motor-driven foam pump is in the **ON** position.
	Control cable between the driver boxes not connected or damaged.	Make sure the control cable between the driver boxes is connected and not damaged.
	Truck hydraulics and hydraulic valve driver is not turned on.	Make sure hydraulic system is operable and the valve driver switch is in the **ON** position.

15 Specifications

System Capacity

Foam Concentrate Rate	Maximum Water Flow GPM (LPM)
0.5%	2400 (9085)
1.0%	1200 (4542)
3.0%	400 (1514)
6.0%	200 (757)

System Specifications

Foam Output GPM (LPM)	12 (45.4)
Max. Operating Pressure PSI (BAR)	400 (28)
Max. Operating Temp. F° (C°)	160° (71°)
Max. Hydraulic Oil Pressure PSI (BAR)	1250 (86.2)
Max. Hydraulic Oil Flow GPM (LPM)	12 (45.4)
Hydraulic Pump RPM for Max. Performance	1350
Hydraulic PTO HP	12
Max. Hydraulic Pump RPM	2500
Min. Hydraulic Reservoir Size Gal. (Liters)	12 (45.4)
Min. Hydraulic Cooler Heat Load BTU/Min	170
Max. Hydraulic Oil Temp. F° (C°)	180° (82.2°)
Max. Amp Draw	5
Voltage	12-24 VDC

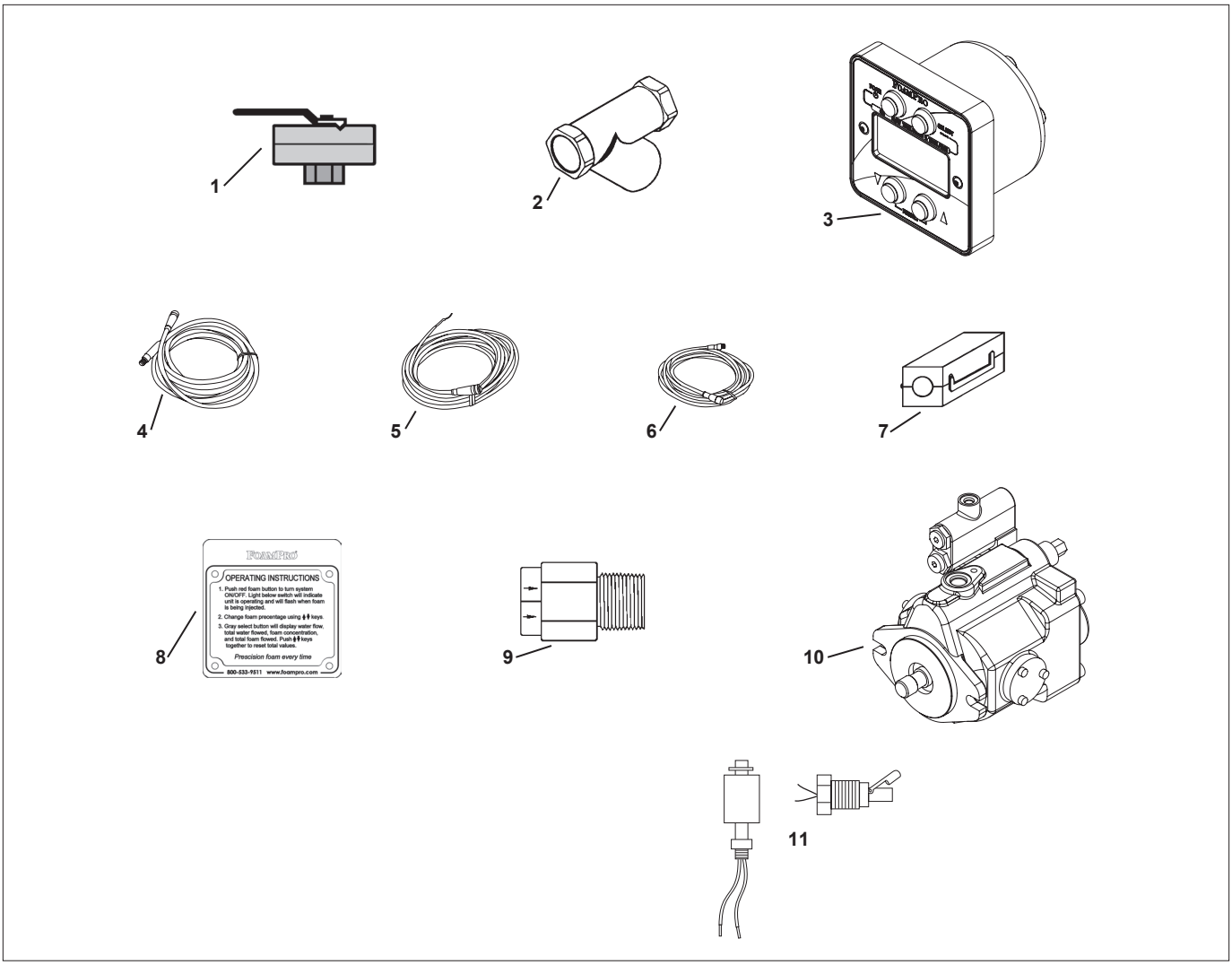
Hydraulic Fittings and Hose Specifications
System Line and Port Description

	Min. Hose ID & Pressure Rating	Port Fitting Type & Size
3012		
Hydraulic block inlet from hyd. pump	1" - 3000 psi	# 8 - SAE O-Ring port
Hydraulic motor outlet to cooler	3/4" - 1500 psi	# 10 - SAE O-Ring port
Hydraulic motor case drain to tank	3/8" - 1500 psi	# 6 - SAE O-Ring port
Hydraulic block load sensing from hyd. pump	1/4" - 3000 psi	# 6 - SAE O-Ring port
System Hydraulic Pump		
Hydraulic pump inlet from tank	1 1/2" - See Note	# 24 - SAE O-Ring port
Hydraulic pump outlet to hyd. block	1" - 3000 psi	# 16 - SAE O-Ring port
Hydraulic pump case drain to tank	5/8" - 1500 psi	# 10 - SAE O-Ring port
Hydraulic pump load sensing from hyd. block	1/4" - 3000 psi	# 4 - SAE O-Ring port

Note:

SAE O-Ring ports are per SAE J514.
Hydraulic pump inlet hose to conform to SAE 100R4.
Hydraulic load sense line to be 8 ft. minimum length.
Do not exceed the pressure rating for the load-sense hose.

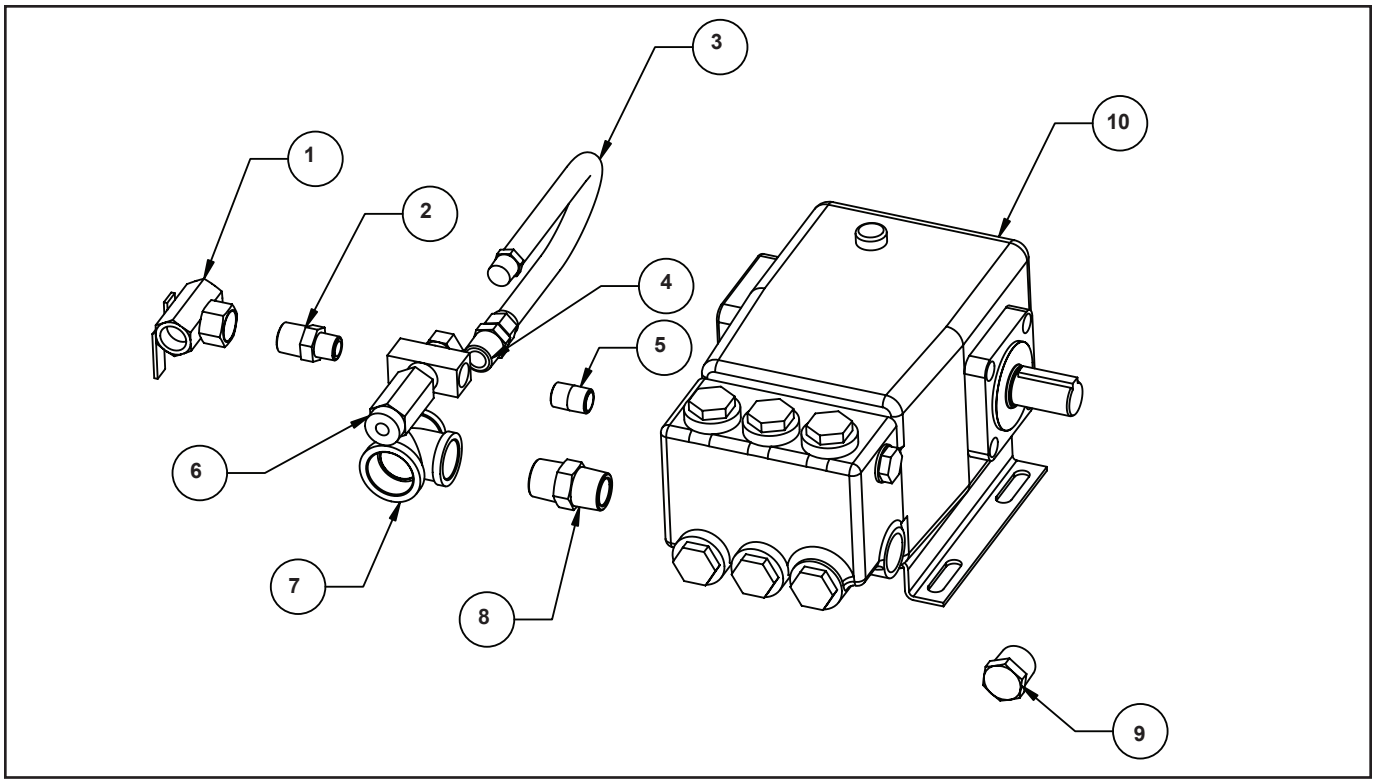
Miscellaneous Standard and Required Components



Ref.	Part No.	Description
1	3304-0025	Calibrate/Inject Valve 1/2" NPT
2	3350-0145	Strainer 1-1/2" - 3012
3	2527-0139	Digital Display Control
4	2520-0048	Control Cable - 6 ft.
	2520-0049	Control Cable - 12 ft. - STD
	2520-0050	Control Cable - 20 ft.
5	2520-0042	Low-Level Sensor Cable
6	2520-0045	Flowmeter Cable - 6 ft.
	2520-0046	Flowmeter Cable - 12 ft. - STD
	2520-0047	Flowmeter Cable - 20 ft.

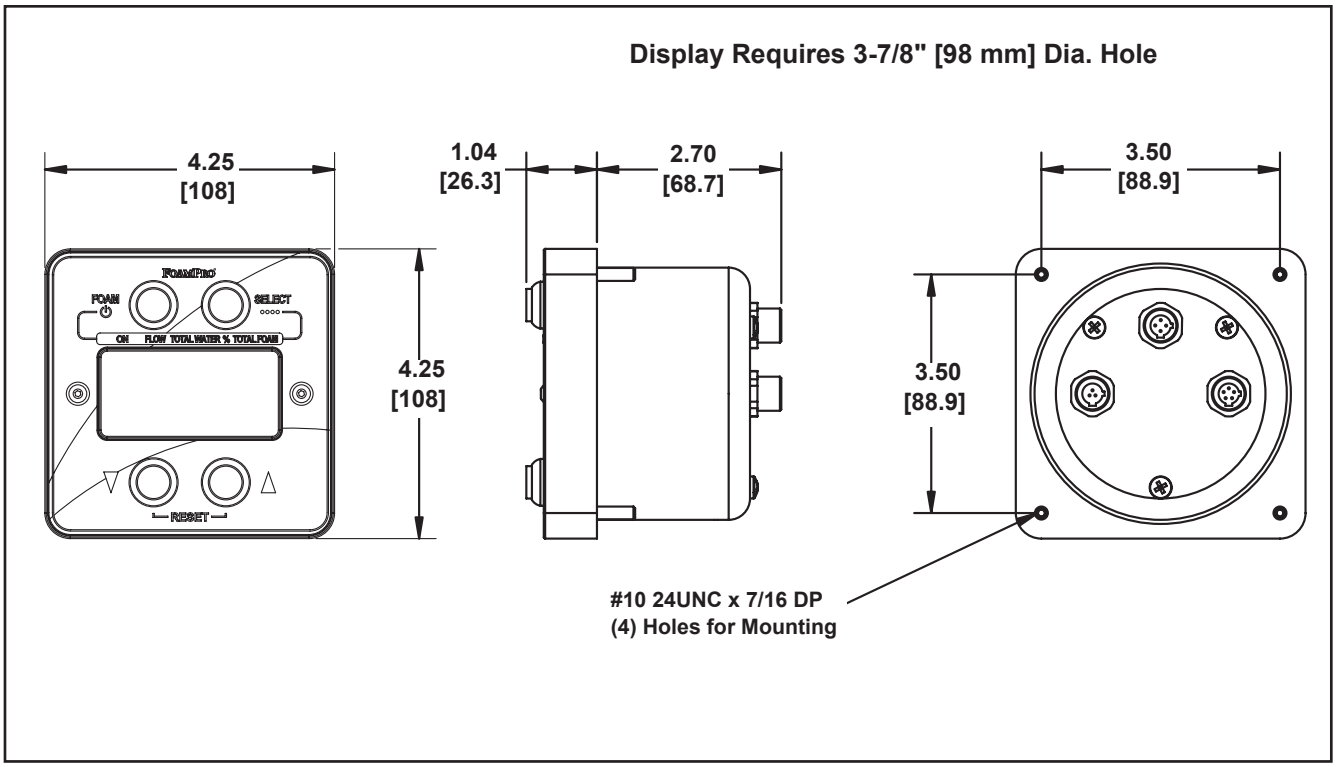
Ref.	Part No.	Description
7	3430-0351	RFI Kit for Controller
	3430-0353	RFI Kit for Flowmeter
8	6032-0012	Instruction Placard
9	3320-0055	Check Valve - 1/2"
10	2500-0041	Hydraulic Pump -13 Tooth - 16/32 Pitch Splined Shaft
11	2510-0028	Low-Level Sensor Vertical
	2510-0032	Low-Level Sensor Horizontal

Parts Identification 3012 Pump Assembly

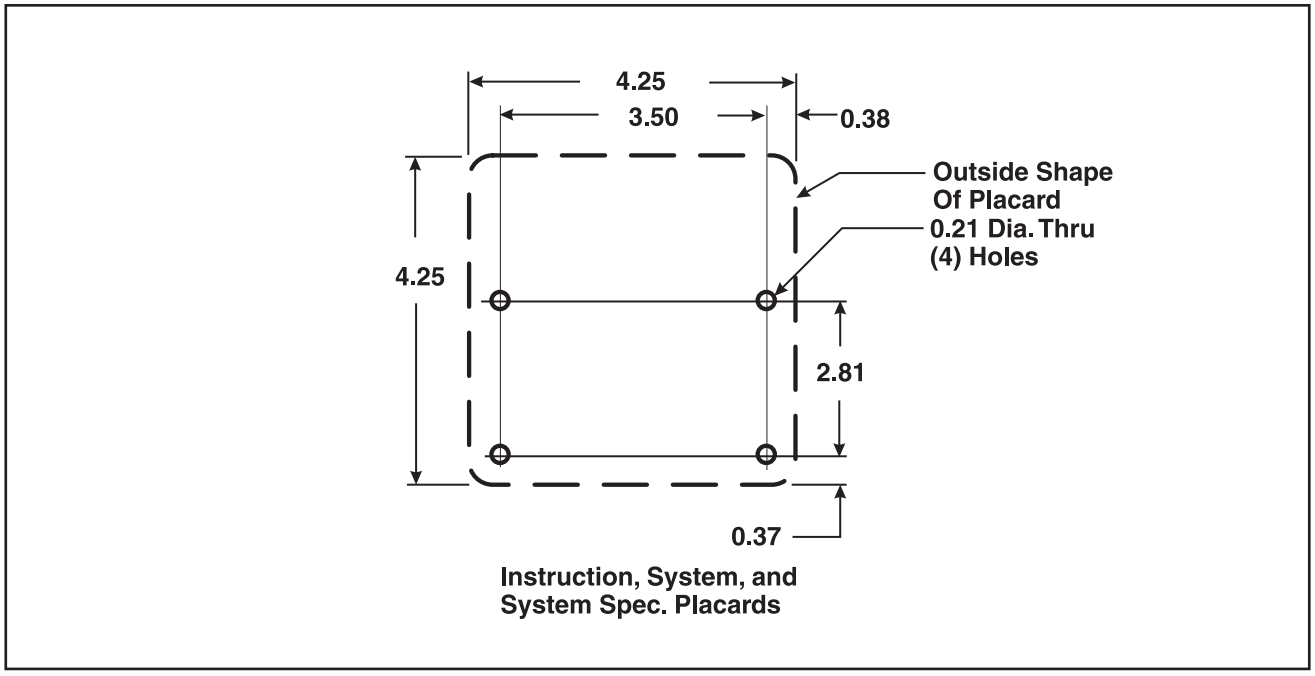


Ref.	Part No.	Description	Qty.
1	3304-0025	Calibrate/Inject Valve - 1/2" NPT	1
2	2404-0271	Reducer	1
3	2900-0049	Bypass Hose	1
4	2404-0272	Reducer	1
5	2402-0017	Nipple - 3/8" NPT	1
6	3300-0092	Relief Valve	1
7	2401-0033	Tee	1
8	2402-0034	Nipple - 3/4" NPT	1
9	21707	Plug - 3/4" NPT	1
10	9910-XWL42.10	Foam Pump	1

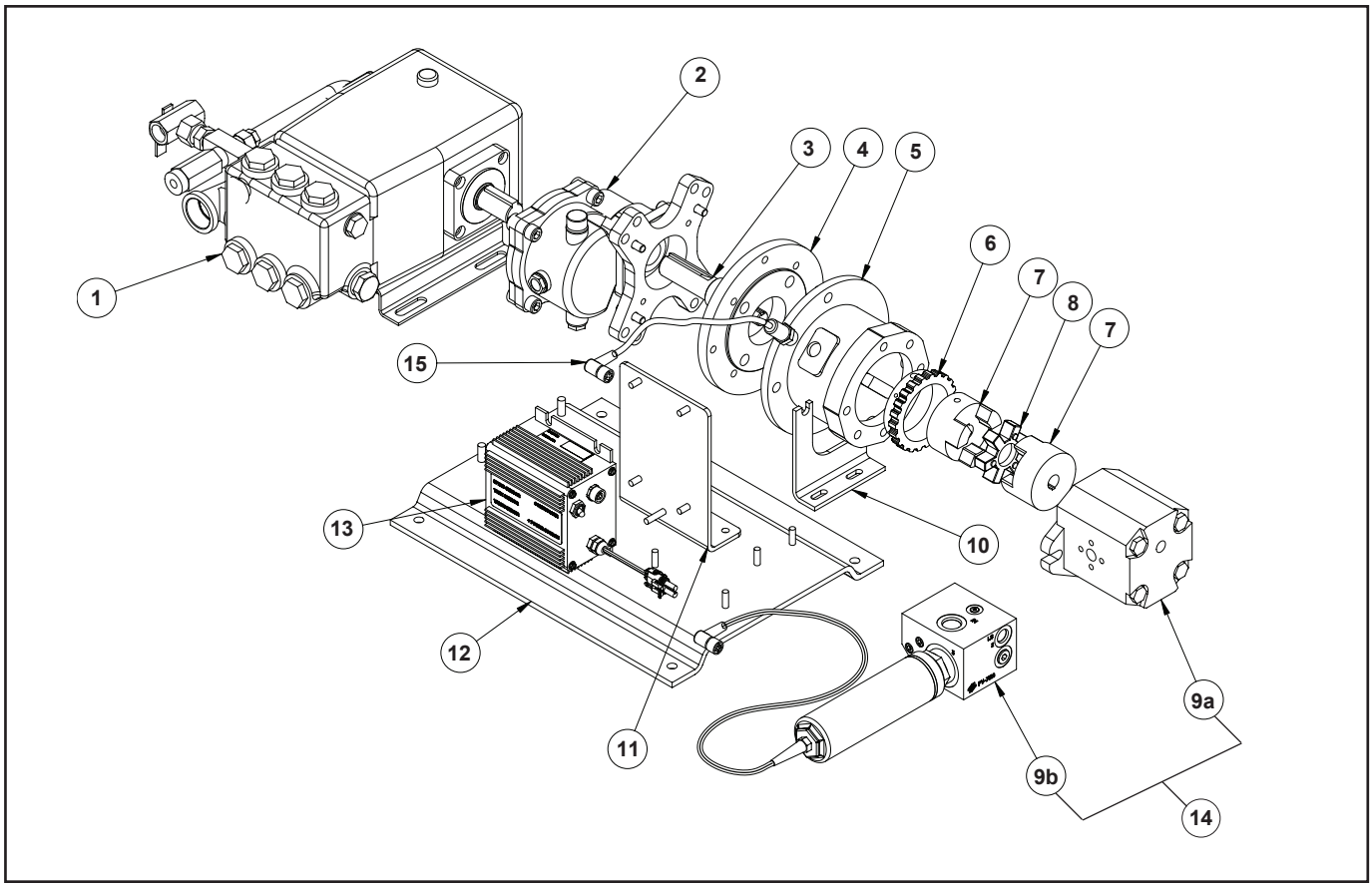
Cutout Dimensions for Display Control Module



Cutout Dimensions for Instruction, System and System Spec. Placards

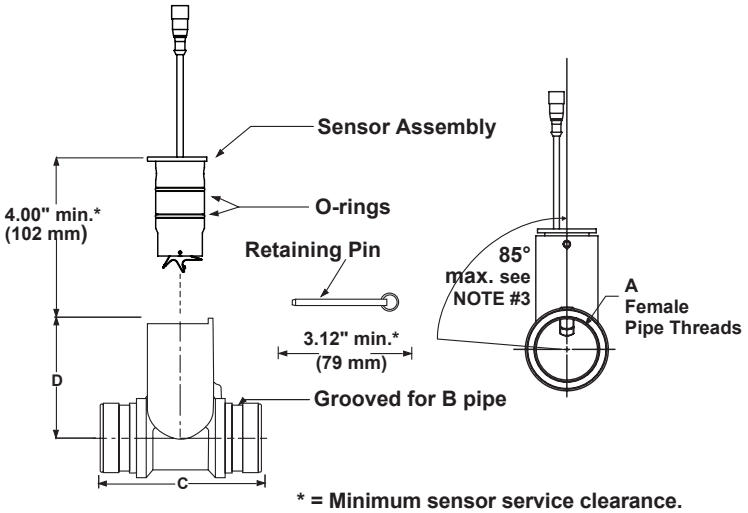


Parts Identification for Foam Pump/Motor Assembly



Ref.	Part No.	Description	Qty
1	8000-0054	Foam Pump Assy.	1
2	9910-KIT1698	Gear Reducer	1
3	2404-0352	Adapter Shaft	1
4	2404-0351	Adapter Plate	1
5	2404-0197	Flange	1
6	3115-0039	Speed Sensor Gear	1
7	2741-0011	Coupling Half - 5/8	2
8	2729-0006	Coupling Insert	1
9a	2500-0039	Hydraulic Motor	1
9b	2590-0018	Flow Control Valve	1
10	1520-0088	Support Bracket	1
11	1520-0086	Valve Driver Bracket	1
12	1510-0108	Base	1
13	2527-0154	Valve Driver	1
14	2500-0055	Hydraulic Valve/Motor Assy	1
15	2530-0092	Speed Sensor	1

FoamPro Flowmeter



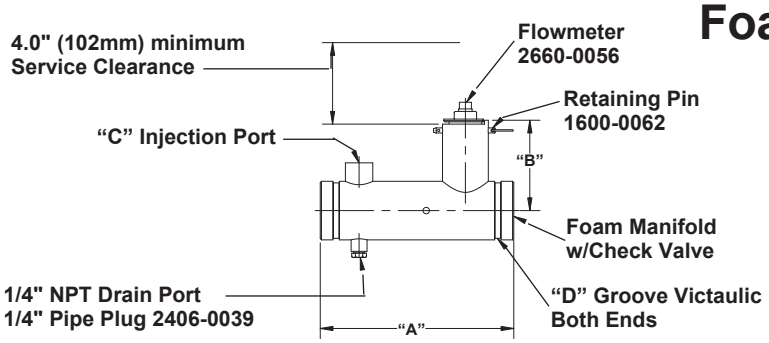
* = Minimum sensor service clearance.

NOTES:

1. **Use CAUTION not to damage sensor during assembly.**
2. **Use Loctite PST 565 or equivalent Teflon tape to seal pipe threads.**
3. **Maximum horizontal installation angle to allow proper water drainage. Unit may also be installed in vertical piping arrangement.**

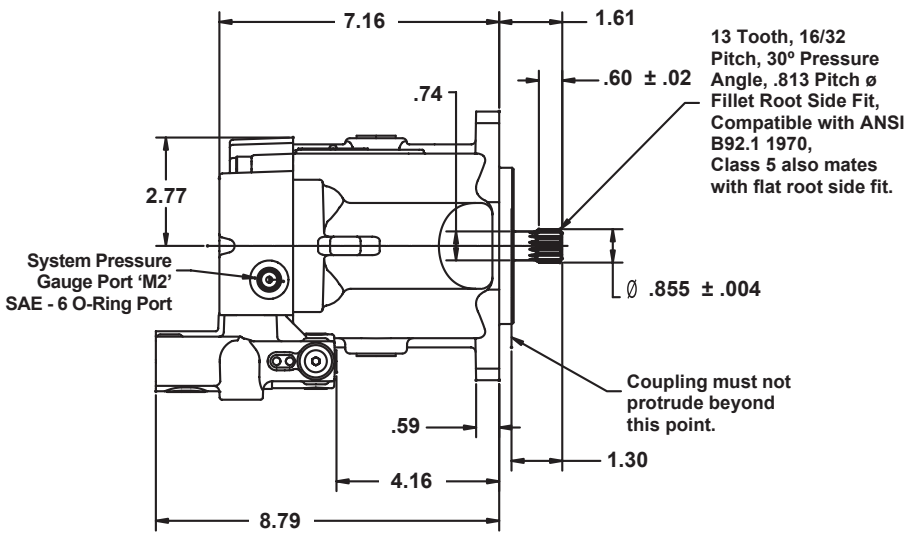
Assy. Part Number	A	B	C	D	Maximum Accuracy Flow Range (gpm)	Maximum Operating Flow Range (gpm)
2660-0030	1-1/2"—11-1/2" NPT NOTE 1'' I.D. Bore	2" Pipe	7-3/8" [188 mm]	3-7/8" [99 mm]	5-110	3-145
2660-0031	1-1/2"—11-1/2" NPT	2" Pipe	5-3/8" [137 mm]	4-1/8" [105 mm]	10-320	3-380
2660-0031B	1-1/2"—11" BSP	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
2600-0033B	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
2600-0034B	3"—11" BSP	4" Pipe	5-1/2" [140 mm]	4-7/8" [124 mm]	30-1150	12-1380
2600-0035	4"—8" NPT	5" Pipe	5-1/2" [140 mm]	5-3/8" [137mm]	55-1980	20-2380
2660-0035B	4"—11" BSP	5" Pipe	5-1/2" [140 mm]	5-3/8" [137mm]	55-1980	20-2380

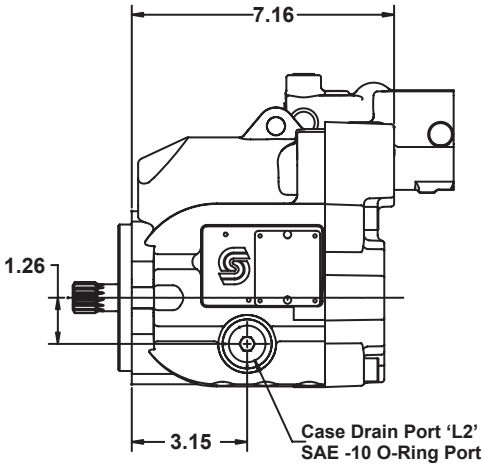
FoamPro Manifold

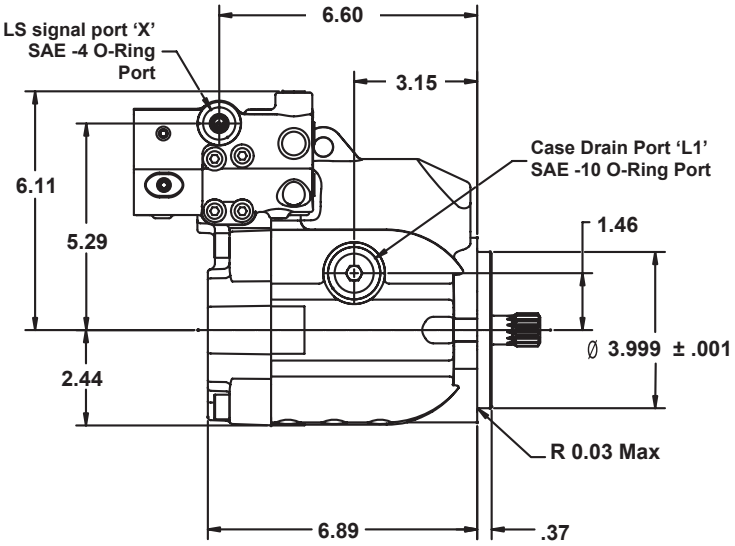


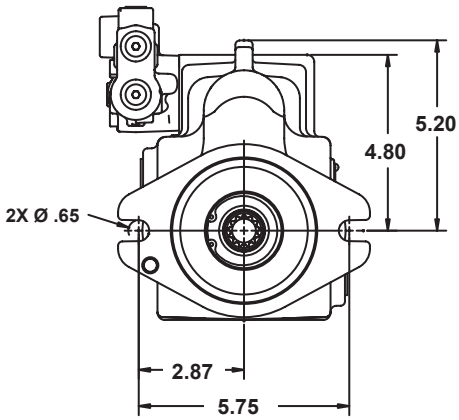
Assy. Part Number	A	B	C	D	Maximum Accuracy Flow Range	Maximum Operating Flow Range
2660-0051	8.5" (216mm)	4.0" (102mm)	1/2" NPT	1-1/2" Pipe	10-320 gpm (38-1211 Lpm)	3-380 gpm (11-1438 Lpm)
2660-0052	8.5" (216mm)	4.3" (109mm)	1/2" NPT	2" Pipe	15-520 gpm (57-1968 Lpm)	5-625 gpm (19-2365 Lpm)
2660-0053	9.5" (241mm)	4.5" (114mm)	3/4" NPT	2-1/2" Pipe	20-750 gpm (76-2840 Lpm)	8-900 gpm (30-3406 Lpm)
2660-0054	9.5" (241mm)	6.3" (160mm)	3/4" NPT	3" Pipe	30-1150 gpm (113-4350 Lpm)	12-1380 gpm (46-5220 Lpm)
2660-0055	11.5" (292mm)	5.2" (132mm	1" NPT	4" Pipe	55-1980 gpm (208-7495 Lpm)	20-2380 gpm (76-9009 Lpm)

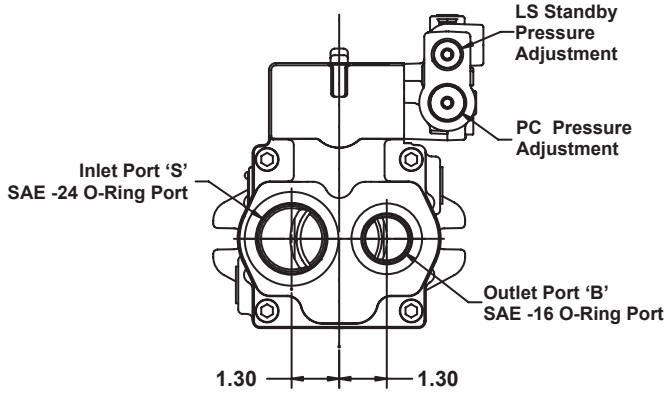
Load-Sensing Pump











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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.

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