



A Safe Fleet Brand

AccuMax II Fury/Fusion Foam Injection System --- Vehicle Mounted & Fixed Systems ---

Pumper Systems

Level #1—500 to 1250 GPM

Foam Pro Models: #3020, #3040, #3060, #3090

Industrial Pumpers and Fixed Systems

Level #2:—1500 to 2500 GPM: Models #3150 & #3300

Level #3—3000 to 6000 GPM: Model #3300

INSTALLATION MANUAL #1



MODEL MAX100



MODEL MAX200

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.

1. CONTENTS

Table of Contents

1. CONTENTS.....	2
2. SAFETY.....	3
Safety Precautions.....	3
3. INTRODUCTION	4
Overview: How the Foam System Works	4
4. INSTALLATION PLANNING.....	6
Installation Guidelines	6
5. FOAM SYSTEM DRAWINGS – BASIC	7
Basic Drawings for Each System.....	7
6. FOAMPRO SUPPLIED COMPONENTS	10
Standard Components	10
7. DISPLAYS AND CONTROLS	21
Fury, Fusion and APEX Displays.....	21
Fury Specifications.....	22
Fusion Specifications	23
APEX Specifications.....	24
8. INSTALLER REQUIREMENTS	25
Installer Supplied Materials and Installation.....	25
9. FOAM SYSTEM -- DATA & MODEL INFORMATION.....	28
Foam Pro Models, Foam Pump Models, & Operational Information.....	28
Foam Pro Models, Foam Pump Models, & Operational Information.....	29
Foam Pro Models, Foam Pump Models, & Operational Information.....	30
10. DRIVE SYSTEMS FOR HYDRAULIC PUMPS	31
Hydraulic Pump -- Power Source	31
11. HYDRAULIC COMPONENT INSTALLATION.....	35
Guidelines—Hydraulic System Installation.....	35
12. HYDRAULIC HOSE INSTALLATION	41
13. FOAM PUMP INSTALLATION	44
Location and Installation.....	44
14. FOAM SYSTEM – INTAKE PLUMBING.....	47
Intake Plumbing – Foam Concentrate.....	47
15. FOAM SYSTEM – DISCHARGE PLUMBING	50
Discharge Plumbing – Foam Concentrate.....	50
16. FOAM /WATER DISCHARGE PLUMBING.....	57
Water Manifold & Foam/Water Discharges – Fire Apparatus	57
17. FOAM SYSTEM AUXILIARY FUNCTIONS	62
Final Installer Requirements -- Mobile Systems.....	62
18. ELECTRICAL AND CABLING INSTALLATION.....	68
General Overview of AccuMax Electrical System	68
19. CHECK-OFF LIST—MAKING SURE EVERYTHING IS WORKING RIGHT.....	80
Limited Warranty	81

2. SAFETY

Safety Precautions

Throughout the AccuMax foam system installation manual, three (3) levels of precautions are denoted as follows:



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



Warnings denote 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.



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



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



- Before attempting to install an AccuMax Foam Injection System, read all of the following safety precautions and follow them carefully.
- Read and understand these installation instructions before proceeding with the system installation and operation.
- Proper ear protection must be worn while operating rotary gear pumps and foam/fire pump systems.
- Proper eye protection is required while operating and maintaining any foam/fire pump system.



- Only utilize components with the proper pressure rating and properly sized drive components when installing the foam pump and fire pump.
- The normal ambient operating temperatures for fixed and mobile foam system applications could vary from -40°F (-40°C) to 130°F (54°C). Special provisions shall be provided by the installer for both extremely low or high operating conditions.
- During installation and testing the installer must monitor operating temperatures inside the pump area, enclosure, or installation area. In addition, SPECIAL ATTENTION must be paid to clearances and insulation protection of valves, plumbing, wiring and other components to the exhaust piping, muffler, and catalytic converters on fire apparatus or fixed installation.
- Optional check valve(s) can be supplied by FoamPro for the discharge manifold or each water discharge line to prevent contamination of potable intake water supply, to meet applicable NFPA #1901 standards. The final installer shall be responsible for foam concentrate discharge contamination hazards and potable intake water supply contamination.
- Maximum Operating Temperatures Inside of the Pump Enclosure: 160° F / 70° C

3. INTRODUCTION

Overview: How the Foam System Works

The FoamPro AccuMax injection system is an electronically controlled, hydraulically driven, foam concentrate proportioning system designed to provide the wide range of foam concentrate injection rates necessary for foam operations. The FoamPro AccuMax system will accurately deliver from 0.1% to 10.0% foam concentrate.

The performance and accuracy of the foam system shall be in compliance to applicable sections of NFPA #1901 (mobile vehicle systems) or NFPA #20 (fixed systems). Please note: the installer shall be responsible for final compliance of the assembled foam installation, setup, and testing to meet NFPA or 3rd party testing requirements.

The FoamPro AccuMax system is a flow-based proportioning system that measures water flow through specified discharges or water manifold and injects the correct proportional amount of foam concentrate to maintain the desired percentage. The FoamPro Fury and Fusion drawings are shown in this section. The basic system is comprised of the following five (5) assemblies for 1 to 15 foam line injectors and discharges:

- a. Hydraulic system:** The hydraulic pump, hydraulic motor, and hydraulic controller shall be supplied by Foam Pro. The hydraulic cooler and reservoir can be supplied by the final installer or are available options from Foam Pro.
- b. Foam System:** Foam line Injectors (FLI) for water manifold (single-point) or each discharge (multi-point), low-flow assembly, Fury or Fusion foam displays, main foam flowmeter, foam pressure transducer, FRC TankVision level display (or optional low-level sensor), and cabling for the entire foam system.
- c. Electrical System:** Shall be comprised of FoamPro furnished electrical communications, cabling and installer supplied power supply fusing and wiring (plus electrical installation of the entire system).
- d. Foam Pump Components:** foam pump, relief valve, and foam pump inlet wye strainer.
- e. Water Discharge Components:** water flowmeter & pressure transducer (single-point) or water flowmeters and pressure transducers on each discharge (multi-point) are supplied by Foam Pro. Fusion and APEX systems have Elkhart electric valves.

The hydraulic controller operates the hydraulic drive system to supply the proper amount of foam concentrate required for the AccuMax operation and foam line controllers in use. A 'wye' strainer shall be installed before the foam pump to protect the positive displacement foam pump from debris. A safety pressure relief valve shall be installed downstream of the foam pump to recirculate foam to the suction side of the foam pump. This relief valve is supply by Foam Pro and is approved by the foam pump manufacturer. Hydraulic power to operate the foam pump is to be provided by a separate hydraulic pump. In mobile systems, it is driven by the transmission mounted PTO and in fixed systems it is driven by an electric motor or diesel engine. The foam concentrate line (from the foam pump) shall have a pressure transducer to control the hydraulic system and to de-stroke the system in overpressure conditions.

The foam line controller (FLI) consists of a foam flowmeter, a foam control valve, a foam injection check valve, a calibrate/inject valve. The AccuMax Fury or Fusion or Fusion/Apex displays communicate the proper information to ensure the proper amount of concentrate to the foam manifold or to the discharge it controls.

The AccuMax II displays are in constant communication with hydraulic controller, foam line injector (FLI), water pressure transducer(s), and water flowmeter(s) to determine the correct amount of foam concentrate required and to control the hydraulic pump to provide the hydraulic flow to drive the foam pump to deliver the proper amount of foam concentrate. Additionally, the AccuMax system monitors the foam flow through the master foam flowmeter from the discharge of the foam pump. The AccuMax Fusion or Fury display menu allows the operator in "menu mode" to display various functions and settings for foam system operator information.

The constant comparison of the water flow and foam flow information by the AccuMax system ensures the desired proportion of foam concentrate, 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 FLI injector. It also controls the foam control valve to allow the proper amount of foam concentrate to be injected into water manifold or individual discharge lines based on the input requirements controlled by the fire pump operator and the information supplied by the foam flowmeter(s) and the water flowmeter(s) regardless of operating pressure.

Each FLI controller operates independently and all FLI assembly(ies) shall communicate with the AccuMax software for total system operation. With a single-point FLI, one pressure transducer is provided. On multi-point Fusion FLI controllers and water pressure transducers are provided, installed on each discharge (to indicate discharge “line pressure” readings). Foam concentrate shall be injected directly into the water manifold or into each discharge of specified foam/water discharges.

The water line flowmeter measures the water flow and sends a signal to the display(s). A water pressure transducer shall be installed on the water manifold (single-point) or each water/foam solution discharge line.

On vehicle mounted systems: 12/24-volt electrical power to operate the foam system shall be provided by the chassis electrical system.

On fixed systems: 12/24-volt electrical power to operate the foam system shall be provided by a separate battery and charger system by the installer. In both electrical systems, the final installer shall be responsible for power supply wiring and fuse protection per the electrical section of this installation manual.

4. INSTALLATION PLANNING

Installation Guidelines

Because of the potential differences in apparatus plumbing and foam system configuration, it is not practical to depict every FoamPro AccuMax Multi-Point system installation that could be installed onto custom built fire apparatus. Most of the information contained in the following sections, however, will apply typical installations.

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

Locate the FoamPro AccuMax system components in an area that is protected from road debris and excessive heat buildup. Since the CAL/INJECT valves and other components may need to be accessed, it is recommended that the Fury and Fusion controls be installed in an accessible location on the operator's panel.

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

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

Like any hydraulic system, the FoamPro AccuMax MP will require cooling and hydraulic fluid filtration. An oil cooler must be provided for the system and consideration must be given to the location. The cooler must be mounted in an area where adequate cool air can flow over the cooler fins. Fluid filtration is vital to a hydraulic system. A suction strainer in the reservoir is required. A hydraulic oil filter is provided on hydraulic systems.

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

The AccuMax systems are designed to be used with gear type foam pumps currently in production in the USA. The foam pumps used in the FoamPro systems are manufactured by Trident, Fire Lion and Edwards.

Information pertaining to the foam pump manufacturers and engineering support information can be found on the Foam Pro website or on the website for each manufacturer:

A. Trident Emergency Products: <https://tridentdirect.com/foam-products/>

B. Fire Lion Global: <https://www.firelionglobal.com/>

C. Edwards Foam Pumps– <https://www.pentair.com/en/products/fire-suppression/pentair-aurora-pumps-and-packaged-systems.html>

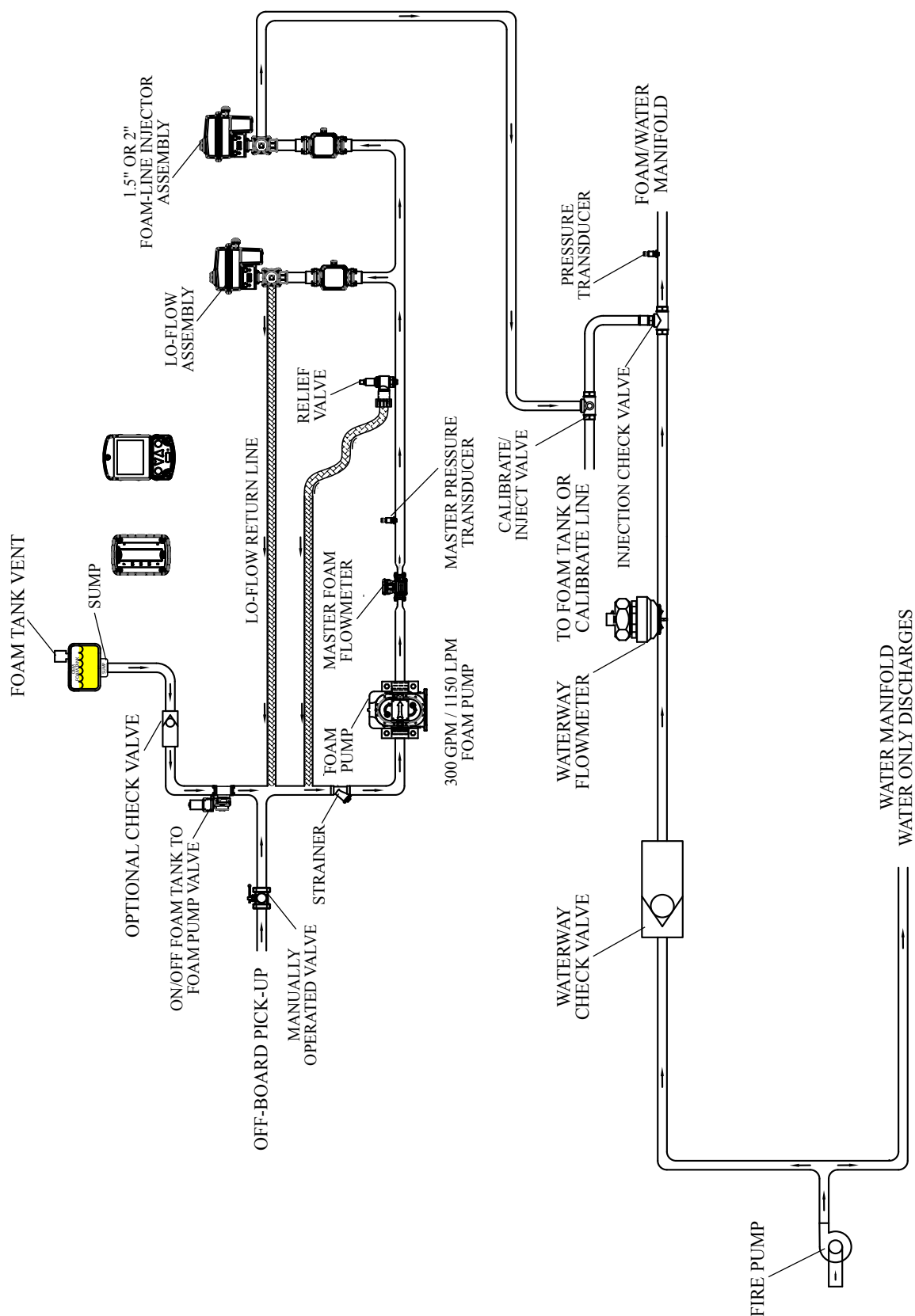


- It is recommended that you read the following sections thoroughly before beginning installation of the FoamPro AccuMax Multi-Point system. It is also recommended that you spend time planning and designing where and how you intend to install this unit in the apparatus before beginning the actual installation.

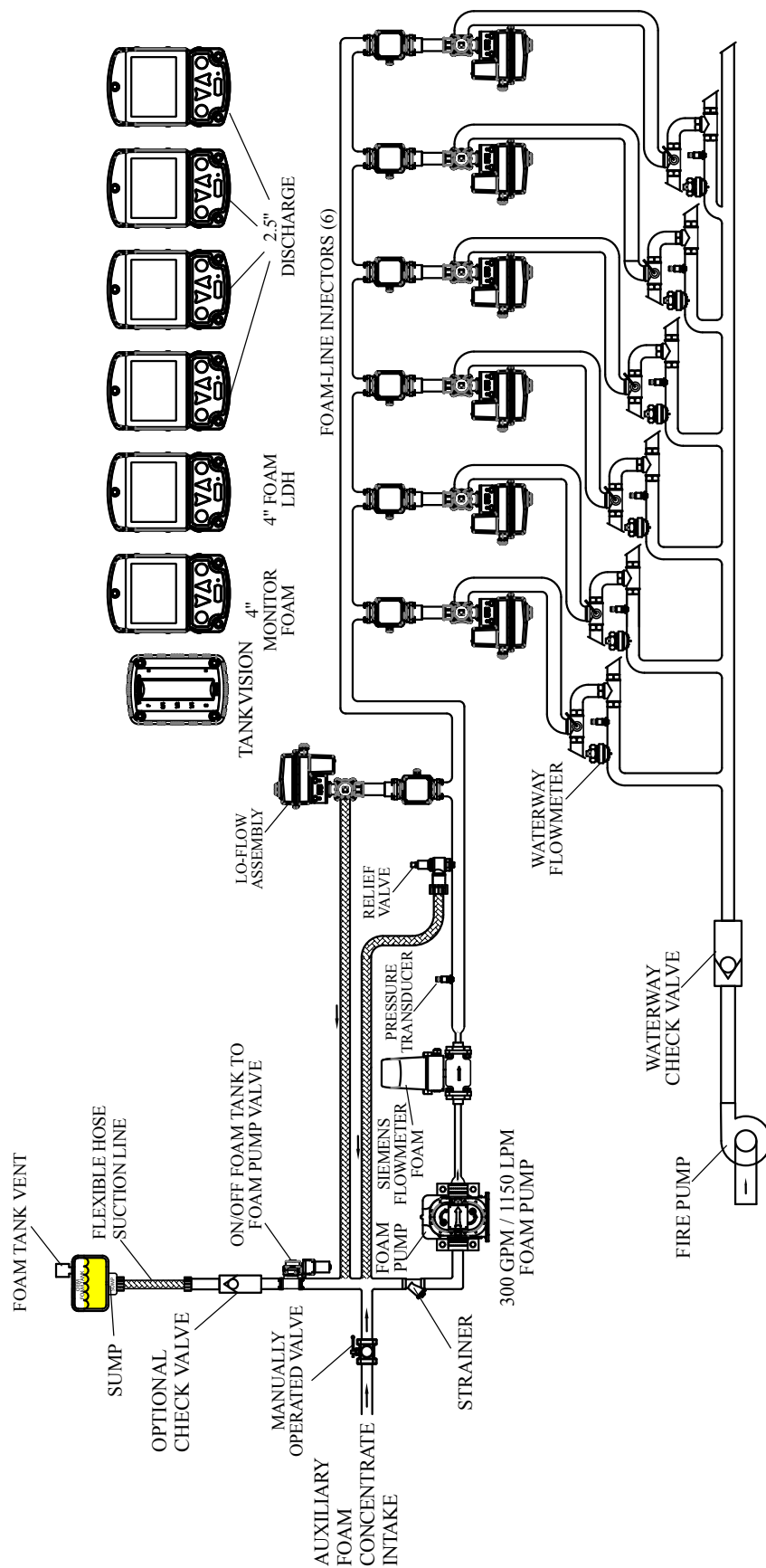
5. FOAM SYSTEM DRAWINGS – BASIC

Basic Drawings for Each System

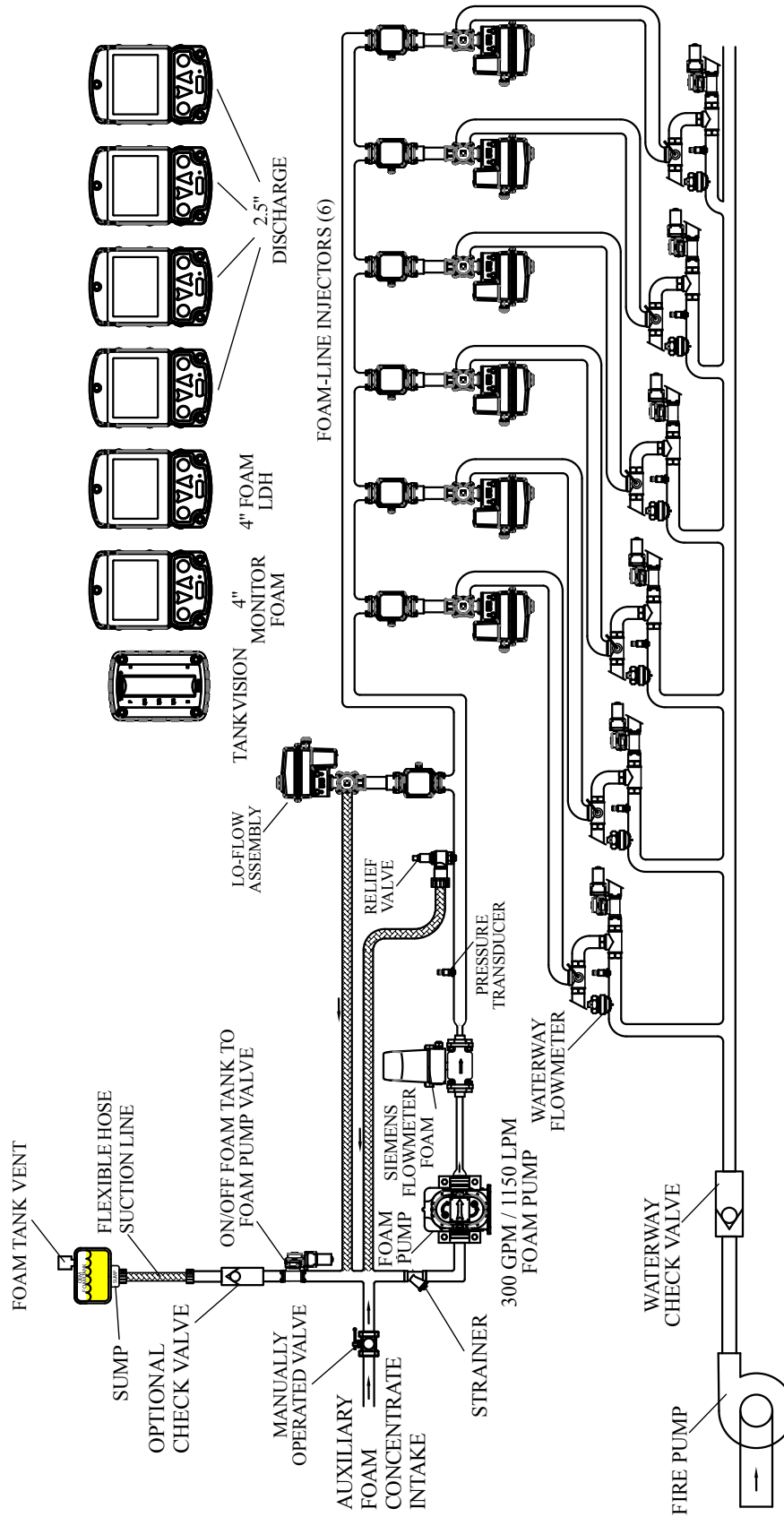
Drawing #1–Fury Single-Point



Drawing #2-Fury Multi-Point



Drawing #3—Fusion Multi-Point



6. FOAMPRO SUPPLIED COMPONENTS

Standard Components

The AccuMax fixed and vehicle mounted foam systems are comprised of the following FoamPro supplied major components:

1. Hydraulic system components – supplied by FoamPro:

- a. Variable displacement hydraulic pump
- b. Hydraulic motor
- c. Hydraulic controller system

2. Foam system and electrical components – supplied by FoamPro:

- a. Foam line injector (FLI) comprised of foam flowmeter, electric foam control valve, calibration valve, and check valve (number and size of FLI shall be specified for multi-point systems)
- b. Foam system display(s) (Fury, Fusion, or Fusion & APEX)
- c. Low-flow foam line injector
- d. Foam concentrate tank level display (FRC TANK VISION) and optional low-tank level sensor in place of tank level display
- e. Master foam flowmeter
- f. Master foam system pressure transducer
- g. CAN Bus electrical cabling for entire foam system (subject to variable cable lengths and number of discharges)

3. Foam pump components – supplied by FoamPro:

- a. Positive displacement rotary gear foam pump
- b. Relief valve downstream of foam pump
- c. Foam pump inlet strainer

4. Discharge water components – supplied by FoamPro:

- a. Fire pump discharge water flowmeter for single-point system and specified number of water flowmeters on multi-point system for both Fury and Fusion foam systems
- b. Water pressure transducer on water manifold (single-point system) or on each water discharge line (multi-point system)
- c. Fusion and APEX: water/foam solution discharge line pressure transducers
- d. Fusion and APEX: each water/foam solution discharge lines shall be supplied with Elkhart electric valves, in sizes as specified.




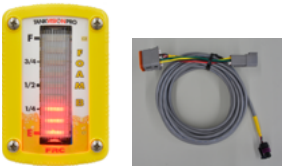






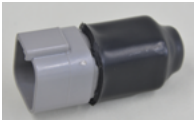
5. Testing and calibration – supplied by FoamPro:

- a. All cabling, foam line injectors, low-flow, hydraulic pump, motor, and hydraulic controller, and specified standard and optional equipment shall be assembled, “pretested”, and calibrated prior to shipment to final installer.
- b. Calibration and testing shall be performed with water (in place of foam concentrate)

NOTE: Please refer to the Operation/Service/Parts manual for part numbers, descriptions, and dimensions for all AccuMax components.

#1: FOAM PRO ACCUMAX -- STANDARD COMPONENTS -- FURY "SINGLE POINT"			
ITEM	DESCRIPTION	QTY	PHOTO
1	FURY -- Single Point Display	1	
2	Foam Pump and Hydraulic motor Manufacturer _____ GPM/LPM Size: _____	1	
3	Hydraulic Variable Output Pump (Model: _____)	1	
4	Relief Valve -- foam discharge Size: 2.5"/65mm	1	
5	Strainer on foam pump intake line Size: 4 "/100mm	1	
6	Master Foam Flowmeter Siemens Size: 2" / 50mm	1	
7	Master Foam Discharge Pressure Transducer Size .250" NPT Male	1	
8	Bypass 'Low-Flow' 1"/25mm Assembly	1	
9	LOW-FLOW cable assembly: length 10'/3M (1)3-pin Master foam pressure (red) and (1) 3-pin Master foam flowmeter (yellow) x 6-pin receptacle (connects to low-flow bypass valve)	1	
10	Foam-Line-Injector -- Foam Pro Single Point, electric valve, foam meter, calibration valve, and check valve Size: 1/2", 1", 1.5", 2" (2" PHOTO SHOWN) Size: 12mm, 25mm, 40mm, 50mm	1	












#1: FOAM PRO ACCUMAX -- STANDARD COMPONENTS -- FURY "SINGLE POINT"

11	Water Flowmeter & Sender: Type: S/S weld (standard) Optional: Victaulic, NPT, Saddle Clamp Size: 2", 2.5", 3", 4", >5" Size: 50mm, 65mm, 80mm, 100mm, >125mm	1	
12	Master Water Pressure Transducer Size .250" NPT Male	1	
13	FOAM INJECTOR cable assembly: to Master water flowmeter and Master pressure transducer: length 10'/3M 3M (Standard) gray (1) 3-pin foam pressure (red) and (1) 3-pin master foam flowmeter (yellow) x 6-pin receptacle (to FLI injector valve)	1	
14	Foam Tank Display TANKVISION FRC: includes sensor for foam tank, cable (length: ___ ft/M), and display	1	
15	Hydraulic Controller Module	1	
16	Hydraulic Module to Hydraulic Pump Cable 4-pin Multi-pack connectors, Length: 10'/3M	1	
17	Power supply terminals, (1) red and (1) black, with 12-pin receptacles & plugs	2	
18	Power Supply "TEE" w/(2) 2-pin Plug/Receptacle	1	
19	Power/Data Extension Cables (Length: 3FT/1M Optional Lengths Available)	2	
20	Power/Data "TEE" Connector Cables	5	
21	Terminator Receptacles 6-pin	2	



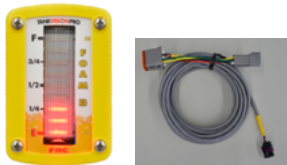




#2: FOAM PRO ACCUMAX -- STANDARD COMPONENTS -- FURY "MULTI-POINT" (6 DISCHARGES)			
ITEM	DESCRIPTION	QTY	PHOTO
1	FURY Displays (one for each water/foam discharge)	6	
2	Foam Pump and Hydraulic motor Manufacturer: TRIDENT GPM/LPM Size: 300GPM/1125LPM	1	
3	Hydraulic Variable Speed Pump	1	
4	Relief Valve -- foam discharge Size: 2.5"/65mm	1	
5	Strainer on foam pump intake line Size: 4 "/100mm	1	
6	Master Foam Flowmeter Siemens Size: 2" / 50mm	1	
7	Master Foam Discharge Pressure Transducer Size .250" NPT Male	1	
8	Bypass 'Low-Flow' 1"/25mm Assembly	1	
9	LOW-FLOW cable assembly: length 10'/3M (1)3-pin Master foam pressure (red) and (1) 3-pin Master foam flowmeter (yellow) x 6-pin receptacle (connects to low-flow bypass valve)	1	
10	Foam-Line-Injector: 2"/50mm discharge: Size: 1/2" / 12mm Foam Concentrate Flow: 26GPM/97LPM	0	
11	Foam-Line-Injector: 2.5"/65mm or 3"/80mm discharge: Size: 1" / 25mm Foam Concentrate Flow: 60GPM/225LPM	4	
12	Foam-Line-Injector for 4"/100mm or 6"/150mm discharge Size: 1.5" / 40mm Foam Concentrate Flow: 150GPM/560LPM	2	

#2: FOAM PRO ACCUMAX -- STANDARD COMPONENTS -- FURY "MULTI-POINT" (6 DISCHARGES)





13	Foam-Line-Injector for 6"/150mm or larger Size: 2" / 50mm Foam Concentrate Flow: 300GPM/1125LPM	0	
14	Water Pressure Transducer Size .250" NPT Male	6	
15	Water Flowmeter & Sender Type: S/S weld (standard) Optional: Victaulic, NPT, Saddle Clamp Size: 2", 2.5", 3", 4", 5" and larger Size: 50mm, 65mm, 80mm, 100mm, 125mm and larger	6	
16	FOAM INJECTOR cable assembly: to water discharge flowmeters and pressure transducers: Length: 10FT/3M (Standard) gray (1)3-pin foam pressure (red) and (1) 3-pin master foam flowmeter (yellow) x 6-pin receptacle (to FLI injector valve)	6	
17	Foam Tank Display TANKVISION FRC: includes sensor for foam tank, cable (length: 10 ft/ 3M) (Standard) and display	1	
18	Hydraulic Controller Module	1	
19	Hydraulic Module to Hydraulic Pump Cable 4-pin Multi-pack connectors, Length: 10'/3M	1	
20	Power supply terminals, (1) red and (1) black, with 12-pin receptacles and plugs	2	
21	Power Supply "TEE" w/(2) 2-pin Plug/Receptacle	2	
22	Power/Data Extension Cables (Length: 3FT/1M)	2	
23	Power/Data "TEE" Connector Cables	16	
24	Terminator Receptacles 6-pin	2	

#3: FOAM PRO ACCUMAX -- STANDARD COMPONENTS -- FUSION "MULTI-POINT" (6 DISCHARGES)			
ITEM	DESCRIPTION	QTY	
1	FUSION Displays (one for each water/foam discharge)	6	
2	Foam Pump Manufacturer TRIDENT 350 GPM/1300 LPM	1	
3	Hydraulic Variable Speed Pump	1	
4	Relief Valve -- foam discharge Size: 2.5"/65mm	1	
5	Strainer on foam pump intake line Size: 4"/100mm	1	
6	Master Foam Flowmeter Siemens Size: 2" / 50mm	1	
7	Master Foam Discharge Pressure Transducer Size .250" NPT Male	1	
8	Bypass 'Low-Flow' 1"/25mm Assembly	1	
9	LOW-FLOW cable assembly: Length 10'/3M (1) 3-pin Master foam pressure (red) and (1) 3-pin Master foam flowmeter (yellow) x 6-pin receptacle (connects to low-flow bypass valve)	1	
10	Foam-Line-Injector: 2"/50mm discharge: Size: 1/2" / 12mm Foam Concentrate Flow: 26GPM/97LPM	0	
11	Foam-Line-Injector: 2.5"/65mm or 3"/80mm discharge: Size: 1" / 25mm Foam Concentrate Flow: 60GPM/225LPM	4	




#3: FOAM PRO ACCUMAX -- STANDARD COMPONENTS -- FUSION "MULTI-POINT" (6 DISCHARGES)

12	Foam-Line-Injector for 4"/100mm or 6"/150mm discharge Size: 1.5" / 40mm Foam Concentrate Flow: 150GPM/560LPM	2	
13	Foam-Line-Injector for 6"/150mm or larger Size: 2" / 50mm Foam Concentrate Flow: 300GPM/1125LPM	0	
14	Water Pressure Transducer Size .250" NPT Male	6	
15	Water Flowmeter & Sender (REQUIRES SIZE & TYPE) Type: S/S weld (standard) Optional: Victaulic, NPT, Saddle Clamp Size: 2", 2.5", 3", 4", 5" and larger Size: 50mm, 65mm, 80mm, 100mm, 125mm and larger	6	
16	FOAM INJECTOR cable assemblies: to water discharge flowmeters and pressure transducers: Length: 10'/3M (Standard) M gray (1)3-pin foam pressure (red) and (1) 3-pin master foam flowmeter (yellow) x 6-pin receptacle (to FLI injector valve)	6	
17	Foam Tank Display TANKVISION FRC: includes sensor for foam tank, cable Length: : 10 FT/ 3 M (Standard)	1	
18	Hydraulic Controller Module	1	
19	Hydraulic Module to Hydraulic Pump Cable 4-pin Multi-pack connectors. Length: 10ft / 3m	2	
20	Power supply terminals, (1) red and (1) black, with 12-pin receptacles and plugs	2	
21	Power Supply "TEE" w/(2) 2-pin Plug/Receptacle	2	
22	Power/Data Isolator	1	


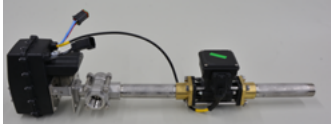








#3: FOAM PRO ACCUMAX -- STANDARD COMPONENTS -- FUSION "MULTI-POINT" (6 DISCHARGES)

23	Power/Data Extension Cables (Length: 3FT/1M Optional Lengths Available)	2	
24	Power/Data "TEE" Connector Cables	16	
25	Terminator Receptacles 6-pin	2	
26	Elkhart 2"/50mm electric discharge ball valve	0	
27	Elkhart 2.5"/65mm electric discharge ball valve	4	
28	Elkhart 3"/80mm electric discharge ball valve	0	
29	Elkhart 4"/100mm electric discharge ball valve	2	
30	Elkhart 6"/150mm electric discharge ball valve	0	
31	Cable for valve data control Optional Various Lengths Available	8	

**#4: FOAM PRO ACCUMAX -- STANDARD COMPONENTS --
FUSION/APEX "MULTI-POINT" (6 DISCHARGES)**

ITEM	DESCRIPTION	QTY	
1	FUSION Displays for water/foam discharge	4	
2	APEX Displays for water/foam discharge	2	
3	Foam Pump Manufacturer: TRIDENT 350 GPM/1300 LPM	1	
4	Hydraulic variable speed Pump		
5	Relief Valve -- foam discharge Size: 2.5"/65mm	1	
6	Strainer on foam pump intake line Size: 4"/ 100mm	1	
7	Master Foam Flowmeter Siemens Size: 2" / 50mm	1	
8	Master Foam Discharge Pressure Transducer Size .250" NPT Male	1	
9	Bypass 'Low-Flow' 1"/25mm Assembly	1	
10	LOW-FLOW cable assembly: Length 10'/3M (1)3-pin Master foam pressure (red) and (1) 3-pin Master foam flowmeter (yellow) x 6-pin receptacle (connects to low-flow bypass valve)	1	

#4: FOAM PRO ACCUMAX – STANDARD COMPONENTS – FUSION/APEX "MULTI-POINT" (6 DISCHARGES)

11	Foam-Line-Injector: 2"/50mm discharge: Size: 1/2" / 12mm Foam Concentrate Flow: 26GPM/97LPM	0	
12	Foam-Line-Injector: 2.5"/65mm or 3"/80mm discharge: Size: 1" / 25mm Foam Concentrate Flow: 60GPM/225LPM	0	
13	Foam-Line-Injector for 4"/100mm or 6"/150mm discharge Size: 1.5" / 40mm Foam Concentrate Flow: 150GPM/560LPM	4	
14	Foam-Line-Injector for 6"/150mm or larger Size: 2" / 50mm Foam Concentrate Flow: 300GPM/1125LPM	0	
15	Water Pressure Transducer Size 0.250" NPT Male	6	
16	Water Flowmeter & Sender Type: S/S weld (standard) Optional: Victaulic, NPT, Saddle Clamp Size: 2", 2.5", 3", 4", 5" and larger Size: 50mm, 65mm, 80mm, 100mm, 125mm and larger	6	
17	FOAM INJECTOR cable assemblies: to water discharge flowmeters and pressure transducers: Length: : 10 ft / 3m (Standard) gray (1)3-pin foam pressure (red) and (1) 3-pin master foam flowmeter (yellow) x 6-pin receptacle (to FLI injector valve)	6	
18	Foam Tank Display TANKVISION FRC: includes sensor for foam tank, cable 10 ft / 3m (Standard) and display	1	
19	Hydraulic Controller Module	1	
20	Hydraulic Module to Hydraulic Pump Cable 4-pin Multi-pack connectors. Length: 10 ft / 3m	1	

#4: FOAM PRO ACCUMAX – STANDARD COMPONENTS -- FUSION/APEX "MULTI-POINT" (6 DISCHARGES)

21	Power supply terminals, (1) red and (1) black, with 12-pin receptacles and plugs	2	
22	Power Supply "TEE" w/(2) 2-pin Plug/receptacles	2	
23	Power/Data Isolator	1	
24	Power/Data Extension Cables (Length: 3ft / 1m Optional Lengths Available)	2	
25	Power/Data "TEE" Connector Cables	18	
26	Terminator Receptacles 6-pin	2	
27	Elkhart 2"/50mm electric discharge ball valve	0	
28	Elkhart 2.5"/65mm electric discharge ball valve	4	
29	Elkhart 3"/80mm electric discharge ball valve	0	
30	Elkhart 4"/100mm electric discharge ball valve	2	
31	Elkhart 6"/150mm electric discharge ball valve	0	
32	Cables for valve data control Optional Various Lengths Available	8	

7. DISPLAYS AND CONTROLS

Fury, Fusion and APEX Displays

Color-Coded Rain Guard

Fury, Fusion, and APEX displays shall be equipped with a color-coded removable rain guard at the top of each display. The rain guard deflects water and dirt from running down the display. The colors shall comply to NFPA #1901 discharge line colors. The discharge display color shall match the discharge color (installer responsibility).

Displays: FURY, FUSION, APEX

High brightness LCD screen shall have numerical, alpha, and graphical displays for discharge and foam system operations. Each display (FURY, FUSION, and APEX) are unique, with various selectable buttons, menus, and functional operations. System messages and errors are shown through indicators on the display. See further details of the screen elements in the Operation manual. See further details of the screen elements in the later Sections in the Installation Manual #1 and Operation/Service/Parts Manual #2.

Foam Delivery ON/OFF Button

The RED button turns foam delivery to the manifold or discharges: **ON** or **OFF**. To turn ON or OFF, press and hold this button for two seconds. When foam delivery is ON, the foam concentrate will be delivered at a specified rate as soon as water flow from the discharge is detected.

Up/Down Buttons

The **YELLOW** buttons with **UP/DOWN** arrows control the foam proportioning rate adjustment either incrementally higher or lower.

- a. When pressed once: a lower (**DOWN**) and higher (**UP**) preset for foam proportioning rate will be recalled (if it exists).
- b. For fine adjustment of foam proportioning rate: press and hold either the **UP/DOWN** button. The rate will start to adjust up/down by 0.1% steps; release this button to stop the adjustment.
- c. **NOTE:** a temporary preset at the current value will be added when the button is released. Presets can be changed, added or deleted by using **USER SETTINGS** from the main **MENU** button.

Select button

When the **BLUE** 'SELECT' button is **pushed**, it changes the data displayed on selectable display located on the bottom of display screen. The button allows operator to read out values for various system parameters as needed. Additionally, it will also allow operator to access "**Water Flow Simulation Mode**". The parameters listed below are selectable with this button can be customized to operator's need using **USER SETTINGS** from the **MENU** button.

List of Available Parameters that can be Selected:

- Foam Total Volume *
- Foam Flow System
- Foam Total Volume System
- Foam Tank Level [1]
- Foam Tank Time to Empty* [1]
- Foam Manifold Pressure
- Water Pressure [2]
- Water Flow *
- Water Total Volume*
- Water Total Volume System
- Water Simulated Flow **

NOTE 1: * enabled to be displayed by default

NOTE 2: ** always enabled

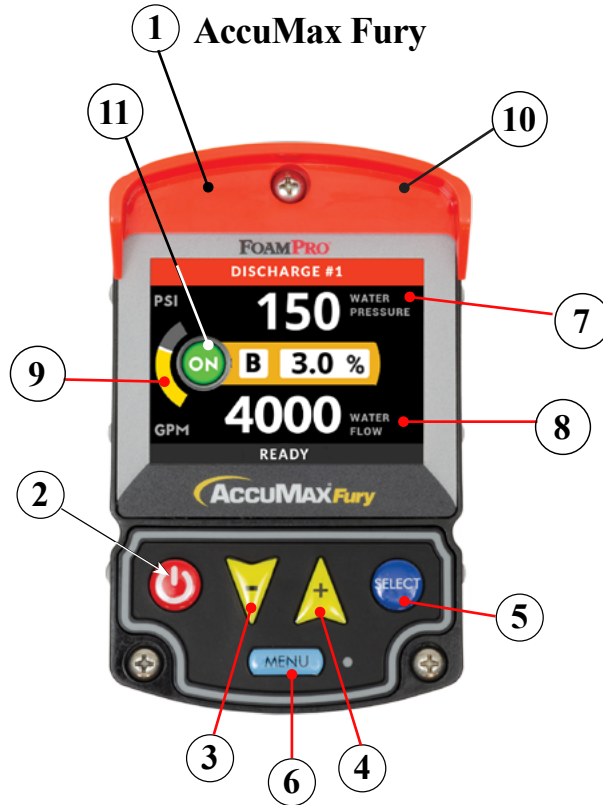
NOTE 3: [1] - for systems equipped with TankVision Foam Tank Gauge

NOTE 4: [2] - Fusion (MAX200 Model Only)

Fury Specifications

Foam/Water Discharge Control Specifications

The Foam Pro AccuMax II Fury foam system shall manage: pin-point foam concentrate injection, continuous monitoring of both water flow and foam flow, and communications to the hydraulic pump for speed and hydraulic fluid output. The foam/water discharge configuration shall include the following components:



- | | |
|--|---|
| 1. FURY Display | 7. Water Pressure Indicator (PSI/BAR) |
| 2. RED: Foam Delivery ON/OFF button | 8. Water Flow Rate (GPM/LPM) |
| 3. YELLOW: Down button (Adjust to lower preset foam %; press and hold) | 9. Foam Tank Level Indicator |
| 4. YELLOW: Up button (Adjust to higher preset foam %; press and hold) | 10. Rain Guard (above display) |
| 5. BLUE: Select button | 11. Foam System ON/OFF Indicator on Display |
| 6. LIGHT BLUE: Menu button | |

Fusion Specifications

Foam/Water Discharge and Electric Valve Controls Specifications

The Foam Pro AccuMax II Fusion foam system shall manage: pin-point foam concentrate injection, continuous monitoring of both water flow and foam flow, and communications to the hydraulic pump for speed and hydraulic fluid output.

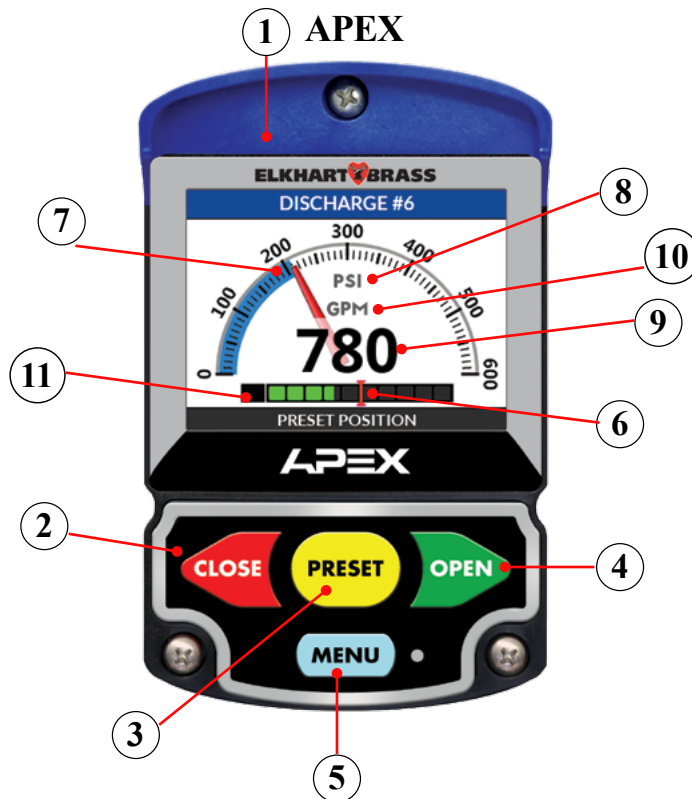


- | | |
|--|---|
| 1. FUSION Display | 9. LIGHT BLUE: Menu button |
| 2. RED: Foam Delivery ON/OFF button | 10. Water Pressure Indicator (PSI/BAR) |
| 3. YELLOW: Down button (Adjust to lower preset foam %; press and hold) | 11. Water Flow Rate (GPM/LPM) |
| 4. YELLOW: Up button (Adjust to higher preset foam %; press and hold) | 12. Tank Level Indicator |
| 5. BLUE: Select button | 13. Rain Guard (above display) |
| 6. YELLOW: Water Valve Preset button | 14. Valve position indicator (bottom bar) |
| 7. RED: Water Valve Close button | 15. Foam System ON/OFF Indicator on Display |
| 8. GREEN: Water Valve Open button | |

APEX Specifications

Electric Valve Control Specifications

When the Foam Pro AccuMax APEX displays are used with a Fusion multi-point foam system, they shall provide: pin-point foam concentrate injection, continuous monitoring of both water flow and foam flow, and communications to the hydraulic pump for speed and hydraulic fluid output. The water/foam discharge components shall have either: individual line injectors for "packaged" discharge assemblies" for a combination of water/foam discharges piped from separate water/foam manifold.



- | | |
|---------------------------------|--|
| 1. APEX Display | 7. Pressure Gauge Scale & Pointer |
| 2. RED: Valve Close button | 8. Pressure unit of measure (PSI or BAR) |
| 3. YELLOW: Valve Preset button | 9. Water Flow Rate (GPM or LPM) |
| 4. GREEN: Valve Open button | 10. Water Flow unit of measure (GPM or LPM) |
| 5. LIGHT BLUE: Menu button | 11. Valve position indicator (red=CLOSED and black=OPEN) |
| 6. Valve Preset Position Marker | |

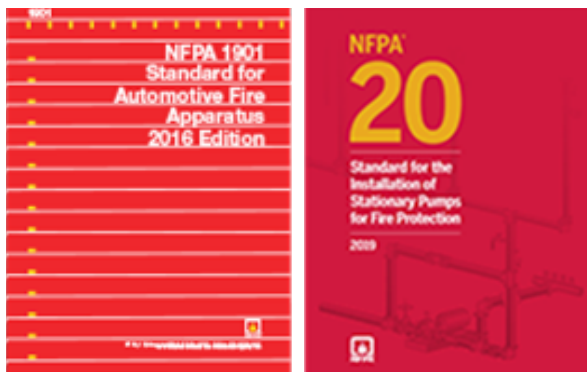
8. INSTALLER REQUIREMENTS

Installer Supplied Materials and Installation

FoamPro AccuMax systems are provided with pre-engineered and configured components and accessories required for installation. Due to differences in fixed systems and mobile vehicle applications and their configurations, the installer must pay close attention to applicable NFPA standards. The final installer must provide foam and water tools, fire pump, fluids, plumbing and fittings, hoses, tubing, electrical wiring, and various components to satisfy installation requirements. The following section defines specific items for “Installer Supplied Parts” and responsibilities.

WARNING

1. Before beginning the Foam Pro AccuMax foam system installation, read this section thoroughly to make sure the proper components and/or provisions are provided. For detailed system installation instructions, refer to the various sections in this final installer Manual.
2. The Foam Pro AccuMax system has been assembled and pretested at the factory prior to shipment. Foam Pro manufactured materials and vendor supplied components of the AccuMax system shall meet applicable sections of NFPA #1901 or NFPA #20 standards. The 'final stage installer' shall be responsible for supplying and installing additional equipment to meet applicable NFPA standards (as warning and name plate labels, check valves, plumbing, etc), including final testing, and certification of the system.



NFPA Code 1901: <https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=1901>

NFPA Code 20: <https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=20>

Final Installer Supplied Components and Responsibilities

The final installer shall supply the following components and/or installation as specified below:

1. Hydraulic System – final installer requirements:

- a. Vehicle Mounted System:** Supply and install the appropriate power-take-off (PTO) drive system to power the variable displacement foam pump.
- b. Fixed Foam System:** Supply and install the appropriate drive system to power the variable displacement foam pump for a by either a line-voltage electric motor or diesel engine power supply. The final installer shall supply electrical control panels, and all supporting equipment and accessories for such electric or diesel powered systems.
- c.** Supply and install hydraulic hose assemblies as required. (Reference chart included in this installation manual.)
- d.** Supply and install a hydraulic oil reservoir and cooling system per specifications of this manual—OR—the final installer may choose the optional reservoir and cooling package from FoamPro and install per the specifications in this manual.
- e.** Supply hydraulic oil per specifications of this manual.

2. Foam System – final installer requirements:

- a. Supply and install water and/or foam tanks as required by the end-user.
- b. Supply and install foam tank to foam pump plumbing, properly sized manual or electric valve with open or closed controls, and check valve.
- c. Install FoamPro supplied master foam discharge flowmeter, pressure transducer, and hydraulic control assembly, including all electrical system cabling.
- d. **In single-point installations:** supply and install water and foam manifolds, check valve on water line to manifold, and install foam line injector (FLI) to supply the foam manifold with foam concentrate. Supply and install flexible hose from calibration FLI valve to accessible location and connection for testing.
- e. **In multi-point installations:** supply and install foam discharge manifold. Install specified number of water/foam solution discharges and foam line injectors (FLI). Supply and install flexible hose lines from calibration FLI valves to accessible location and connections for testing.
- f. Provide and install a foam flush system per the requirements of this manual. **NOTE:** this may be manual or electrically controlled. (Refer to optional Foam Pro AUX-System option in this manual.)
- g. **Externally supplied auxiliary foam intake connection:** the final installer shall supply and install an auxiliary foam inlet(s) with a manually or electrically controlled valve(s) (preferably at the pump panel.) This intake plumbing shall supply the foam pump from an external foam concentrate supply or pressurized source. This inlet shall be the same size or larger than the foam pump inlet.
- h. **OPTIONAL:** FoamPro can supply the external foam intake with an Elkhart electric valve and APEX display, or this intake can be controlled by the optional Foam Pro supplied FOAM-AUX system. Or, the final installer may install the auxiliary foam inlet electric valve and display.



- Next to the Auxiliary Foam Intake Connection shall be a warning label for the operator to indicate that incoming pressure at the INTAKE valve shall be under 50 PSI (3 BAR). (NOTE: for Fire Lion and Edwards foam pumps only.)
 - i. The final installer may supply multi-function foam controls for:
 - 1) Foam tank supply valve (Denote size in/mm)
 - 2) Foam flushing system
 - 3) Foam concentrate intake (OFF-BOARD) (Denote size in/mm)
 - 4) Foam concentrate discharge (ON-BOARD) (Denote size in/mm)
 - 5) Foam tank refilling
 - j. **OPTIONAL:** multi-functional FOAM-AUX system and display can be supplied by Foam Pro for the following functions:
 - 1) Foam tank to foam pump valve control (Denote size in/mm)
 - 2) Flushing system control for a manual valve or electric valve control
 - 3) Foam intake control, with manual valve or optional APEX electric valve. (Denote size in/mm)
- Foam line injector (FLI) assembly, with foam flowmeter, electric valve and diverter valve is comprised of:
- 4) Foam tank refill
 - 5) Foam concentrate discharge (Denote size in/mm)
 - 6) Foam concentrate recirculation

3. Foam Pump Installation– final installer requirements:

- a. Install the hydraulic pump, foam pump, hydraulic motor package (supplied by Foam Pro) and hydraulic hoses
- b. Install relief valve supplied by Foam Pro (on discharge side of foam pump)
- c. Install the wye strainer supplied by Foam Pro (just before the connection to the foam pump inlet)
- d. Install a foam concentrate manifold

4. Discharge Water and Foam System Installation – final installer requirements:

- a. Install fire pump water discharge manifold.
- b. In single-point system:** install water flowmeter and check valve in line supplying the water/foam discharge manifold.
- c. In multi-point system:** install individual discharge line water flowmeters, pressure transducers and check valves.
- d. In single-point and multi-point Fury display systems:** final installer shall supply and install all discharge valves (with manual or electric controls), supply and install water pressure displays or gauges, and install the Fury display(s). The final installer shall supply and install necessary discharge valve adapters and caps and specified monitor(s).
- e. In multi-point Fusion & Fusion/APEX display systems:** final installer shall install FoamPro furnished Elkhart electric discharge valves and displays. The final install shall supply and install necessary discharge adapters and caps and specified monitor(s).

5. Final Acceptance Testing (FAT), Setup, and foam system calibration by final installer:

- a. Final installer shall set-up and calibrate the foam system per the requirements of this Installation Manual.
- b. Final acceptance: foam and fire pump testing (FAT) shall be per applicable NFPA #1901 vehicle standards, NFPA #20 fixed system testing, country requirements or applicable purchaser testing requirements.
- c. Calibration and testing may be performed with water (in place of foam concentrate) for the AccuMax system.



- Final installer shall be responsible for all setup, calibration, fire pump and foam pump testing, customer instruction and training costs, and applicable foam concentrate costs for such testing.



- The use and disposal of foam concentrate during testing and calibration are the responsibility of the final installer or customer.



- The water manifold must be sized to adequately supply the specified number of foam/water discharges, monitor and LDH discharges, and total water flow that could be expected or specified by the end-user.
- If “potable” water supply is to be used, check valves must be installed in accordance with applicable NFPA #1901 standards.)

9. FOAM SYSTEM -- DATA & MODEL INFORMATION

Foam Pro Models, Foam Pump Models, & Operational Information

Specifications for Trident Pump Systems

System Capacity	Fire Pump Maximum Water Flow GPM (LPM)					
FoamPro Model	MAX020	MAX040	MAX060	MAX090	MAX150	MAX300
Foam Solution Flow						
1%	2,000 (7,571)	4,000 (15,142)	6,000 (22,712)	9,000 (34,069)	15,000 (56,781)	30,000 (113,563)
3%	667 (2,525)	1,333 (5,046)	2,000 (7,571)	3,000 (11,356)	5,000 (18,927)	10,000 (37,854)
6%	333 (1,261)	667 (2,525)	1,000 (3,785)	1,500 (5,678)	2,500 (9,464)	5,000 (18,927)
Max. Foam Output GPM (LPM)	20 (75.7)	40 (151.4)	60 (227.1)	90 (340.7)	150 (567.8)	300 (1,135.6)
Max. Operating Pressure PSI (BAR)	300 (20.7)	300 (20.7)	300 (20.7)	300 (20.7)	300 (20.7)	300 (20.7)
Max. Operating Temp. F (C)	160 (71)	160 (71)	160 (71)	160 (71)	160 (71)	160 (71)
Max. Hydraulic Oil Pressure PSI (BAR)	2,006 (138)	2,689 (185)	2,711 (187)	3,505 (241.7)	5,374 (370.6)	5,662 (390.4)
Max. Hydraulic Oil Flow GPM (LPM)	10.9 (41.3)	12.4 (46.9)	15.8 (59.8)	27.2 (103)	25.5 (96.6)	41 (156)
PTO Pump RPM for Min. Performance RPM	999	1,136	1,210	1,367	1,283	1,194
PTO HP-HP (kW) at Max. Performance	16.7 (12.5)	25 (18.6)	32.1 (23.9)	63 (47)	90 (68)	153 (114)
PTO Torque at Max. Performance Lbf-ft (Nm)	86 (116.6)	115 (156)	138 (187)	242 (328)	369 (501)	670 (909)
Hyd. Pump Mounting Flange	SAE 'B' Flange	SAE 'B' Flange	SAE 'C' Flange	SAE 'C' Flange	SAE 'C' Flange	SAE 'D' Flange
Hyd. Pump Input Shaft	13 Tooth 16/32 Pitch	13 Tooth 16/32 Pitch	14 Tooth 12/24 Pitch	14 Tooth 12/24 Pitch	14 Tooth 12/24 Pitch	13 Tooth 8/16 Pitch
Max. PTO Speed RPM	4,000	4,000	3,600	3,600	3,600	3,100
Minimum Hydraulic Reservoir Size Gal. (Liter)	8 (30.3)	8 (30.3)	8 (30.3)	8 (30.3)	8 (30.3)	15 (56.8)
Minimum Hydraulic Cooler Heat Load BTU/Min.	N/A	N/A	N/A	792 6.2 (24)	1137 5.8 (22)	1916 8.2 (31)
Maximum Hydraulic Oil Temp. F (C)	220 (104)	220 (104)	220 (104)	220 (104)	220 (104)	220 (104)

Foam Pro Models, Foam Pump Models, & Operational Information

Specifications for Fire Lion Pump Systems

System Capacity	Fire Pump Maximum Water Flow GPM (LPM)					
FoamPro Model	MAX020	MAX040	MAX060	MAX090	MAX150	MAX300
Foam Solution Flow						
1%	2,000 (7571)	4,000 (15,142)	6,000 (22,712)	9,000 (34,069)	15,000 (56,781)	30,000 (113,563)
3%	667 (2525)	1,333 (5046)	2,000 (7,571)	3,000 (11,356)	5,000 (18,927)	10,000 (37,854)
6%	333 (1261)	667 (2525)	1,000 (3,785)	1,500 (5,678)	2,500 (9,464)	5,000 (18,927)
Max. Foam Pump Output Flow GPM (LPM)	20 (75.7)	40 (151.4)	60 (227.1)	90 (340.7)	150 (567.8)	300 (1,135.6)
Max. Operating Pressure PSI (BAR)	300 (20.7)	300 (20.7)	300 (20.7)	300 (20.7)	300 (20.7)	300 (20.7)
Max. Operating Temp. F (C)	160 (71)	160 (71)	160 (71)	160 (71)	160 (71)	160 (71)
Max. Hydraulic Oil Pressure PSI (BAR)	2,284 (157.5)	2,931 (202.1)	3,624 (249.9)	3,923 (270.5)	5,522 (380.8)	5,819 (401.2)
Max. Hydraulic Oil Flow GPM (LPM)	14.8(56.0)	17.4 (65.9)	20.6 (78.0)	24.3 (92.0)	27.3(103.4)	40.7 (154.1)
PTO Pump RPM for Min. Performance RPM	1,216	1,432	1,418	1,221	1,375	1,185
PTO HP—HP (kW) at Max. Performance	22.8 (17.0)	34 (25.4)	49.6 (37.0)	62.9 (46.9)	99.1 (73.9)	155.1 (115.7)
PTO Torque at Max. Performance Lbf-ft (Nm)	98.0 (132.9)	124.6(169.0)	182.9 (248.0)	270.2 (366.4)	378.3 (512.9)	688 (932.8)
Hyd. Pump Mounting Flange	SAE 'B' Flange	SAE 'C' Flange	SAE 'C' Flange	SAE 'C' Flange	SAE 'C' Flange	SAE 'D' Flange
Hyd. Pump Input Shaft	13 Tooth 16/32 Pitch	13 Tooth 16/32 Pitch	14 Tooth 12/24 Pitch	14 Tooth 12/24 Pitch	14 Tooth 12/24 Pitch	13 Tooth 8/16 Pitch
Max. PTO Speed RPM	4,000	4,000	3,600	3,600	3,600	3,100
Minimum Hydraulic Reservoir Size Gal. (Liter)	8 (30.3)	8 (30.3)	8 (30.3)	8 (30.3)	8 (30.3)	15 (56.8)
Minimum Hydraulic Cooler Heat Load BTU/Min. @	282 4.5(17.1)	425 5.3 (20)	620 5.2 (20)	792 5.5 (20.8)	1,252 6.2 (23.5)	1,966 8.2 (31.1)
Maximum Hydraulic Oil Temp. F (C)	220 (104)	220 (104)	220 (104)	220 (104)	220 (104)	220 (104)

Foam Pro Models, Foam Pump Models, & Operational Information

Specifications for Edwards Pump Systems

System Capacity	Maximum Water Flow GPM (LPM)					
FoamPro Model	MAX020	MAX040	MAX060	MAX090	MAX150	MAX300
Foam Solution Flow						
1%	2,000 (7,571)	4,000 (15,142)	6,000 (22,712)	9,000 (34,069)	15,000 (56,781)	30,000 (113,563)
3%	667 (2,525)	1,333 (5,046)	2,000 (7,571)	3,000 (11,356)	5,000 (18,927)	10,000 (37,854)
6%	333 (1,261)	667 (2,525)	1,000 (3,785)	1,500 (5,678)	2,500 (9,464)	5,000 (18,927)
Max. Foam Output GPM (LPM)	20 (75.7)	40 (151.4)	60 (227.1)	90 (340.7)	150 (567.8)	300 (1,136)
Max. Operating Pressure PSI (BAR)	300 (20.7)	300 (20.7)	300 (20.7)	300 (20.7)	300 (20.7)	300 (20.7)
Max. Operating Temp. F (C)	160 (71)	160 (71)	160 (71)	160 (71)	160 (71)	160 (71)
Max. Hydraulic Oil Pressure PSI (BAR)	1,734(119.6)	2,649 (182.7)	3,484 (240.2)	4,479 (308.8)	4,378 (301.9)	5,873 (405.0)
Max. Hydraulic Oil Flow GPM (LPM)	16.8(63.6)	16.3 (61.7)	22.9 (86.7)	23.7 (89.7)	29.5 (112)	47.4 (180)
PTO Pump RPM for Min. Performance RPM	1381	1,336	1,579	1,200	1,485	1,387
PTO HP-HP (kW) at Max. Performance	20.5(15.3)	29.5 (22.0)	53.3 (39.8)	70.5 (52.6)	85.3 (63.6)	185.1 (138.1)
PTO Torque at Max. Performance Lbf-ft (Nm)	78(106)	116 (157.3)	177.3 (240.4)	308.6 (418.4)	301.7 (409.1)	701 (950.1)
Hyd. Pump Mounting Flange	SAE 'B' Flange	SAE 'B' Flange	SAE 'C' Flange	SAE 'C' Flange	SAE 'C' Flange	SAE 'D' Flange
Hyd. Pump Input Shaft	13 Tooth 16/32 Pitch	13 Tooth 16/32 Pitch	14 Tooth 12/24 Pitch	14 Tooth 12/24 Pitch	14 Tooth 12/24 Pitch	13 Tooth 8/16 Pitch
Max. PTO Speed RPM	4,000	4,000	3,600	3,600	3,600	3,100
Minimum Hydraulic Reservoir Size Gal. (Liter)	8 (30.3)	8 (30.3)	8 (30.3)	8 (30.3)	8 (30.3)	15 (56.8)
Minimum Hydraulic Cooler Heat Load BTU/Min.	244 5.2(19.7)	359 5.0 (19.0)	663 5.9 (22.3)	886 5.4 (21)	1073 6.7 (25)	2312 9.5 (36)
Maximum Hydraulic Oil Temp. F (C)	220 (104)	220 (104)	220 (104)	220 (104)	220 (104)	220 (104)

10. DRIVE SYSTEMS FOR HYDRAULIC PUMPS

Hydraulic Pump -- Power Source

The hydraulic power for the FoamPro AccuMax foam system is supplied by a hydraulic pump mounted on the fire apparatus chassis transmission or auxiliary PTO on a vehicle system or a separate electric motor or diesel engine for fixed installations. The hydraulic pump supplied with the Foam Pro system has been pre-engineered and selected to provide the required flow and pressure to drive the specified foam system.

Vehicle Mounted PTO Drive Systems



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 chassis engine speed, for fire pump and foam system operations. The FoamPro AccuMax hydraulic pump will provide the correct fluid flow over the widest range of engine speeds. By using a PTO ratio greater than 1.0, full hydraulic pump system performance can be at “idle” speed to “no-load” governed speed of the engine.

It is important to address the “TOTAL” horsepower (kw) of the fire pump, foam pump, and hydraulic system, with a sufficient ‘safety factor’ to account for variables as plumbing and other factors such as: PTO horsepower (kw), torque rating (nm), ratio of PTO to engine speed and constant-duty rating operations (more than 5 minutes) rating factors. Chassis engine driven power sources include: transmission pad mounted power-take-offs, sandwich mounted PTO between engine and transmission, and split-shaft mounted power dividers of various types. Component manufacturers of such drive sources **MUST** approve ‘constant duty’ requirements required in firefighting operations.

A typical transmission SAE pad mounting that will allow bolting the hydraulic pump directly to the transmission PTO unit or driven by a PTO shaft. The FoamPro AccuMax hydraulic supply pump is furnished with a standard SAE mounting flange and shaft. Refer to the Foam Pro data sheet for each AccuMax foam system denoting requirements for horsepower (kw) rating, torque (nm) rating, RPM maximum speeds, and rotation requirements of the hydraulic pump within this installation manual.

When selecting a transmission PTO, it is imperative that consideration be given to chassis frame clearances exposure to exhaust system heat, and the space where the hydraulic pump is to be mounted. For new installations, careful installer 3-D CAD engineering design and planning will pin-point clearance problems. Consult PTO, transmission, and chassis manufacturers body builder’s books to determine dimensions and clearances required. When a FoamPro AccuMax system is being installed as a retrofit the same requirements must also be considered.

The PTO control must be located in the chassis cab by the final installer with visual warnings and an instruction label on proper engagement instructions per applicable requirements of NFPA#1901.

NOTE: The PTO can be left in gear all the time to circulate oil as soon as the engine is started since the hydraulic pump will draw less than 5 horsepower when operating in standby mode.

When selecting a chassis mounted PTO to drive the hydraulic pump, ensure the maximum RPM of the hydraulic pump is 3600 RPM or lower. Select a PTO ratio that will provide the best performance from an “idle” speed to maximum engine “No Load” RPM speed of the chassis engine.

Typical Example for a Foam Pro AccuMax #3150 Foam System

- a. **Fire pump RPM operational window:** the maximum engine speed that the water pump can be operated is 1,800 RPM and idle speed is approximately 800 RPM.
- b. **Foam Pro #3150 system:** the hydraulic pump maximum speed is 3,600 RPM and minimum speed is 1,300RPM.
- c. **PTO Ratio (Percentage of engine speed):** It is recommended to choose a PTO with a percentage of engine speed that will produce a hydraulic pump shaft speed that will cover a range from idle speed of 800RPM to 1800 RPM maximum engine speed. A PTO with a 1.60 ratio x engine speed is required.

This will allow for FULL foam pump performance from 800 to 1800 RPM, even at a truck “idle” speed or if the apparatus is working from a fire hydrant system and pressure governor returns engine to an “idle” condition or a full operation at the maximum RPM of the engine.

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

PTO recommended: 1.60 Ratio:

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



WARNING

- The selection of the proper PTO for the transmission is critical. The selection of the correct transmission PTO is the responsibility of the final installer.
- Standard hydraulic pump rotation is **clockwise** when viewing the hydraulic pump from the shaft end. Check with the FoamPro factory for other configurations and rotation that may be available.



DANGER

- All DOT, SAE or other applicable standards must be followed when installing the hydraulic supply system. Pay close attention to engine, transmission, and component manufacturer's limitations.
- To ensure the integrity of fitting connections in the hydraulic system, use only SAE JIC 37° flare or equal type hose connections as noted in the Hydraulic Hose chart in this installation manual.
- Dirt and contaminants are the primary causes of premature wear and failure in any hydraulic system. Use extreme care during assembly and service to keep contaminants out of the system.
- The final installer must follow engine, transmission, and component manufacturer's guidelines, recommendations, and limitations on horsepower (HP/kw) and torque (ft/lbs / NW) ratings.

Fixed Foam System

Electric Motor Driven

The final assembler shall be responsible for selection of the electric motor, electronic controls, and wiring for the AccuMax foam system. Foam Pro includes in this installation manual the required horsepower and RPM requirements of the hydraulic system to guide the installer in motor selection; normally a 10% safety factor is added in selecting electric motor horsepower rating.



NFPA Code 20: <https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=20>

NFPA Code 70: <https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=70>

The installation shall meet applicable requirements of NFPA #70 National Electric Code, NFPA #20 for fixed systems, third-party certifications and testing requirements.



High voltage electrical power wiring to the electric motor drive shall be well separated from AccuMax foam system flowmeters, molded cables, and foam system electrical equipment. The installer shall furnish the proper motor to foam pump, flexible coupling, mounting base, and corrosion resistant painting required for interior and corrosive exterior environment locations. The electrical motor monitoring instruments such as: voltage, amperage, frequency, start/stop controls, warning signals, and electronic control panel shall be located near the foam control, in a safe operating area.

The location of the electric powered fixed foam system is of major concern, due to environmental or unusual operating conditions. The foam skid unit, foam tank, and control panels shall be properly protected from sea water corrosion or salt-air conditions, freezing temperatures, and other extreme weather conditions, including radiant heat exposure from an industrial fire. Due to the high noise level of hydraulic driven positive displacement foam pumps, sound reduction mountings and enclosures may be specified by the final end-user.

Diesel Engine Driven

The selection of diesel engines to drive the variable displacement hydraulic pump furnished by Foam Pro AccuMax system is critical. Engine selection must address to parasitic losses on both the engine unit and also normal losses encountered with hydraulic systems.

Diesel engines (air-cooled or radiator cooled) have 'unique' gross and net horsepower (kw) and torque (nm) ratings. Gross horsepower losses, such as: alternator, water pump, cooling fan, exhaust systems, and various government environmental regulations will affect the **NET horsepower (kw)** available to drive the hydraulic pump. Such items could account for 15% to 25% deduction from the "gross" horsepower rating. In addition, the hydraulic system efficiency will require 20% to 30% additional horsepower (kw) over the normal engine losses.

The installation of the fuel tank and lines should follow applicable requirements in NFPA #20 for drive systems for fire pump installations. The fuel tank shall be located away from the diesel engine for easy refilling. Sizing of the fuel tank may depend on the customer requirements, size of hazard, and planned duration in firefighting operations.

The exhaust system should be piped away from the operator's area to a safe location. Radiated heat from the exhaust system and engine radiator must be part of the pre-engineering requirements. The engine radiator system shall be designed to prevent hot air recirculation. The fresh air pick-up for the engine air cleaner shall be piped to a cool, dust, and moisture free location and have ember separator device.

The diesel motor monitoring instruments: engine RPM speed control, start/stop controls, engine gauges, warning signals, and electronic control panel shall be located near the foam control and in a safe area. The location of the diesel-powered fixed foam system is of major concern, due to environmental or unusual operating conditions and exposure to fire hazards. The foam skid unit, foam tank, and control panels shall be properly protected from sea water corrosion or environmental conditions, freezing temperatures, and other extreme weather conditions, including radiant heat exposure from a fire at the industrial site.

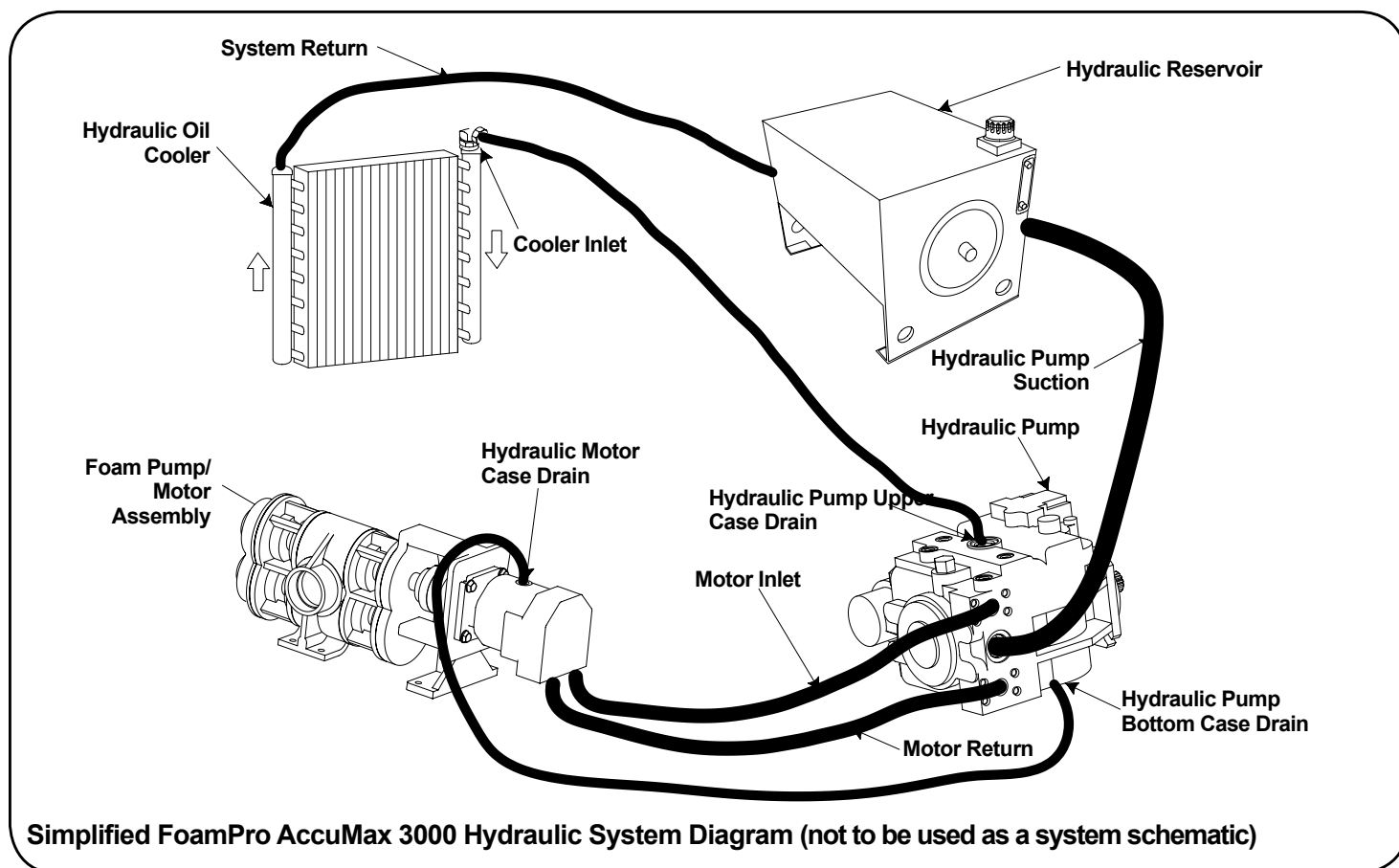


- In electric motor installations with 50 and 60 cycle, three phase motors of various Class, Type, voltages, soft-starting provisions, and other factors are encountered; therefore, final installer engineering is critical.

11. HYDRAULIC COMPONENT INSTALLATION

Guidelines—Hydraulic System Installation

The drawing below provides “typical” hydraulic hose plumbing and layout of the hydraulic system components. When making hydraulic component connections, ensure all applicable SAE standards are followed. Use hoses that exceed the maximum working pressure, hose sizes, and pressure ratings as listed in the "Hydraulic Hose & Fittings Specifications" section of this installation manual.



WARNING

- Use only Type 300 series high-pressure stainless-steel pipe or brass Schedule #40 pipe, or flexible hose with stainless steel connections, and fittings from the foam pump outlet to the injection point. Such plumbing shall be rated at or above 400 PSI (28 BAR).
- Use only flexible high-pressure hose and fittings from the hydraulic oil pump to the foam pump hydraulic motor, which are listed in this installation manual and are approved for mobile hydraulic system use.
- The hydraulic pump pressure is preset at the factory for proper operation.

Hydraulic Oil Filtration

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

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

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

Hydraulic Oil Reservoir and Oil Cooler

A hydraulic reservoir and hydraulic oil cooler system are required to be installed for either mobile or fixed foam system installations. Depending on environmental conditions, size of the foam pump, a larger reservoir may be required to run at maximum capacity for extended periods of time.

The hydraulic reservoir and oil cooler can be supplied by the final installer or FoamPro could supply an optional pre-engineered package.

1. Final Installer: Hydraulic Reservoir and Cooling System Installation

The size of the oil reservoir shall comply to FoamPro recommendations for each size hydraulic pump and foam pump size.

The reservoir must have a diffuser on the inlet to prevent entrapment of air into the system. A particle screen of 100-170 mesh on the oil outlet shall be required. A baffle to separate the inlet and outlet sections must be provided within the reservoir. A vented and filtered breather of sufficient size to allow filling of oil are required. The hydraulic tank shall have a drain line, control valve and plug, with warning label installed in an accessible location.

The reservoir outlet to the pump inlet should be above the bottom of the reservoir to take advantage of the gravity separation and to prevent large particles from entering the pump. The fluid return should be positioned so that the flow to the reservoir is discharged below the normal fluid level and directed into the interior of the reservoir for maximum dwell and deaeration of the fluid.

A sight level gauge with thermometer shall be installed, 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 system, and be in a location that allows easy access for checking and filling the oil.

An oil cooler capable of maintaining the temperature of the hydraulic oil at 160° to 220°F (71° to 104°C) shall be required. For extended firefighting operations in high ambient temperatures use of an air-to-oil radiator-type heat exchanger shall be provided to ensure adequate cooling of the hydraulic system oil. Either an electrically or hydraulically-driven fan shall be provided. A thermostat system shall be provided for quick warm-up of the hydraulic oil in cold climates.

Hydraulic fluid filtration is vital to the performance and life of any hydraulic system. A suction strainer of 100 to 170 mesh is required in the outlet of the reservoir and should be sized to accommodate the charge pump flow of the system without significant pressure drop. Hydraulic oil filtration units are supplied with all hydraulic pumps.



- FoamPro supplied hydraulic pumps have a spin-on filter installed for that particular pump protection. This filter has a Beta 10 rating of 10 to 20.
- FoamPro #3020 and 3040 systems require a suction filter with a Beta rating of 10. The flow rating on the filter should be at least 25 GPM when used for suction.
- Refer to the Foam Pump Selection Foam System Specifications, of this manual for specific hydraulic reservoir sizing and BTU requirements for the cooling system.
- Final installer supplied reservoir and cooler specifications must strictly comply to Foam Pro engineering requirements and must be pre-approved by Foam Pro prior to installation.



2. Foam Pro Supplied: Optional Oil Reservoir and Electric Cooling Package: Model #2502-0002 12/24 VOH Electric Fan Cooler system—designed for foam pumps 150 GPM /560 LPM and smaller Foam Pro systems

NOTE: Refer to FoamPro #947 manual.

A Foam Pro supplied hydraulic tank, filter, and cooling assembly has been pre-engineered and configured for specified operating conditions as specified under NFPA #1901 or as specified by the end-user. The hydraulic performance, oil tank, and cooling system shall meet all requirements of the hydraulic component manufacturers and applicable SAE standards.

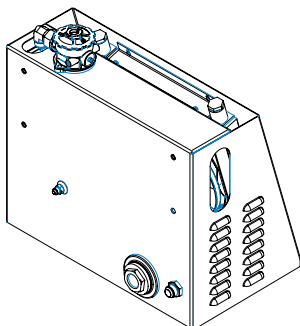
The Foam Pro #2502-0002 electric powered packaged kit shall be supplied and shall incorporate an 8-gallon / 30 liter hydraulic tank, electric cooling assembly, filling cap, oil level gauge, oil drain provisions temperature gauge, strainer, and necessary provisions for apparatus manufacturer installation. The cooling system shall be designed to maintain hydraulic oil temperature between 160°F to 220°F /72 to 102 C. The assembly shall include a suction strainer #3800-1003 and return filter #3800-1001.

The assembly shall be enclosed in a louvered sheet metal enclosure with mounting holes for installation and connections for apparatus manufacturer supplied hoses. The dimensions of the assembly shall be approximately 29" /736mm high x 17" /178 mm deep x 30" /762 mm wide. The unit requires mounting by the apparatus manufacturer in an accessible location for proper operation up to 120°F (49°C), monitoring and service of the hydraulic tank and changing hydraulic fluid.

Necessary hydraulic hoses, electrical connections, and hydraulic fittings shall be supplied and installed by final installer.



- The hydraulic reservoir and cooling assembly shall be located ABOVE the variable displacement hydraulic pump and within 10 feet/3 meters of the pump. The area shall be high as possible, open area for good ventilation, and away from engine heat, exhaust heat, and engine radiator fan hot air discharge (in vehicle installations).



3. Foam Pro Supplied: Optional Model #2502-0003: Hydraulic Reservoir, Hydraulic Oil Filter, and Hydraulic Oil Cooling Assembly for 300 GPM/1150 LPM foam systems

NOTE: Refer to FoamPro #947 manual.

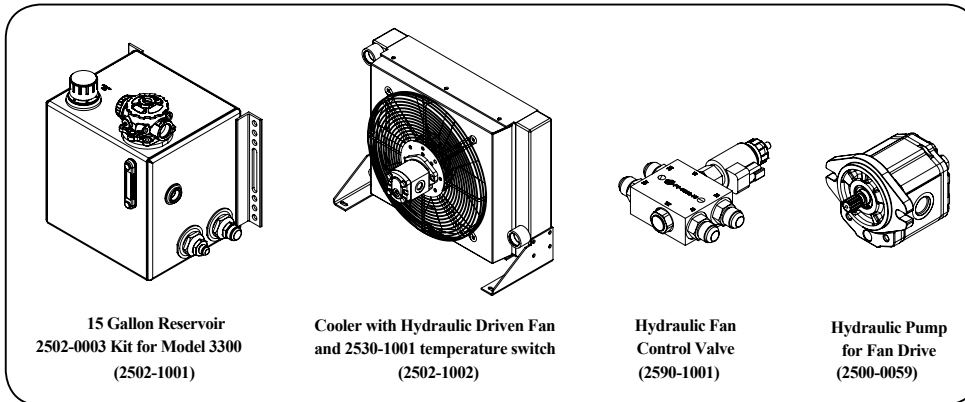
A Foam Pro Model #2502-0003 hydraulic tank, filter, and cooling assembly shall be provided. The modular unit shall be pre-engineered and configured for specified operations. The hydraulic performance, oil tank, and hydraulic cooling system shall meet all requirements of the hydraulic component manufacturers and applicable SAE standards.

The packaged kit shall be supplied and shall incorporate the 15-gallon /56.8 liter hydraulic tank #2502-1001, electrical supply, hydraulically driven motor #2500-0059, hydraulic fan control valve #2590-1001, and cooling assembly #2502-1002, filling cap, oil level gauge, oil drain provisions temperature gauge, strainer, and necessary provisions for apparatus manufacturer installation. The cooling system shall be designed to maintain hydraulic oil between 160°F to 220°F / 71°C to 104°C. The assembly shall include a suction strainer #3800-1002 and return filter #3800-1001.

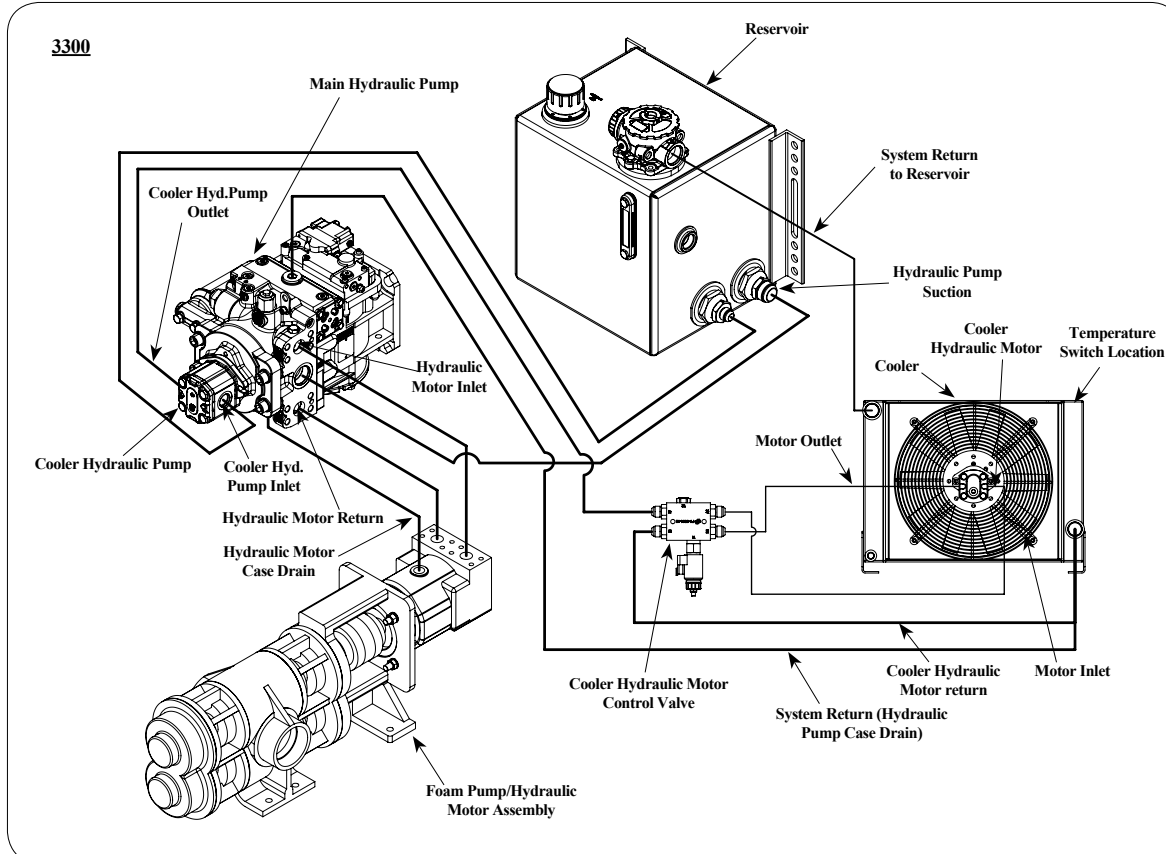
The cooling assembly shall be approximately: 13"/330mm deep, 20"/510mm high, and 30"/765mm wide. The hydraulic tank shall be approximately: 16"/60mm deep, 21"/535mm high, and 22"/560mm wide. The assembly shall contain modularized components to allow the apparatus manufacturer to install where space is available. The assembly requires mounting in an accessible location for proper operation up to 120°F / 50°C, monitoring, and service of the hydraulic tank and changing hydraulic fluid. Necessary hoses, electrical connections, and hydraulic fittings shall be provided by the final installer.

WARNING

- The location of any hydraulic cooling system is 'critical' in maintaining hydraulic oil temperatures within manufacturer's recommendation.
- Due to 'high ambient operating temperatures around the global, it is essential that adequate air flow is provided.



3300



Hydraulic Oil

Ratings and data for the FoamPro AccuMax systems are based upon recommendations of the component manufacturers as Parker, Sauer Danfoss, and other suppliers. One such example would be an environmentally safe vegetable oil supplied by: Mobil #224H, VG22 hydraulic oil. These premium fluids include premium turbine oils, API CD engine oils per SAE J183, M2C33F 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. Other hydraulic fluids such as SAE 10W-40HD motor oil are too viscous for proper pump performance.

The following reference chart is provided for global applications and suppliers of hydraulic oil suitable for FoamPro AccuMax systems.

Fluid Specifications

Feature		Unit			
Viscosity	Intermittent ¹⁾	mm ² /s	[SUS]	5	[42]
	Minimum			7	[49]
	Recommended Range			12-80	[66-370]
	Maximum			1600	[7500]
Temperature Range ²⁾	Minimum (Cold Start) ³⁾	°C	°F	-40	[-40]
	Recommended Range			60-85	[140-185]
	Rated			104	[220]
	Maximum Intermittent ¹⁾			115	[240]
Filtration (recommended minimum)	Cleanliness per ISO 4406-1999			23/21/15	
	Efficiency (charge pressure filtration)	β-ratio		β ₁₅₋₂₀ =75 (β ₁₀ ≥10)	
	Efficiency (suction and return line filtration)			β ₃₅₋₄₅ =75 (β ₁₀ ≥2)	
	Recommended Inlet Screen Mesh Size	μm		100-125	
¹⁾ Intermittent=Short term t < 1 min per incident and not exceeding 2% of duty cycle based load-life					
²⁾ At the hottest point, normally case drain port					
³⁾ Cold Start=Short term t < 3 min, p ≤ 50 BAR [725 PSI], n ≤ 1000 min ¹ (RPM)					
					T000 129E

Please visit the [Mobil website](https://www.ulei-mobil.ro/pdf/MobilIndustrieDataSheet/EAL%20224H%20pds.pdf) for additional details on the Mobil #224H, and to download the product data sheet PDF. (<https://www.ulei-mobil.ro/pdf/MobilIndustrieDataSheet/EAL%20224H%20pds.pdf>)



WARNING

- Ensure hydraulic fluid is clean and free from contamination when filling and changing the fluid in the system.
- Use only approved petroleum-based hydraulic fluids as described in this manual. 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.

Hydraulic Controller Module

The hydraulic system shall be automatically controlled with a Foam Pro supplied hydraulic controller module. A 'plug and play' panel shall be installed with three (3) plug-in connections: (a) switch sensors, (b) power data bus and (c) hydraulic motor. A light "status light" shall be provided to note engagement. Refer to the electrical chapter (section 18) on the installation of the hydraulic controller module and wiring harness lengths available.



Hydraulic Back-Up System

The hydraulic system shall be equipped with a 'back-up' micro-processor system. This 'Watchdog' system shall incorporate a second micro-processor that provides automatic override of the hydraulic system; the second board shall be activated by a 'single-input' disruption of the main hydraulic system.

12. HYDRAULIC HOSE INSTALLATION

Hydraulic Hoses and Fittings

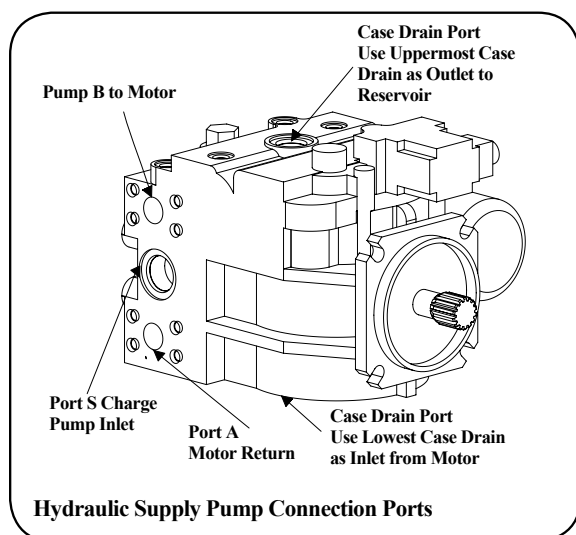
High pressure hydraulic hoses and connections shall meet or exceed the maximum hydraulic pressure rating found in the Hydraulic Installation Hose section. To reduce the potential for leaks at the hydraulic connections, use SAE 37° flare JIC type fittings, SAE straight thread O-ring fittings, or SAE split flange connections.

Hydraulic Pump and Hydraulic Motor Hose Connections

The Foam Pro supplied hydraulic pump shall be located well away from exhaust piping, muffler, and discharge of the exhaust system. If this is impossible, then appropriate separation and barriers shall be installed. Monitoring of operating temperatures shall be addressed during all testing conditions by the final installer.

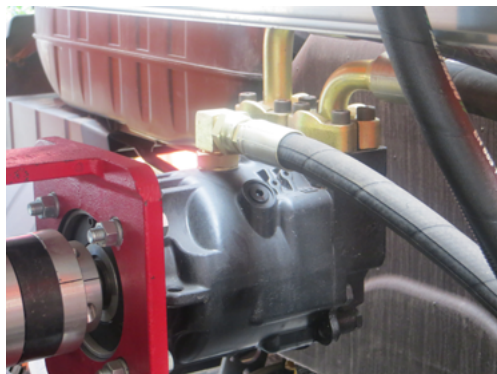
After all hydraulic system components have been mounted, hose connections must be installed per the FoamPro Hydraulic Hose and Fittings reference chart on the next page.

Always use the uppermost case drain port available on the hydraulic pump and add hydraulic motor.



Be sure the hydraulic hoses and the foam concentrate plumbing can be properly routed to the inlets and outlets on the hydraulic pump, hydraulic motor, hydraulic reservoir, and cooling components.

Appropriate protection must be provided for the plumbing, hose, foam pump, and wiring to prevent chafing and abrasion and exposure to excessive heat during operation of the foam system. Refer to the hydraulic pump and motor dimensions and photos in this installation manual for exact connections of the hydraulic hoses.



Hydraulic Pump Adjustment

The Foam Pro supplied hydraulic pump does not require any adjustment. The pump is adjusted to provide the maximum performance through the entire operating range and has been pre-tested at Foam Pro.



- All DOT, SAE or other applicable standards must be followed when installing the hydraulic supply system. Pay close attention to engine, transmission, and component manufacturer's limitations.
- To ensure the integrity of fitting connections in the hydraulic system, use only SAE JIC 37° flare or equal type hose connections as noted in the HYDRAULIC HOSE AND FITTINGS pages of this installation manual.
- Dirt and contaminants are the primary causes of premature wear and failure in any hydraulic system. Use extreme care during assembly and service to keep contaminants out of the system.
- Use only flexible hose with stainless steel fittings from the hydraulic oil pump to the foam pump hydraulic motor, which are rated as listed in this installation manual and are approved for mobile hydraulic system use.
- The hydraulic pump pressure is preset at the factory for proper operation.
- Refer to the Hydraulic Component and FoamPro model page of this installation manual for BTU rating of the final installer supplied reservoir and cooling capacity.

Hydraulic Fittings and Hose Specifications Chart

Connection	FoamPro Model	Minimum Hose ID	Pump Port Fitting & Pressure Rating	Motor Port Fitting & Type
Hydraulic Reservoir to Hydraulic Charge Pump Inlet	3020/3040	1" Suction	#16 SAE O-Ring	N/A
	3060	1" Suction	#16 SAE O-Ring	N/A
	3090	1" Suction	#16 SAE O-Ring	N/A
	3150	1" Suction	#16 SAE O-Ring	N/A
	3300	1-1/4" Suction	#20 SAE O-Ring	N/A
Hydraulic Pump Port B to Motor Port A	3020/3040	3/4" - 3000 PSI	#16 SAE O-Ring	#12 SAE O-Ring
Hydraulic Pump Port B to Motor Port B	3060	1" - 3600 PSI	1" SAE Split Flange	#12 SAE O-Ring
	3090	1" - 4500 PSI	1" SAE Split Flange	3/4" SAE Split Flange
	3150	1" - 4500 PSI	1" SAE Split Flange	3/4" SAE Split Flange
	3300	1" - 6000 PSI	1-1/4" SAE Split Flange	1" SAE Split Flange
Hydraulic Pump Port A to Motor Port B	3020/3040	3/4" - 3000 PSI	#16 SAE O-Ring	#12 SAE O-Ring
Hydraulic Pump Port A to Motor Port A	3060	1" - 3600 PSI	1" SAE Split Flange	#12 SAE O-Ring
	3090	1" - 4500 PSI	1" SAE Split Flange	3/4" SAE Split Flange
	3150	1" - 4500 PSI	1" SAE Split Flange	3/4" SAE Split Flange
	3300	1" - 6000 PSI	1-1/4" SAE Split Flange	1" SAE Split Flange
Hydraulic Motor Case Drain to Hydraulic Pump Case Drain	3020/3040	3/4" - 1500 PSI	#12 SAE O-Ring	#10 SAE O-Ring
	3060	3/4" - 1500 PSI	#12 SAE O-Ring	#10 SAE O-Ring
	3090	3/4" - 1500 PSI	#12 SAE O-Ring	#10 SAE O-Ring
	3150	3/4" - 1500 PSI	#12 SAE O-Ring	#10 SAE O-Ring
	3300	3/4" - 1500 PSI	#16 SAE O-Ring	#10 SAE O-Ring
Hydraulic Motor Case Drain to Hydraulic Cooler	3020/3040	3/4" - 1500 PSI	#12 SAE O-Ring	N/A
	3060	3/4" - 1500 PSI	#12 SAE O-Ring	N/A
	3090	3/4" - 1500 PSI	#12 SAE O-Ring	N/A
	3150	3/4" - 1500 PSI	#12 SAE O-Ring	N/A
	3300	3/4" - 1500 PSI	#16 SAE O-Ring	N/A

Notes:

SAE O-Ring Ports are per SAE J514

SAE Split Flange Ports are to SAE J518 code 62

Hydraulic pump inlet hose to conform to SAE 100R4

13. FOAM PUMP INSTALLATION

Location and Installation

Since the foam pump is hydraulically driven, the pump shall be located in a convenient location for service, maintenance, or removal on a fire apparatus or in a fixed foam system skid. Foam concentrate must gravity feed to the foam pump inlet from the foam tank. Preferably, the foam pump should be located as close as possible to the foam tank. The foam pump must be mounted in an area to avoid excessive exhaust system heat buildup and provide easy access for inspection, service and repairs. The foam pump shall have Victaulic or flange provisions for easy removal of the foam pump for overhaul.



WARNING

- 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.
- Use only Type 300 series stainless steel pipe, hose with stainless steel connections, and fittings from the foam pump outlet to the injection point. Such plumbing shall be rated at or above 400 PSI (28 BAR).

Vehicle Mounted Foam Pump Installation

The foam pump shall be installed in an accessible location for service and lubrication (as required for foam pump service and noted in the Operation, Service & Parts manual) Protect the foam pump from direct road spray and debris. Although the AccuMax foam system is sealed and designed to be resistant to the harsh environments, a protected location for service access shall be provided on the fire apparatus. As noted in the photo, adequate under vehicle clearance and protection of plumbing components shall be provided by final installer in mobile applications.

In Edwards and Trident, refer to foam pump manuals on lubrication fill and drain provisions when the foam pump is mounted in various positions. In Trident foam pumps, the timing gear assembly must be filled with SAE 30W (ISO Grade 100) oil and in Edwards foam pumps bearings must be greased per requirements of the pump manufacturer. Bearing assemblies on the Edwards foam pump must be easily accessible for grease lubrication. FireLion foam pumps do not have bearings or timing gears.



Fixed Foam Pump Installation

Three (3) flexible high-pressure hydraulic motor hoses are attached to the variable speed hydraulic pump. The power source and the foam pump and hydraulic motor can be located remotely from the electric motor or diesel engine drive system.

In Edwards and Trident refer to foam pump manuals on lubrication fill and drain provisions when the foam pump is mounted in various positions. In Trident foam pumps, the timing gear assembly must be filled with SAE 30W (ISO Grade 100) oil and in Edwards foam pumps bearings must be greased per requirements of the pump manufacturer. Bearing assemblies on the Edwards foam pump must be easily accessible for grease lubrication. FireLion foam pumps do not have bearings or timing gears.



CAUTION

- Rotary gear pump, foam system and fire pump installations require that personnel be properly trained.
- Proper ear protection must be worn while operating rotary gear pumps and foam/fire pump systems.
- Over 90Db noise levels are normal in positive displacement rotary gear foam pumps. The final installer or purchaser may consider noise reduction vibration dampener mountings and full enclosures of the foam pump (with removable panels for normal servicing.)
- Proper eye protection is required while operating and maintaining any foam/fire pump system.
- Do not operate a FireLion rotary gear pump dry for more than ten (10) minutes. Trident and Edwards foam pumps can be operated dry without damage.
- Operating rotary gear pumps can create heat and pumps should never be allowed to operate in a “dead headed” condition – ensure intake and discharge valves in the system are open prior to starting the pump.

WARNING

- Use only Type 300 series stainless steel foam injection hose with stainless steel connections and fittings from the foam pump outlet to the injection point. These hoses and fittings shall be rated at or above 400 PSI (28 BAR) and tested by the final installer.
- When operating the FoamPro AccuMax System in the “Simulated Mode” function, OPEN 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. The calibration valve 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.
- 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.



- Do not operate the foam pump at pressures exceeding the maximum listed operating pressure of 300 PSI [20.7 BAR].
- Only utilize components with the proper pressure rating and properly sized drive components when installing the foam pump and plumbing system.
- Do not operate the foam pump at pressures exceeding the maximum listed operating pressure of 300 PSI [20.7 BAR].
- Only utilize components with the proper pressure rating and properly sized drive components when installing the foam pump and fire pump.
- Rotating drive line components may cause injury or death. Be careful of rotating PTO, drive lines, or similar components at all times during installation.
- The safety relief valve is supplied with the foam system, **do not readjust the pressure setting.**
- The normal "exterior" operating temperatures for fixed and mobile foam system applications could vary from -40°F (-40°C) to 130°F (54°C). Special provisions shall be provided by the final installer for both extremely low or high operating conditions. Operating temperatures "inside" of a pump enclosure of a fire apparatus shall not exceed 160°F (72°C); supplementary cooling fans may be required, louvered panels, or both. Exhaust piping, mufflers, or catalytic converters may need to be removed in order to reduce temperatures.
- During installation and testing, the installer must monitor operating temperatures inside the pump area, enclosure, or installation area. In addition, special attention must be paid to clearances and insulation protection of valves, plumbing, wiring and other components to the exhaust piping, muffler, and catalytic converters on fire apparatus or fixed installation.
- Final installer must install DANGER labels located at the foam system external foam inlet valve, for FireLion and Edwards foam pumps (not required for Trident foam pumps.) If the external supply foam inlet valve is to be used from a "positive pressure source" (foam tender with foam pump transfer), an intake pressure gauge must be installed next to the gated intake control valve to allow the pump operator to control inlet pressure to a maximum of 25 TO 50 PSI (2 to 3 BAR) of pressure.
- Use the fire pump FLUSH SYSTEM for flushing the foam and water plumbing after each use. Do not use the auxiliary foam inlet valve for flushing the foam system on Edwards and Fire Lion foam pumps, due to the limitation on foam pump inlet pressure.

14. FOAM SYSTEM – INTAKE PLUMBING

Intake Plumbing – Foam Concentrate

Foam Concentrate Tank

The final installer shall supply the required foam concentrate tank. The capacity shall comply to purchaser requirements and shall comply to applicable sections of NFPA #1901 standards for construction and functional requirements. The foam tank shall be located close as possible to the foam pump. Capacity of the foam tank shall be specified by the end-user.

The foam tank shall be equipped with an adequately sized two-way venting system to protect the foam tank during normal foam system operations and during foam tank re-filling operations. The foam tank filling provisions shall include an accessible and sealed cover in compliance to NFPA #1901 section.

The foam tank shall be equipped with a foam tank drain for flushing and cleaning purposes and/or “direct foam tank refill” connection. The connection shall be piped to the side of the vehicle or in fixed installations to the side of the tank. The drain or refill shall be warning labeled on use, type and percentage of foam, valve position ON/OFF, with cap and chain provided.

A power-fill system or transfer foam pump from an external foam source directly into the vehicle’s foam tank may be required by end-user. Such refill systems shall require adequately sized venting provisions.

The foam tank shall be sealed "air tight" and equipped with a properly sized expansion dome in compliance to application section of NFPA #1901. The foam tank-to-foam pump plumbing connection shall be installed from a bottom “sump” with anti-swirl provisions. A foam tank level sensor connection (.250” NPT) shall be provided by the tank manufacturer.



Poly Water and Foam Tank



Poly Expansion Dome and Fill Tower, With Vent

Foam Tank to Foam Pump Plumbing -- Foam Concentrate

In the foam tank to foam pump line shall be flexible hose with stainless steel connections that are rated for 23" Hg (584.2mm) vacuum and minimum of 400 PSI (30 BAR) pressure. Fixed piping & swept connections shall be Type 300 series stainless steel or Schedule #40 brass. All foam concentrate plumbing components used must be compatible with the industry common foam concentrates. Plumbing pressure rating shall comply to applicable NFPA #1901 standards for pressure rating and hydrostatic testing. The flexible hose shall be installed from the foam tank sump to the ON/OFF foam tank valve by the final installer. Refer to the chart below for the minimum ‘inside diameter’ of the foam line.

The location of the foam pump, elbows, and distance between the foam tank and the foam pump must be carefully evaluated. **Contact FoamPro engineering for foam tank-to-foam pump plumbing approval.** In addition, many class B foams are more viscous and will require one size larger inside diameter foam tank line hose.

Foam Tank to Foam Pump Plumbing Chart

FoamPro Model	Min. Hose ID
3020/3040	1-1/2" (40mm)
3060	2" (50mm)
3090	2-1/2" (65mm)
3150	3" (80mm)
3300	4" (100mm)

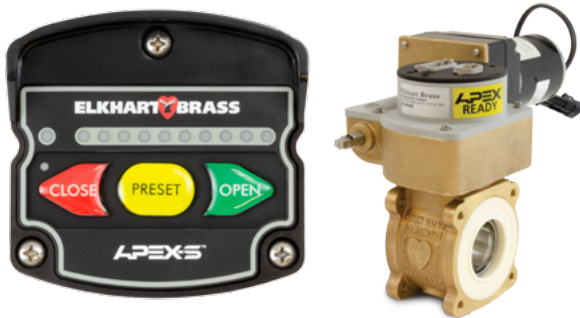
A full-flow check valve shall be provided and installed by the final installer between the foam tank connection and the foam tank ON/OFF valve, sized same as the plumbing. This check valve shall prevent accidental back-flow from the water flushing system or foam concentrate from the auxiliary off-board foam inlet line.



Foam Tank – Main ON/OFF Control Valve

The ‘foam tank-to-foam pump’ control valve shall be the same size as the foam tank line (see chart), and installed **AFTER** the check valve and **BEFORE** the auxiliary foam intake connection, relief valve connection, flush connection, and foam line strainer. The ‘foam tank ON/OFF valve’ and control are available as follows:

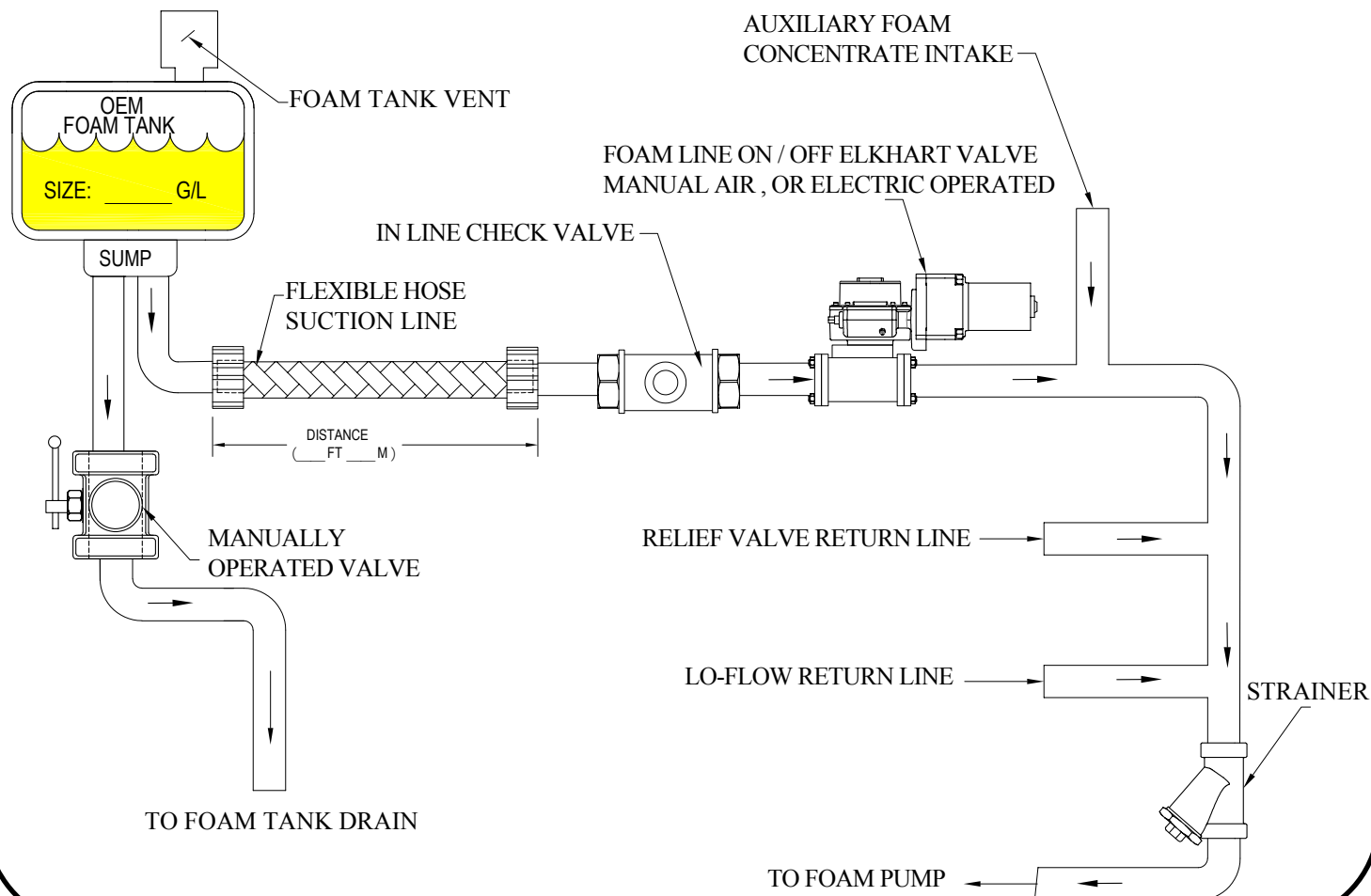
- a. **Final Installer Supplied Valve:** final installer supplies and installed any manufacturer of valve and type of control. The control of the valve could be manually operated, air operated control, or electrically operated.
- b. **OPTIONAL:** Foam Pro can supply an optional Elkhart electrically operated valve and actuated by an APEX display.



- c. **OPTIONAL:** Foam Pro can supply an optional Elkhart electrically operated valve and actuated by the FOAM-AUX display. NOTE: refer to FOAM-AUX Section in this manual for more information on installation and operation of this display.



Foam Tank to Foam Pump Piping and Controls



Wye Strainer Installation in Foam Intake Plumbing

A wye strainer shall be provided by FoamPro. The final installer shall install the strainer in foam concentrate intake line to the foam pump. The strainer size shall match the foam pump inlet piping size. The final installer shall provide proper clearance and accessibility to service and clean the strainer per the service and maintenance section of the Operation/Service/Parts manual.



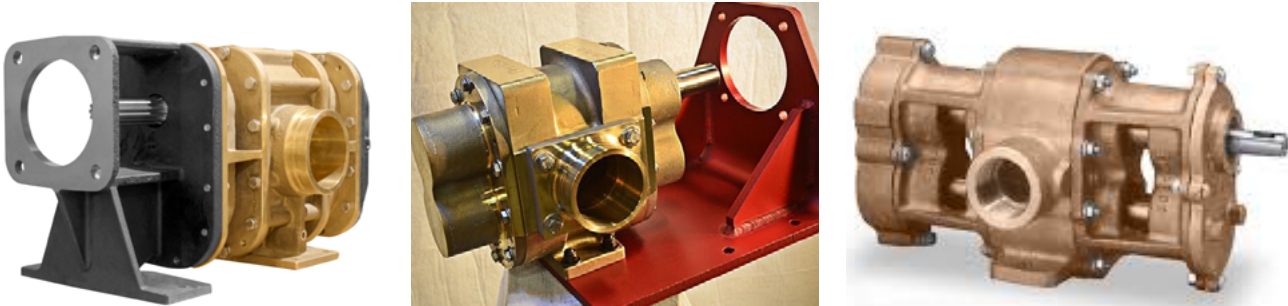
15. FOAM SYSTEM – DISCHARGE PLUMBING

Discharge Plumbing – Foam Concentrate

Foam Pump–Discharge Size

On the ‘discharge side’ of the foam pump shall have Victaulic or flange connection. The minimum inside diameter discharge connection and piping from the foam pump shall be:

1. 1.5" (25 mm) for #3020 and 3040
2. 2" (50mm) for #3060
3. 2.5" (65 mm) for #3090
4. 3" (80 mm) for #3150
5. 4" (100 mm) for #3300

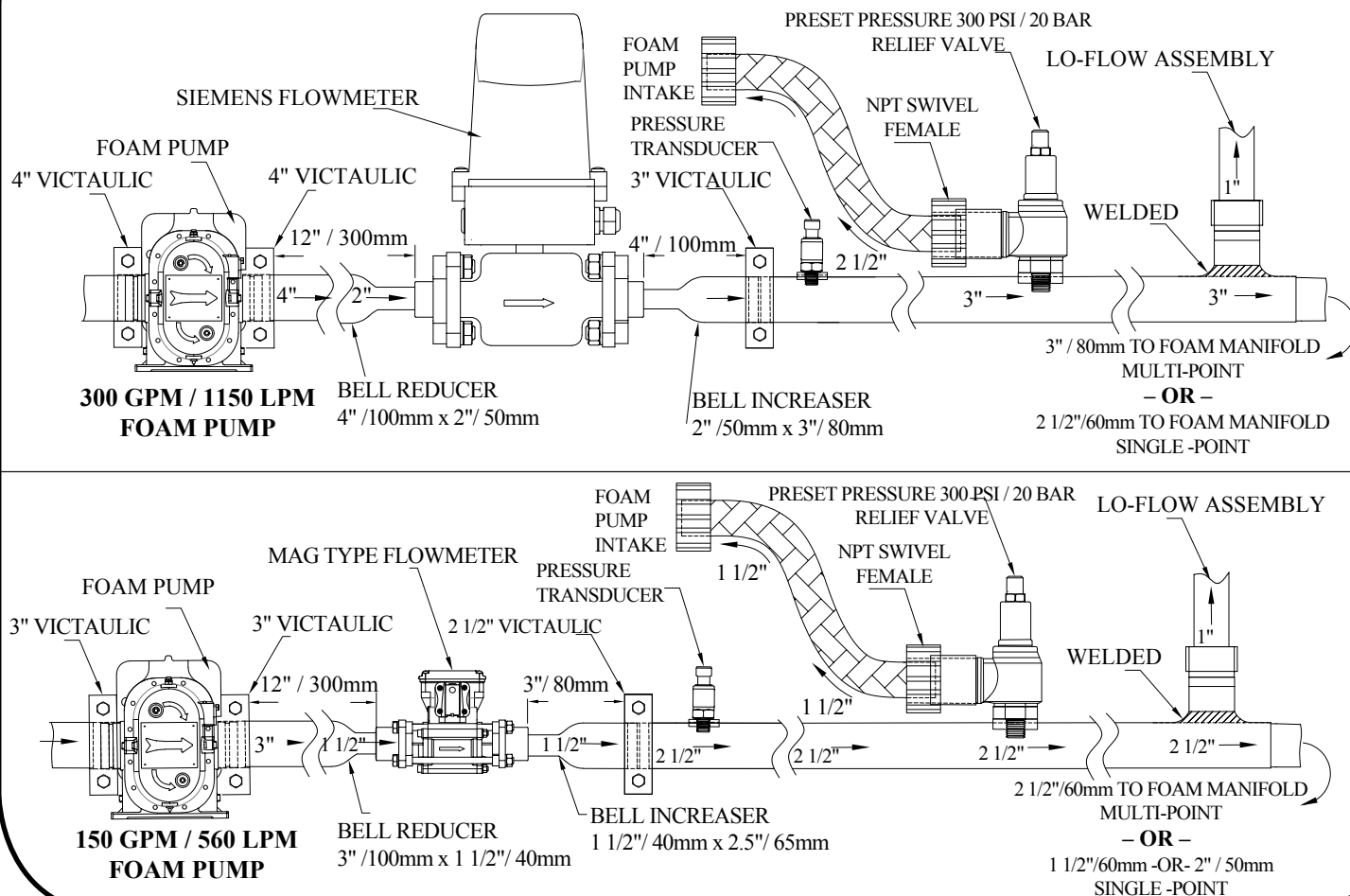


Master Foam Flowmeter Installation

The FoamPro supplied ‘master foam flowmeter’ shall be installed in a horizontal position after the foam pump discharge swept ‘bell reducer’. A minimum of 12" (305mm) straight run of plumbing before the flowmeter and 4"/100mm of straight-run of plumbing after the flowmeter.



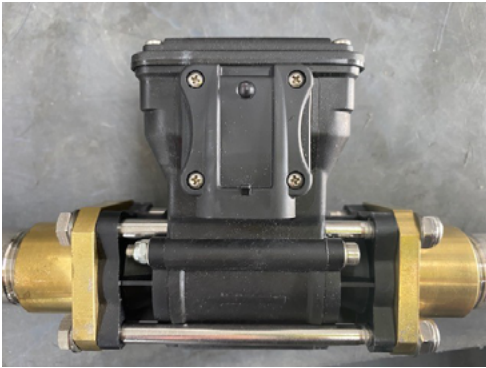
Foam Pump Discharge Plumbing



Ensure the foam concentrate direction is the same as the "arrow" on the side of the flowmeter.

Refer to foam system drawings in this installation manual for typical Fury and Fusion installations and guidelines. The master foam flowmeter shall communicate to the actuator on the "Low-Flow" bypass assembly. The master foam flowmeter shall communicate to the actuator on the "Low-Flow" bypass assembly. The following flowmeter type and sizing are determined by the foam pump capacity and Foam Pro model number:

1. 0.50" (12 mm) for #3020 mag-type flowmeter
2. 1" / 25mm for #3040 and 3060 mag-type flowmeter
3. 1.5" (40 mm) for #3090 and #3150 mag-type flowmeter
4. 2" (50 mm) for #3300 Siemens mag-type flowmeter



Pressure Transducer Sensor Installation

The FoamPro supplied pressure transducer sensor connection shall be installed after the master foam flowmeter. The connection shall be on the top of the foam line and shall be 0.250" NPT thread connection supplied and installed by final installer. Refer to the above foam pump discharge plumbing drawing for exact location of the pressure transducer.

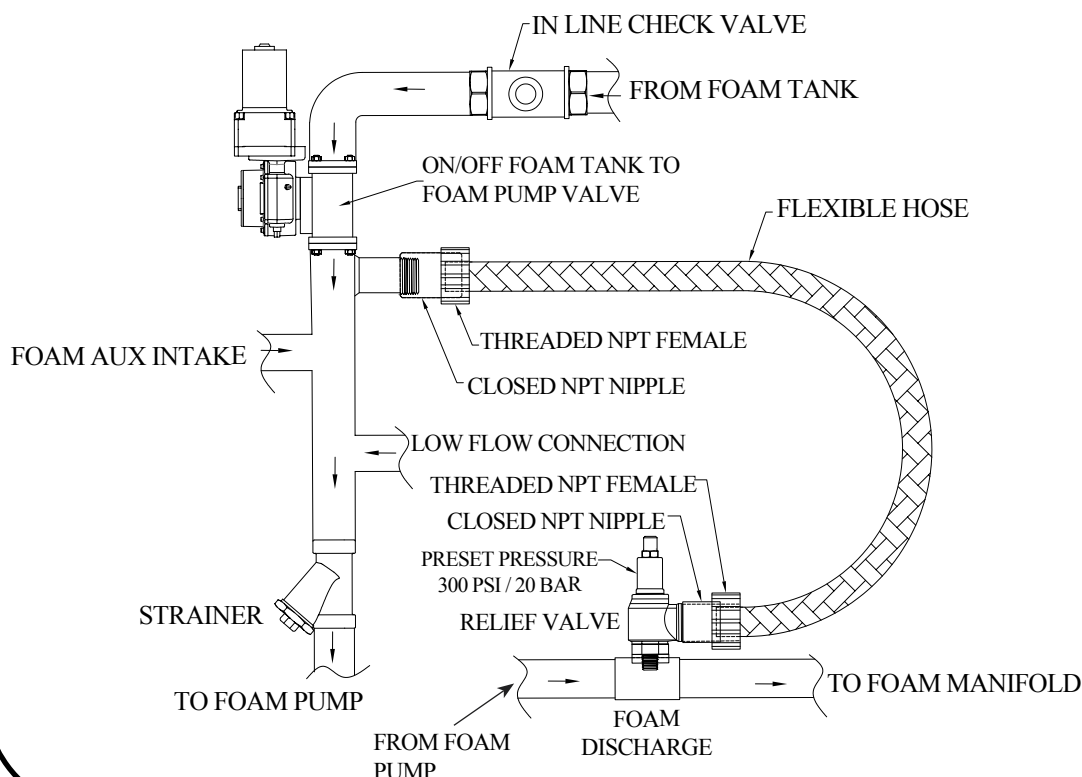
The pressure transducer communicates to the actuator on the "low-flow" bypass assembly. On reaching approximately 275 PSI/18BAR a 'high foam pressure' warning signal will be denoted on the display.



Relief Valve -- Foam Pump Discharge

Foam Pro shall supply a relief valve sized to foam pump manufacturer recommendations. The relief valve shall be preset to 300 PSI (20BAR). The final installer shall install the relief valve downstream of the master foam flowmeter and piped to the suction side of the foam pump (after the tank-to-pump valve). The line from the relief valve to the suction side plumbing shall be high pressure flexible hose with a minimum rating of 400PSI/28BAR). **DO NOT** pipe the relief valve to the foam tank. The relief valve to foam suction line shall be a minimum of 60"/1200mm upstream of the foam pump to lessen aerating of the foam concentrate.

RELIEF VALVE PIPING



WARNING

- The final installer or end-users shall not re-adjust the relief valve pressure setting.

Low-Flow By-Pass Injector Installation

The 'low-flow' bypass injector assembly shall be supplied by Foam Pro. The 1"(25mm) assembly shall be installed 'after' the pressure relief valve connection and piped to the suction side of the foam pump (ahead of the wye strainer) by the final installer. The 'low-flow' assembly shall be comprised of a master foam pressure transducer, master mag-type foam flowmeter and electric metering valve. The unit shall communicate to the Fury or Fusion system to assure that the minimum foam concentrate flow is maintain under all operating conditions.

Foam Manifold

The foam manifold(s) (if necessary) shall be designed, engineered, and installed by the final installer. The discharge capacity from the foam pump shall require a foam manifold with multi-point systems to disperse foam concentrate to the foam-line-injectors. The size of the foam manifold(s) shall be subject to discharge foam concentrate flow requirements of the foam system and number of foam-line-injectors in multi-point systems.

Foam concentrate manifold shall be constructed of stainless-steel compatible with all foam concentrates. The manifold shall be rated for and hydrostatically tested to 400 PSI (28 BAR) pressure by the final installer.

Foam Concentrate Line Injector(s), Hose, and Connections

The foam-line-injectors (FLI) assembly(ies) shall be supplied by Foam Pro; one (1) unit for a single-point system and two (2) to fifteen (15) injectors supplied with multi-point systems.

The number and diameter of FLI units and foam auxiliary system shall determine the required foam concentrate flow and foam manifold size. The foam concentrate discharge outlet size shall be determined by the foam pump flow 'capacity' and possible transfer foam concentrate to another pumper, monitor, or foam tanker. The FLI piping shall be the same inside diameter when connected to the foam manifold. **Pre-engineering of the foam manifold is essential by the final installer.**

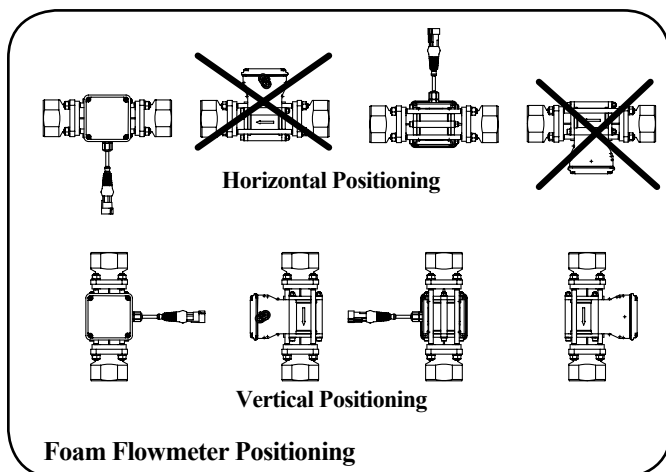
The FLI assembly calibration 3-way valve and check valve shall be installed AFTER the FLI assembly, prior to attachment to the water discharge manifold (single point) or prior to the foam/water discharge assemblies on multi-point systems. Between the FLI and water discharge shall be flexible high-pressure hose (minimum of 400PSI/28BAR) with stainless steel female swivel connections; sized the same as the FLI.

The Foam-Line-Injector (FLI) assemblies are tested at the FoamPro factory. All the cables, displays, and foam flowmeter, foam control valve assemblies and water flowmeters are all color coded to keep them together during installation of the units by the final installer. Matching these color codes together will ensure the compatibility of these components together.



Foam-Line-Injector Assembly Installation

The foam-line-injector (FLI) assemblies shall be shipped by Foam Pro in a pre-assembled package with the check valve and calibration valve to be installed by the final installer. The FLI are designed to give a maximum performance and accuracy over a the full range operations for each FLI. The FLI discharge assemblies shall include stainless-steel piping, a mag-type foam flowmeter, and an actuator/metering valve. The orientation of the FLI shall be as noted in the drawing below.



Calibration 3-Way Valves and Testing

The 3-way calibration valve shall be provided by FoamPro with each foam-line-injector assembly. Each valve shall be installed between the foam-line-injector electric valve and the check valve shall be used for calibration of the FLI foam flowmeter. The valve shall be equipped with quick-connection coupling for attachment of a calibration hose to a remote location for the flowmeter test kit. An end-user shall specify the size and length of calibration hose assemblies.



The final installed shall check to make sure the 3-way valve is installed properly. Check the handle and ball valve opening position; the flow should go from the center port to each of the end ports.

The hoses to and from the calibration valve should be $\frac{3}{4}$ " (19mm) for #3020 and #3040, 1" (25.4 mm) for #3060, 1.5" (40mm) for #3150, and 2" (50mm) for #3300 systems, inside diameter. The hose line(s) and connections to the calibration valve(s) shall be at rated for a minimum of 400 PSI (28 BAR) working pressure.

Downstream calibration discharge hose shall have quick connection fittings to the calibration valve and long enough to reach the foam tank or portable foam concentrate test assembly. Refer to drawing on an optional calibration manifold assembly that may be supplied by the final installer.

Check Valves – Foam-Line-Injector Assembly to Water/Foam Discharges

The foam-line-injector assemblies are Foam Pro provided with an in-line check valve to prevent the foam concentrate flow from the foam tank through the injection point and into the main fire pump discharge piping or manifold. The check valves have a minimum cracking pressure of 4 PSI (0.1 BAR) and are pressure rated to 400 PSI (28 BAR) minimum working pressure. Check valves shall be installed horizontal or higher angle to allow water and debris in the water line to drain away from the check valve(s). This will avoid sediment deposits or formation of an ice-plug in cold weather applications.

Calibration – Optional Methods, Manifold, and Calibration Test Kit

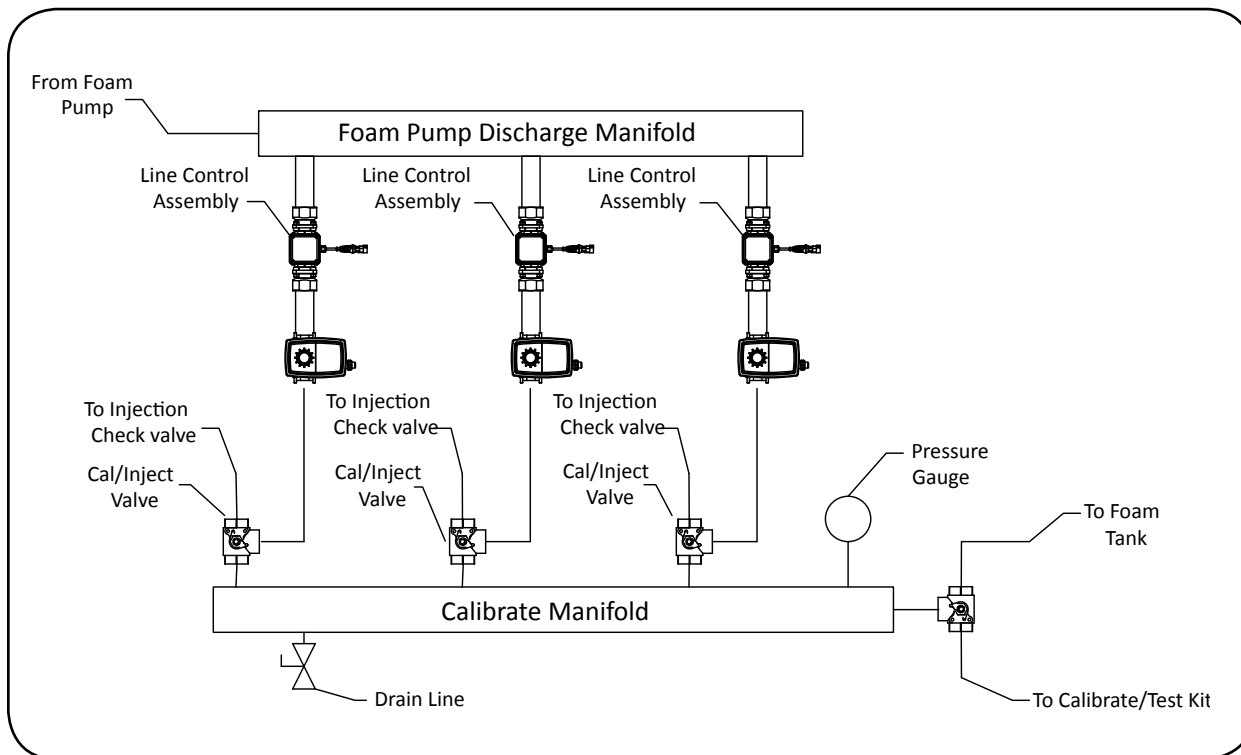
As noted above in the 'Calibration Valve' section, Foam Pro provides a 3-way calibration valve with each low-flow bypass injector assembly and foam-line-injectors (FLI) assembly(ies). These valves are sized the same as the FLI. On the outlet side of calibration valves, the final installer shall provide Check Valves – Foam-Line-Injector Assembly to Water/Foam Discharges cam-lock or NPT brass fittings for connection of flexible hose assembly(ies). A portable test kit and a calibration/test manifold assembly may be provided to the final installer as described below:

1. **Foam Pro Portable AccuMax Calibration Kit (part number #3430-0381):** is an available FoamPro option. The kit includes cam-loc inlet and outlet fittings, an FRC flowmeter, pressure gauge, and a back-pressure quarter turn ball valve. During foam system calibration and testing, the final installer may connect the flexible hose assembly(ies). The flexible hoses shall be supplied by the final installer and attached to each FLI, low-flow injector cal-valve to the kit, and calibrate manifold outlet on pump panel. From the calibration kit, a final installer flexible hose shall be supplied to the foam concentrate tank or portable 1000L/265G foam tote.

Foam Pro AccuMax Portable Calibration Kit (Part Number #3430-0381)

2. **Calibration Testing and Diagnostic Operations Manifold:** It may be advantageous to install a calibration test and diagnostic operations manifold assembly to speed the testing and calibration of the foam system. Flexible hoses shall be installed from the each cal-valve to the 'calibrate manifold', and then a flexible hose to an accessible location (pump panel or similar location). This cam-loc connection shall allow a hose connection with cam-loc fitting for the Foam Pro portable calibration kit. The manifold and installation shall be installed according to the typical drawing on the following page and items as follows:

- Manifold, flexible hoses and fittings are to be rated at or above 400 PSI/28BAR working pressure.
- Manifold, fittings, and flexible hose connections shall be compatible with all foam agents used with the system, using brass or Type #300 stainless steel.
- Manifold shall be at least one pipe size larger than the largest foam-line-injector (FLI) assembly pipe size.
- All lines and valves shall be properly identified with the FLI assemblies and water/foam discharge they service.
- The end of the manifold shall be equipped with a 3-way valve, with cam-loc fittings to allow the test-person to direct the foam concentrate to the system foam tank or to a pump panel outlet for attachment of the calibration kit unit.
- The cam-lock connection shall be used to drain and flush from the 'calibrate manifold'.
- A pressure gauge may be provided on the pump panel or manifold for diagnostic purposes.



16. FOAM /WATER DISCHARGE PLUMBING

Water Manifold & Foam/Water Discharges – Fire Apparatus

Engineering and Design of Mid-ship & Rear Mounted Pump Enclosures

As noted in the pre-planning section of this manual the first (4) four critical steps are:

1. Determine the required fire pump manufacturer, model, GPM/LPM flow rating, and location of the fire pump
2. Determine the fire-ground pumping operations (draft-only or pumper relay/fire hydrant use)
3. Determine the foam concentrate type and percentage required
4. Determine the total foam solution flow requirement.

It is important that the final end-user and installer have a good working knowledge of “water flow hydraulics” in pumper or industrial pumper fire apparatus or fixed systems. Before selecting discharges on any fire apparatus, the end-user should determine the available water supply, intake volume and pressure, intake sizes (refer to NFPA #1901 Table 16.13.2.2.1.1 suction hose size and number of suction lines for fire pumps), and quantity of both ungated and gated “water intakes”.

After determining the fire pump “rating” from draft and applicable NFPA #1901 sections that apply, the end-user must determine the minimum number of discharges required to meet #1901 requirements. Normally, fire departments specify far more than the “minimum” number of discharges required and such discharges are positioned on a pumper for “convenience” of use.

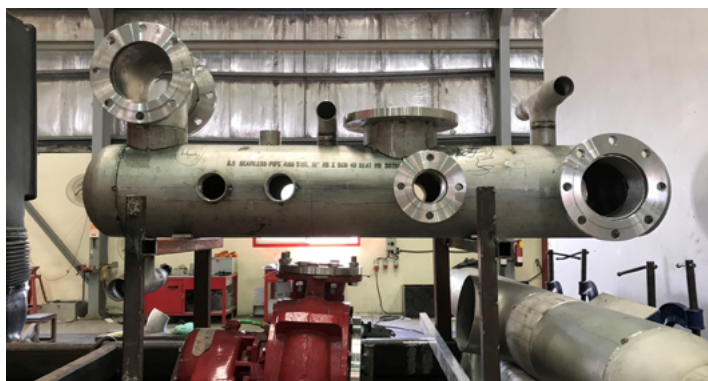
It is critical that the end-user determine the total foam/water solution GPM/LPM flow and the specific discharges to be utilized for firefighting purposes. After determining this information, the final installer can determine the Foam Pro AccuMax model, foam pump capacity and number of foam/water discharges to be supplied. With the above information, the final installer and fire pump engineers can easily determine the required horsepower/KW necessary.

In addition, the chassis engine must be large enough to power both the fire and foam pumps. Refer to NFPA #1901 standard for guidance and the Foam Pro AccuMax ‘workbook’ for calculations of total water flow and sizing of discharges and suction.

In the design of both mid-ship and rear mounted industrial pumpers in Level #2 and #3 GPM/LPM flow ranges, the pump enclosures (pump house) and pump panel must be sized to adequately allow for all plumbing specified. Typically, in today’s foam system installations, Final installers have standardized on electrically controlled valves and engineered pump enclosures in the range of 60” to 80” (1500mm to 2000mm) wide.

Water Manifold – Fire Apparatus

In fire apparatus foam systems, pre-engineering of the water manifold and water/foam discharges are absolutely essential. The Foam Pro AccuMax foam systems are “FLOW BASED” and custom configured for each purchaser. It is critical that the final installer determine end-user requirements, fire pump selection, quantity of and sizes of water only and foam/water discharges, and design of the water manifold in larger fire industrial pumper installations before the fabrication of the water manifold, as noted in the following photo:



Foam/Water Discharge Assemblies

The location and number water only and foam/water discharge assemblies shall be determined by the end-user. The discharge assembly shall be comprised of a discharge valve and specified control, water flowmeter, water pressure transducer, and optional water discharge line check valve (**required by NFPA #1901 standards in potable water applications**). The foam-line-injector assemblies shall be installed to supply the specified foam/water discharges by the final installer as determined by the type of system.

In Fury foam systems: the discharge valves and controls, and line pressure gauges, and water line check valves shall be supplied and installed by the final installer, per requirements of the end-user. Water flowmeter and foam-line-injectors are supplied by Foam Pro.

In Fusion foam systems: electrically operated Elkhart discharge valves, pressure transducers, water flowmeters, and foam-line-injectors are supplied by FoamPro.

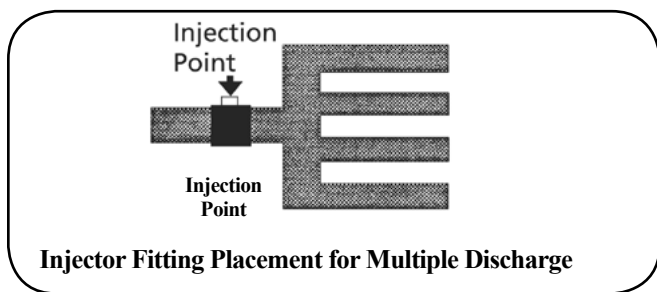
In both foam systems, the end-user shall specify discharge quantity, size of discharges, type of discharge (handline, pre-connects, LDH discharges, monitors, etc.) A check-off questionnaire is available from FoamPro website or sales representatives in the collection of the above information.

In addition, the auxiliary foam system shall be determined to meet end-user requirement; in supplying external intake valve(s), auxiliary foam tank re-fill, auxiliary foam concentrate discharge, flush system, calibration valves and hose assembly, and tank-to-pump valve and controls must be supplied by either the final installer or an optional FOAM-AUX system must be specified from FoamPro.

Water Flowmeter Selection and Installation

Single point Foam Pro AccuMax systems are provided with one (1) water flowmeter, which shall be installed before the foam/water discharge manifold. An upstream water line check valve shall be installed by the final installer before the water flowmeter. The water flowmeter shall be sized according to the estimated water flow GPM/LPM capacity of the system (pipe size & water flow) and the foam-line-injector assembly size.

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.



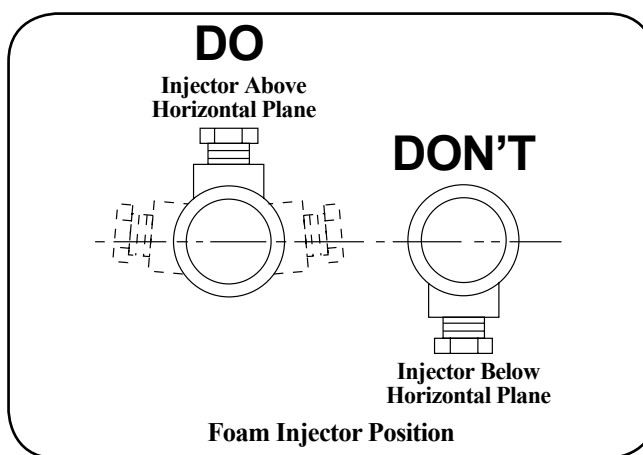
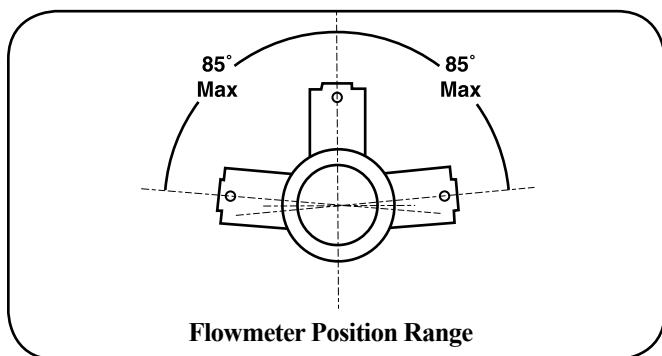
Multi-point Foam Pro AccuMax systems are provided with water flowmeter and pressure transducer on 'each' foam/water discharge assembly. Each water flowmeter shall be sized according to the estimated water flow GPM/LPM capacity of each discharge (pipe size & water flow) and the foam-line-injector assembly size.

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

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

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

2. The downstream plumbing of the water flowmeter is not as critical, but straight runs without fittings help maintain accurate repeatable flow readings.
3. Do not mount a flowmeter directly after an elbow or valve. Valves create severe turbulence when they are “gated down” (as shown in the diagram).
4. Try to mount the flowmeters in a position that is accessible for routine inspection and maintenance.



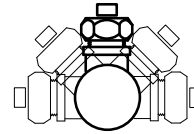
FoamPro paddlewheel flowmeters are available with several types of mounting assemblies.

ABBREVIATIONS	DESCRIPTION OF MOUNTING
SS	Stainless Steel Weldment
S	Steel Weldment
AL	Aluminum Weldment
PT	Pipe Tee
SC	Saddle Clamp
M	Manifold
SS+FC	Stainless Steel Weldment + Flow Conditioner
SS+ST	Stainless Steel Weldment + Shallow Throat
S+FC	Steel Weldment + Flow Conditioner
AL+FC	Aluminum Weldment + Flow Conditioner
PT+FC	Pipe Tee + Flow Conditioner
SC+FC	Saddle Clamp + Flow Conditioner



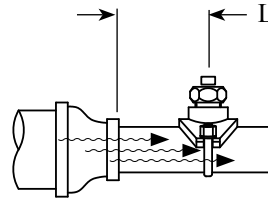
Flow Sensor Location Guide

The preferred location for mounting a flow sensor is on the top half of the pipe. The best orientation is vertical. If the sensor is mounted on the bottom of the pipe, it may be susceptible to dirt accumulation impacting operation.



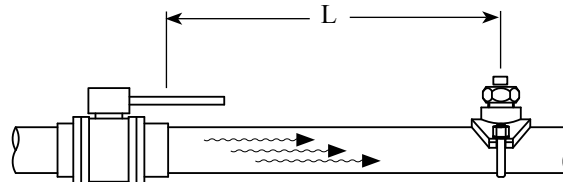
Best Orientation is Vertical

When mounting a sensor after the pipe diameter is reduced, length L must be at least 2 times the pipe diameter.



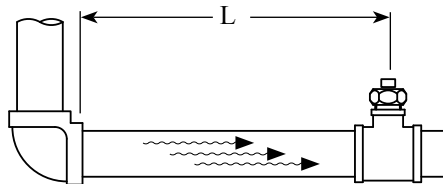
After Reduction
 $L > 2 \times \text{PIPE DIA.}$

When mounting a sensor after a valve, length L must be at least 14 times the pipe diameter.



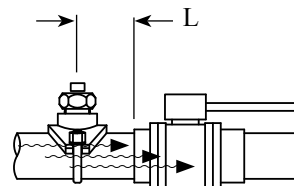
After Valve
 $L > 14 \times \text{PIPE DIA.}$

When mounting a sensor after an elbow, length L must be at least 6 times the pipe diameter.



After Elbow
 $L > 6 \times \text{PIPE DIA.}$

When mounting a sensor before a valve or an elbow, length L must be at least equal to the pipe diameter.



Before Valve or Elbow
 $L > 1 \times \text{PIPE DIA.}$

Water and Foam System -- Drain Valves

After each foam system use, the entire foam system and water/foam discharges shall be flushed with clean potable water with all caps removed and water flowed through every fire pump discharge. The foam system shall be separately flushed with potable water with the specified flush kit assembly, noted on Page # 59. The entire foam and water system shall be flushed and entirely drained “dry” and left in that condition (with foam and water tank valves closed.)

The foam system and water system shall have separate drains and valve controls with a minimum size of 0.75” (15 to 20mm) NPT in size. The drains shall allow draining of all liquids from the plumbing systems. Refer to applicable sections of NFPA #1901 for fire apparatus draining provisions. Such drain piping and valves shall be piped to the side of the vehicle for mobile installations for easy access by operators and shall include necessary color-coded identification and labeling.

If applicable, the final end-user may specify “low-point” drain valves and piping to be provided on all water and foam plumbing to prevent freezing in cold weather locations.

Fire pump, plumbing, hoses and fittings shall be rated at 400 PSI (28 BAR) working pressure with single stage fire pumps and 700 PSI (40BAR) with two-stage fire pumps. Drain system fittings and hoses shall be compatible with all foam agents to be used with brass or Type 300 series stainless steel connections and valves.

Check Valves – Water Supply Lines

If the foam system is to be installed on a fire apparatus where “potable water” sources may be may need to be isolated from the possibility of foam concentrate contamination, there are a few methods that can be incorporated into the design of the plumbing system to comply to applicable NFPA #1901 standards.

One method is to install check valves in all water/foam solution discharges and flush systems. This would allow the foam concentrate liquid to drain back into the fire pump or water tank of the fire apparatus, and the water discharge piping will supply water/foam solution. Another method is to install a check valve or other device between the fire pump, water tank, and the suction inlets routed to the fire pump or outlets of a fire hydrant.

17. FOAM SYSTEM AUXILIARY FUNCTIONS

Final Installer Requirements -- Mobile Systems

Auxiliary Foam Functions

The foam system shall be supplied with “auxiliary function” components to provide several supplemental operations of the foam system. This equipment can be provided and installed by the assembler of the system and/or certain assemblies can be provided by Foam Pro as ‘optional’ equipment.

To assist the installer, the following section outlines:

1. Final installer supplied and installed auxiliary foam functions
2. Foam Pro provided FOAM-AUX components and display system

“Simulation Mode”: Operating Foam System for Auxiliary Functions

The operation of the “simulation mode” is outlined in the SET-UP and OPERATION section of this manual. Careful operator training and visible instructions must be in place for such operations. The “simulation mode” operation of a foam-line-injector is required for auxiliary foam operation. 1.5”/40mm size (for up to 150GPM/560LPM flow) or 2”/50mm size for (300GPM/1125LPM flow) should be installed on one (1) of the 1.5" or 2" foam-line-injectors (FLI) -- SEE DRAWING BELOW.



- It is extremely important all operators are trained in the operation of the “simulation mode” of a foam-line-injector. A large instruction plaque shall be installed at the pump panel to denote the step-by-step set-up of this mode.
- When operating the FoamPro AccuMax System in the “Simulated Mode” function, an outlet for the foam concentrate must be provided. Otherwise, dangerous excessive pressure may be built up in the apparatus water piping and/or hoses. This outlet for the foam concentrate can be provided by turning the “CAL/INJECT” valve to the “CAL” position. A suitable container must be provided to collect the foam concentrate. Or, The foam concentrate discharge or foam tank refill line can be operated.

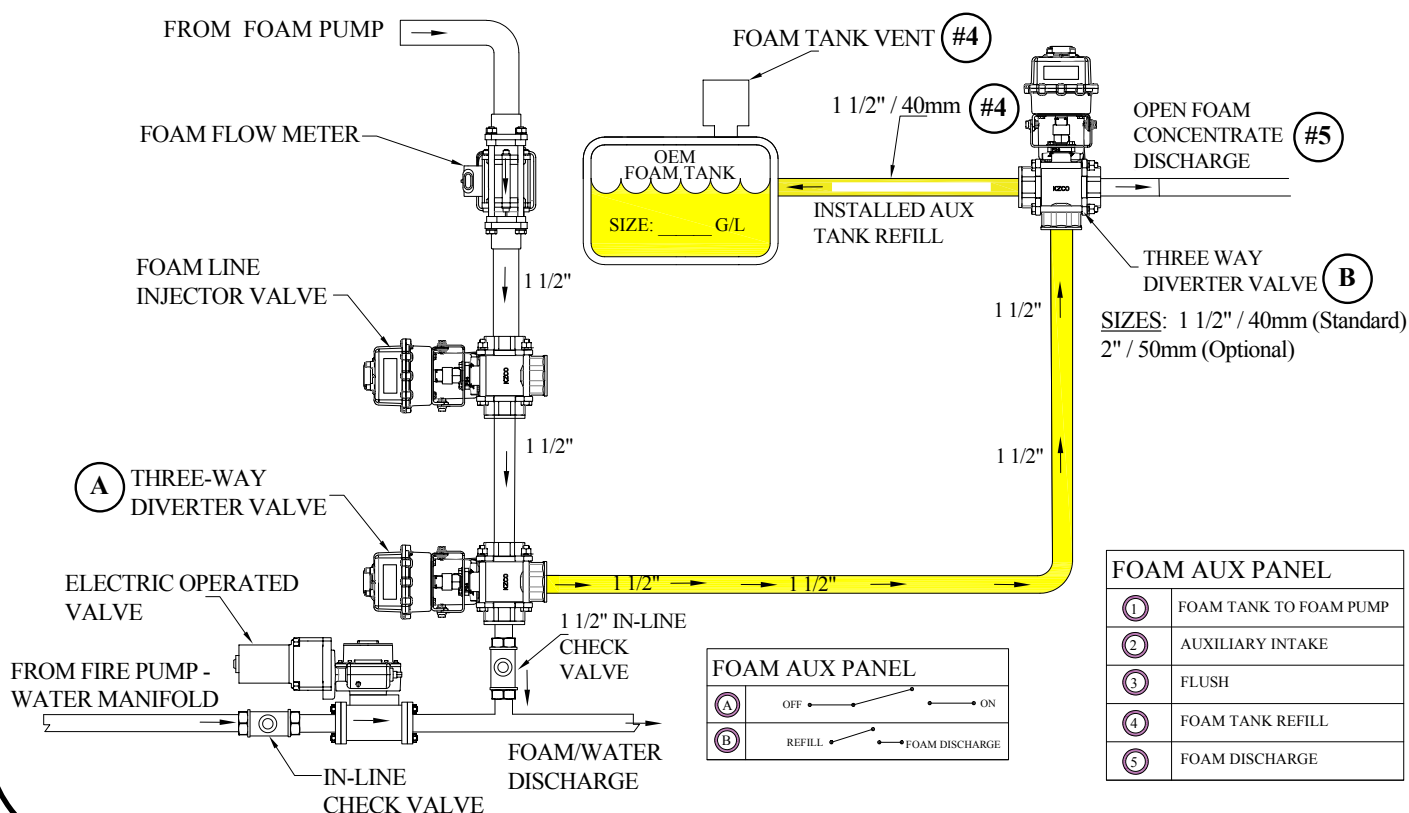
“Final Installer” Supplied: Auxiliary Foam Functions and Installation

The final installer supplied “Auxiliary Functions” could be as follows:

1. Valve and control of the foam tank-to-foam pump control valve (noted previously under INTAKE PLUMBING) (Specify Size: _____ inches/_____ mm)
2. External foam concentrate intake valve (known as OFF-BOARD). Refer to section #15 on this installation. (Specify Size: _____ inches/_____ mm)
3. Flushing of the foam system (Noted below)
4. (*) If specified, foam tank refill system (Specify Size: _____ inches/_____ mm)
5. (*) External foam concentrate discharge control. Refer to section #16 in this installation manual. (Specify Size: _____ inches/_____ mm)
6. Note: opening item #1 and #4 would allow the foam concentrate to be recirculated.

Functions #4 and #5 (*) require special plumbing and installation of three-way valves to be installed AFTER the foam-line-injector (FLI) assembly. These three-way valves shall be the same size as the FLI and shall be separately controlled with an ON/OFF bypass switch and diverter control switch: foam tank refill or foam concentrate discharge (open outlet – without cap). Refer to the drawing on a typical installation arrangement.

Final Installer Auxiliary Functions # 4 And # 5



Flushing Kit Installation and Controls

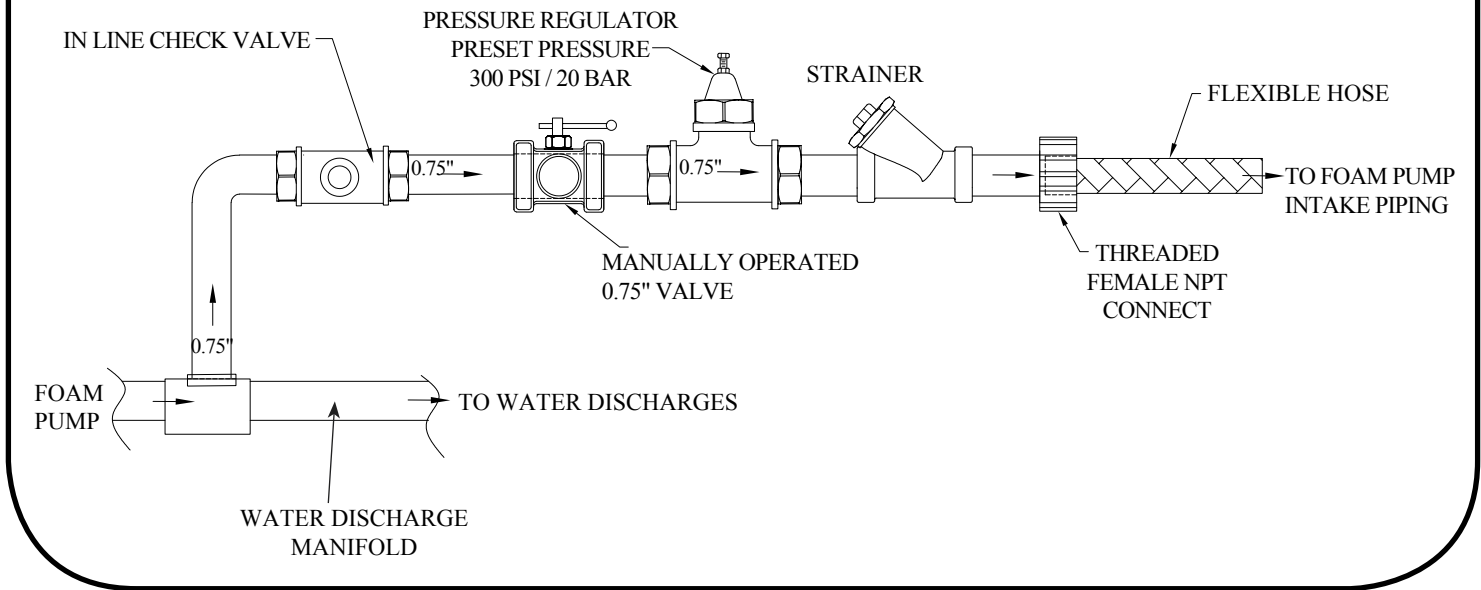
No matter which Foam Pro system is supplied on both vehicle or fixed foam system installations, a foam concentrate “flushing” system shall be required. This system shall be furnished and installed by the final installer. Refer to the drawing below that outlines the plumbing, control valve, pressure regulator, check valve, strainer, and connecting hose from the flush kit to the intake-side of the foam pump piping.

The flushing of the foam system after each use is required. The water supply for “flush kit” shall be from the fire pump discharge manifold. Flushing of the foam system from the auxiliary foam concentrate intake **IS NOT** recommended for FireLion and Edwards foam pumps. On these intakes – warning labels on maximum of foam concentrate intake pressure and a pressure gauge shall be installed next to the intake valve. (Note: these items are NOT REQUIRED on Trident foam pumps).

The final installer shall provide the flushing system which shall include the following components:

1. Check valve (0.75"/20mm in size) and connected to water manifold
2. Flush valve (0.75"/20mm in size) manually controlled on the operator's panel. **Note: this valve shall be electrically operated with a Foam Pro FOAM-AUX system.**
3. Pressure regulator (0.75"/20mm in size) preset at 50 PSI/3BAR
4. In-line strainer (0.75"/20mm in size)
5. A flexible hose line with female swivel NPT connections (0.750" / 20mm) shall be installed from the flush kit to the foam pump intake piping, connecting BEFORE the main wye strainer.

Flush Kit



Flushing Foam Pump and Foam Plumbing System

After using any foam system, it should be flushed with fresh, potable water. The following procedure can be used for flushing the foam system:

1. Connect a potable water supply to the fire pump or the flush kit assembly inlet
2. Foam concentrate tank control valve should be in the CLOSED position (final installer valve or FOAM-AUX CONTROL).
3. Following standard fire and foam system operating manuals and procedures, start the power source, engage the fire pump, engage the hydraulic pump system PTO or power source and establish water-flow through all foam/water solution discharges.
4. Manually OPEN the flush water supply valve from fire pump discharge or outside water source (see drawing) or operate the FOAM-AUX function #3 to OPEN the electric water supply valve.
5. Turn ON the foam system (by using the Fury or Fusion display) and allow the hydraulic motor-driven foam pump to operate.
6. OPEN all foam/water discharge valves
7. Auxiliary Functions—Final Installer Supplied System:
 - a) Operate the 3-way diverter valve “B” to the foam concentrate discharge outlet position
 - b) Operate the 3-way diverter valve “A” to ON, which diverts flushed water to the “B” diverter valve.
8. Auxiliary Functions: Foam Pro FOAM-AUX system:
 - a) FOAM-AUX display — turn on display and push Function #3 FLUSH
9. OPEN the external foam concentrate intake valve and CLOSE valve when clear water has been discharged
10. Continue to operate FLUSH SYSTEM until all water/foam discharges are flowing clear water and external foam concentrate discharge flows clear water.
11. Operate the system for 5 to 10 minutes until all foam concentrate is ‘flushed’ from the system.

12. To shut-down the system:

- a) Turn OFF the foam system on the display
- b) Reduce RPM on power source, disengage fire pump, and hydraulic pump system
- c) Close flush valve, or select the OFF position for the FOAM-AUX display
- d) Disconnect potable water supply to fire pump
- e) Let all water drain from discharges outlets, bleeder valves, and master fire pump drain system.
- f) Restore all discharge adapters and caps.



- The foam concentrate liquid and foam/water solution that is “flushed” from the foam system shall be directed to a ‘safe’ foam concentrate collection location. The final installer and/or end-user shall be responsible for flushing the system.

Auxiliary Foam Concentrate Intake Connection(s)

Every foam system shall be equipped with an auxiliary external foam concentrate connection intake. Such intakes are commonly referred to as “OFF-BOARD” pick-up intakes. The final installer shall be responsible for the auxiliary foam concentrate intake installation. Normally, this intake valve is located at or near the pump operator’s position, so that the operator can easily see and control foam drafting or foam intake pressure.

The foam intake valve, plumbing, and adapters must be “sized” to the same size as the foam pump intake piping; supplied by the final installer. An optional FoamPro FOAM-AUX system and Elkhart electric valve are available.

If specified by the end-user, the final installer shall supply an "off-board" foam suction hose, of a minimum of 10 feet / 3 meters in length. If longer, the intake hose shall be increased in hose diameter by one size. The intake line and suction hose shall be the same size as the foam tank to foam pump line.

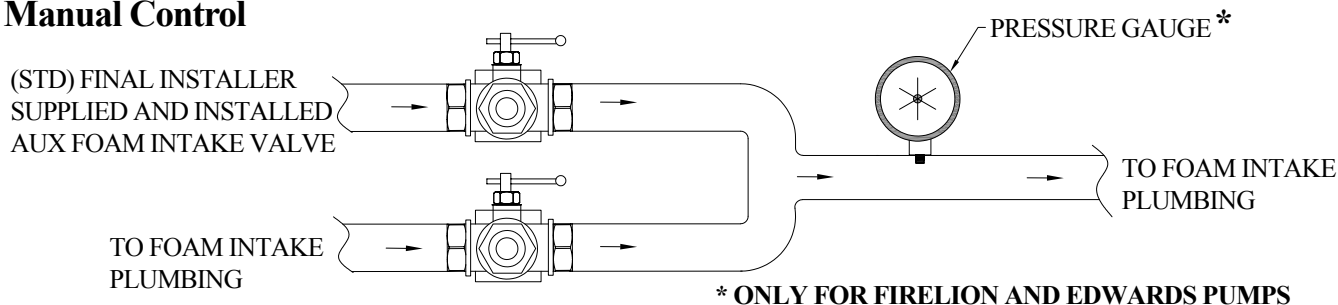
The end-user shall specify one of the following alternatives for an auxiliary foam intake valve(s):

- a. **“Suction only” intake use:** from foam totes, portable foam tank, or foam tanker supply, without a pressure and the foam intake is for “suction only” purposes. A manual or electric gated ball valve sized to match the foam pump supply inlet shall be installed. The intake valve, intake hose fittings and adapters shall be supplied by the final installer.

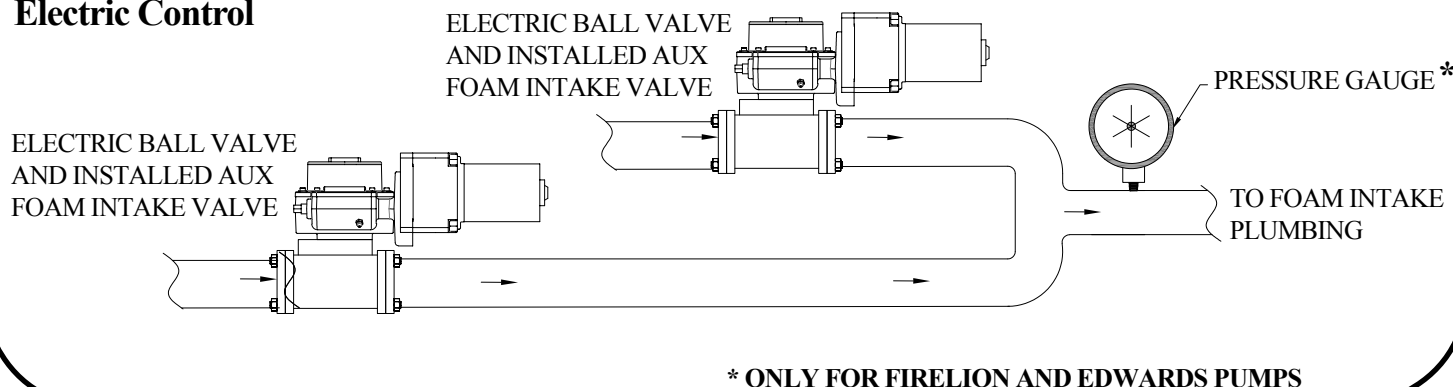


- The final installer shall install the following warning label next to the foam intake valve and connection: this applies only to FireLion and Edwards foam pumps.
 - Foam concentrate intake is intended for “suction ONLY” purposes. This foam intake shall NOT be used for “flushing” foam system or pressurized foam supply.
- b. **“Pressurized and Suction” intake use:** This is a dual-purpose intake, for both suction purposes and pressurized foam concentrate supply from foam pumpers or tankers with foam pumps. The final installer shall supply and install an auxiliary foam inlet with manual or electric gated ball valve on inlet plumbing to supply the foam pump from an external foam concentrate supply or pressurized source. This valve shall permit the pump operator to control the intake pressure. The intake hose fittings and adapters shall be supplied by the final installer.

Auxiliary Intake Foam Concentrate Manual Control



Auxiliary Intake Foam Concentrate Electric Control



Foam Pro Supplied: FOAM-AUX Functions

OPTIONAL: EXTERNAL FOAM CONCENTRATE INTAKE(S)

Foam Pro supplied “off-board” foam supply valve(s): external “off-board” foam intake(s) shall be Elkhart Brass electric valve(s) with either an APEX control or FOAM-AUX display control. The intake hose fittings and adapters shall be supplied by the final installer.

These valves are available in two (2) alternative methods:

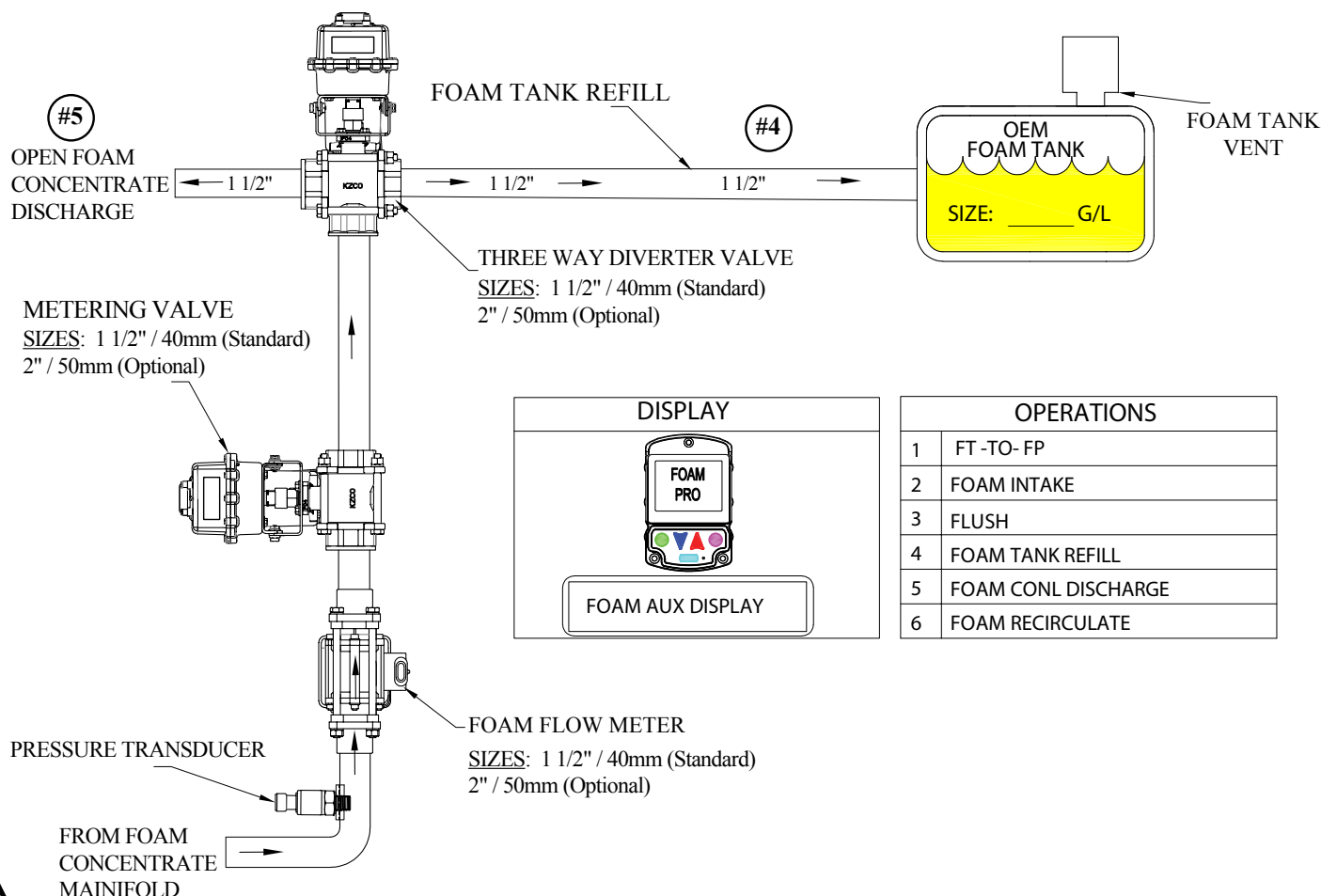
- a. **Elkhart APEX Valve Control:** foam concentrate intake electric valve shall be controlled by an APEX valve display.
- b. **FoamPro FOAM-AUX display control:** A Foam Pro supplied FOAM-AUX auxiliary function system and display shall be installed by the final installer. The FOAM-AUX shall control an Elkhart electric intake valve(s).

The FOAM-AUX system shall provide the following functions:

1. Foam tank-to-foam pump valve control ON/OFF (Specify size: ____”/mm)
2. External foam concentrate valve(s) control (Specify size: ____”/mm)
 - a. Manually controlled valve(s) supplied and installed by final installer
 - b. Elkhart electrically controlled foam concentrate intake valve(s) supplied by Foam Pro and installed by final installer.
 - c. Flush system control (manual valve or electric valve) supplied and installed by final installer.
 - d. Foam tank refilling (Specify size: ____”/mm)
 - e. Foam concentrate discharge (Specify size: ____”/mm)
 - f. Foam concentrate recirculation

Refer to drawing on the installation of the FOAM-AUX plumbing diagrams. The setup and operation of the system is noted under the SETUP section of this installation manual.

Foam Aux Display and Installation



WARNING

On FireLion and Edwards foam pumps a pressure gauge shall be installed next to the intake valve. The final installer shall install the following warning label next to the foam intake valve and connection:

- **WARNING:** foam intake valve (from either “suction” or “pressurized” foam supply) shall be ball valve controlled to allow a **maximum pressure of no more than 50 PSI (3 BAR)** or foam pump damage will result. The foam intake shall NOT be used for “flushing” purposes.

18. ELECTRICAL AND CABLING INSTALLATION

General Overview of AccuMax Electrical System

The electrical system for FoamPro AccuMax systems has changed dramatically from earlier versions and product releases. The new electrical system is virtually a “plug-and-play” system, thus radically reducing the labor hour electrical installation time. The electrical cabling, major components, and connections are simple to install and extremely durable in design for years of operation. This electrical section is designed to assist the final installer to understand each step and breakdown of the component assembly in the electrical installation process. Any electrical installation first requires the final installer to provide an adequate and stable power supply; including proper wiring and fuse protection in accordance with the guidelines in this section and recognized SAE, NEC, and NFPA standards. Understanding the AccuMax electrical terms, wiring cabling, connections, and major components are essential before starting the installation process.

“Pre-Planning” any electrical installation is critical to assure a reliable and trouble-free system. This section will review a ‘step-by-step’ review of system components, cables, and layout of the components for either a fixed system or mobile installation.

All Foam Pro AccuMax systems shall be furnished with molded cable sets and wiring harness assemblies. Refer to photos and individual schematic drawings of standard cabling for Fury and Fusion foam systems. Data and power communication bus cables and supplement cables are pretested with the Fury or Fusion displays, foam-line-injector assemblies, and flowmeters at the Foam Pro factory. A color-coded tab is placed on each FLI component; **do not interchange or mismatched components, cables, and molded connections**. The system can only perform when the electrical connections are tight; make sure all connections are properly inserted.

Basic AccuMax Electrical Terms & Glossary, Color-Codes, and Symbols

- A. Power supply wire (positive): Color: red wire
- B. Power supply wire (negative/ground): Color: black wire
- C. Electrical receptacles: are denoted by ‘white’ squares on cable drawings
- D. Electrical pin-type plugs: are denoted by ‘black’ squares on cable drawings
- E. Foam-line-injectors (FLI): are pre-assembled components for foam concentrate injection into water discharge line(s).
- F. Low-Flow Bypass (LFB): each AccuMax system includes a foam concentrate low flow system to assure a minimum foam flowing in the system.
- G. Power-Supply-Terminals (PST): are provided with each AccuMax system for final installer wiring of power from battery source.
- H. Power-Tap-Connection (PTC): is provided as required to supply power and data communications to the foam pumps from the PST.
- I. Power-Data-TEE (PDTC) cables: are provided for main foam system power and data communications. Each will have two (2) plugs and one (1) receptacle.
- J. Power-Isolator Unit (PIU): shall be supplied and shall be installed in multi-point systems to extend the main power/data bus cabling and allow the using of a second power-tap-connection (PTC).
- K. Terminator Caps (TC): at the end of the ends of power/data cables, terminator caps shall be inserted to close/open receptacle connections.
- L. Extension Cables (EXC): are available in various pre-engineered lengths for 6-pin, 3-pin, and special wiring harness lengths.
- M. Electric Valve-Power-Supply Junction Box (EVPS): a final installed supplied power distribution, fuse installation, and protective enclosure.

Power Supply:

The electrical power and wiring must be supplied from an independent battery system on fixed systems or fire apparatus chassis electrical system for the AccuMax foam system. Electrical devices or systems can be damaged or operate intermittently when powered by a weak or erratic power source and a FoamPro AccuMax system is not any different. The following electrical installation instructions shall ensure the AccuMax system will perform as designed and engineered.

The foam system can be operated with either 12 or 24 VDC, negative ground, power source. The power supply wiring shall be protected with a properly sized fusing, wire size, and recommendations of FoamPro in this installation manual. All foam system components should all be powered from a positive (red in color cable) and negative ground (black in color cable) from battery terminals. The main power source must be supplied directly from a battery(ies) without any other connections or high amperage devices such as: electric primer pump, electric cable or hose reels, warning lights, scenelights, etc.

A ‘master electrical power disconnect’ shall be installed on fire apparatus per requirements of NFPA #1901 with cab operated ON/OFF control or in a fixed system, with a switch on the master control panel (properly labeled with operator instructions). The foam system power supply shall be activated when the master switch or relay is activated. Refer to the drawing on a typical power supply wiring diagram.

Battery Connections:

The primary 12 or 24 VDC power supply shall be wired directly to the battery bank or power relay. One (1) positive (red) power line and one (1) negative ground (black) line, in a single-point system using ____ **gauge/** ____ **amp** or in a multi-point system ____ **gauge/** ____ **amp** with Type: sSXL wire with a protective wire loom for abrasion. Fuse protection shall be provided at the battery or master relay area; the fuse shall be sized to wire size and load requirements of the foam system installation. The battery connections and wiring shall meet applicable requirements of final installer chassis manufacturers, SAE, and applicable NFPA #1901 standards on the ‘power supply’ cables and electrical installations.



Primary & Secondary Power-Supply-Terminal (PST) -- Studs & Receptacles:

The “primary” power supply shall be provided with two (2) combination stud terminal-type and 12-pin receptacles for power-supply-terminal (PST) connections. Cable and terminal stud colors: (1) red and (1) black. Each power connection shall have a threaded stud and nut terminal for connection of the battery power cable wiring. Each unit shall have a 12-pin gray receptacle, with a 12-pin plug for installer use.

The primary power supply terminal & receptacle connections shall be wired to battery supply connections. The “primary-power-terminal” connection shall supply the molded cable assembly for displays, FLI units, and data communications for Fusion electric valves, and optional ‘FOAM-AUX’ auxiliary function valves. Integral fuse protection is provided on each AccuMax display, hydraulic controller module, and foam-line-injectors (FLI).

In Fusion multi-point systems, an additional “secondary power terminal” connections is provided for auxiliary function valves (see Chapter #18) and Fusion electrical valves. Fuse protection shall be installed by the final installer between the “primary and “secondary” power connections, to provide separate fuse devices to the valve load and wire sizes. Individual fuse protection shall be installed for each Fusion electric valve and/or auxiliary function final installer supplied valves as noted under Fusion data cabling. See schematics in this chapter that pertain to Fusion systems.



Power-Tap Connection (PTC):

A power-tap connection (PTC) unit shall be provided for each foam system to power and communicate to the main data bus cabling. The unit shall include double plugs with isolator, and two (2) power-drops with plugs to connect to the 12-pin plugs at the primary power terminals. Each drop shall have ‘red’ positive and black negative wires: 12-volt, 8-amp, 16-gauge or 24-volt, 4-amp, 16-gauge.



Power & Data “TEE” Cables (PDTC):

“Black” power/data ‘TEE’ molded cables shall be provided for data/communications in the foam system, these units shall include RFI power shield protection. Each (PDTC) ‘TEE’ cable shall include: one receptacle: 6-pin Color: gray/black and two (2) plugs: 6-pin Color: green/black.



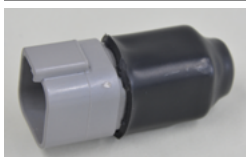
Power -Isolator Unit (PIU):

For multi-point systems (over (5) discharges) Foam Pro shall supply in-line ‘power isolator unit’ (PIU), which shall be installed between ‘PDT’ TEE cables. Refer to electrical schematics in multi-point installations for exact location. Each unit shall include two (2) receptacles: 6-pin Color: gray



Terminator Cap (TC):

At the end of the unused power/data “TEE” cable, “terminator” caps shall be provided to seal the last cable receptacle. Refer to the electrical schematics in multi-point installations for the exact location.



Extension Cables (EXC):

Due to the installation variations in both fixed and mobile installations of the FoamPro AccuMax systems, 'extension cables' are provided in various lengths and types (6-pin, 3-pin, and special wiring harnesses.) (See optional 6-pin cable extension chart.) Each cable shall include a 6-pin receptacle and plug. In the foam systems noted below, FoamPro shall supply standard extension cables. **CAUTION:** *optional extension cables may be required and must be ordered by the final installer for special installations.*

1. Fury Installations:

- A. Fury Single-Point Installations: FoamPro shall include one (1) 6-pin power/data extension cable to be installed between the TankVision & Fury displays and the Power -Tap connection and one (1) 6-pin power/data extension cable to be installed between the hydraulic controller module and the Power-Tap connection. Two (2) 6-pin terminators shall be provided. Length of each shall be: 5 feet /1.5 meter or final installer shall specify optional lengths (see chart below).
- B. Fury Multi-Point Installations:
 - 1. In Fury multi-point system with (4) or less displays & FLI, Foam Pro shall provide one (1) 6-pin power/data extension cable to be installed between the TankVision & Fury displays and the Power Tap connection and one (1) 6-pin power/data extension cable to be installed between the hydraulic controller module and the Power-Tap connection. Two (2) 6-pin terminators shall be provided. Length of each shall be: 5 feet /1.5 meter or final installer shall specify optional lengths (see chart below).
 - 2. Fury System: in multi-point system with (5) or more displays & FLI, FoamPro shall provide one (1) 6-pin power/data extension cable to be installed between the TankVision & Fury displays and the Power Tap connection and one (1) 6-pin power/data extension cable to be installed between the hydraulic controller module and the Power Tap connection. Length of each shall be: 5 feet /1.5 meter or final installer shall specify optional lengths (see chart below). In addition, a power/data isolator, a second Power -Tap assembly, and two (2) 6-pin terminators shall be provided.

2. Fusion and Fusion/Apex Multi-Point Installations:

- A. Fusion System: in multi-point system with (4) or less displays & FLI, Foam Pro shall provide one (1) 6-pin power/data extension cable to be installed between the TankVision & Fusion displays and the Power-Tap connection and one (1) 6-pin power/data extension cable to be installed between the hydraulic controller module and the Power-Tap connection. Length of each shall be: 5 feet /1.5 meter or final installer shall specify optional lengths (see chart below). In addition, a power/data isolator, a second Power -Tap assembly, and two (2) 6-pin terminators shall be provided.
- B. Fusion System: in multi-point system with (5) or more displays & FLI, Foam Pro shall provide one (1) 6-pin power/data extension cable to be installed between the TankVision & Fusion displays and the Power-Tap connection and one (1) 6-pin power/data extension cable to be installed between the hydraulic controller module and the Power-Tap connection. Length of each shall be: 5 feet /1.5 meter or final installer shall specify optional lengths (see chart below). In addition, a power/data isolator, a second Power -Tap assembly, and two (2) 6-pin terminators shall be provided.

NOTE: valve data/communication cables for Elkhart electric discharge valves and optional FOAM-AUX control valves are available in various lengths (see charts below).

NOTE: See Chapter #18 of Foam Auxiliary cables or Foam Pro FOAM-AUX installations and operational data and extension cables supplied by the final installer.

Display Module Installations: Fury, Fusion, and Fusion/APEX Systems

The Foam Pro AccuMax displays are designed to be mounted in the operator's panel of a fire apparatus or in the main control panel for a fixed system. Refer to drawings in the schematic drawings and mounting instructions for cut-outs on the panels for various displays. The displays shall be secured with three (3) pan head fasteners #10/32 socket head screws in the panel front. Each display requires 5 inches (120 mm) minimum clearance from the back to allow clearance for cable connections. The final installer must provide adequate clearance behind the operator's panel for the cables and connection installations.

Master Foam Flowmeter: Installation

The Foam Pro furnished 'Master Foam Concentrate Flowmeter' shall be installed AFTER the foam pump discharge with a minimum of 12 inches (305 mm) straight-run pipe BEFORE the foam flowmeter and 4"/100mm straight-run pipe AFTER the foam flowmeter. Swept type stainless steel 'bell reducer/increaser' with Victaulic connections shall be installed before and after master foam concentrate flowmeter. On #3020, #3040, #3060, #3090, and #3150 systems, either 1"/25mm or 1.5"/40mm mag-type flowmeter shall be provided. On the #3300 foam system, a 2"/50mm Siemens flowmeter shall be provided.

Master Pressure Transducer: Installation

The Foam Pro furnished 'Master Foam Concentrate Pressure Transducer' shall be installed AFTER the above master foam flowmeter BEFORE the relief valve and low-flow bypass connection. The pressure transducer shall be mounted on the top of the discharge pipe – per drawing below.

Master Foam Flowmeter and Pressure Transducer: Cable Connections

From the low-flow bypass valve actuator shall be a 6-pin receptacle to connected to a 6-pin male plug and two (2) gray cables to the master flowmeter (blue) and pressure transducer (red) connections, each with 3-pin plug connections. This standard cable length shall be 5 feet /1.5 meters or optional cable lengths as noted in chart below.

Low-Flow Bypass Assembly: Installation and Cable Connections

The foam concentrate 'Low-Flow' bypass assembly shall consist of: an electric metering valve with actuator control box and a foam concentrate flow meter with stainless steel 1"/25mm NPT piping.

Three (3) power and data communication connections shall terminate at the side of the actuator control box as follows:

#1. Power and data communications 6-pin receptacle for connection for the molded "TEE" connector

#2. Foam concentrate flowmeter cable and 3-pin flat plug connection with 'yellow foam' labels

#3 and #4. Power and data communications receptacle (red and black wire), for connections of a single 6-pin plug wired to two (2) gray cables (standard 5 feet /1.5 meters) to the master foam concentrate pressure transducer (red label) 3-pin plug and master foam concentrate flowmeter (blue label) 3-pin plug.



Foam-Line-Injector (FLI) Assembly

A 'foam-line-injector' assembly shall consist of: an electric metering valve with actuator control box, foam concentrate flowmeter with stainless steel NPT piping, check valve, and a three-way test calibration valve shall be shipped loose. Three (3) power and data communication connections shall terminate at the side of the actuator control box as follows:

#1. Power and data communications receptacle, for 6-pin molded "TEE" plug connection

#2. Foam flowmeter cable, with 3-pin flat plug connection with ‘yellow’ foam labels to connect directly to the FLI foam flowmeter

#3 and #4. Power and data communications receptable (red and black wire), with a single 6-pin plug wired to two (2) gray cables (standard cable is 5 feet /1.5 meters) to fire pump main discharge line water pressure transducer (red label) 3-pin plug and fire pump main discharge line water flowmeter (blue label) 3-pin plug.



NOTE: in single-point and multi-point foam system installations, the end-user shall determine the fire pump rating, type of water supply, number and size of discharges, percentage of foam concentrate, and total amount of foam solution desired. Then, the foam system designer shall determine foam pump capacity and size of the FLI to match performance requirements & user discharge number and size. Determination and coordination of this information can be assisted by using the Foam Pro user workbook found on the company website and contacting Foam Pro factory team.

Elkhart Electric Valve: Installation and Cable Connections

In Fusion systems, Foam Pro shall furnish the end-user specified quantity and size of Elkhart electric valves. A 6-pin x 3-pin connector shall be provided between the foam system main data bus and the valve bank. In addition, the 3-pin cable can connect to the optional FoamPro FOAM AUX valves. The data and communications 3-pin cables shall be provided, based on the required valve quantity. Optional 3-pin extension cables may be required for the ‘daisy-chaining’ linking of discharge and FOAM AUX valves to the main foam system data/power 6-pin cable. Optional valve data communication extension cables in various lengths shall be specified by the final installer (refer to chart below).

Refer to the Elkhart website for additional downloads on Unibody valves, electric actuators, APEX valve manuals and wiring:

<https://www.elkhartbrass.com/products/apparatus-valves/unibody-apparatus/multimedia>

<http://www.elkhartbrass.com/products/apparatus-valves/APEX/tech>

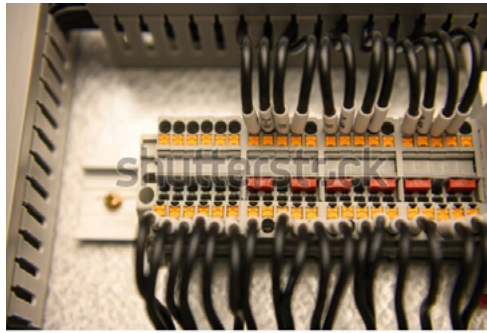
<http://www.elkhartbrass.com/products/apparatus-valves/APEX/manuals>



Electric Valve-Power-Supply Junction Box (EVPS):

The final installer shall provide and install a separate “Valve Power Supply” (VPS) junction and terminal box. The secondary ‘Power -Tap Terminal’ (PTT) unit shall supply power to the valve junction box. The junction box shall be located near the ‘primary and secondary’ power supply terminals. The covered and weather-resistant junction box shall include a positive & negative bus-bar arrangement for individual wiring connections and fuse protection for each valve.

The final installer shall provide the “power supply wiring” to each electric discharge or auxiliary function valve. The power supply wiring shall be 12 or 24 volt with Type SXL wire, **10 gauge**, to provide up to 30 amps for each Elkhart discharge valve. Wiring to auxiliary function or FoamPro Foam-Aux valve shall be sized to the required electrical load of each valve. The final installer shall determine the fuse protection for each valve and the valve power supply junction box.



Foam Tank Display -- FRC TankVision Installation and Connections

A Fire Research TankVision Pro model #WLA470-B00 tank level indicator and remote foam tank sender assembly shall be supplied by Foam Pro. The TankVision assembly shall include a level indicator, tank sender unit, and a 10 feet/3 meter (or optional longer) extension cable. The display shall show foam concentrate tank level on the ‘yellow’ color indicator with nine (9) super bright RGB LEDs mounted by the final installer on the operator’s panel.

The tank level indicator shall receive input information over a data cable from a tank sender assembly and 6-pin power/data connector at back unit. In addition, each Fury or Fusion display shall have a ‘dial indicator’ to denote foam tank level.

Refer to the FRC website (<https://www.firersearch.com/product.php?id=wla400>) to download the product installation/operation manual (document # XE-WLA3PM-R0A) and drawings for the TankVision.

Document Number:
XE-WLA3PM-R0A



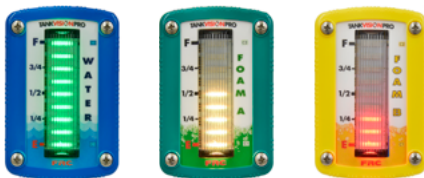
TANKVISION PRO TANK INDICATOR

WLA300/400 WATER TANKS

WLA360/460 CLASS A FOAM CONCENTRATE TANKS

WLA370/470 CLASS B FOAM CONCENTRATE TANKS

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Electrical Chapter **CAUTION-WARNING-DANGER** Alerts



- Any electrical system has the potential to cause sparks during service. Take care to eliminate explosive or hazardous environments during installation of the foam system.
- The electrical power and data cables shipped with each FoamPro AccuMax systems are pretested at the factory as a complete assembly or individually as necessary. Improper handling and forcing connections may damage these cables which might result in system or cable damage.
- Do not mount radio transmitter or transmitter cables in direct or close contact with the FoamPro units.
- Use care when installing molded cables. Check plugs and receptacles, count pins or check color-codes before connecting of displays, FLI's, and matching components. 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.
- Never connect the main "power or ground leads" supplying the foam system to any other high power electrical components such as fire pump module wiring, electric fire pump primer pumps, electric hose & cable reels, warning lights, scenelights, etc.
- Always use Foam Pro supplied "Weather Pack" connectors, extension cables, and other optional components.
- Ensure that all 'receptacle and plug' connections are tight and locked to avoid potential electrical problems.
- Always check and test electrical system for total electrical line loads, correct wire size, and correct fuse protection.



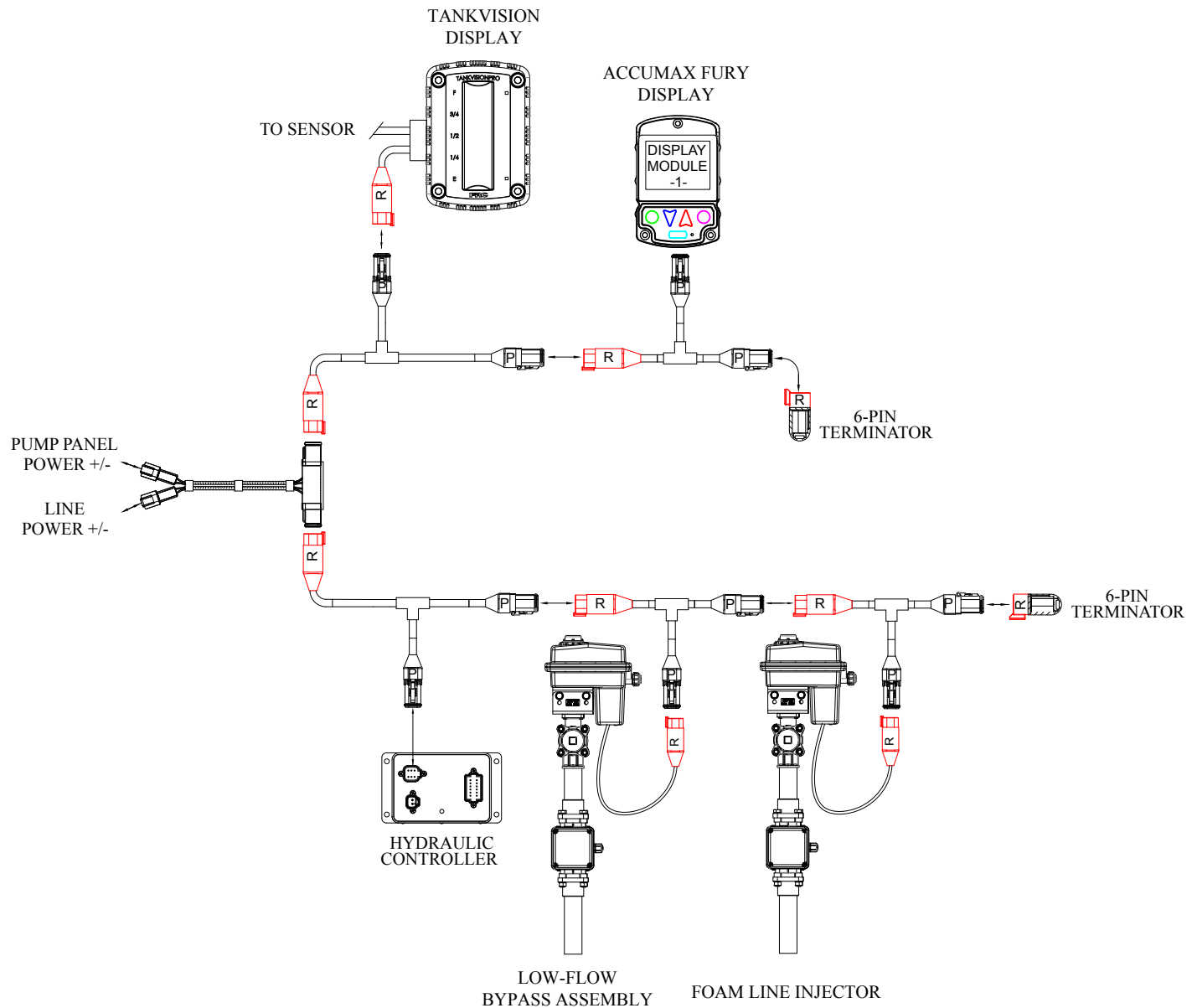
- Never attempt to cut or lengthen the molded cables. Doing so, will result in RFI/EMI interference.
NOTE: The installer must estimate the required number molded cables and extension cables when ordering the AccuMax system (refer to charts within this chapter and on 'ordering forms' for available standard lengths and optional lengths of cables.
- In fire apparatus applications, under chassis and pump enclosure temperatures are subject to exhaust piping, muffler and exhaust components. Electrical harnesses and wiring must be routed to provide clearances of at least 24 inches / 600 mm from mufflers and catalytic converters; in addition, heat shields should be installed reduce temperatures.
- On fire apparatus applications, during factory 3-hour fire pump tests, the final installer shall monitor and record operating temperatures within the pump enclosures.



- Always disconnect the ground and positive battery cables from the battery terminals, electrical wires and control cables from the foam system and all other FoamPro equipment before electric arc welding at any point on the apparatus. Failure to do so will result in a power surge through the unit that might cause irreparable damage.
- Do not hookup the main power cables until all connections are made to each of the electrical components. The last connections should be the power cables to the Control Display Modules and the Control Driver Modules.

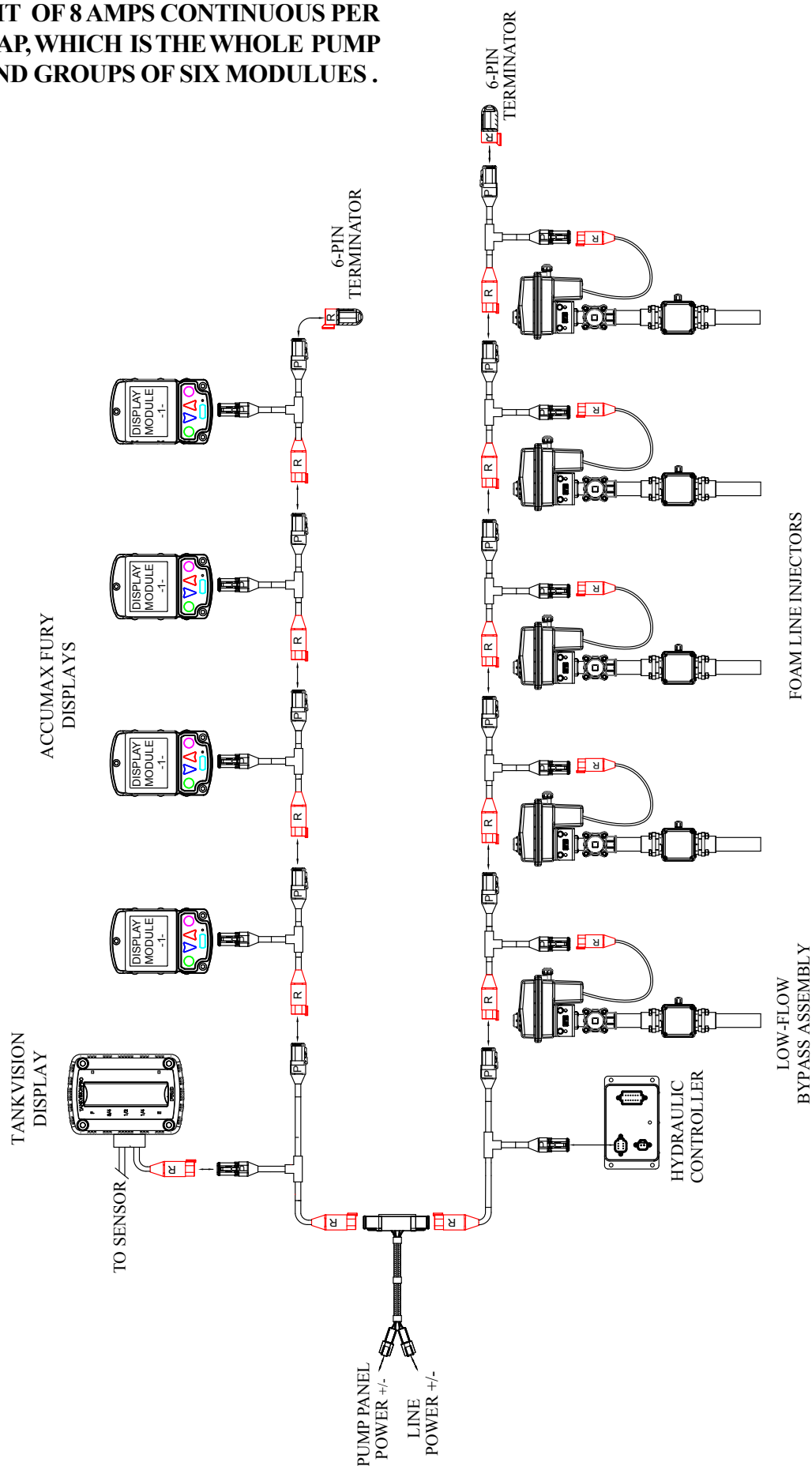
Drawing #1 - AccuMax Fury Single-Point

NOTE : PAY CAREFUL ATTENTION TO THE DIRECTION OF THE RECEPTACLES AND PLUGS ON THE TEE CABLES.

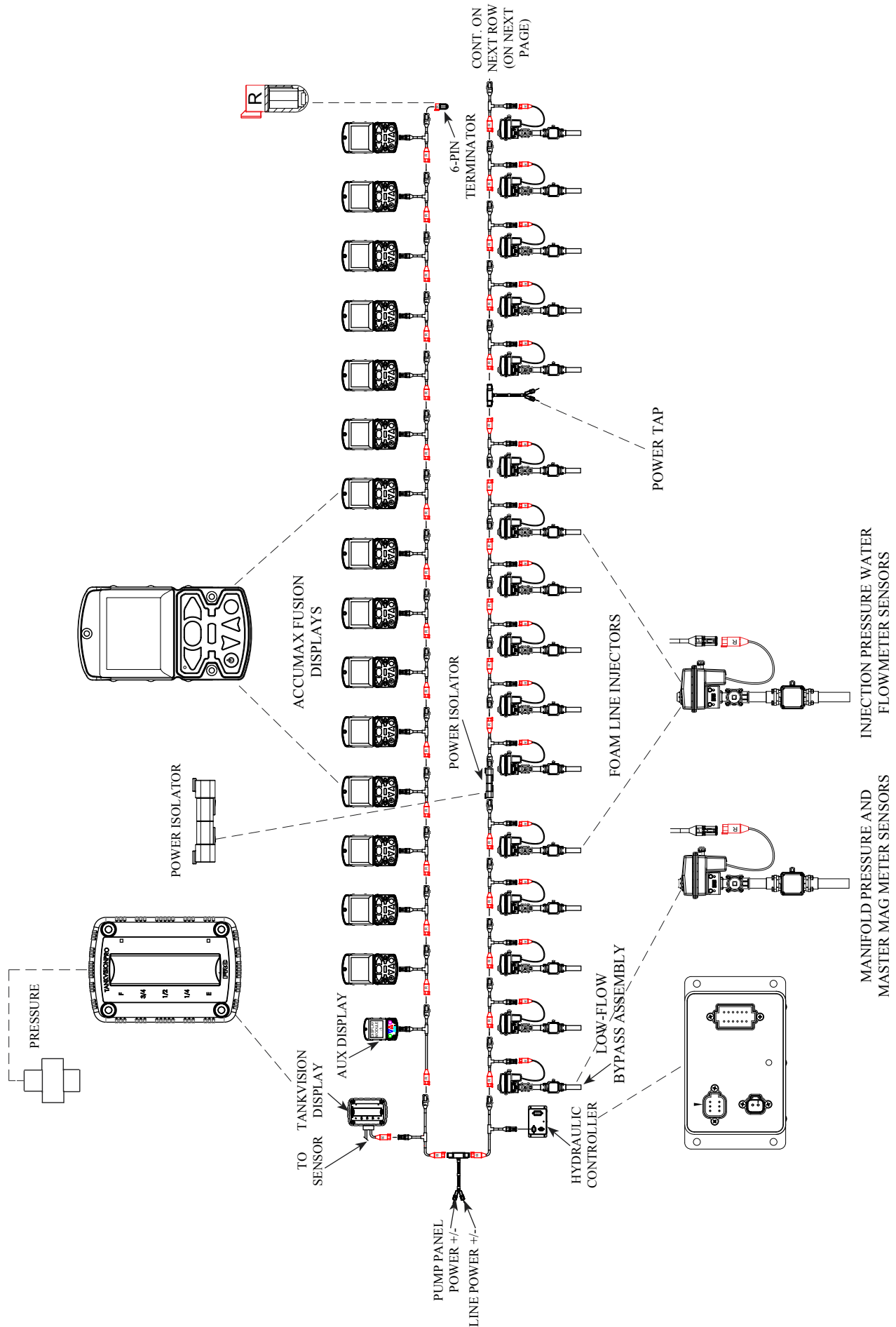


Drawing #2 - AccuMax Fury Multi-Point

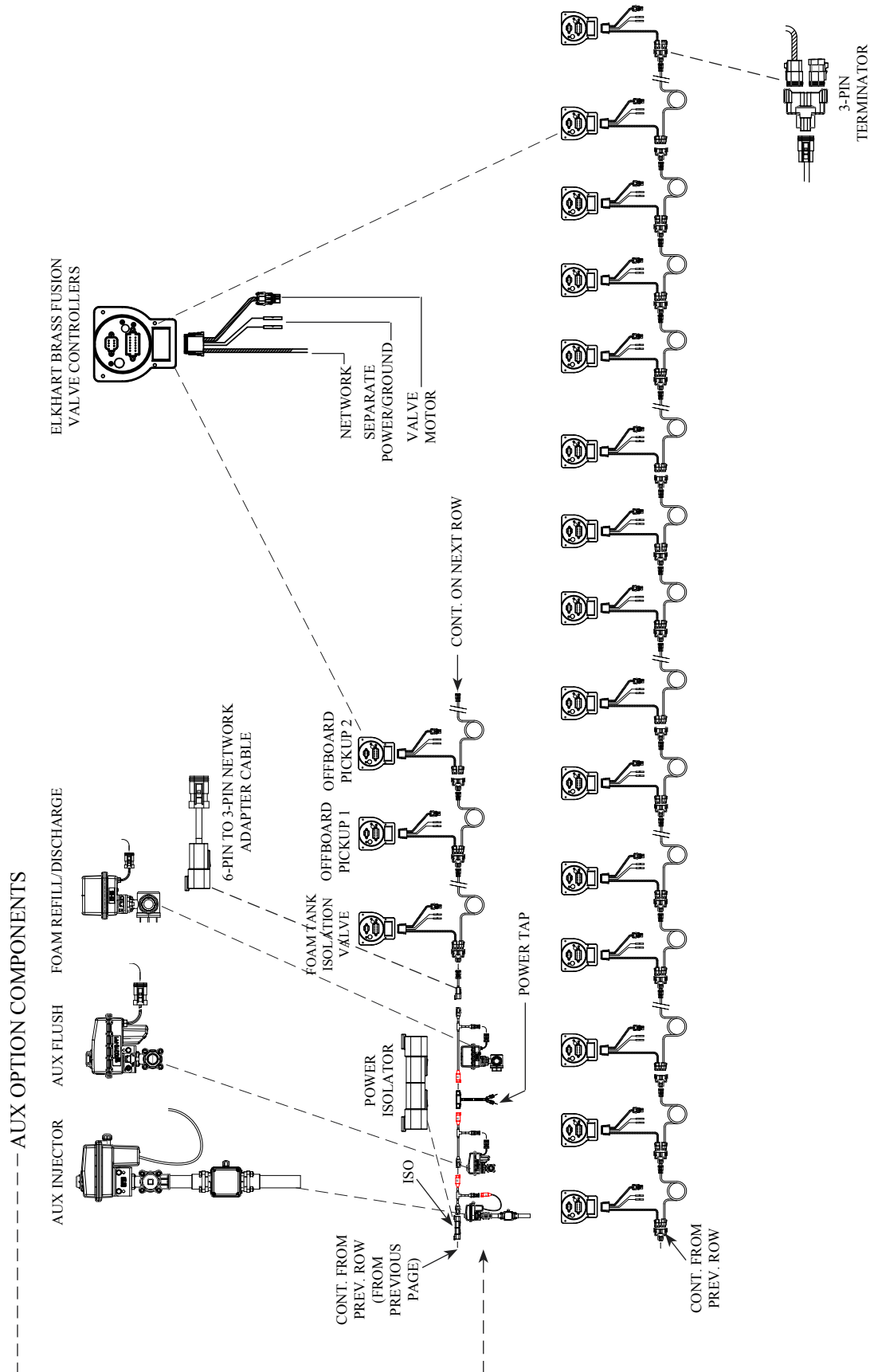
**NOTE : LIMIT OF 8 AMPS CONTINUOUS PER
POWERTAP, WHICH IS THE WHOLE PUMP
PANEL AND GROUPS OF SIX MODULES .**



Drawing #3 - AccuMax Fusion Multi-Point - Left Side Diagram (Part One)



Drawing #3 - AccuMax Fusion Multi-Point - Right Side Diagram (Part Two)



19. CHECK-OFF LIST—MAKING SURE EVERYTHING IS WORKING RIGHT

Hydraulic Supply (Refer to **Sections 11 and 12**)

- 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 18**)

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

Liquid (Refer to **Sections 14, 15 and 16**)

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

Foam Pump (Refer to **Section 13**)

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

For operating instructions, set-up, factory settings, calibration and testing, service, drawings, and part number for replacements see manual #2 operations-service-testing.

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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DANGER

PERSONAL RESPONSIBILITY CODE

The member companies of FEMSA that provide emergency response equipment and services want responders to know and understand the following:

1. Firefighting and Emergency Response are inherently dangerous activities requiring proper training in their hazards and the use of extreme caution at all times.
2. It is your responsibility to read and understand any user's instructions, including purpose and limitations, provided with any piece of equipment you may be called upon to use.
3. It is your responsibility to know that you have been properly trained in Firefighting and/or Emergency Response and in the use, precautions, and care of any equipment you may be called upon to use.
4. It is your responsibility to be in proper physical condition and to maintain the personal skill level required to operate any equipment you may be called upon to use.
5. It is your responsibility to know that your equipment is in operable condition and has been maintained in accordance with the manufacturer's instructions.
6. Failure to follow these guidelines may result in death, burns or other severe injury.



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