



# FoamLogix™

## Model 2.1A and 1.7AHP Class “A” Electronic Foam Proportioning Systems Description, Installation and Operation Manual

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## APPARATUS INFORMATION

Hale FoamLogix System Serial Number \_\_\_\_\_

In Service Date \_\_\_\_\_

Fire Department \_\_\_\_\_

Engine Number \_\_\_\_\_

Calibration Factors:

Water Flow Factor \_\_\_\_\_

Class A Foam Factor \_\_\_\_\_



### NOTICE!

Hale Products does not assume responsibility for product failure resulting from improper maintenance or operation. Hale Products is responsible only to the limits stated in the product warranty. Product specifications contained in this manual are subject to change without notice.

All Hale products are quality components -- ruggedly designed, accurately machined, precision inspected, carefully assembled and thoroughly 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 YOUR CORRESPONDENCE.

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	F	UPDATED INFORMATION AND DRAWINGS TO INCLUDE NEW MOTOR DRIVER	JDF	11/1/18	JLS

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## HOW TO USE THIS MANUAL

This manual is divided into seven sections for clarity and ease of use. Each of the following manual sections can be a stand alone section or can be used in conjunction with each other.

### **SECTION 1 SAFETY**

This section must be carefully read, understood and adhered to strictly by all installer/builders, operators and service personnel using the Hale FoamLogix 2.1A and 1.7AHP Foam Proportioning Systems. Do not use or install the system until you have thoroughly read this section. Failure to comply could cause risk of serious injury to yourself and others, or damage to the system.

### **SECTION 2 DESCRIPTION**

Provides an introduction to the Hale foam proportioning system along with guidelines for designing and ordering a complete system.

### **SECTION 3 INSTALLATION**

Provides information to assist the OEM with installation and initial setup of Hale foam proportioning systems on an apparatus.

### **SECTION 4 SETUP AND CALIBRATION**

Is used by the installer and end user for start-up and calibration of the Hale foam proportioning system.

### **SECTION 5 OPERATION**

Is primarily used by the apparatus user for proper operation and maintenance of the Hale foam proportioning system.

### **SECTION 6 TROUBLESHOOTING**

If a problem develops, see this section for troubleshooting procedures.

### **SECTION 7 PARTS IDENTIFICATION**

Section 7 includes a parts breakdown of the most commonly used parts of the FoamLogix System.



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## NOTES



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# SECTION 1 SAFETY



## IMPORTANT!

**THE HALE “FOAMLOGIX™” MODELS 2.1A AND 1.7AHP CLASS “A” ELECTRONIC FOAM PROPORTIONING SYSTEMS ARE DESIGNED FOR OPTIMUM SAFETY OF ITS OPERATORS AND TO PROVIDE RELIABLE AND SAFE FOAM CONCENTRATE INJECTION. FOR ADDED PROTECTION AND BEFORE ATTEMPTING INSTALLATION OR OPERATION PLEASE FOLLOW THE SAFETY GUIDELINES LISTED IN THIS SECTION AND ADHERE TO ALL WARNING, DANGER, CAUTION AND IMPORTANT NOTES FOUND WITHIN THIS GUIDE.**

**THIS SECTION ON SAFETY MUST BE CAREFULLY READ, UNDERSTOOD AND ADHERED TO STRICTLY BY ALL INSTALLERS AND OPERATORS BEFORE ATTEMPTING TO INSTALL OR OPERATE THE FOAMLOGIX PROPORTIONING SYSTEM.**

**WHEN DEVELOPING DEPARTMENTAL APPARATUS OPERATING PROCEDURES, INCORPORATE THE WARNINGS AND CAUTIONS AS WRITTEN.**

*FoamLogix is a trademark of Hale Products, Incorporated. All other brand and product names are the trademarks of their respective holders.*

## GUIDELINES

**READ ALL INSTRUCTIONS THOROUGHLY BEFORE BEGINNING ANY INSTALLATION OR OPERATION PROCESS.**

- ❑ Installation should be performed by a trained and qualified installer, or your authorized Hale Products service representative.
- ❑ Be sure the installer has sufficient knowledge, experience and the proper tools before attempting any installation.
- ❑ Make sure proper personal protective equipment is used when operating or servicing apparatus.

- ❑ A foam tank low level sensor must be utilized to protect the Hale Foam proportioner from dry running. *Failure to use a low level sensor with the Hale Foam system voids warranty.*
- ❑ DO NOT permanently remove or alter any guard or insulating devices, or attempt to operate the system when these guards are removed.  
Make sure all access/service panels and covers are installed, closed and latched tight, where applicable.
- ❑ DO NOT remove or alter any hydraulic or pneumatic connections, electrical devices, etc. DO NOT tamper with or disconnect safety features or modify protective guards (such as covers or doors). DO NOT add or remove structural parts. *Doing so voids the warranty.*

Any of the above could affect system capacity and/or safe operation of the system and is a serious safety violation which could cause personal injury, could weaken the construction of the system or could affect safe operation of the FoamLogix Proportioning System.



## WARNING!

**NO MODIFICATIONS OR ADDITIONS MAY BE MADE TO THE FOAMLOGIX PORPORTIONING SYSTEM WITHOUT PRIOR WRITTEN PERMISSION FROM:**

**Hale Products, Incorporated**  
700 Spring Mill Avenue  
Conshohocken, PA 19428  
Telephone: 610-825-6300  
Fax: 610-825-6440

- ❑ To prevent electrical shock always disconnect the primary power source before attempting to service any part of the Hale Foam system.

- ❑ All electrical systems have the potential to cause sparks during service. Take care to eliminate explosive or hazardous environments during service and/or repair.
- ❑ To prevent system damage or electrical shock the main power supply wire is the last connection made to the Hale Foam proportioner distribution box.
- ❑ Release all pressure then drain all concentrate and water from the system before servicing any of its component parts.
- ❑ Do not operate system at pressures higher than the maximum rated pressure.
- ❑ Use only pipe, hose, and fittings from the foam pump outlet to the injector fitting, which are rated at or above the maximum pressure rating at which the water pump system operates.
- ❑ Hale Foam proportioning systems are designed for use on negative ground direct current electrical systems only.
- ❑ Do not mount radio transmitter or transmitter cables in direct or close contact with the FoamLogix control unit.
- ❑ Before connecting the cord sets and wiring harnesses, inspect the seal washer in the female connector. If the seal washer is missing or damaged, water can enter the connector causing corrosion of the pins and terminals. This could result in possible system failure.
- ❑ Always disconnect the power cable, ground straps, electrical wires and control cables from the control unit or other Hale Foam system equipment before electric arc welding at any point on the apparatus. Failure to do so could result in a power surge through the unit that could cause irreparable damage.
- ❑ DO NOT connect the main power lead to small leads that are supplying some other device, such as a light bar or siren.

**The Hale FoamLogix, Models 2.1A and 1.7AHP require 40 AMP minimum current.**

- ❑ When operating the Hale FoamLogix in Simulated Flow mode, an outlet for the foam concentrate must be provided to prevent excessive pressure buildup in the discharge piping or hoses.
- ❑ Make sure the foam tank and foam concentrate suction hoses are clean before making final connection to foam pump. If necessary flush tank and hoses prior to making connection.
- ❑ Check all hoses for weak or worn conditions after each use. Ensure that all connections and fittings are tight and secure.
- ❑ Ensure that the electrical source of power for the unit is a negative (–) ground DC system, of correct input voltage, with a reserve minimum current available to drive the system.
- ❑ The in-line strainer/valve assembly is a low pressure device and WILL NOT withstand flushing water pressure in excess of 45 PSI (3 BAR).
- ❑ When determining the location of Hale Foam system components keep in mind piping runs, cable routing and other interferences that could hinder or interfere with proper system performance.
- ❑ Always position the check valve/injector fitting at a horizontal or higher angle to allow water to drain away from the fitting. This avoids the possibility of sediment deposits or the formation of an ice plug.
- ❑ The cord sets provided with each Hale Foam system are indexed to ensure correct receptacle installation (they insert one way only). When making cord set connections DO NOT force mismatched connections as damage can result in improper system operation.
- ❑ Make sure all connections are sound, and that each connection is correct.
- ❑ The cables shipped with each Hale Foam system are 100% tested at the factory with that unit. Improper handling and forcing connections can damage these cables which could result in other system damage.

❑ There are no user serviceable parts inside Hale Foam system electrical/electronic components.  
*Opening of the distribution box or control unit voids the warranty.*

❑ Use mounting hardware that is compatible with all foam concentrates to be used in the system. Use washers, lock washers and cap screws made of brass or 300 series stainless steel.

❑ When making wire splice connections, make sure they are properly insulated and sealed using an adhesive filled heat shrink tubing.

❑ ALWAYS connect the primary positive power lead from the terminal block to the master switch terminal or the positive battery terminal.

Use a minimum 8 AWG type SGX (SAE J1127) chemical resistant battery cable and protect with wire loom.

❑ Prevent corrosion of power and ground connections by sealing these connections with silicone sealant provided.

❑ Prevent possible short circuit by using the rubber boot provided to insulate the primary power connection at the Hale FoamLogix distribution box.

## NOTES

## SECTION 2 DESCRIPTION

The Hale FoamLogix 2.1A and 1.7AHP Foam Proportioning Systems are completely engineered, factory matched foam proportioning systems that provides reliable, consistent foam concentrate injection for Class “A” foam operations.

Hale FoamLogix Foam systems accurately deliver from 0.1% to 10.0% (up to the capacity of the foam pump) foam concentrate through a check valve/ injector fitting, directly into the water discharge stream. It is then fed as foam solution into a standard fog nozzle, an air aspirated nozzle, or CAFS equipment, through the apparatus discharge piping. A properly configured and installed foam system with Hale recommended components virtually eliminates contamination of the booster tank, fire pump and relief valve with foam concentrate.

### ROTARY PLUNGER PUMP

The heart of the Hale FoamLogix 2.1A and 1.7AHP systems are an electric motor driven rotary plunger pump. The pump is constructed of anodized aluminum and stainless steel and is compatible with most Class “A” foam concentrates. The pump is close coupled to the electric motor thereby eliminating maintenance of an oil filled gearbox. A relief valve mounted on the foam pump and constructed of brass, protects the foam pump and foam concentrate discharge hoses from over pressurization and damage.

### CONTROL UNIT

The control unit, mounted on the operator panel, is the single control point for the FoamLogix system. Pressing the ON button starts foam concentrate injection. A super bright digital LED display shows the:

- ❑ Water flow rate
- ❑ Total water flow

- ❑ Foam concentrate injection percentage
- ❑ Total foam concentrate used, depending on the display mode selected.

A bar graph indicates the approximate system capacity being used. Adjustment of the foam concentrate injection rate is accomplished by pressing the appropriate button.

The control unit display also warns the operator if errors or abnormal operations occur in the system, such as low foam level.

### WATER FLOW SENSOR

Foam concentrate injection rate is controlled by a computer chip in the control unit for accurate, repeatable, reliable foam concentrate injection. A water flow sensor constantly monitors water flow through the discharge piping. The information from the flow sensor is provided to the control unit by a shielded cable. When the FoamLogix system is activated at the control unit a signal is sent through the control cable to the distribution box to begin foam concentrate injection. The distribution box then provides power to the electric motor. As the motor rotates the pump, foam concentrate flows through the foam pump discharge to the one piece check valve/ injector fitting into the water discharge stream.

**Note:** All Hale FoamLogix Foam systems require a flow sensor for operation.

### FEED BACK SENSOR

A feedback sensor in the foam pump discharge measures foam concentrate flow. The water flow rate and foam concentrate flow rate are constantly compared by the computer chip in the control unit.

The motor speed is constantly adjusted to maintain the operator selected foam concentrate injection rate. Since the system is flow based, injection rate remains constant regardless of changes in system pressure or the number of discharges that are open (within the limits of the system).

The maximum rated foam concentrate flow, in gallons per minute, is denoted by the model number. Table 1: "Maximum Foam Solution Flows" shows the system capacity at various foam concentrate injection rates for the Hale FoamLogix 2.1A and 1.7AHP units.

Injection Rate Percent (%)	Maximum Foam Solution Flow			
	Gallons per Minute (GPM)		Liters Per Minute (LPM)	
	2.1A	1.7AHP	2.1A	1.7AHP
0.1	2,100	1,700	7,949	6,426
0.2	1,050	850	3,974	3,213
0.3	700	567	2,650	2,143
0.5	420	340	1,590	1,285
1.0	210	170	795	643

**Table 1: Maximum Foam Solution Flows**

The Hale FoamLogix 2.1A & 1.7A Foam system configuration is shown in Figure 2-3: "Typical System Layout" on page 21.

## LOW PRESSURE STRAINER

A low pressure foam concentrate strainer is mounted at the inlet of the foam pump. The strainer protects the pump from debris that might accumulate in the foam concentrate tank. The strainer/valve assembly has a composite nonmetallic housing with stainless steel mesh strainer element and includes a service shut-off valve.

The valve inlet offers 1/2" NPT (13 mm) threads, with a fitting to connect a 1/2" (13 mm) ID foam concentrate suction hose.

The strainer and valve are low pressure devices and are designed for installations where the strainer IS NOT subject to HIGH pressure flushing water.

## ORDERING INFORMATION

Ordering Hale FoamLogix 2.1A and 1.7AHP Foam Systems is simple. Using the current Hale FoamLogix 2.1A Foam System Price List and Order Form helps ensure a complete matched system is provided to the end user.

Use the following procedure when ordering a Hale FoamLogix 2.1A Foam system. Following all steps to ensure that a complete system is ordered:

1. Check Hale Foam system product information update (Bulletin #961) for the latest information and advice for foam system selection.
2. Determine the Class "A" foam concentrate to be used in the system and ensure system compatibility by referring to the Hale Foam Concentrate Compatibility list (Bulletin #650).
3. Consult the current Hale FoamLogix 2.1A/ 1.7AHP Price List and Order Form for ordering of the system.

The Hale FoamLogix 2.1A and 1.7AHP can be ordered as one of two pre-configured packages that include the pump and motor assembly, control unit, flow sensor cable, stainless steel check valve and injection manifold, and an installation kit.

**Package "A"** includes the single check valve manifold.



**Package “B”** includes dual check valve manifold.

**Note:** If package “A” is selected an additional check valve is required where the foam manifold attaches to the pump discharge for NFPA compliance.

4. The Hale FoamLogix 2.1A and 1.7AHP may also be ordered “a-la-carte” if one of the standard packages does not meet end user requirements. When ordering the system “a-la-carte” for a complete system the Pump and motor assembly, flow sensor, flow sensor cable, low tank sensor and check valve injector fitting must be ordered as a minimum.

Ordering the components as a complete system allows Hale to configure and test the complete order, to ensure a problem-free system.

5. Additional Hale components available to enhance system operation and ease installation include:

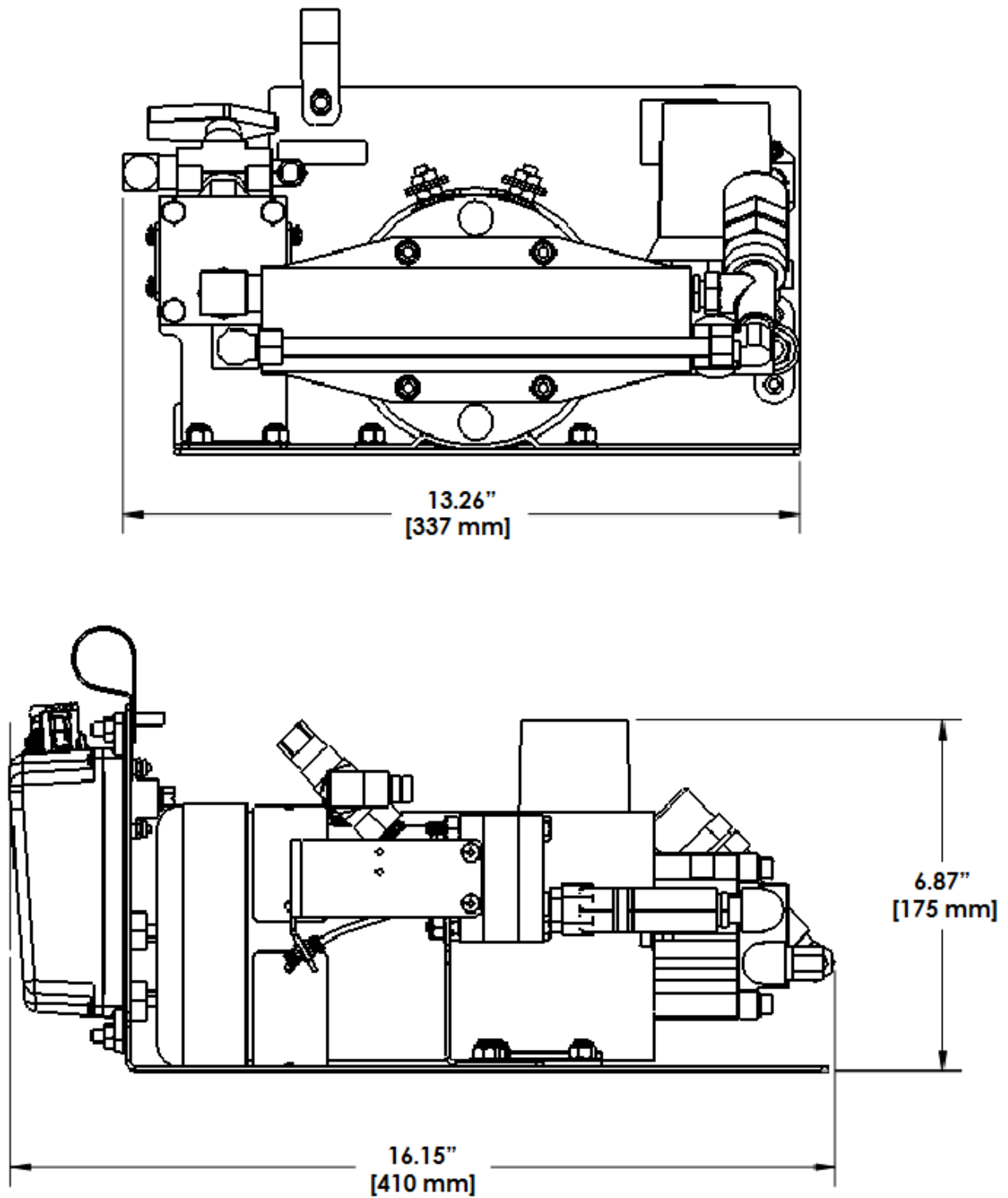
- ☐ Control Cable Extension
- ☐ Waterway Check Valves
- ☐ Manifolds
- ☐ Flanges

System components are shown in the following heading “System Configuration,” beginning on page 20.

All components listed are engineered and tested with Hale Foam systems to provide optimum system performance. Using the information provided in this manual and the detailed ordering procedures on the option order form ensures that a complete Hale Foam system is ordered thus eliminating delays caused by missing components.

## HALE FOAM SYSTEM SPECIFICATIONS

	2.1A	1.7AHP
Foam Pump	Dual Plunger	Dual Plunger
Maximum Foam Concentrate Output	2.1 GPM (8 LPM)	1.7 GPM (6.5 LPM)
Maximum System Operating Pressure	250 PSI (17 BAR)	400 PSI (27.5 BAR)
Maximum Operating Temperature	160° F (71° C)	160° F (71° C)
Pump Motor	0.44 HP (0.3 Kw), 12 VDC	0.44 HP (0.3 Kw), 12 VDC
Operating Ampere Draw	25 AMPS @ 12 VDC	30 AMPS @ 12 VDC
Maximum Ampere Draw	40 AMPS @ 12 VDC	40 AMPS @ 12 VDC



**Figure 2: Foam Pump Installation Envelope Dimensions**



## SYSTEM CONFIGURATION

### Package A

**Part Number: (Choose One)**☐ FLX21-12-1-10-1 (2.1A 12 Volt)☐ FLX21-24-1-10-1 (2.1A 24 Volt)☐ FLX17-12-1-10-1 (1.7AHP 12 Volt)☐ FLX17-24-1-10-1 (1.7AHP 24 Volt)

**Description: FoamLogix Kit with *single* stainless steel check valve manifold**

Includes the following:

- (1) FoamLogix full function digital display control that displays flow, foam %, total flow and total foam
- (1) Foam pump assembly with bypass and strainer service valves
- (1) 15 feet of cable between display and pump and 10 feet of cable between display and flow sensor
- (1) Compact foam manifold assembly with a single waterway check valve, flow sensor and foam injection check valve installed. 3 inch grooved victaulic connections  
Flow range 30 - 750 GPM  
Note: A second check valve is recommended to avoid pump/water tank contamination.
- (1) Installation kit includes clear reinforced foam inlet hose, hose clamps, positive and ground terminal insulation kit
- (2) Operation and Installation manuals
- (1) Single tank system instruction placard
- (1) Side mount low level tank sensor

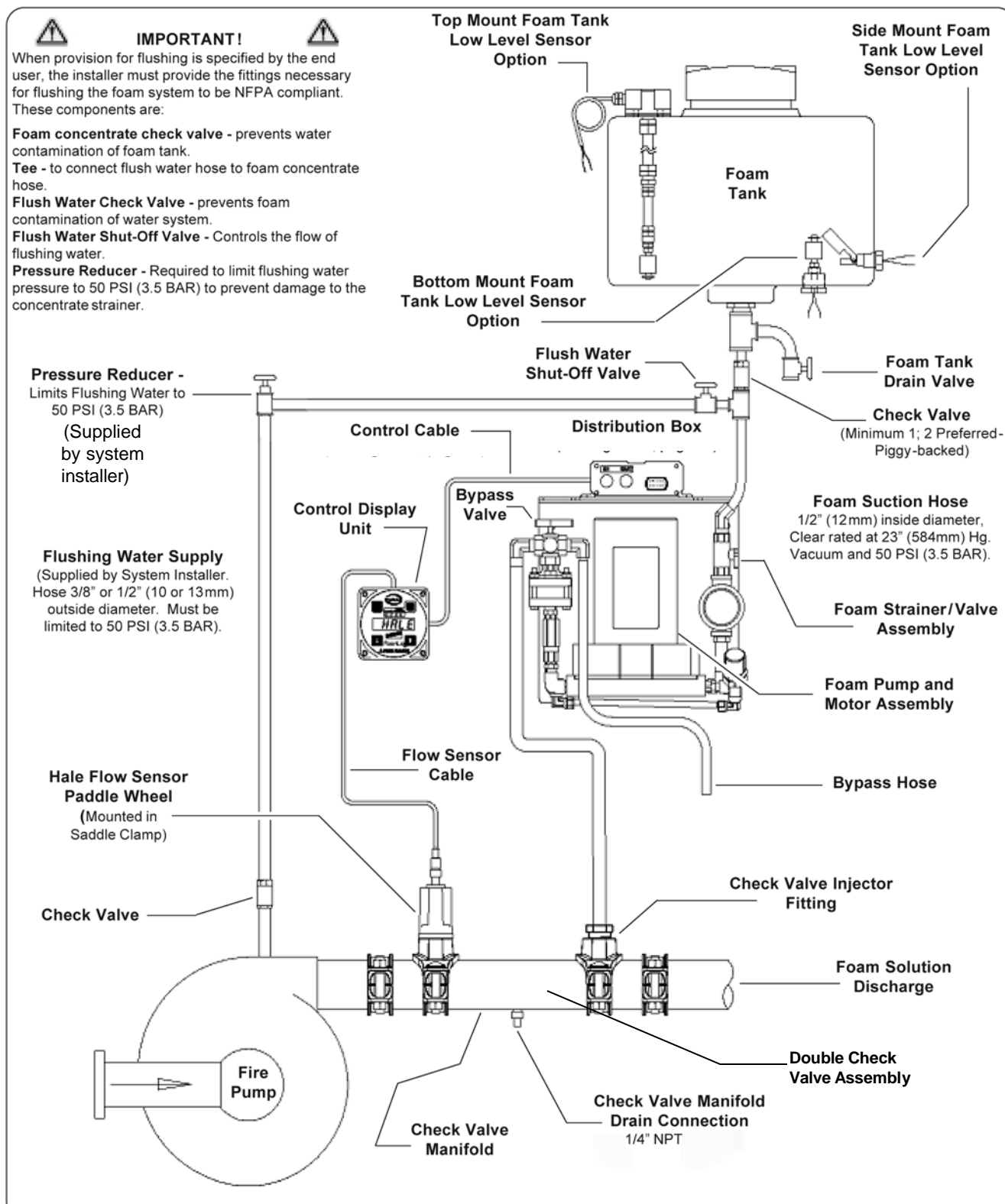
### Package B

**Part Number: (Choose One)**☐ FLX21-12-2-10-1 (2.1A 12 Volt)☐ FLX21-24-2-10-1 (2.1A 24 Volt)☐ FLX17-12-2-10-1 (1.7AHP 12 Volt)☐ FLX17-24-2-10-1 (1.7 AHP 24 Volt)

**Description: FoamLogix Kit with *dual* stainless steel valve manifold (recommended for NFPA backflow prevention compliance):**

Includes the following:

- (1) FoamLogix full function digital display control that displays flow, foam %, total flow and total foam
- (1) Foam pump assembly with bypass and strainer service valves
- (1) 15 feet of cable between display and pump and 10 feet of cable between display and flow sensor
- (1) Foam manifold assembly with dual waterway check valves, flow sensor and foam injection check valve installed. 3 inch grooved Victaulic connections  
Flow range 30 - 750 GPM
- (1) Installation kit includes clear reinforced foam inlet hose, hose clamps, positive and ground terminal insulation kit
- (2) Operation and Installation manuals
- (1) Single tank system instruction placard
- (1) Side mount low level tank sensor

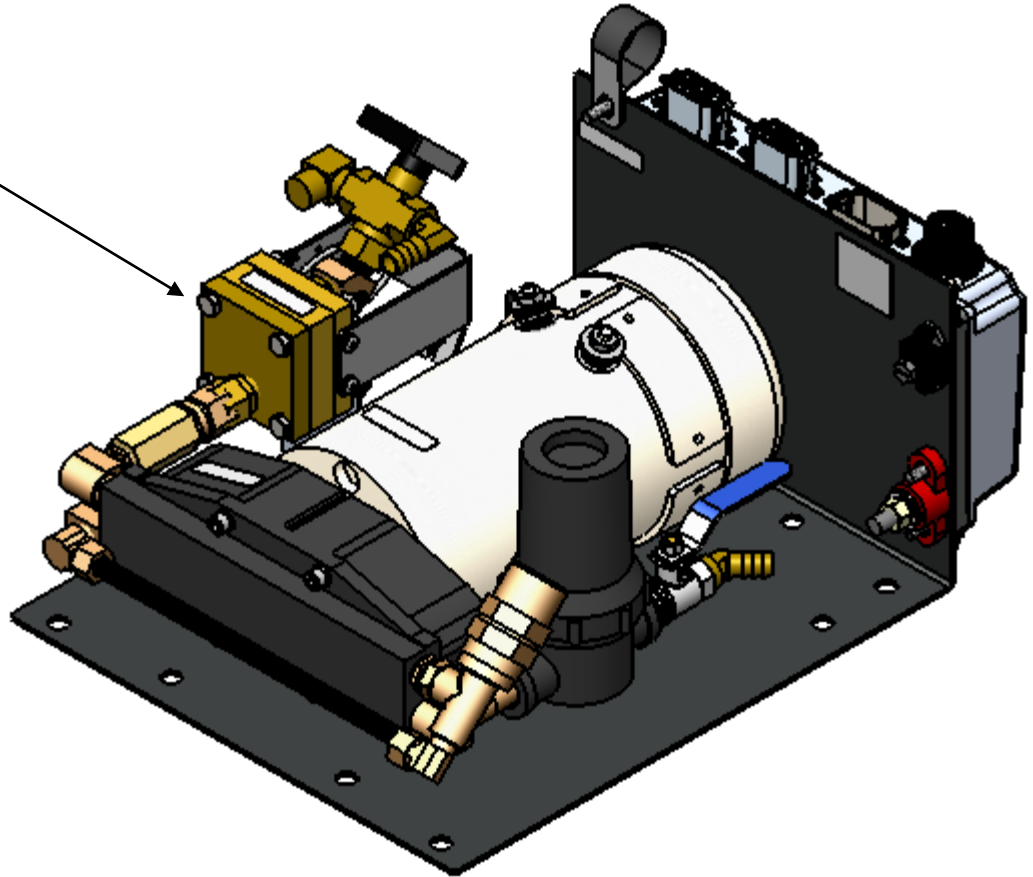


**Figure 3: Typical Hale FoamLogix 2.1A and 1.7AHP System Layouts**  
(Also see Figure 20: "Control Harness Connections" on page 45)

## Hale FoamLogix 2.1A and 1.7AHP Foam Proportioner Systems

All Hale FoamLogix 2.1A and 1.7AHP systems include: Foam Pump/Motor Assembly and Control Unit

FoamLogix Base Unit,  
Foam Pump/Motor Assembly  
2.1A - 12V: 115498  
2.1A - 24V: 115499  
1.7AHP - 12V: 119276  
1.7AHP - 24V: 119277



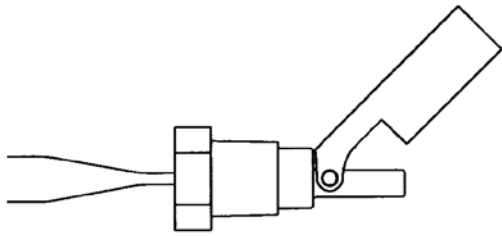
Control Display Unit p/n: 111530

Check Valve/Injector Fitting  
p/n: 038-1790-00-0

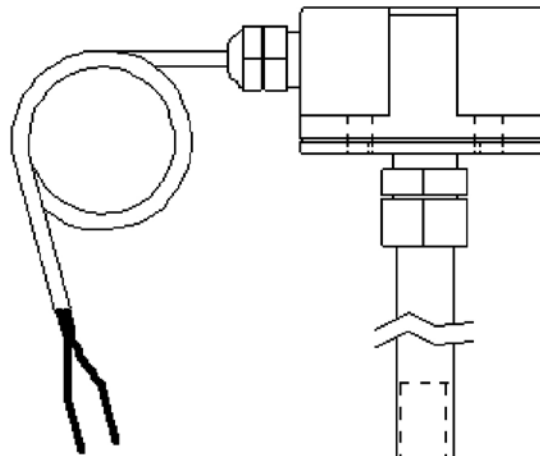


## Low Tank Level Sensor Options

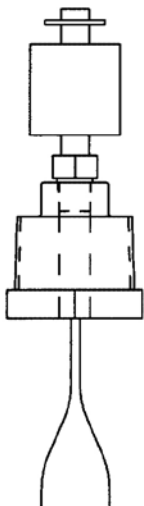
One Low Tank Level Sensor is Required



**Side Mount Low Level Tank Sensor**  
p/n: 200-2110-02-0  
(1/2" NPT threaded bushing to  
mount from outside foam tank.)



**Top Mount Low Level Tank Sensor**  
p/n: 200-2110-06-0  
(Extends from 2-1/2' to 5' (0.8 to 1.5 meters) - may  
be cut shorter if required.)



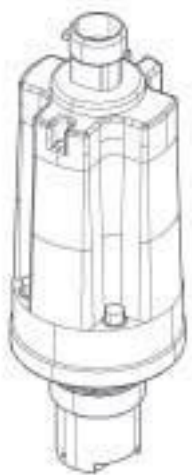
**Bottom Mount Low Level Tank Sensor**  
p/n: 200-2100-04-0  
(1" NPT threaded bushing to mount from outside  
foam tank.)

## Flow Sensors

Each Hale foam system requires a flow sensor for operation. Pipe size must be selected based on the minimum and maximum water flow in the foam capable discharge. Following is a list of pipe size and rated flow ranges, along with flow sensor saddle clamp part number. In all instances, a weld fitting may be substituted for the saddle clamp.

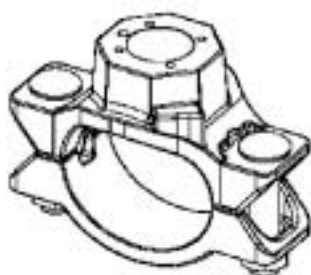
Pipe Size	Flow Range	
	GPM	LPM
1.5"	10 - 350	38 - 1,219
2"	20 - 550	76 - 2,082
2.5"	30 - 800	114 - 3,028
3"	50 - 1,250	189 - 4,731
4"	75 - 1,800	284 - 6,813
SCV or DCV	30 - 750	114 - 2,839

**Figure 4: Pipe Size vs. Flow Range**



Flow Sensor Paddle Wheel  
p/n: 102714

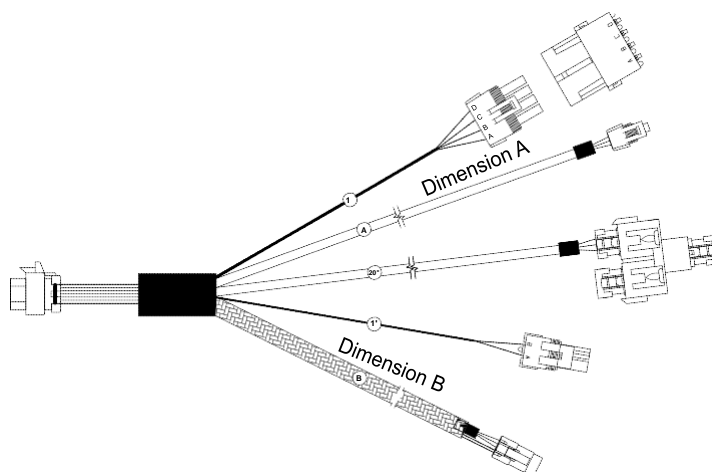
Flow Sensor Weld Fitting  
Stainless Steel, p/n: 082-3060-00-0  
Steel, p/n: 309020  
Aluminium, p/n: 309010



Flow Sensor Saddle Clamp

### Threads (NPT) Part Number

2" – p/n: 4842010  
2.5" – p/n: 4843010  
3" – p/n: 4844010  
4" – p/n: 4846010



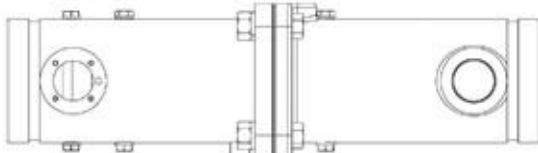
Flow Sensor Cable

Dimension A & B	Part Number
10' x 14' (3.05m x 4.27m)	113438
15' x 19' (4.57m x 5.79m)	113439

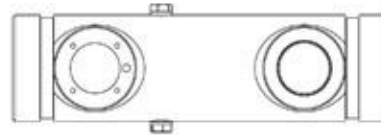


## Check Valve Manifolds, Flanges and Gaskets

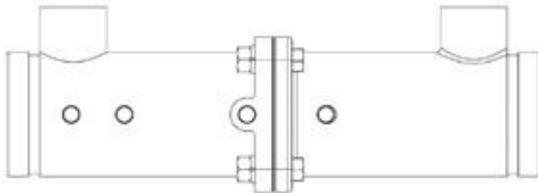
The check valve manifolds include Flow Sensor, Check Valve/Injector Fitting and Single or Dual Waterway Check Valve Flappers. End connections for the manifolds are 3" Victaulic.



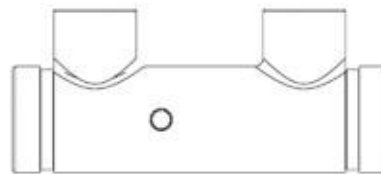
**DUAL CHECK VALVE MANIFOLD - 3.0"**



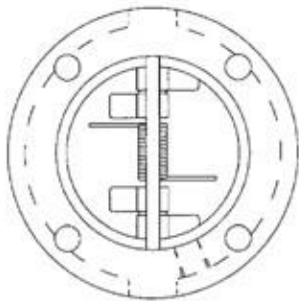
**SINGLE CHECK VALVE MANIFOLD**



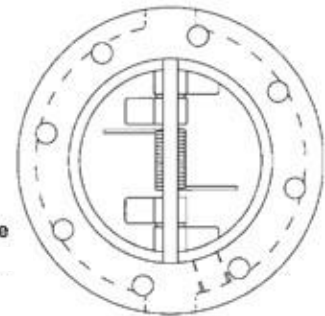
3.0" dual check Valve - p/n 108995



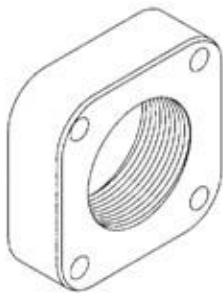
p/n 112074 (2.0") & 108966 (3.0")



**3" 115 Check Valve**  
p/n: 038-1570-06-0



**4" Wafer Check Valve**  
p/n 038-1570-08-0



Threads (NPT)	Part Number
3"	115-0080-00-0
2.5"	115-0070-00-0
2"	115-0060-00-0
BLANK	125-0050-00-0

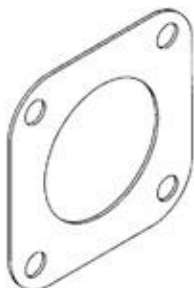
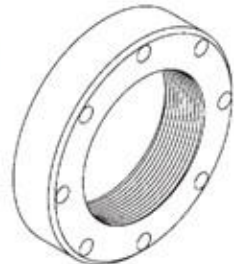
**Type 115 Flange**

(Use 3" and 2.5" NPT with 3" check valves.  
Also available with 1.5" and 2" NPT Threads)

Threads (NPT)	Part Number
4"	115-0040-00-0
3"	115-0030-00-0
2.5"	115-0020-00-0
BLANK	115-0010-00-0

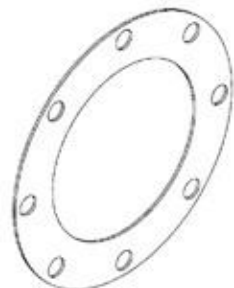
**Type 2433D Flange**

Use 4" NPT with 4" check valves  
Also available with 2.5" and 3" NPT threads)

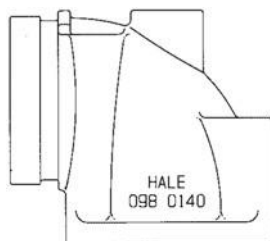


**115 Flange Gasket**  
p/n: 046-0050-00-0

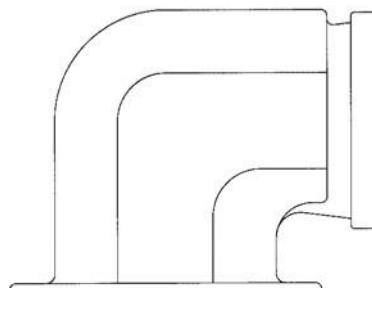
**2433D Flange Gasket**  
p/n: 046-0040-00-0



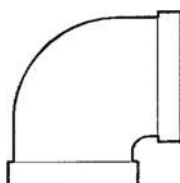
## Elbows and Mini-Manifolds



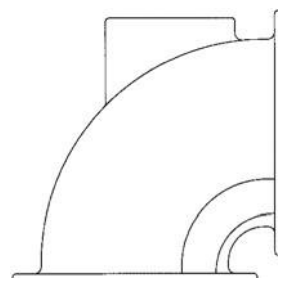
Close Fit Flanged Elbow  
p/n: 098-0140-00-0  
(115 flange inlet with 3" Victaulic outlet)



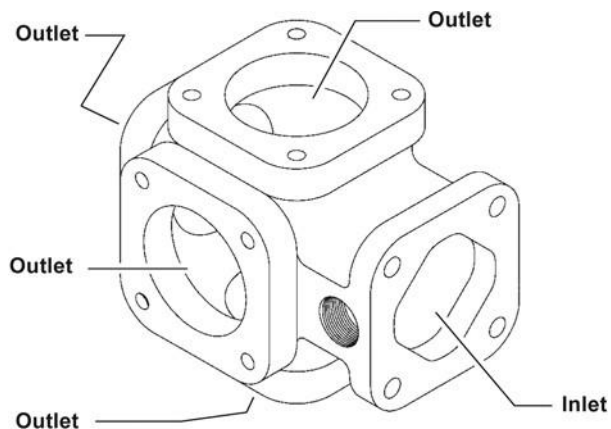
Close Fit Flanged Elbow  
p/n: 098-0190-00-0  
24330 flange inlet with 3" NPT female  
and 4" Victaulic outlet)



Close Fit Flanged Elbow  
p/n: 098-0050-00-0  
(115 flange inlet with 2.5" NPT female outlet)



Close Fit Flanged Elbow  
p/n: 098-0020-00-0  
(115 flange inlet with 115 flange outlet)

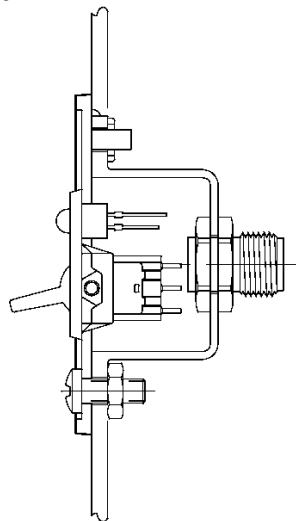
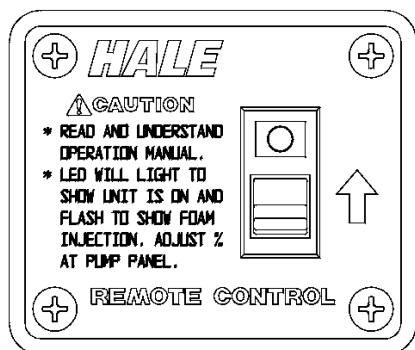


Mini-Manifold p/n:  
178-0320-02-0

## Remote Start Option

Switch

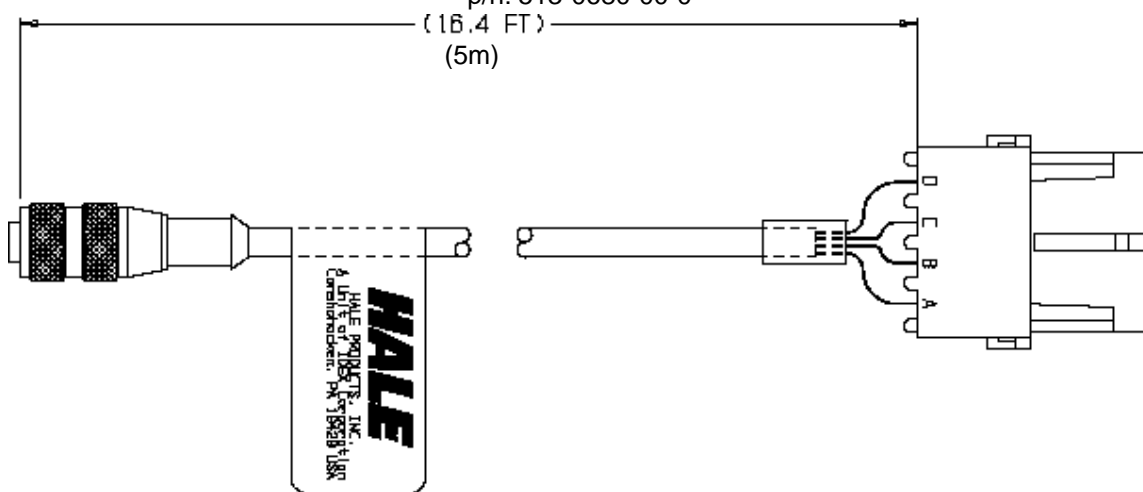
p/n: 513-0330-01-0



## Remote Start Option

Harness

p/n: 513-0680-00-0





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## NOTES

## SECTION 3 INSTALLATION

To simplify installation selection, one of the two packages described in previous Section 2 should be ordered. While either package provides most of the components required for installation, the following guidelines are offered to assist the system installer with a complete system installation.

Carefully review the procedures that follow to ensure the system is properly designed. This section lists components that have been tested with Hale FoamLogix and provide the best system performance. Use of the recommended materials and specified parts ensures a virtually maintenance free installation.

Differences in apparatus plumbing and foam system configuration make it impractical to show exactly how the Hale FoamLogix 2.1A and 1.7AHP systems are installed on a particular apparatus. The information contained in this section, however, applies to most situations and should be used when designing and installing Hale FoamLogix 2.1A and 1.7AHP systems. A system plumbing and electrical diagram is provided at the end of this section to assist with installation.

Before proceeding with system installation, carefully review the procedures that follow to ensure the system is properly designed.

The Hale FoamLogix system is supplied with five major components that must be located on the apparatus.

- ☐ Foam pump and motor assembly
- ☐ Control unit
- ☐ Instruction/system diagram placard
- ☐ Flow Sensor
- ☐ Check valve injector fitting

**Notes:** The flow sensor and check valve injector fitting may be pre-mounted, if a manifold or pre-configured package is ordered.

Optional components that require mounting on the apparatus include:

- ☐ Mini Manifold
- ☐ Flanged elbows



### IMPORTANT !

**WHEN DETERMINING THE LOCATIONS OF HALE FOAMLOGIX COMPONENTS BEING INSTALLED KEEP IN MIND PIPING RUNS, CABLE ROUTING AND OTHER INTERFERENCES THAT COULD HINDER OR INTERFERE WITH PROPER SYSTEM PERFORMANCE.**

### FOAM PUMP AND MOTOR ASSEMBLY

The foam pump and motor assembly must be located in an area that is protected from road debris and excessive heat buildup. The back of a compartment or a compartment shelf is often an ideal location. The foam system, bypass valve, strainer and shut-off valve are located on the foam pump and motor assembly and access to these components must be provided.

The foam pump and motor assembly must be mounted below the discharge of the foam tank to provide for gravity feed to the foam pump. The foam tank must be located where refilling can be easily accomplished with 5 gallon (19 liters) pails and other methods suitable to the end user. Most water tank manufacturers build the foam tank into the booster tank.

When specifying a foam tank, make sure provisions are made for:

- ☐ Installation of the low tank level sensor

- ❑ Foam suction connections
- ❑ Tank drainage
- ❑ Proper fill openings, per NFPA requirements.

In addition, a foam tank refill system may be required. See Hale EZFill system for installation requirements.

## CONTROL UNIT AND INSTRUCTION/ SYSTEM DIAGRAM PLACARD

Determine a location on the operator panel of the apparatus for the control unit and instruction/ system diagram placard, if provided. These components must be located at the main pump operator position in close proximity to each other. Consideration must be given for routing the control cable from the control unit to the distribution box on the foam pump and motor assembly. If necessary, order longer or shorter cable assemblies to suit the location demands.

## INSTALLER SUPPLIED COMPONENTS

Due to the many differences in apparatus configurations and design requirements the Hale FoamLogix system installer must supply components, such as,

- ❑ mounting brackets
- ❑ piping
- ❑ hoses
- ❑ fittings
- ❑ electrical wiring
- ❑ foam tank(s)

The following guidelines are recommendations for selection of additional components for a complete system installation. These recommendations reflect materials and components that are tested extensively with Hale FoamLogix systems and provide proven reliable performance.

## Foam Concentrate Suction Hose

The Hale FoamLogix 2.1A and 1.7 AHP Foam systems are provided with 15' (4.6 meters) of 1/2" (13mm) ID reinforced PVC foam concentrate suction hose. The system installer may need to supply additional fittings and hose from the foam tank to the inlet of the foam pump.

All components selected transfer foam concentrate, therefore they must be compatible with the foam concentrates being used in the system. Hoses for Class A foam concentrates have minimum 1/2" (13mm) inside diameter.

Hoses for the foam concentrate suction must have a rating of 23" (584 mm) Hg vacuum and 50 PSI (3.5 BAR) pressure or greater.

**Note:** NFPA requires that foam concentrate suction hose be clear to observe foam concentrate flow during foam pump operation.

## Recommended Components

- ❑ **Hose:** PVC, Kuriyama Kuri-Tec K3130 or K7130 series
- ❑ **Fittings:** Hose Barb Type; Brass, Stainless Steel or Nylon

A tee with foam tank shut-off valve and a drain valve is recommended in the foam tank suction hose to allow, tank drainage and easier priming.

These components are subject to the same material characteristics and pressure ratings as stated above.

The foam concentrate strainer includes a shut-off valve. This valve is used to shut off foam concentrate flow to service the strainer.

## Foam Concentrate Discharge Hose

The system installer must supply fittings and hoses from the foam pump inject connection to the check valve/injector fitting inlet. All components selected transfer foam concentrate, therefore they must be compatible with the foam concentrates being used in the system.

The foam pump discharge connection is a 1/2" (13 mm) compression fitting. The check valve injector fitting connection has 1/2" NPT threads. Hoses and fittings of 1/2" minimum diameter rated at 500 PSI (34.5 BAR) working pressure or maximum discharge pressure of the fire pump must be used. Fittings and hoses must be compatible with all foam agents to be used.

### Recommended Components

- ❑ **Hose:** Aeroquip 2580-8 or Equivalent Reinforced Hydraulic Hose.
- ❑ **Fittings:** Brass or Stainless Steel Hose End Crimp or Reusable Type (Aeroquip 412-9-8 or Equivalent)

## Foam Concentrate Bypass Hose

The foam concentrate bypass hose connection is a 1/2" (13mm) hose barb connection. Hoses and fittings of nominal 1/2" diameter must be used as bypass hose. Since the bypass hose is used for calibration and draining the system it does not see high operating pressures; therefore, a hose with a lower pressure rating than the inject hose may be used.

Fittings and hoses used must be compatible with all foam agents expected to be used. Use fittings made of brass or 300 series stainless steel compatible with all foam concentrates.

### Recommended Components

- ❑ **Hose:** Low Pressure Hydraulic Hose or Air Brake Tubing
- ❑ **Fittings:** Brass or Stainless Steel

It is recommended that the foam concentrate bypass hose be long enough to extend past the apparatus running board to reach five (5) gallon (19 liter) containers, making foam pump setup and calibration simpler.

## Check Valves

Check valves must be installed on the apparatus with foam systems to prevent contamination of the foam concentrate with water and contamination of the fresh water tank with foam. (See Figure 3: "Typical Hale FoamLogix 2.1A and 1.7AHP System Layout" on page 21.)

When a Hale FoamLogix 2.1A and 1.7AHP foam injection systems and related components are properly installed the required check valves are integral parts of the system.

NFPA standards require a check valve in the foam concentrate injection line at the injection point. The Hale p/n: 038-1790-00-0 Integral Check Valve/Injector Fitting, a standard component included with the Hale FoamLogix 2.1A and 1.7AHP systems and installed when a manifold kit is ordered, meets these requirements and threads directly into the foam injection port on Hale manifolds.

Check valves must be installed in all water piping locations where foam concentrate could drain back into pumps or other components of the fire apparatus.

As a minimum one check valve must be installed where the water piping that supplies foam solution connects to the fire pump discharge. To more effectively keep foam contamination out of the fire pump and water tank, double check valves are recommended.



Separate two check valves by at least 6" to 8" (152 to 203mm) of piping to form a dead zone between the check valves. Individual drain lines should be used on each check valve. The waterway check valves must be rated for 500 PSIG (34.5 BAR) test pressure.

### Flushing Water Hose

If a Hale and USFS approved Class "A" foam concentrate is used, flushing of the Hale FoamLogix 2.1A and 1.7AHP systems is not necessary as long as the system is used periodically.

If a flushing water hose is required to flush the foam pump, it must have a pressure reducer/regulator that limits the flush water pressure to 25 to 50 PSI (2 to 4 BAR). The tubing and fittings used must be compatible with foam concentrates being used in the system.

To be NFPA compliant, when flushing is required, the system installer must provide proper

- ☐ hoses
- ☐ shut-off valves
- ☐ check valves
- ☐ reducer/regulator
- ☐ connections for flushing water for the system.

### Foam Discharge Drains

Drains must be provided from foam capable discharge piping components to prevent freezing in cold weather. When designing the drain system care must be taken to prevent contamination of the water system with foam and the foam concentrate with water. Some multiple drain systems that allow individual drain lines to communicate also allow foam to bypass the installed check valves causing contamination of fire pump and the water or foam concentrate storage tanks.

Hale offers an optional manual or air-operated 6-port drain valve, Class1 Model MMD6 (p/n: 104961). The valve provides individual drains with a single control and is use for applications where a single point for multiple drains is required. If a Hale MMD6 drain valve is not used, individual drain lines and valves for foam capable discharge piping is recommended.

### Apparatus design/build for cold weather (below freezing) duty

If the end-user will use the fire apparatus in sub-freezing temperatures, the onus is on the fire truck builder to build into the apparatus design an appropriate ambient temperature operating environment for the envelope where the FoamLogix system will be located. This routinely takes on the form and function of mounting the FoamLogix system in a limited ventilation area that is served by an appropriate pump house auxiliary heater. Simply, the fire truck builder must keep ambient air temperature above 32°F (0 deg C) in the envelope around the FoamLogix hardware, including the base foam pump unit, foam strainer, foam concentrate injection line, etc. There are several best practices in the fire industry that can be employed to meet this criteria and the fire truck builder/designer can choose the best choice for their specific installation. Note that there must be ventilation available to cool the area around the unit also, to prevent electric motor overheating when the unit is operating in high temperature ambient environments.

### Electrical Requirements

The system installer must provide the primary power wire and a ground strap for the Hale FoamLogix system.

Primary power must be supplied from the main apparatus battery to the motor controller box on the foam pump and motor assembly. The Hale FoamLogix 2.1A and 1.7AHP require minimum 40 AMP electrical service.

Primary electrical power must be supplied directly from the battery or the battery master disconnect switch or solenoids to the Hale FoamLogix.



### IMPORTANT!

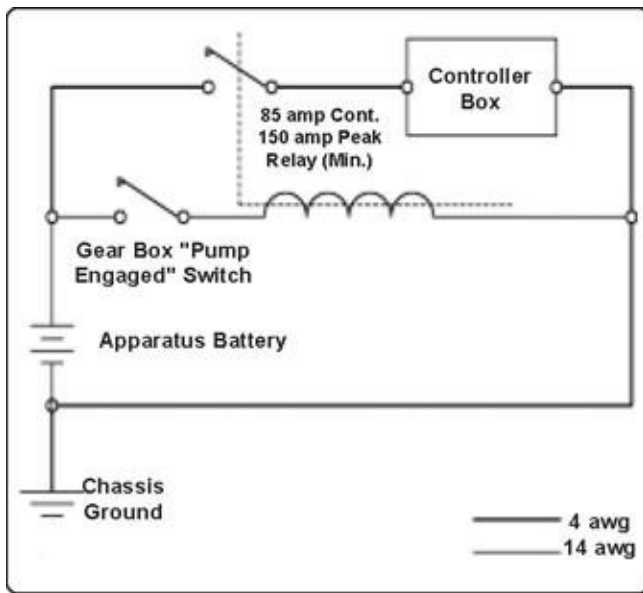
OTHER ELECTRICAL COMPONENTS MUST NOT BE SUPPLIED FROM THIS WIRE. DO NOT CONNECT THE PRIMER AND HALE FOAMLOGIX TO THE SAME POWER WIRE.

The primary power connection must be made so



that power is supplied to the Hale Foam-Logix when the main apparatus electrical system is energized and the pump is in gear. Use of a solenoid with a 150 AMP peak, 85 AMP continuous rating is recommended. Figure 5: “Recommended Relay Wiring Schematic” shows the recommended wiring for this relay.

**Note:** This ensures immediate operation when the operator places the apparatus in PUMP mode, and to prevent battery power drain when the apparatus is not running.



**Figure 5: Recommended Relay Wiring Schematic**

With Hale FoamLogix 2.1A and 1.7AHP cable lengths up to 6' (1.8 meters) require a minimum 8 AWG type SGX (SAE J1127) battery cable. (See Table 6: “Recommended Primary Power Cable Sizes.”) Use solder lugs on cable ends with a 5/16” (8mm) diameter hole.

Models 3.3 and 5.0	Maximum length
8 AWG (8.4mm <sup>2</sup> )	6' (1.8M) or less
4 AWG (21.2mm <sup>2</sup> )	6; (1.8M) to 15" (4.6M)
0 AWG (53.5mm <sup>2</sup> )	15' (4.6M) or Longer

**Table 6: Recommended Primary Power Cable Sizes**

When planning cable runs make sure the primary wires are routed by the shortest most direct route.

A braided flat ground strap connected to the apparatus chassis is recommended for the ground connection.

This limits the RFI/EMI interference encountered with radios, computers or other sensitive electronic equipment. The ground strap should be a minimum of 1-1/4” (32mm) wide and no longer than 18” (457mm). It must have soldered flat lug ends with 3/8” (10mm) diameter holes. If the ground strap length exceeds 18” (457mm), a wider ground strap should be used or use a double thickness of 1-1/4” (32mm) wide ground strap. The ground strap must be connected to the chassis. Use minimum 5/16” (8 mm) diameter bolt or mounting to secure the strap.

Power and ground must also be provided for the display unit using the 2 pin Packard connector. The power must be a minimum 5 amp dedicated and fused circuit. The ground must be connected to the chassis ground stud and protected from corrosion. Make sure the ground is attached directly to the chassis frame and not to the apparatus body work.



BEFORE MAKING GROUND CONNECTIONS REMOVE ALL PAINT, GREASE AND COATINGS FROM THE CONNECTION AREA. AFTER MAKING CONNECTION, SEAL AGAINST CORROSION. WHEN A FLAT GROUND STRAP IS NOT AVAILABLE USE A BATTERY CABLE ONE SIZE LARGER THAN THE POWER CABLE USED.

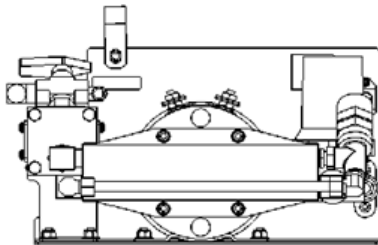
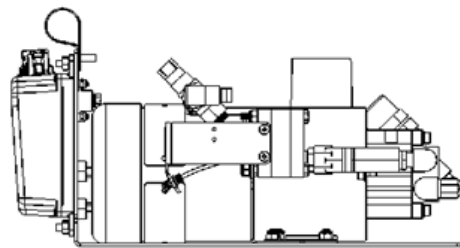
## FOAM CONCENTRATE TANK

A foam concentrate tank must be supplied to suit the capacity required for the apparatus application. The tank must meet NFPA minimum standards for its design capacity, including:

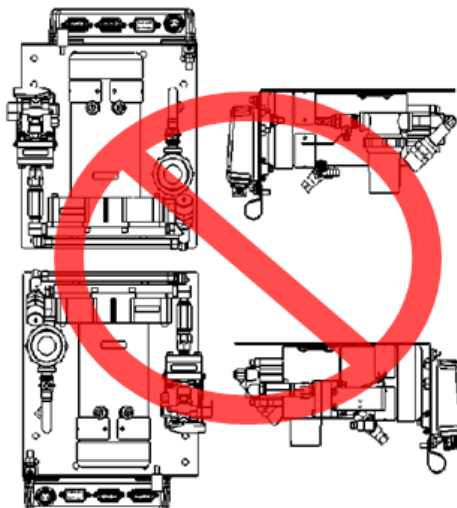
- ☐ Filler size
- ☐ Vapor pressure venting
- ☐ Baffling
- ☐ Drain facilities.

## Foam Pump Mounting

Position the foam pump and motor assembly in the desired location on the apparatus. When installing the foam pump and motor assembly, the assembly should be kept in a **HORIZONTAL** position with the base plate on the bottom (See Figure 7: “FoamLogix Pump Installation.”)



**CORRECT**



**INCORRECT**

**Figure 7: FoamLogix Pump Installation**

Although the system is sealed and designed to be resistant to the harsh environment of fire fighting apparatus, a compartment with easy operator access is recommended.

The base plate of the foam pump and motor assembly must be anchored to a surface or structure that is rigid and of adequate strength to withstand the vibration and stresses of apparatus operation.

Figure 8: “Base Plate Mounting Hole Locations,” on page 35, provides the mounting base dimensions for the FoamLogix foam pump and motor assembly.

Make sure the foam concentrate hoses are properly routed to the inlet and outlet on the foam pump. Foam concentrate must gravity feed to the foam pump inlet from the foam tank(s). The foam pump must be mounted in an area to avoid excessive engine exhaust system heat or accessory heat buildup.

The base of the foam pump and motor assembly includes 5/16” (8mm) diameter predrilled mounting holes. The apparatus mounting location must to be drilled accordingly. The base plate may be used as a template to mark mounting hole location. Also see Figure 8: “Base Plate Mounting Hole Locations” on page 35.

## PLUMBING INSTALLATION

Hale FoamLogix System plumbing diagram is located on page 21 of this manual.

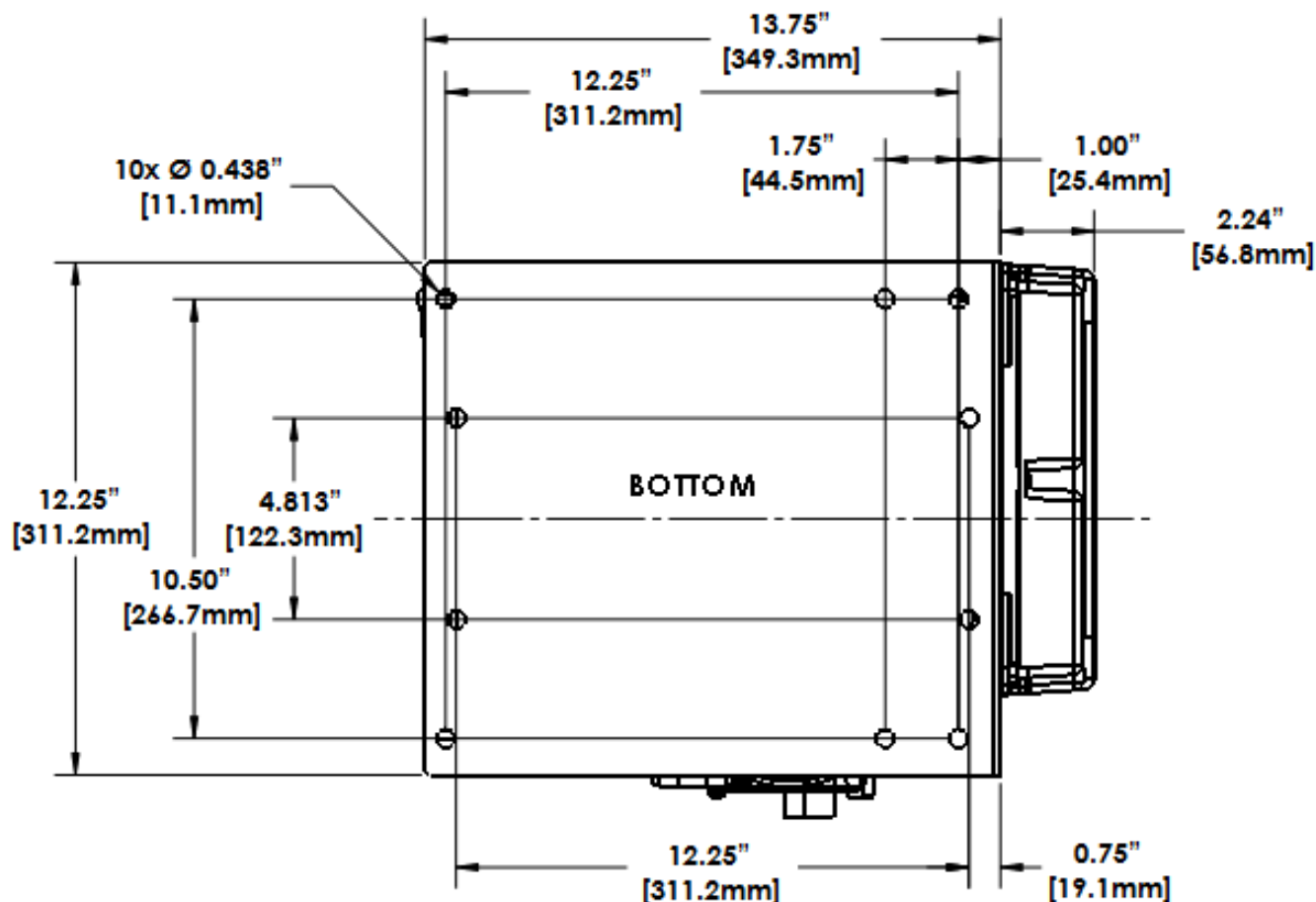


Figure 8: Base Plate Mounting Hole Locations

The diagram provides recommended guidelines for the installation of system components that handle water, foam concentrate and foam solution. The sequence in which the plumbing installation is completed depends on your individual installation.

### Water and Foam Solution Plumbing

When installing water and foam solution piping runs, use best industry practices to install this piping. Use a suitable pipe sealing compound at all joints.

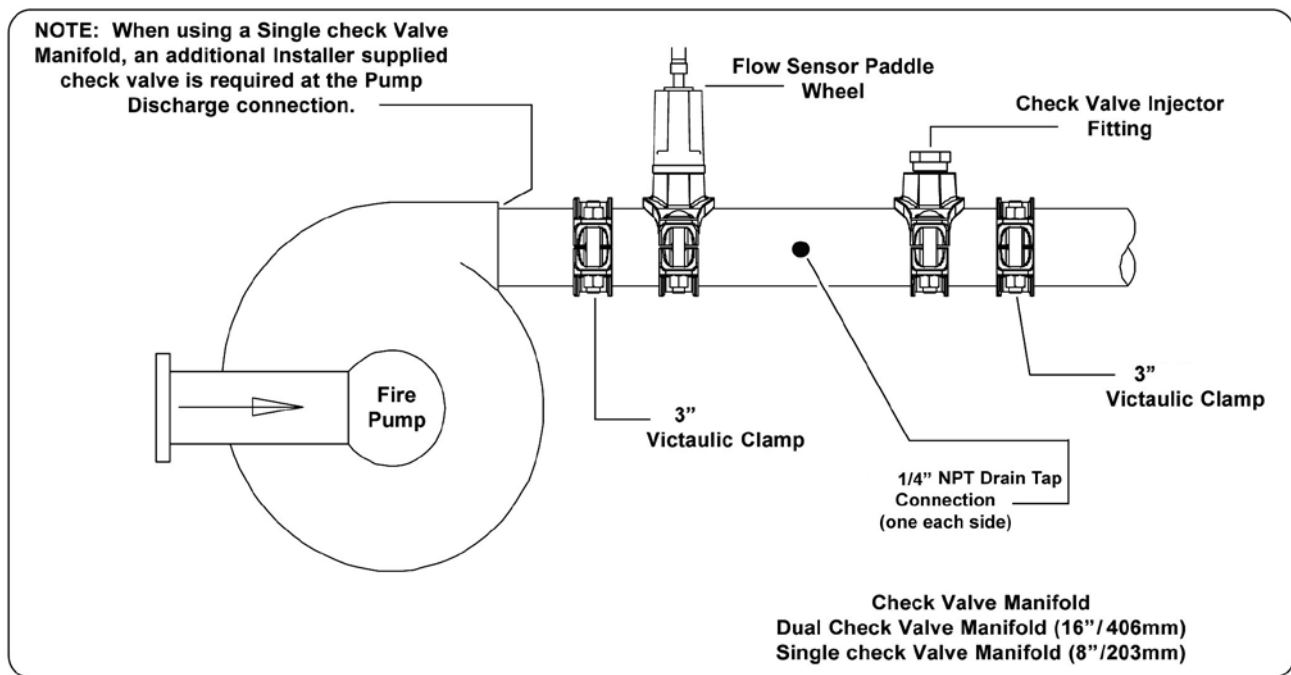
### Check Valve Manifold

Hale pre-made stainless steel foam manifolds are recommended.

The manifolds are available in kits and eliminate the extra labor and leaks from large pipe thread connections.

The manifolds use 3" (76mm) Victaulic connections and are available in single or dual check valve configurations.

Figure 9: "Check Valve Manifold Installation," on page 36, shows a typical check valve manifold installation.



**Figure 9: Check Valve Manifold Installation**

**Note:** When the manifold is installed the drain tap that must be placed in the "down" position and plumbed to an individual drain.

When properly mounted, the flow sensor and check valve/injector fitting are on the side of the manifold and one of the drain ports is on the bottom. The flow sensor should point upwards slightly to allow drainage of water and sediment. See Figure 12: "Flow Sensor Tee Position Range," on page 38.

### Optional Hale Piping Components

Hale piping components, such as 3" (76mm) and 4" (102mm) wafer-type check valves, 115 and 2433 series flanges, mini manifold, etc. are available to simplify installation of water and foam solution discharge piping.

The arrangement shown in Figure 10: "Typical Midship Pump Installation," on page 37, provides accurate proportioning across a wide range for up to four discharges from the mini manifold.

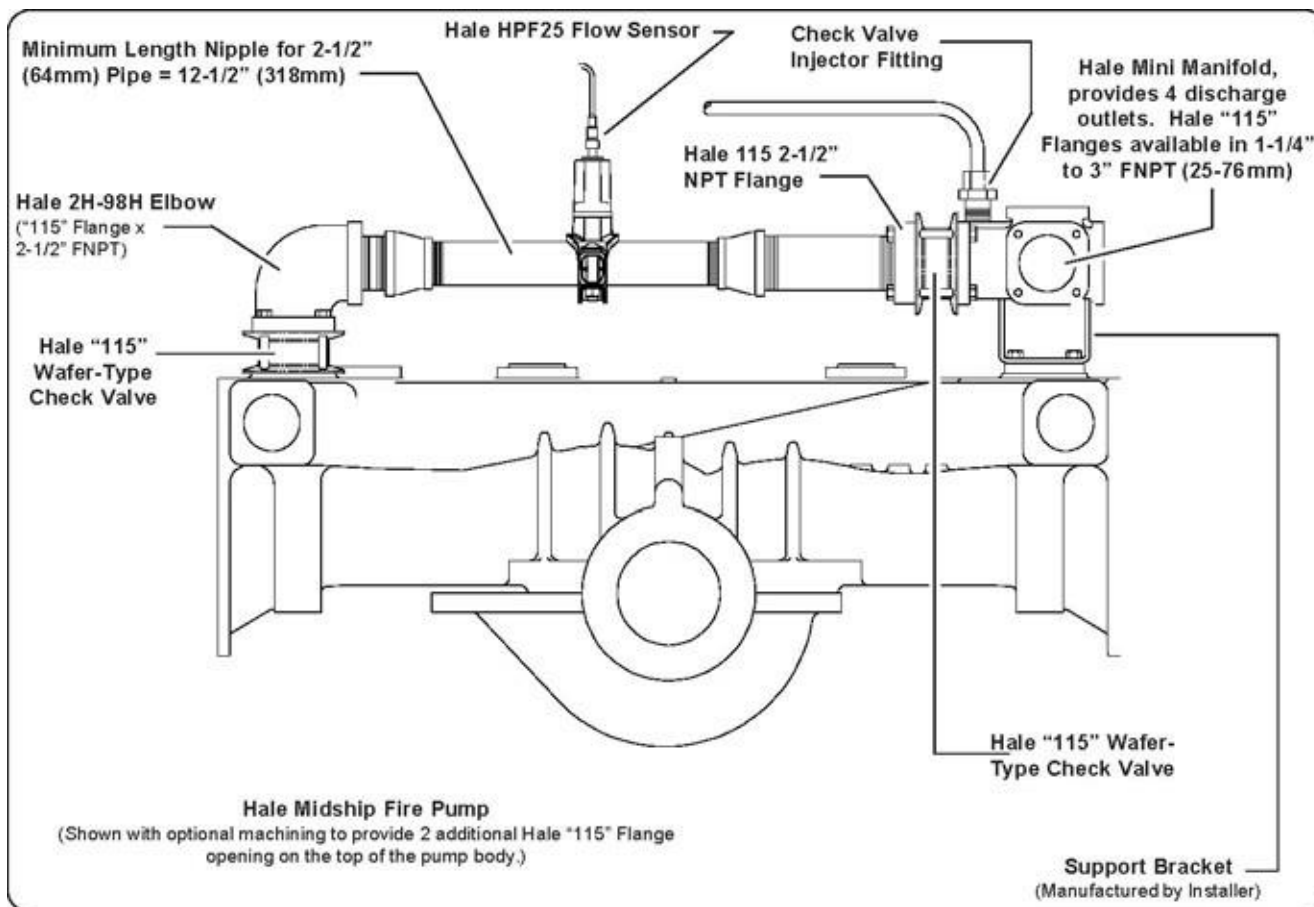
The Hale mini manifold provides a 1" NPT tap for installation of the check valve/injector fitting.

The Hale mini manifold and elbow components offer 4-3/8" diameter bolt circles and minimize fabrication and pipe work. After installation, make sure all pipes, hoses and tubes are supported using the best industry practices.

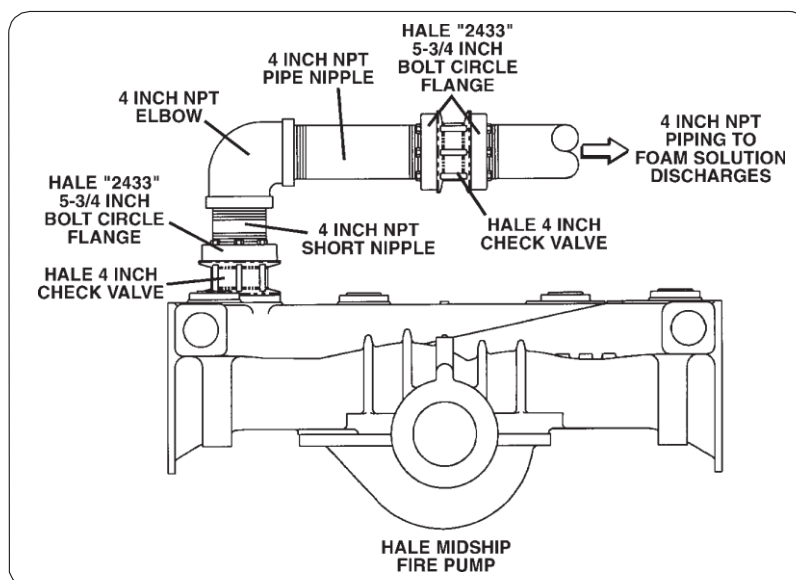
Figure 11: "Typical 4" Check Valve Installation, Midship Pump" on page 37 shows a suggested installation arrangement using Hale 4" (102mm) check valves, pipe and Hale 2433 flanges.

### "Waterway" Check Valves

Check valves in the waterway, rated at 500 PSI (34.5 BAR), are required to keep foam solution out of the main pump and allow pump priming without drawing foam into the piping.



**Figure 10: Typical Midship Pump Installation**



**Figure 11: "Typical 4" Check Valve Installation, Midship Pump**



Using double check valves, separated by at least 6" to 8" (152 to 203mm) of pipe before the foam injection point, ensures that the pump and tank water remain uncontaminated.

## Flow Sensor

The Hale FoamLogix flow sensor is specially designed to enable quick and easy sensor inspection and maintenance. The flow sensor paddle wheel is installed on a saddle clamp or weld fitting to the foam-capable discharge piping of the apparatus.

In horizontal piping runs, the flow sensor is mounted within the range shown in Figure 12: "Flow Sensor Tee Position Range."

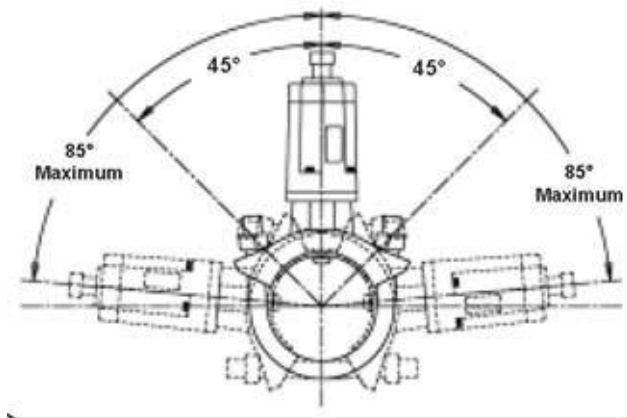


Figure 12: Flow Sensor Tee Position Range

When selecting a flow sensor, it is important to consider the minimum and maximum flow requirements during operation. Refer to the Figure 4: "Pipe Size vs. Flow Rate," on page 24, for the proper pipe size for flow range desired.

The flow sensor is installed in the piping before the foam concentrate injection point.

This is true in applications where the foam system needs to supply a 3" (76mm) deck gun, as well as a 1" (25.4mm) booster line.

Pipe Size	Minimum Recommended Straight Run Pipe
1-1/2"	9"
2"	12"
2-1/2"	15"
3"	18"
4"	24"

Table 13: Pipe Size vs. Minimum Straight Run

Pipe size for flow sensor mounting must be selected to provide accuracy at the lowest flow rate. Mounting the flow sensor in a short section of pipe, one pipe size smaller (e.g., 4" to 3"; 3" to 2-1/2", etc.), provides better accuracy at the lower flows.

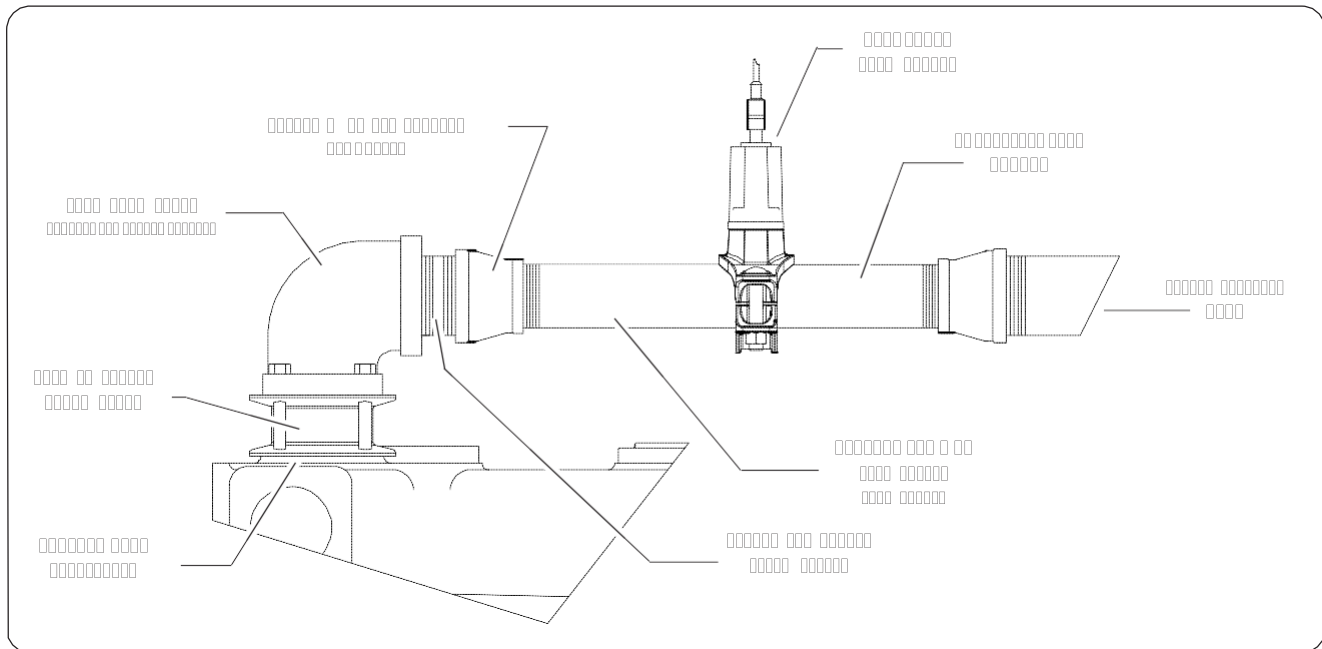
Refer to the Table 13: "Pipe Size vs. Minimum Straight Run" for pipe size. Selecting the next smaller pipe permits reducing the straight pipe run the required distance prior to the flow sensor paddle wheel.

In the short length of reduced pipe pressure loss is minimal and there is minimal pressure loss through elbows and fittings. See Figure 14: "Typical Reduced Size Sensor Piping Arrangement" on page 39.

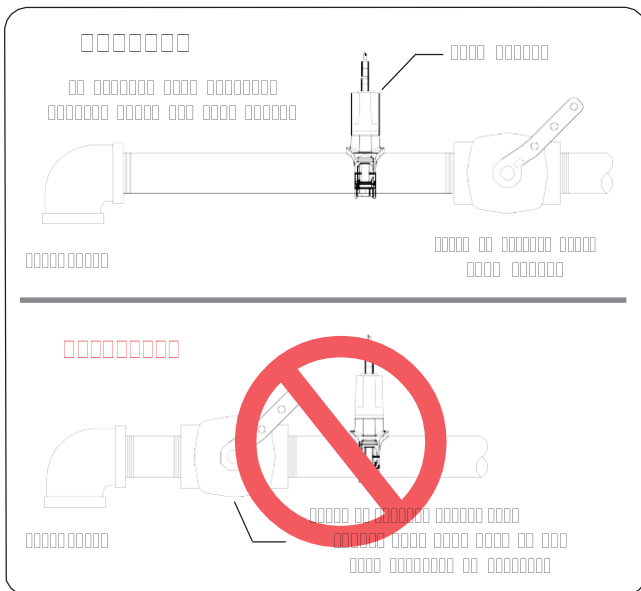
Excessive turbulence in the flow sensor may produce unstable and inaccurate flow readings. The length of straight pipe prior to the flow sensor must be sufficient to reduce any turbulence in the pipe.

The following guidelines help attain the best readings, and maintain Hale FoamLogix system accuracy.

1. A minimum of **6 times the pipe diameter** of straight run pipe without any fittings is necessary prior to the flow sensor paddle wheel. (See Figure 15: "Flow Sensor Placement" on page 39.)



**Figure 14: Typical Reduced Size Sensor Piping Arrangement**



**Figure 15: Flow Sensor Placement**

2. The downstream piping length is not as critical, but there must be a short length of straight pipe with no fittings or valves immediately after the flow sensor paddle wheel. Two to three times the pipe diameter is recommended.

3. Do not mount a flow sensor directly after an elbow or valve. Valves create severe turbulence when they are “Gated”.

### Saddle Clamp Installation

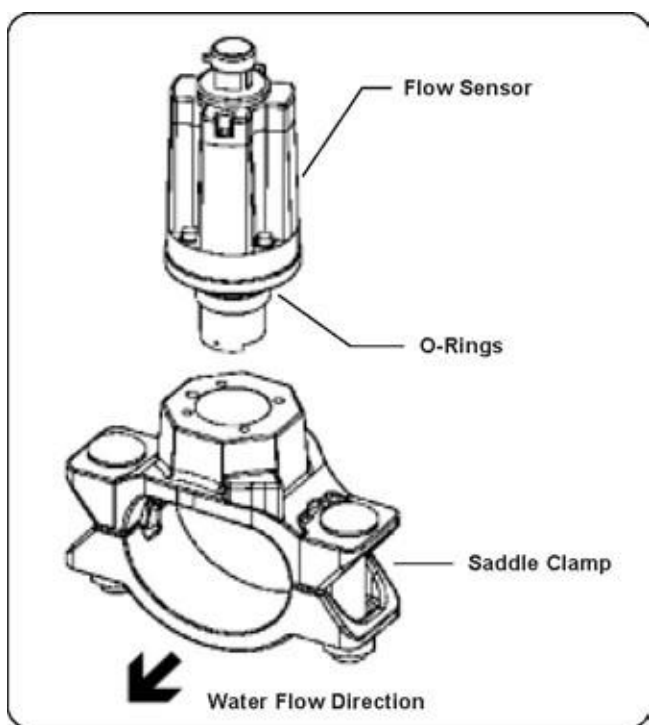
See Figure 16: Flow Sensor/Saddle Clamp Installation“ on page 40.

Installation of the Paddle Wheel Flow Sensor using a saddle clamp requires a 1.385”/ 1.390” (35/35.3mm) bored hole in the pipe.

A minimum of six times the pipe diameter of straight run pipe without any fittings is necessary prior to the position of this hole.

The flow sensor requires a spacer and eight stainless steel internal hex head screws. These are supplied with the sensor.

Four 6-32 x 1/2” screws attach the spacer to the saddle clamp mount, and four 6-32 x 3/4” screws with lock washers attach the paddle wheel to the spacer.



**Figure 16: Flow Sensor/Saddle Clamp Installation**

Align the indexing pin of the saddle clamp to the indexing hole of the spacer to align the saddle clamp mount.

Secure with four 1/2" machine screws, no lock washers. Torque to 8.5 in.-lbs. (1.0 N-m).

Align the paddle wheel indexing pin to the indexing hole in the spacer and secure using four 3/4" screws and lock washers. Torque to 7.5 in.-lbs. (0.9 N-m).

Apply a small amount of grease to the saddle clamp gasket before the final installation of the assembly onto the pipe. Firmly tighten the saddle clamp onto the pipe.

## Foam Pump Flush System

The flushing water hose must be a minimum of 1/2" (12 mm) inside diameter. The flush water supply is provided from one of the pressure taps on the discharge side of the fire pump.

It must be reduced to 50 PSI (3.5 BAR). It is recommended to installed a check valve at the pressure tap to prevent contamination.

## FOAM CONCENTRATE PLUMBING



### CAUTION!

**MAKE SURE THE FOAM TANK AND FOAM CONCENTRATE SUCTION HOSES ARE CLEAN BEFORE MAKING FINAL CONNECTION TO FOAM PUMP.**

**FLUSH TANK AND HOSES PRIOR TO MAKING CONNECTIONS.**

**MAKE SURE THE FOAM CONCENTRATE IS GRAVITY FED FROM THE TANK TO THE PUMP.**

Foam concentrate plumbing consists of:

- ☐ Foam concentrate suction hose
- ☐ Foam strainer
- ☐ Foam concentrate discharge hose
- ☐ Check valve/injector fitting.

## Foam Strainer Connection



### CAUTION!

**THE FOAM CONCENTRATE STRAINER ASSEMBLY, MOUNTED ON THE FOAM PUMP INLET, IS A LOW PRESSURE DEVICE. IT WILL NOT WITHSTAND FLUSHING WATER PRESSURE. IF FLUSHING WATER IS TO BE PROVIDED THE PRESSURE MUST BE LIMITED TO 50 PSI (3.5 BAR).**

The strainer/valve assembly has 1/2" (12mm) NPT female threaded ports. A 1/2" hose barb fitting is supplied to connect the 1/2" ID hose, provided with the Hale Foam-Logix 2.1A installation kit.



The hose from the foam tank to the strainer must have adequate wall stiffness to withstand the vacuum of the foam pump while it is operating (23" [584 mm] Hg and 50 PSI [3 BAR], Kuriyama, Kuri-tec K-3130 or K-7130 series or equal).

After the foam pump is mounted on the apparatus, connect the PVC hose provided to the strainer inlet.

Install the clear plastic hose from the foam tank outlet to the inlet of the strainer/valve assembly. The inlet is on the valve end. Wetting the ends of the hose and fittings makes the installation on the hose fittings easier.



### CAUTION!

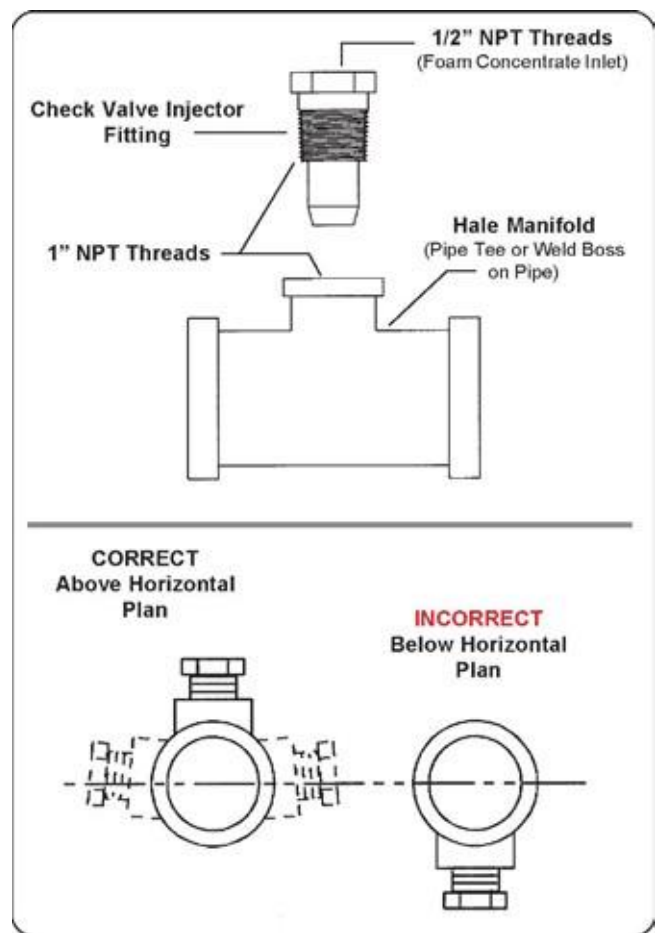
**MAKE SURE THE FOAM TANK AND FOAM CONCENTRATE SUCTION HOSES ARE CLEAN BEFORE MAKING FINAL CONNECTION TO FOAM PUMP. IF NECESSARY FLUSH TANK AND HOSES PRIOR TO MAKING CONNECTION.**

### Check Valve/Injector Fitting

The Hale check valve/injector fitting, supplied with the Hale FoamLogix system, meets NFPA requirements for a non-return device in the foam injection system. It prevents back flow of water into the foam concentrate tank.

When properly installed the brass and stainless steel construction check valve/injector fitting ensures foam concentrate is injected into the center of the water flow for better mixing.

**Note:** Always position the check valve/ injector fitting at a horizontal or higher angle to allow water to drain away from the fitting. (See Figure 17: "Check Valve Injector Fitting Installation.") This avoids sediment deposits or the formation of an ice plug.

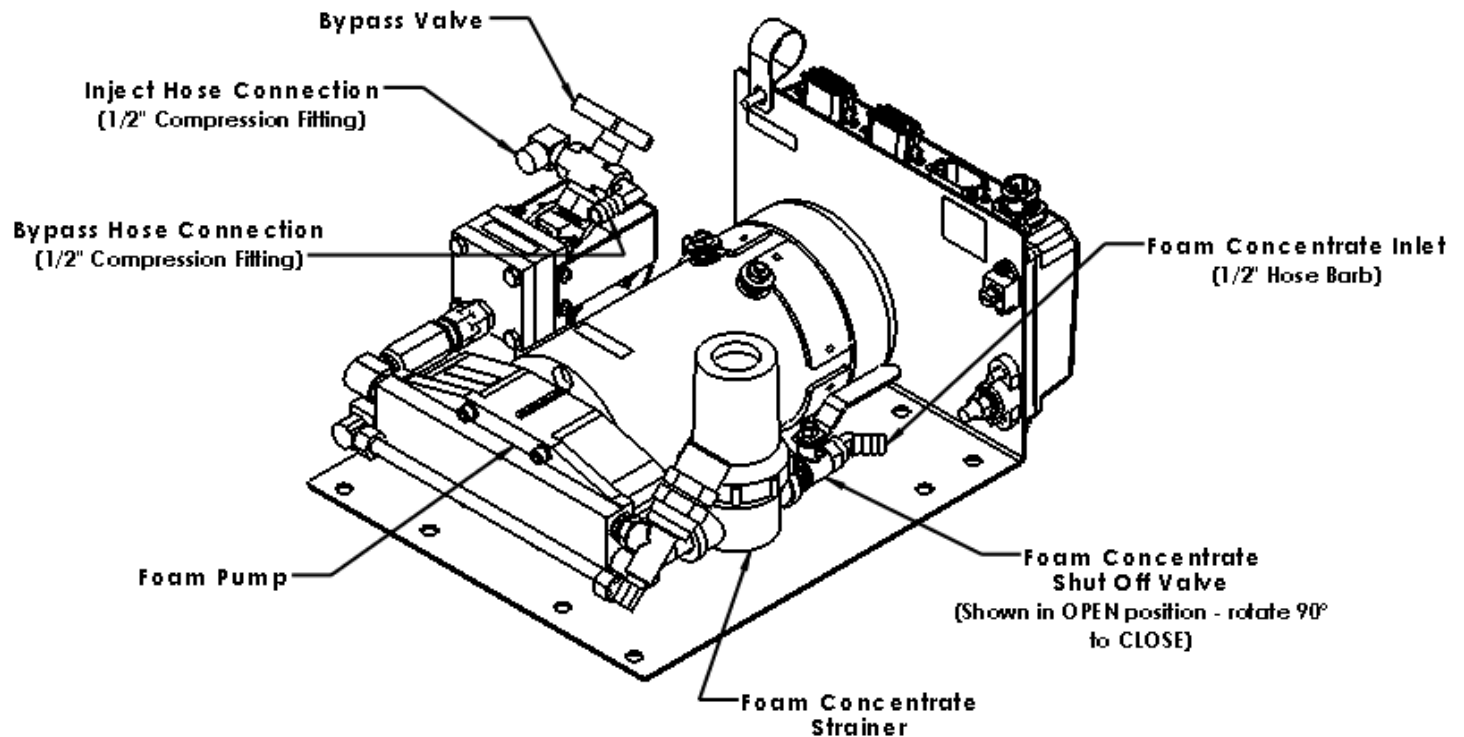


**Figure 17: Check Valve Injector Fitting Installation**

The check valve/injector fitting **MUST** be mounted in a location that is common to all discharges which require foam concentrate. (See Figure 18: "Injection and bypass Hose Connection")

The Hale FoamLogix system **DOES NOT** permit a separate injection point for each foam capable discharge.

The check valve/injector fitting has – 1" NPT (25.4mm) threads on the outside, to fit into the 1" NPT threaded connection on the Hale mini manifold a pipe tee, or a 1" NPT weld fitting installed in the discharge piping of the fire pump. (See Figure 17: "Check Valve Injector Fitting Installation.")



**Figure 18: Injection and Bypass Hose Connection**

The inlet connection of the check valve/ injector fitting uses a 1/2" NPT female thread.

### Foam Concentrate Injection Hose

Connect a hose from the foam pump inject port to the inlet of the check valve injector fitting. (See Figure 18: "Injection and Bypass Hose Connection")

The hose and fittings from the INJECT port to the check valve injector fitting should have minimum 1/2" (13 mm) outside diameter and be rated at 500 PSI (34 BAR) working pressure (Aeroquip 2580-10 or equal).

### Bypass Hose Connection

A bypass valve is mounted on the discharge of the foam pump. The bypass handle must be accessible by the pump operator during normal operations.

The bypass is a 3-way directional valve. Determine which port is the INJECT port and which port is the BYPASS. (See Figure 18: "Injection and Bypass Hose Connection")

Bypass hose connections are 1/2". Hose fittings compatible with all foam concentrates must be provided. The hose from the BYPASS port is plumbed to the atmosphere.

This hose is used for calibrating the foam pump, pumping the concentrate into a container to empty the foam tank or to assist in priming of the foam pump. The hose from the BYPASS port must be long enough to reach a container outside the truck.

## ELECTRICAL INSTALLATION

### Electrical Connections

Complete harness electrical diagrams are provided on page 45 of this manual. Refer to these diagrams for proper installation of each of the electrical components.

The Hale FoamLogix system is designed to be installed with a minimum of electrical connections. Cables are provided with each Hale FoamLogix system to make the flow sensor, control unit and motor controller box connections.

The system installer must supply primary power wire, low tank level sensor wire and flat braided ground straps.



### CAUTION!

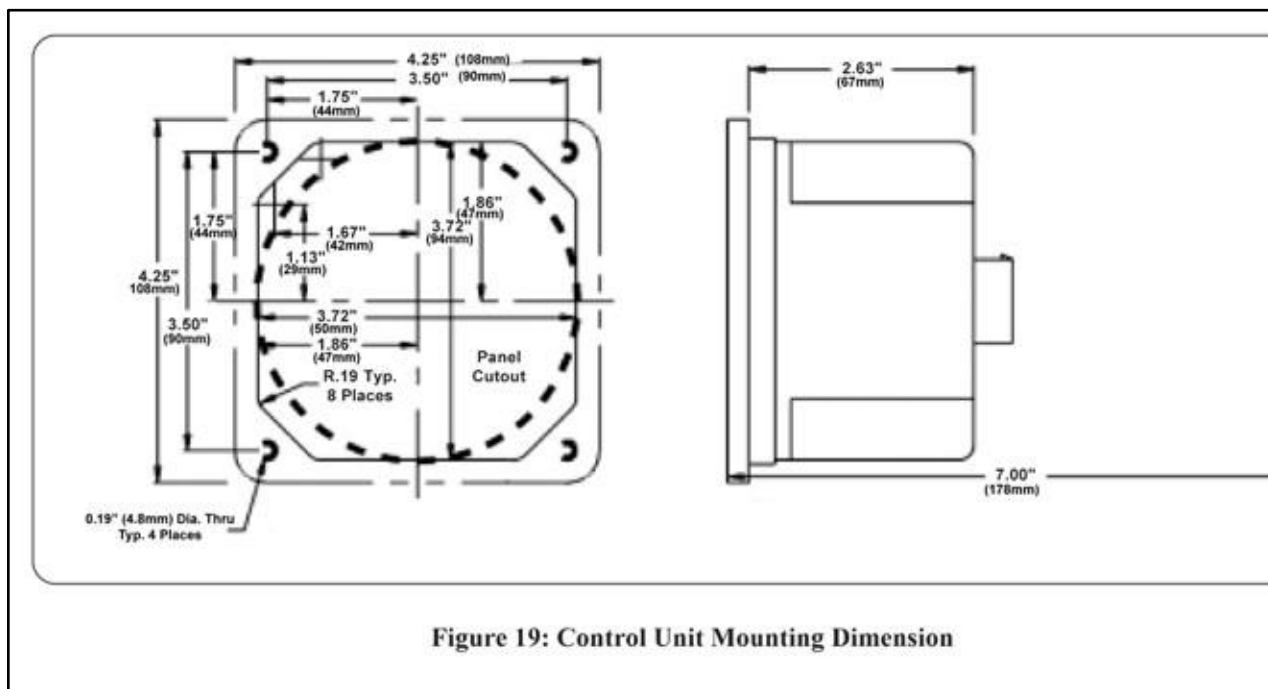
- ❑ Review the “Safety” section of this manual, beginning on page 11, in its entirety before proceeding with electrical connections.
- ❑ To prevent system damage or electrical shock the main power supply wire must be the last connection made to the Hale FoamLogix motor controller box. See Figure 3: “Typical Hale FoamLogix 2.1A and 1.7APH System Layout” on page 21.
- ❑ The cables provided with each Hale FoamLogix system contain shielded assemblies.

NEVER attempt to shorten or lengthen the shielded cables. If necessary order longer or shorter cables from Hale Products to suit the particular installation.
- ❑ The cables are indexed so they connect to the correct receptacle one way only. When making cable connections DO NOT force mismatched connections as damage can result, causing improper system operation.
- ❑ The cables shipped with each Hale FoamLogix

system are tested at the factory with that unit. Improper handling and forcing connections can damage these cables which could result in other system damage.

- ❑ The system can only perform when the electrical connections are sound. Make sure each electrical connection is correct.
- ❑ Hale FoamLogix systems are designed for use on direct current, negative (–) ground apparatus electrical systems only.
- ❑ Do not mount radio transmitter or transmitter cables in direct or close contact with the Hale FoamLogix unit.
- ❑ Before connecting the cables, inspect the O-ring seal in the female connector. If the seal washer is missing or damaged, water can enter the connector causing corrosion of the pins and terminals resulting in possible system failure.
- ❑ The ground strap must be a minimum of 1-1/4” (32mm) wide and no longer than 18” (457mm).

A longer ground strap must be wider or a double thickness strap must be used. Make sure the ground strap is attached to the chassis frame. Grounding to the body IS NOT acceptable.
- ❑ Always disconnect the power cable, ground straps, electrical wires and cables from the control unit or other Hale FoamLogix equipment before electric arc welding at any point on the apparatus. Failure to do so could result in a power surge through the unit that could cause irreparable damage.
- ❑ There are no user serviceable parts inside Hale FoamLogix system electrical/ electronic components. Opening of these components (motor controller box or control unit) voids the warranty.



## Control Unit

The control unit mounts in the operator panel of the apparatus. The display is secured with four #8 socket head screws. (See Figure 19 “Control Unit Mounting Dimension” for mounting dimensions).

The display requires a 7” (178mm) minimum clearance from the back of the operator panel to allow proper connection of cables. Once the control unit is mounted on the operator panel, attach the 14 pin AMP connector on the cable assembly to the back of the display. Referring to Figure 20: “Control Harness Connections” and Figure 21: “System Power and Ground Connections,” on page 45, make connections to the motor controller box and flow sensor.

**Notes:** Ensure that the panel where the control unit is mounted has an adequate ground. For stainless steel and vinyl coated panels a ground strap ½ inch (12mm) wide must be attached from one of the four screws holding the control unit in place to the frame of the fire truck to ensure adequate grounding.

Allow a service loop to prevent “pulling” of the wires or connectors during body and frame flex.

## Display Unit Power and Ground Connections

Power must be connected directly to the display unit. The power and ground connection is the 2-pin packard connector on the 12” (305mm) long pigtail of the harness (see Figure 20 on page 45).

The mating harness provided is approximately 18” (457mm) long. If additional wire length is required, use minimum 16 AWG type SXL, or GXL (SAE J1128) wire.

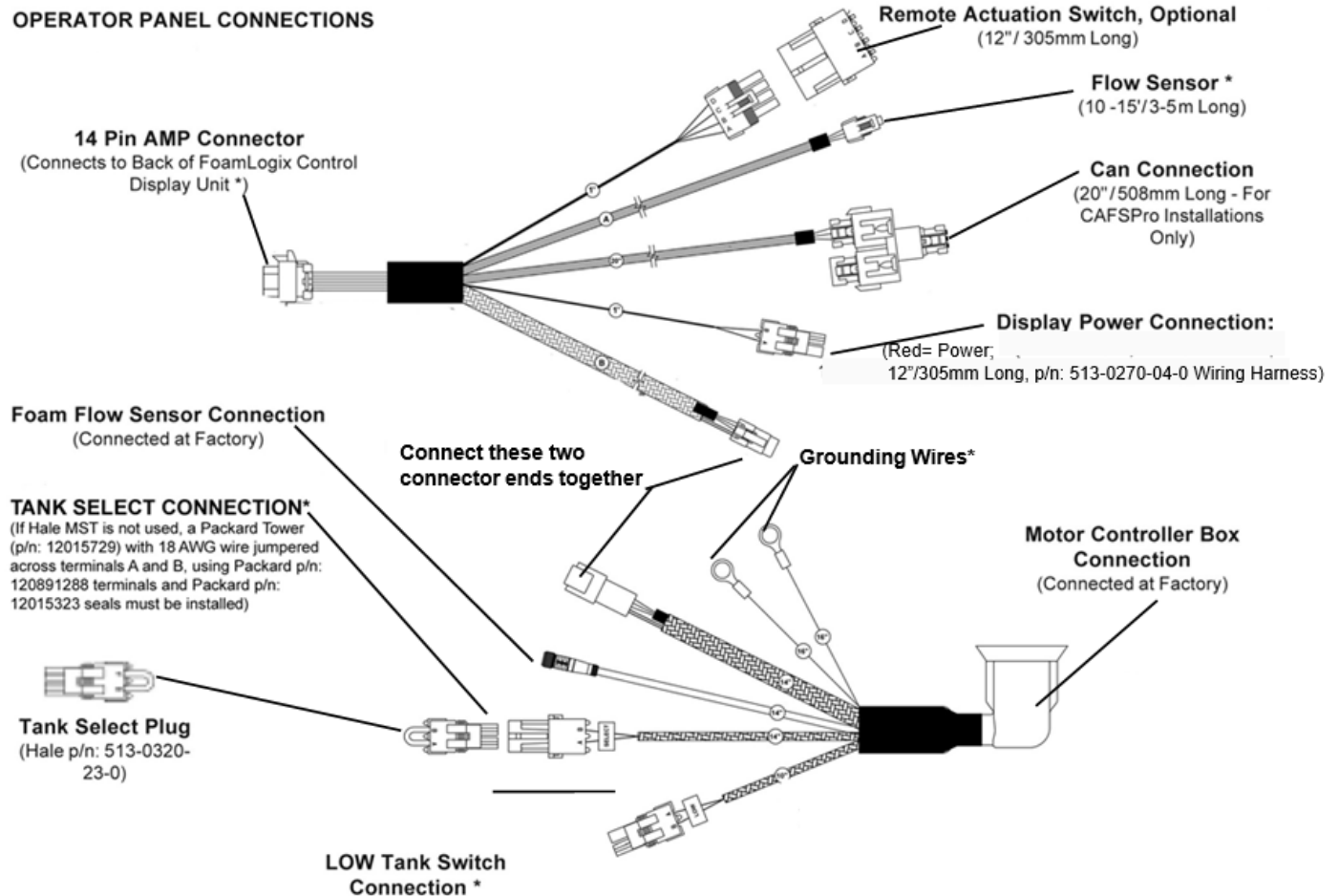
Connect the black (B) wire to a chassis ground stud. Protect the ground connection from corrosion.

Connect the red (A) wire to the power supply. It is recommended to connect the power wire to a minimum 5 AMP, fused, dedicated circuit. If a dedicated circuit is not available, the power lead may be connected to a terminal where there is not a HIGH current load. Acceptable additional components powered from this terminal include ENFO IV, Governor, Tank Level Gauge, Etc.

**Figure 20: Control Harness Connections**

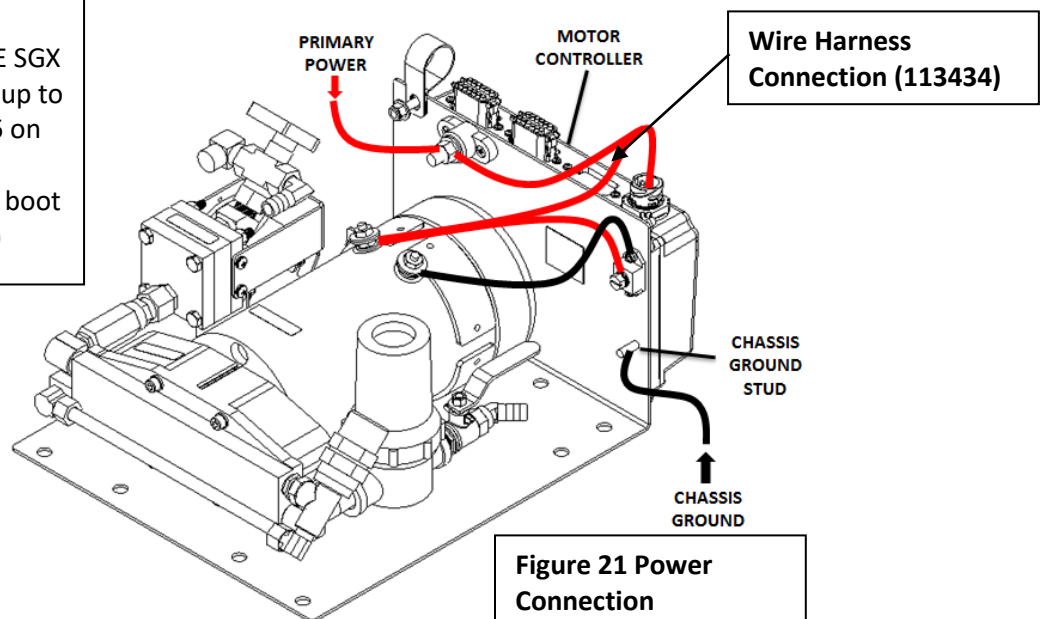
(Single Tank System Shown) (Connections required during system installation)

**OPERATOR PANEL CONNECTIONS**



**PRIMARY POWER CONNECTION**

(40 AMPS Minimum - 8 AWG TYPE SGX (SAE J1127) Minimum for lengths up to 6'. For lengths over 6' see Table 6 on page 31. Use silicone sealane to prevent corrosion and use rubber boot provided to prevent short circuit.)





## Motor Ground / Primary Power



### CAUTION!

**CONNECT THE PRIMARY POSITIVE LEAD FROM THE TERMINAL BLOCK TO THE MASTER SWITCH TERMINAL OR RELAY TERMINAL USING MINIMUM 8 AWG TYPE SGX (SAE J1127), CHEMICAL RESISTANT, BATTERY CABLE AND PROTECT WITH WIRE LOOM.**

**PREVENT CORROSION OF POWER AND GROUND CONNECTIONS BY SEALING THESE CONNECTIONS WITH THE SILICONE SEALANT PROVIDED.**

## Ground Connection

Be sure the Hale FoamLogix system is grounded to the chassis. Use a short length of wide flat ground strap at least 1-1/4" (32 mm) wide and less than 18" (457 mm) long to reduce the potential of RFI emitted by this connection.

A stud is located on the mounting base to attach the chassis ground strap to the Hale FoamLogix system. (See Figure 21: "System Power and Ground Connections" on page 45.)

When making the ground strap connections make sure lugs are soldered to the strap ends for trouble free connections. Seal all connection against corrosion.

When the length of the ground strap exceeds 18" (457 mm) use a wider strap or a double thick strap.



### CAUTION!

**DO NOT CONNECT THE MAIN POWER LEAD TO SMALL LEADS THAT ARE SUPPLYING SOME OTHER DEVICE, SUCH AS A LIGHT BAR OR SIREN. THE HALE FOAMLOGIX MODELS 2.1A AND 1.7AHP REQUIRE 40 AMP MINIMUM CURRENT.**

## Primary Power Supply Connection

Make sure adequate switched electrical power from the battery + terminal to the battery connection stud on the motor controller box is provided. (See Table 6: "Recommended Primary Power Cable Sizes" on page 33.)

Use 8 AWG minimum type SGX (SAE J1127) battery cable directly to the battery, battery switch or solenoids for cable runs up to 6' (1.8 meters) long. Longer wire runs may require larger battery cable for proper operation. **DO NOT** connect power to the same connection as the pump primer.

## RFI/EMI

Electrically shielded cables for control unit and flow sensor are provided with the Hale FoamLogix system. The cables are 100% electrically shielded to eliminate the potential problem of EMI/RFI.

Proper installation of system components and cables along with proper grounding will limit radio interference caused by the Hale Foam-Logix system. Additionally, make sure radio cables and hardware are not located in the immediate area where Hale FoamLogix equipment is mounted.

Making round coils of extra control and flow sensor cables in the pump compartment can act as an antenna. While the control and flow sensor cables cannot be shortened, various lengths of cable are available to minimize the "extra" cable in the truck.

When routing control and flow sensor cables take care to avoid routing them next to antenna wires, radio power lines and radio components. When there is extra cable, double the cable back on itself and secure with plastic wire ties in a flat bundle instead of making a round coil. (See Figure 22: "Extra Cable Storage" on page 47.)

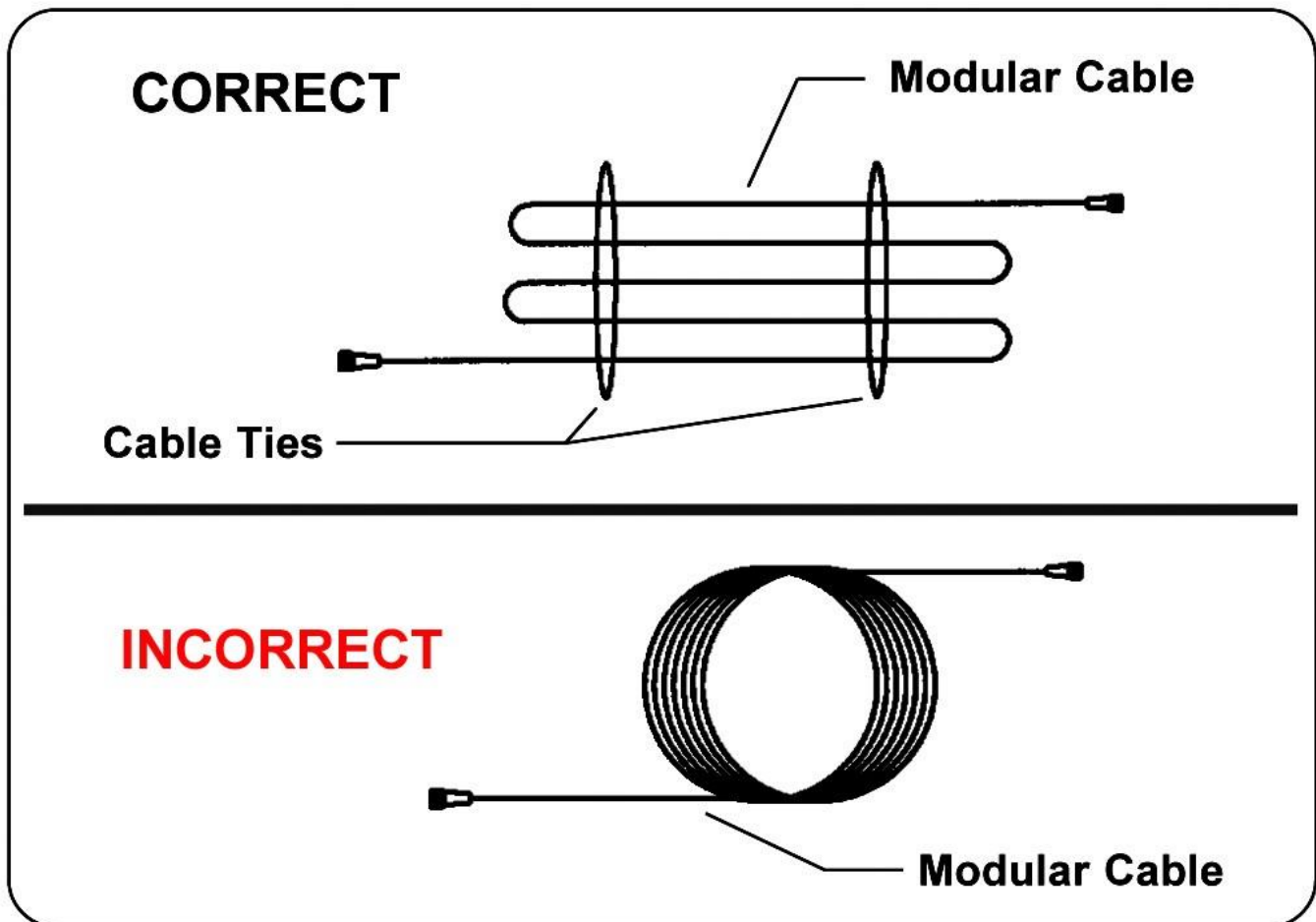


Figure 22: Extra Cable Storage



## START-UP CHECKLIST

Before energizing the apparatus and Hale Foam-Logix system for the first time make sure the following items are checked:

### ELECTRICAL

- ☐ Tank level sensor wires connected to distribution box and sealed from moisture.
- ☐ Tank level sensor functions properly.
- ☐ Control cable connection at distribution box correct and tight.
- ☐ Flow sensor cable properly connected.
- ☐ All cables and wires are secured and protected from damage during operation.
- ☐ Control and flow sensor cables properly folded and secured; radio antennas, power lines and equipment away from cables.
- ☐ Foam pump and motor assembly properly grounded using flat ground strap.
- ☐ Correct voltage provided. Direct current, negative (–) ground.
- ☐ Adequate current, 40 AMPS minimum, available. Main power direct to battery, battery switch or solenoid without primer or other accessories tied in.
- ☐ Primary electrical and ground connections tight and protected from corrosion with silicone sealant.
- ☐ Splices in wires sealed from moisture using adhesive filled heat shrink tubing.

### LIQUID

- ☐ Flow sensor mounted with flow arrow in the correct direction for water flow.
- ☐ Check valves are properly mounted in water and foam concentrate lines.
- ☐ Strainer mounted for proper concentrate flow direction in foam tank to pump hose.
- ☐ Foam tank to foam pump valve is in place and open.
- ☐ Check valve/injector fitting lines are proper size and connections are tight.
- ☐ Bypass valve is properly mounted and oriented for direction of concentrate flow.
- ☐ Foam concentrate gravity feeds to foam pump from foam concentrate tank.
- ☐ All hoses free of kinks and sharp bends.
- ☐ No sharp bends that can trap air exist in system.
- ☐ Flush water connections correct and tight.
- ☐ Discharge piping hydro tested in accordance with NFPA/UL requirements.
- ☐ Bypass valve handle is in the INJECT position.

### FOAM PUMP

- ☐ Foam pump and motor assembly mounted in horizontal position with base plate down.
- ☐ Foam pump and motor assembly properly secured using proper mounting hardware.
- ☐ Foam pump suction and discharge hoses connected to proper ports.
- ☐ Foam pump suction and discharge hose fittings tight.



## System Installer Start-up

On initial power-up of the Hale FoamLogix system, at the installer facility, the following procedures must be followed.

### INITIAL SYSTEM POWER CHECK

Watch the display on the control unit as the apparatus electrical system is turned ON. Check the control unit readout for:

- ❑ FLOW
- ❑ TOTAL FLOW
- ❑ % FOAM
- ❑ TOTAL FOAM
- ❑ all bar graph LEDs light
- ❑ “88888” appears for several seconds
- ❑ “HALE CLASS 1 2002” (or “HALE CLASS 1 [CURRENT DATE]”) scrolls across the display
- ❑ The default display, zero (0), if no water is flowing and FLOW LED

(See Figure 23: “Control Unit Ready Indication”)

If a default display does not appear, refer to Section 6: TROUBLESHOOTING for possible **WARM-UP/ SYSTEM CHECKING** causes and solutions.

### INITIAL SYSTEM CHECK

After initial system power-up, low tank level sensor operation, foam pump operation and flow sensor calibration must be checked per the following:



**CAUTION !**

**WATER IS USED AT THE SYSTEM INSTALLER FACILITY TO VERIFY LOW TANK LEVEL SENSOR SYSTEM READY OPERATION AND FOAM PUMP OPERATION AS THE END USER SPECIFIED FOAM CONCENTRATES MAY NOT BE READILY AVAILABLE.**

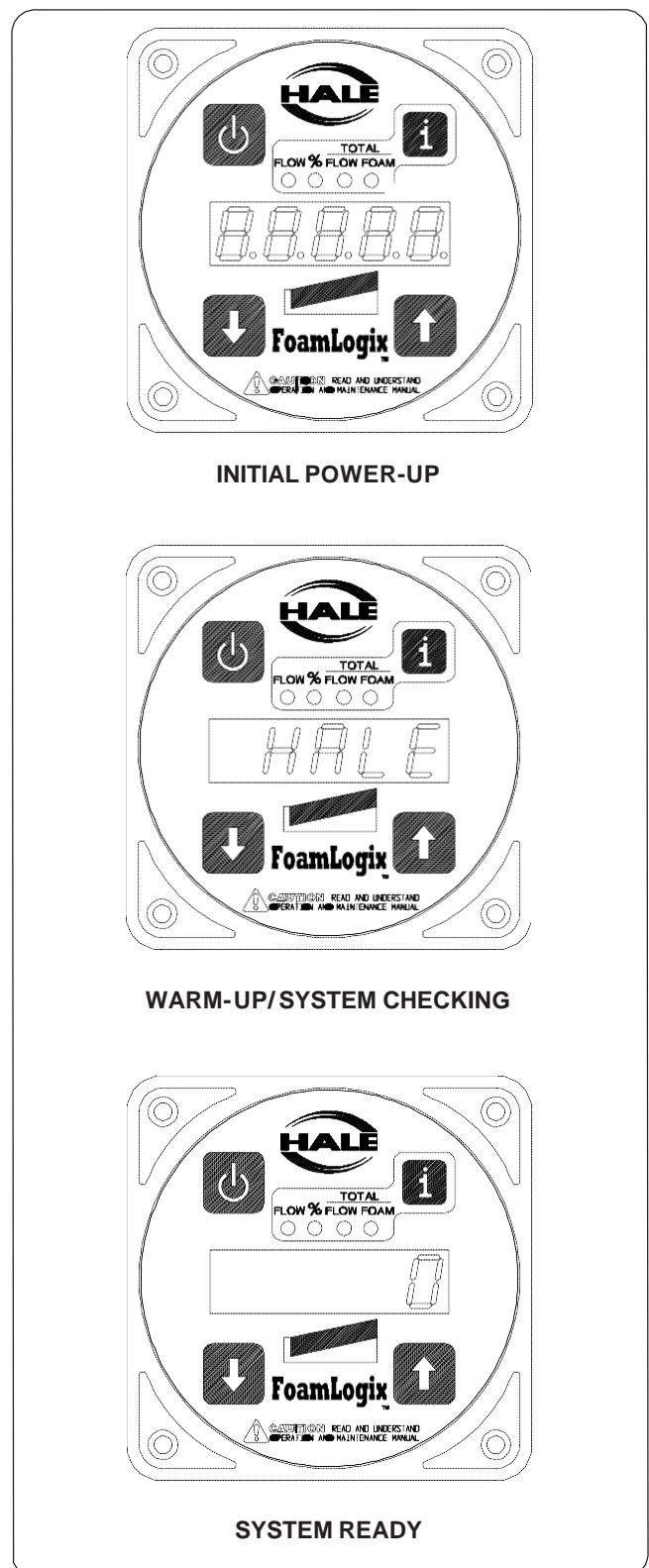


Figure 23: Control Unit Ready Indication

**DO NOT PUMP WATER WITH THE HALE FOAM-LOGIX FOAM PUMP FOR MORE THAN ONE (1) MINUTE. DO NOT ATTEMPT TO CALIBRATE FOAM PUMP FEEDBACK SENSOR WITH OTHER THAN END USER SPECIFIED FOAM CONCENTRATE.**

**MAKE SURE THE BYPASS VALVE IS IN THE BYPASS POSITION WHEN PUMPING WATER WITH THE FOAM PUMP.**

1. Upon initial power-up with the foam tanks empty, the display on the control unit alternates between **0** and **Lo A**, indicating the foam tank is empty.

Fill the foam concentrate tank with WATER. The **Lo A** indication clears from the display, indicating the low tank level sensor is operating properly.

2. Place the bypass valve to the **BYPASS** position to check foam pump operation. Place a calibrated five gallon container at the discharge of the bypass hose.

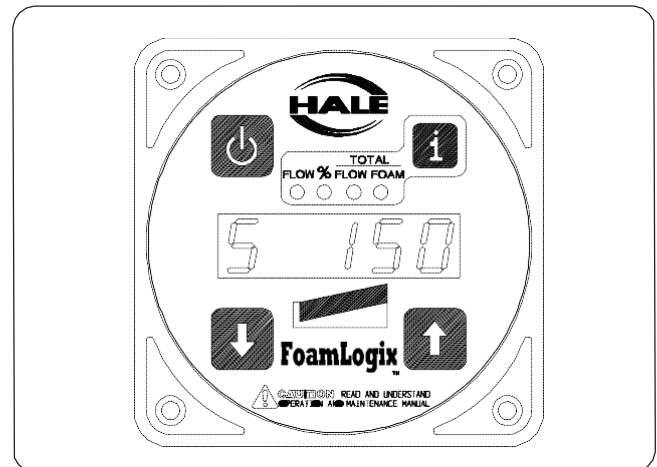
3. Place the system in simulated flow mode by pressing the SELECT DISPLAY button

(i) until the LED under **FLOW** lights. Then press both up ↑ and down ↓ buttons simultaneously.

Set simulated flow value to **100** GPM by pressing UP ↑ or DOWN ↓ button. The display shows **S** at the left most position to indicate the simulated flow. (See Figure 24: “Simulated Flow Display.”)

4. Press the (i) button until the LED under **% FOAM** lights. Set foam concentrate injection rate to **1.0** using the UP ↑ or DOWN ↓ button.

5. Cycle the (i) button until the LED under **TOTAL FOAM** lights. Press the **ON** button to energize the Hale FoamLogix system.



**Figure 24: Simulated Flow Display**

Observe the discharge at the bypass hose to make sure the foam pump is operating.

6. After one minute press the **ON** button again to STOP the foam pump. Approximately one gallon (3.8 liters) of water should discharge into the container. The TOTAL FOAM display reads approximately **1.0**.

7. Exit the simulated flow mode by selecting the **FLOW** display and pressing both up ↑ and down ↓ buttons simultaneously.

8. Drain water from foam tanks and concentrate lines and return the bypass valve to the **INJECT** position.

9. Verify operation of the flow sensor. Also calibrate the flow sensor using the calibration procedures. See heading “User calibration” beginning on page 53.

This completes the Hale FoamLogix system operation checks accomplished at the system installer facility.

Foam pump feedback calibration along with setting of user specified default simulated flow and concentrate injection rates should be accomplished upon delivery to the end user using actual end user specified foam concentrates and default values.



## INSTALLATION AND DELIVERY CHECK LIST

After the Hale FoamLogix system is installed, use the following check list to verify installation and ensure proper system setup when the apparatus is delivered to the end user.

### INSTALLATION

DATE INITIALS

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

- ☐ System properly installed. (Review "Start-Up Check List" on page 48.)
- ☐ Tank level sensor function verified. (Review "System Installer Start-Up" on page 49.)
- ☐ Foam pump operation checked. (Review "System Installer Start-Up" on page 49.)
- ☐ Foam tank and hoses drained of water. (Review "System Installer Start-Up" on page 49.)
- ☐ Flow sensor function checked and calibrated. (Review "User Calibration" on page 53.)

### DELIVERY

DATE INITIALS

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

- ☐ Foam tank filled with user specified foam concentrate. (Compies with Hale approved concentrate compability list.)
- ☐ Foam pump priming checked.
- ☐ Flow sensor calibration verified with Pitot.
- ☐ Default simulated flow value set to end user specification.
- ☐ Default foam concentrate injection rate set to end user specification.
- ☐ Foam concentrate feedback value verified and calibrated with end user specified foam.
- ☐ Proper Hale FoamLogix system operation demonstrated to end user in accordance with manual procedures.

DATE INITIALS

_____	_____
_____	_____
_____	_____

- ☐ End user trained in proper operation of Hale FoamLogix system in accordance with manual procedures.
- ☐ Warranty registration card filled out by end user and mailed to Hale Products.
- ☐ Two copies of Description, Installation and Operation manual provided to end user.



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## NOTES

## USER CALIBRATION

The complete Hale FoamLogix Systems; foam pump and motor assembly, control unit and flow sensor, is tested at the factory before shipping to the installer. If the Hale FoamLogix system is properly installed, further calibration IS NOT necessary until delivery to customer.

The system permits easy checking of component calibration to assure accurate operation. The calibration process verifies component calibration and allows adjustments to the flow sensor and feedback sensor display readings, to allow for variations in apparatus piping configurations and end user selected foam concentrate.

Default values for simulated flow and foam concentrate injection rate may be set to end user specifications while in the calibration mode.

**Note:** The Hale FoamLogix system is calibrated at the factory to U.S. measurement (GPM, PSI, GALLONS, etc.) units. The system may be set to Metric units. (See heading “English to Metric Units” on page 58.) However, the same unit of measurement must be used throughout the calibration process to ensure proper proportioning by the system.

Recalibration of the system may be required ONLY after major repairs or component changes are made to the Hale FoamLogix foam system. Different viscosity foam concentrates may also required recalibration.

## ENTERING PASSWORDS

Entering passwords is accomplished using the control unit function buttons.

To enter passwords, press and hold the **DISPLAY** button. The display shows **PASS**, then clears. While continuing to hold the display button press the **↑** or **↓** buttons sequentially to enter the password. See Table 25: “Password Sequence.”

Mode	Password Sequence
User Calibration	↑↑↑↑
Restore Factory Defaults	↑↑↓↑

Table 25: Password Sequence

## RESTORE FACTORY DEFAULTS

To return to the factory default values, enter the restore factory values password (↑↑↓↑) as previously described.

Once the password is entered correctly the unit displays **FAC** and returns to normal operation.

Factory default values:

Simulated Flow.... 150 GPM (568 LPM) %  
FOAM ..... 0.5% Class “A”

Also see Figure 26: “Display - Password and Calibration Modes” on page 54.

## CALIBRATION

- 1 To enter calibration password press and hold the **SELECT DISPLAY** button (**i**). The display shows **PASS**, then clears.
- 2 While holding **i** pressed, enter the calibration password (↑↑↑↑).
- 3 The display shows **CALL** for several seconds, followed by **L** (or **O** when display is set to metric). (See Figure 26: “Display - Password and Calibration Modes” on page 54.)

The **FLOW** LED (Water Flow sensor Calibration) also illuminates. (See Figure 27: “Display - Flow Sensor Calibration” on page 54.)

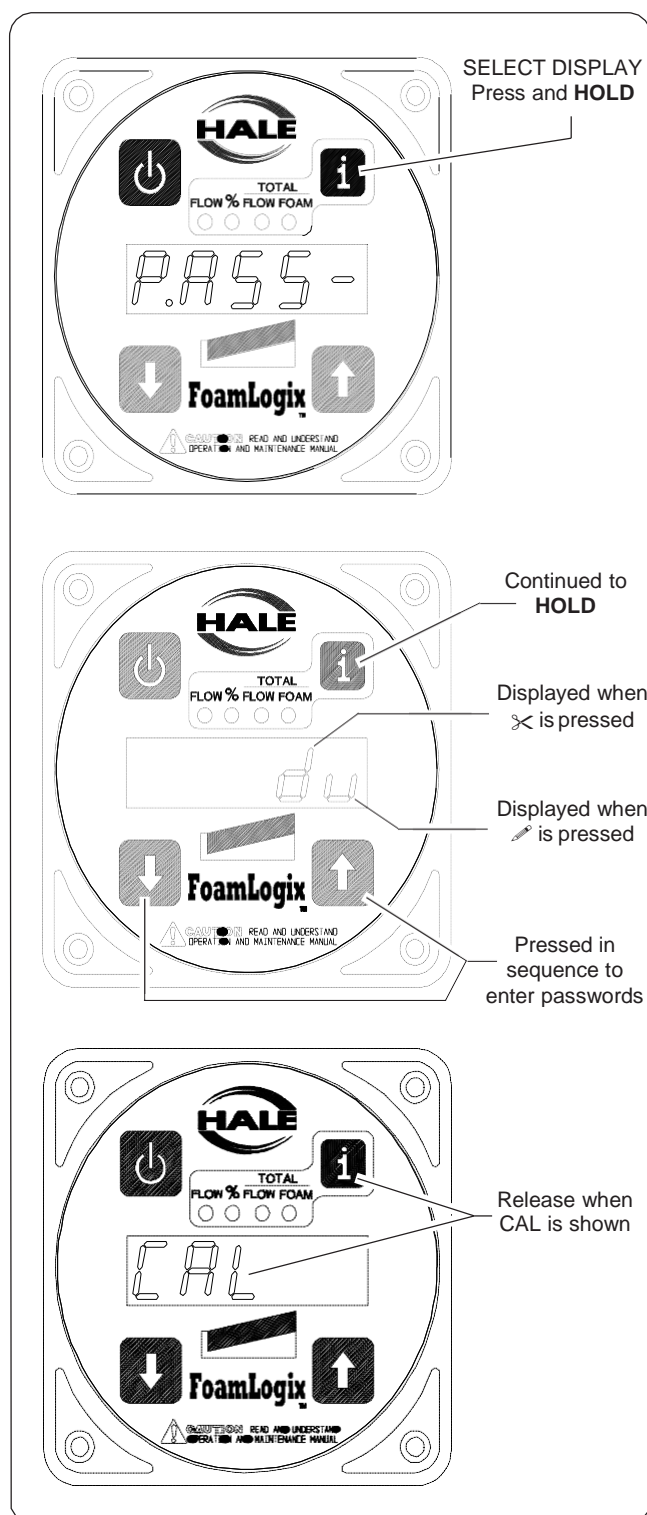
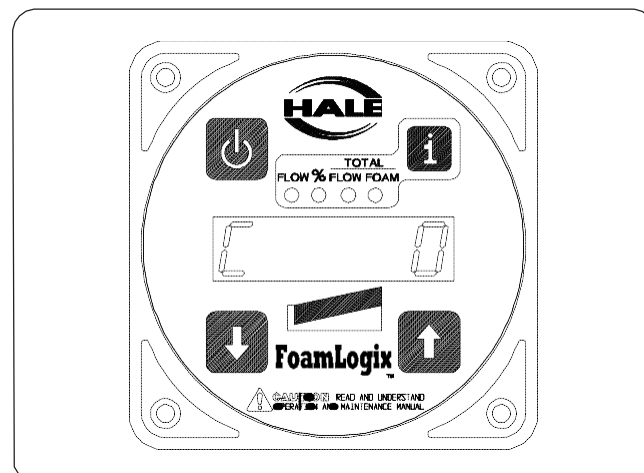


Figure 26: Display - Password and Calibration Modes



27: Display - Flow Sensor Calibration

## FLOW SENSOR CALIBRATION

Verify flow sensor calibration during NFPA/UL testing of the apparatus and delivery to end user.



### IMPORTANT!

AN ACCURATE FLOW MEASURING DEVICE MUST BE USED TO MEASURE THE WATER FLOW WHEN CALIBRATING THE FLOW SENSOR. USE A SUITABLE SIZE, SMOOTH BORE, NOZZLE AND AN ACCURATE AND CALIBRATED PITOT GAUGE INSTRUMENT. HAND HELD PITOT GAUGES ARE USUALLY NOT VERY ACCURATE.

MAKE SURE THE SYSTEM IS CALIBRATED WITH AN ACCURATE FLOW MEASURING DEVICE.

1. Determine the water flow normally expected from the discharge outlet and establish flow.
2. Make sure the water flow established is within the range of the flow sensor monitoring the discharge.

For example, establish a flow rate of 150 GPM (568 LPM) of water through a nozzle and Pitot system. Compare the calculated flow value to the value shown on the control unit display.



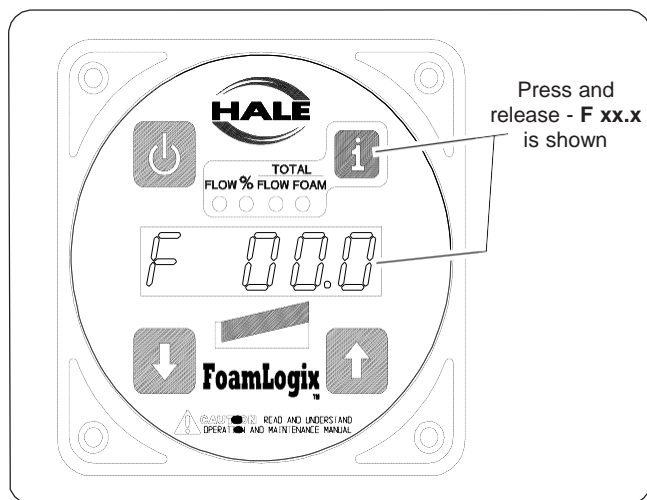
3. Press the **↑** or **↓** button and set the reading to match the actual flow calculated from the Pitot gauge reading.
4. Decrease fire pump pressure by approximately one half (1/2) and recalculate water flow rate.

Verify the reading on the control unit is within 5% of the actual value.

5. STOP the water flow when adjustments are completed.

### Record Flow and Sensor Calibration Factors

Press and release the **i** button. The display show **F xx.x**, which is the water flow sensor calibration factor (See Figure 28: “Display Flow Sensor Calibration Factor.”)



**Figure 28: Display - Flow Sensor Calibration Factor**

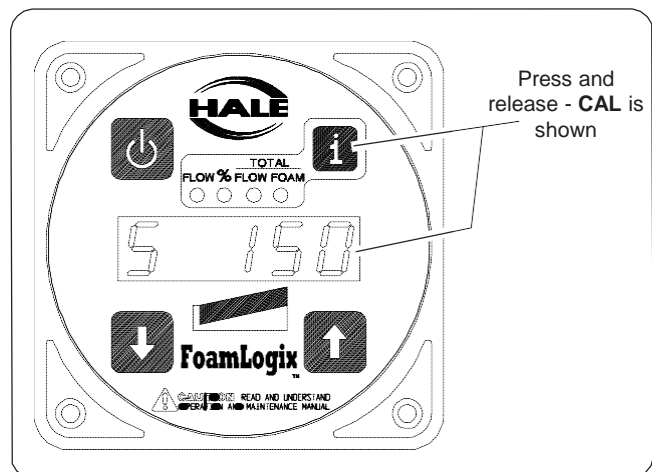
Record this value for future reference. This factor must be programmed into the display if the display is ever replaced.

### WATER FLOW SENSOR CALIBRATION

**FACTOR:** \_\_\_\_\_

### SIMULATED FLOW

The default Simulated Flow value is factory set to 150 GPM (568 LPM) and, if necessary, may be adjusted while in the user calibration mode.



**Figure 29: Display - Simulated Flow Calibration**

Press the **i** button. The default simulated flow rate is shown. (See Figure 29: “Display - Simulated Flow Calibration.”)

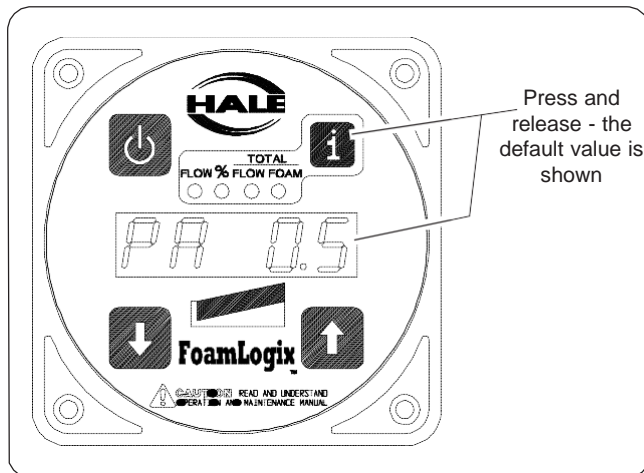
Adjust the setting to the required rate by pressing the **↑** or **↓** buttons (e.g., **S 150**).

### FOAM CONCENTRATE INJECTION RATE

When the Hale FoamLogix system power is turned ON, the foam concentrate injection rate stored in memory is the default setting. The user specific default concentrate injection rate is adjusted in calibration mode.

1. Press the **i** button.

The display shows the current default concentrate injection rate stored in the computer memory for the selected foam concentrate tank. (See Figure 30: “Display Foam Concentrate Injection Rate Default Value” on page 56.)



**Figure 30: Display - Foam Concentrate Injection Rate Default Value**

2. If the factory default values have not been changed the display shows **PA 0.5**.
3. Use the **↑** or **↓** buttons to set the user specified default concentrate injection rate.

## FOAM PUMP FEEDBACK CALIBRATION



### IMPORTANT!

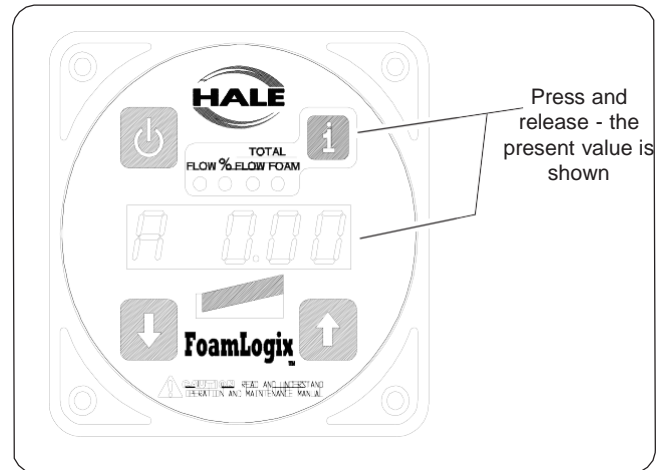
FOAM PUMP FEEDBACK IS CALIBRATED AFTER INSTALLATION TO VERIFY VALUES WITH THE ACTUAL FOAM CONCENTRATE(S) BEING USED. ONLY CALIBRATE USING ACTUAL FOAM CONCENTRATES.

DO NOT USE WATER, TRAINING OR TEST FOAMS FOR FEEDBACK CALIBRATION VERIFICATION.

1. Press the **i** button.

The display shows **A x.xx**, the total volume of foam concentrate pumped during the last calibration run. (See Figure 31: “Display - Foam Pump Feedback Calibration.”)

2. Set the bypass valve to the **BYPASS**.

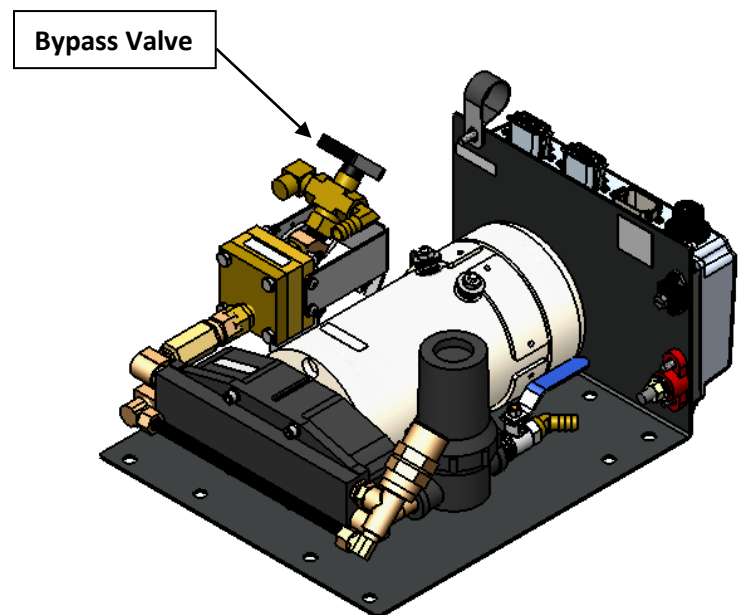


**Figure 31: Display - Foam Pump Feedback Calibration**

3. Place a graduated measure container at the outlet of the bypass hose capable of containing the expected volume of foam concentrate, 5 gallons (19 liters) minimum.

(See Figure 32: “Foam Concentrate Collection.”)

**Note:** If an accurate calibrated container is not available an accurate scale can be used to weigh the foam concentrate pumped. The total volume of foam concentrate is then calculated from this weight and the density of the foam concentrate per the MSDS sheet.



**Figure 32: Foam Concentrate Collection**



4. Start the Hale FoamLogix foam pump by pressing the red **ON** button.

The LEDs on the horizontal bar graph lights as the foam pump begins operating at approximately two-thirds speed, pumping foam concentrate into the container.

The display shows the volume of foam concentrate being pumped.

5. STOP the foam pump and accurately measure the amount of foam concentrate collected.
6. Adjust the reading on the display to match the volume actually pumped using the **↑** or **↓** button.
7. Repeat the procedure to verify the setting is correct.
8. Set the bypass valve handle back to **INJECT** position.

### Record Foam Pump Feedback Calibration Factor

1. Press and release the **i** button.

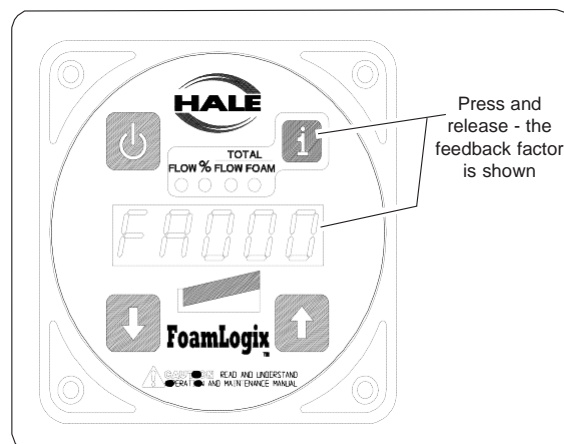
The display shows **FA xxx**, the foam pump feedback calibration factor. (See Figure 33: "Display - Foam Pump Feedback Calibration Factor.")

2. Record this value for future reference. This factor must be programmed into the display if the display is ever replaced.

**FOAM PUMP FEEDBACK CALIBRATION FACTOR:** \_\_\_\_\_

### EXIT AND SAVE CALIBRATION

1. To exit calibration and save the set values, press and hold the **i** button.

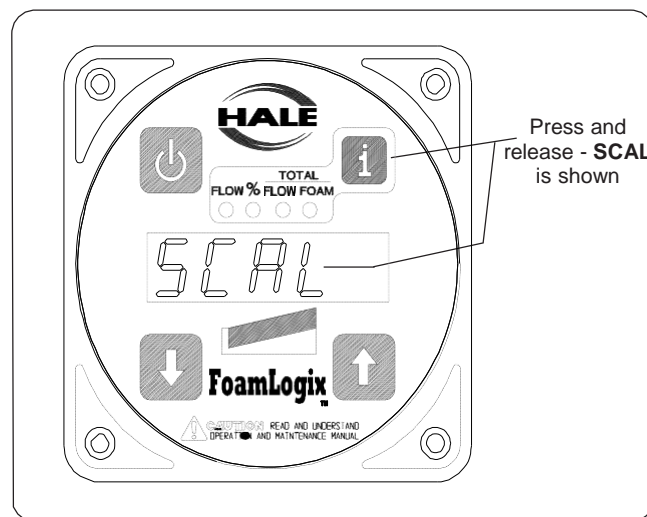


**Figure 33: Display - Foam Pump Feedback Calibration Factor**

The display show **PASS**, then clears.

2. While continuing to hold the display button enter the password (**↑↑↑↑**).
3. The display shows **SCAL** for several seconds and then cycles through the start-up sequence followed by the flow display **0**. (See Figure 34: "Display - Exit and Save Calibration.")

This completes verification and adjustment of the system. The Hale FoamLogix system is now ready to be placed in service.



**Figure 34: Display - Exit and Save Calibration**

## RELIEF VALVE

The pressure relief valve is factory tested and set to 300 PSI (21 BAR). (See Figure 35: "Relief Valve.")

During normal installation and operation, the relief valve does not require adjustment.

If adjustment is necessary during field installation, contact Hale Products Inc. at 610-825-6300 for Relief Valve Service information.

The Hale FoamLogix system is calibrated at the factory to U.S. measurement (GPM, PSI, GALLONS, etc.) units.

### To convert to Metric units:

1. Press and hold the **i** button. The display show **PASS**, then clears.
2. While continuing to hold the display button enter the password (**↓ ↑ ↑ ↓**).
3. The display shows **IN** to indicate Metric units are selected.

## ENGLISH TO METRIC UNITS

The FoamLogix Display offers both English and Metric readouts.

**Note:** Switching to English is accomplished by repeating Steps 1 through 3. The display shows **EN** to indicate English units.

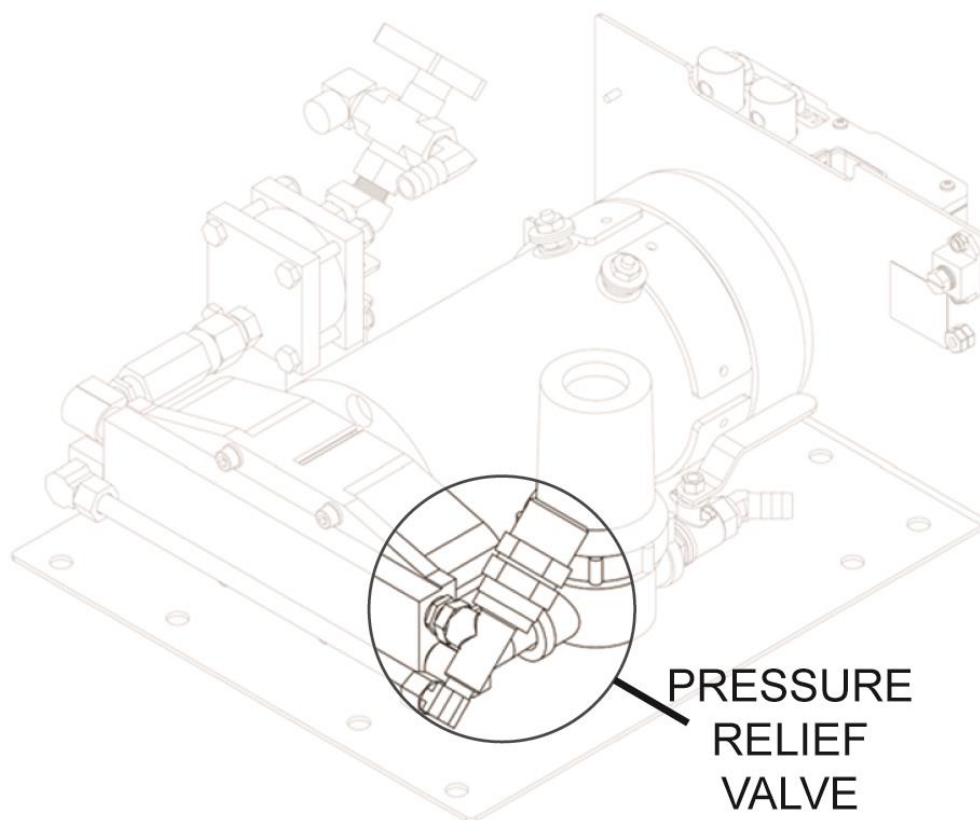


Figure 35: Relief Valve

## Section 4 Operation

### DESCRIPTION

Operation of Hale FoamLogix systems is controlled by the Digital Display Control Unit, provided with four push buttons (pads). (See Figure 36: "Digital Display Control Unit Overview.")

The Hale FoamLogix system constantly monitors water and foam concentrate flow values, maintaining foam injection at the specified concentrate injection rate. The system responds to variations in water flow by increasing or decreasing the speed of the foam pump.

On initial power up of the apparatus, the Hale FoamLogix system begins a brief self-diagnostic routine. When completed, the system enters the **STANDBY** mode. The **FLOW** LED lights and the display shows the current water flow rate in the monitored discharge pipe.

Pressing the **DISPLAY** button (i) cycles through the four functions as indicated by the red LED illuminating under each function.

may be reset any time they are displayed. When the **% FOAM** LED is lit, or in any other function mode, the foam concentrate injection rate may be set to the desired value, if different from the default value. This may be adjusted prior to or during foam operations by pressing the **↑** and **↓** buttons. Also see heading "Control unit functions" on page 60.

When the red **ON** button is pressed, the **FLOW** LED illuminates indicating that the system is ready. If water flow is present the foam pump starts and injects foam concentrate into the discharge stream.

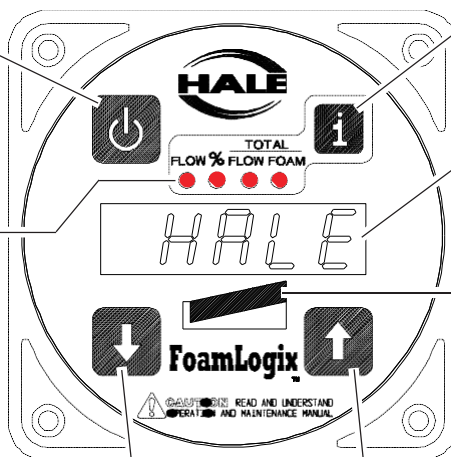
The bar graph lights when foam is being injected and indicates system capacity.

When the **ON** button is pressed again the LEDs extinguish, indicating that the system is in **STANDBY** mode and the foam pump **STOPS**. However, other system monitoring functions continue.

**Note: TOTAL FLOW and TOTAL FOAM values**

**On/OFF BUTTON**  
(Turns Foam Injection ON or OFF.)

**LED Indicators (4)**  
(Light to indicate the function selected.)



**SELECT DISPLAY**  
(Selects control unit function as indicated by labels and LEDs to the left.)

**DIGITAL DISPLAY**  
(Provides direct readout of selected function values and shows WARNINGS.)

**BAR GRAPH**  
(Lights to indicate the system is ON and the level of injected foam concentrate.)

**UP/DOWN ARROWS**  
(Used to adjust the concentrate injection rate during operation. Pressing both arrows simultaneously resets the TOTAL FOAM or FLOW Values.)

**Figure 36: Digital Display Control Unit Overview**

## DISPLAY INFORMATION

The five digit display on the control unit shows the value of the selected function or provides WARNINGS to the operator as the system is operating.

A function is selected by pressing the grey DISPLAY button (i). Each time the button is pressed a new function mode is selected and displayed. LEDs above the digital display denote which function is selected.

Pressing the DISPLAY button (i) changes the control unit functions but does not affect injection rate.

## Control Unit Functions

See Figure 37: “Display - Function Modes.”)

### FLOW

The display shows the current flow rate of water or foam solution per minute in Hale flow sensor monitored discharges.

### % FOAM

The display shows the foam concentrate injection rate setting in the % **FOAM** mode (e.g., **A 0.5**).

### TOTAL FLOW

The display shows the total amount of water or foam solution pumped through flow sensor monitored discharges. This totalized value may be reset - see heading using procedures outlined in the “Reset Functions” paragraph.

### TOTAL FOAM

The display shows the total amount of foam concentrate pumped.

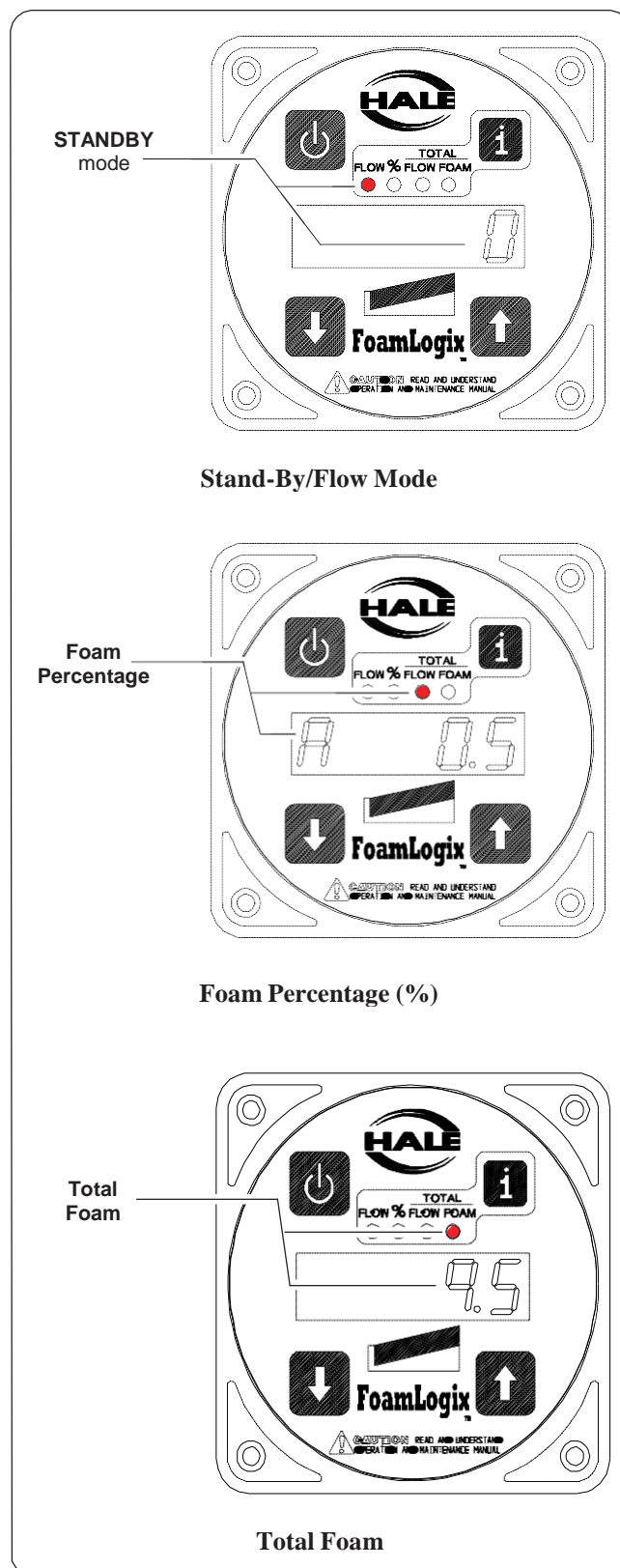


Figure 37: Display - Function Modes

The value is in the same unit of measure as the water flow. This totaled value may be reset - see heading "Reset Function".

For example, the display may show **9.5**, indicating 9.5 gallons (36 liters) of foam concentrate have been used. (See Figure 37: "Display - Function Modes" on page 60.)

## Bar Graph

The bar graph consists of a ten (10) LED array. When the ON button is pressed the left-most LED lights to indicate the system is ON and ready to inject foam concentrate.

When water is flowing, LEDs to the right on the bar graph light indicating foam concentrate is being injected. The amount of LEDs lighted provides an indication of the approximate pump capacity being used.

If water flow requirements exceed the capacity of the pumps ability to deliver foam concentrate, pump speed increases to the maximum rate. All bar graph LEDs light and the right-most LED flashes, warning the operator that the system capacity is being exceeded and is running "lean" on foam concentrate percentage.

If the flow decreases such that the required injection rate is less than the lowest rating of the pump, pump speed decreases to its minimum rate and the first bar graph LED to the left flashes, warning the operator that the system capacity is being exceeded and is running "rich" on foam concentrate percentage.

## RESET FUNCTIONS

The totaled values for water and foam concentrate pumped are cleared from memory by performing a **RESET** function.

- 1 Using the DISPLAY button (i), select either **TOTAL WATER** or **TOTAL FOAM**.
- 2 By pressing and holding both the **↑** and **↓** buttons at the same time, the value shown is cleared and the display shows zero (0).
- 3 Additionally the totaled values for water and foam concentrate reset to zero automatically when the apparatus power is turned OFF.

## FOAM CONCENTRATE INJECTION RATE

When % **FOAM** is selected, the **↑** and **↓** buttons respectively increase or decrease foam concentrate percentage.

While operating in any function, with the exception of **FLOW** during simulated flow operation, whenever the **↑** or **↓** buttons are momentarily pressed, the display switches to the % **FOAM** display and shows the current injection rate for 2 seconds.

In any display mode, if either the **↑** or **↓** button is held down for a period of 2 seconds or more, the injection rate value increases or decreases accordingly. Once released, the display returns to the last selected display after 2 seconds.

When a reset is performed in the % **FOAM** display mode, the foam concentrate injection rate returns to the default value.

## WARNING MESSAGES

Several safety features are incorporated into the Hale FoamLogix system to protect the foam concentrate pump, electric motor and apparatus wiring while maintaining personnel safety.

Messages appearing on the display alert the



operator to adverse conditions that could cause damage to Hale FoamLogix system components, the apparatus and cause personnel injury.

## Low Foam Tank Level

The Hale FoamLogix foam pump is interlocked with the foam concentrate tank level switch. If the tank is empty, the pump runs for 1 minute. The low foam concentrate tank level message is shown (**Lo A**) alternating with the normal selected function on the display. See Figure 38: “Display Low Foam Tank Display.”

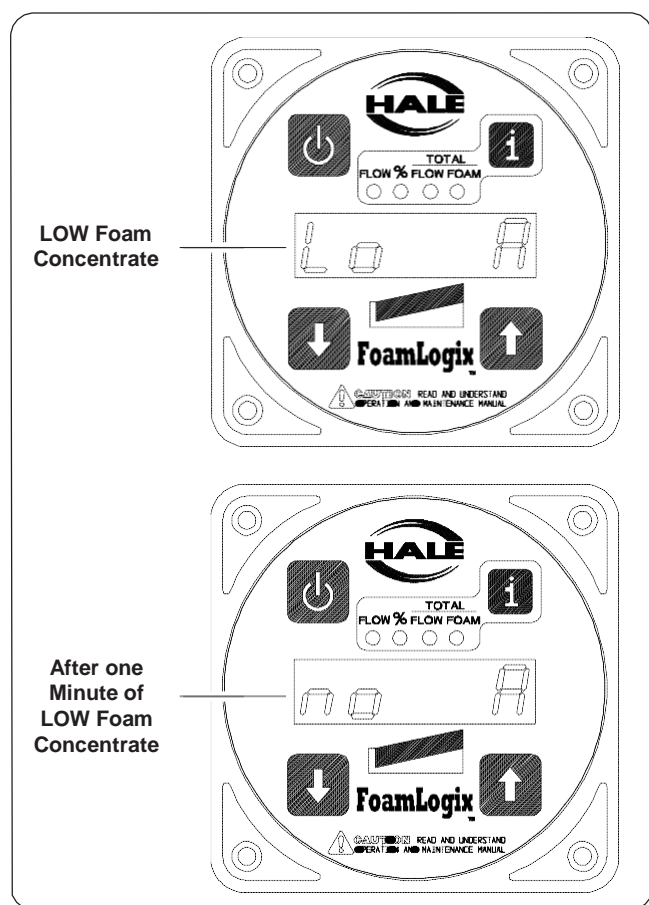


Figure 38: Display - Low Foam Tank

If one minute of low concentrate level is detected the display shows no **A**, and the pump **STOPS**. The left-most LED turns **OFF** until the foam level is restored and the **ON** button is pressed.

If the **ON** button is pressed before refilling the foam tank, the system runs for 30 seconds before shutting down again.

## Priming Error

In the event there is no feedback signal being received when the foam pump starts, indicating a lack of foam concentrate flow, the foam pump motor runs at full speed attempting to establish foam concentrate flow.

If the system operates for a period of 45 seconds without a feedback signal the system switches to the **STANDBY** mode and the display flashes **no Pr** (no prime) indicating there is no foam concentrate flow. (See Figure 39: “Display - Priming Error.”)

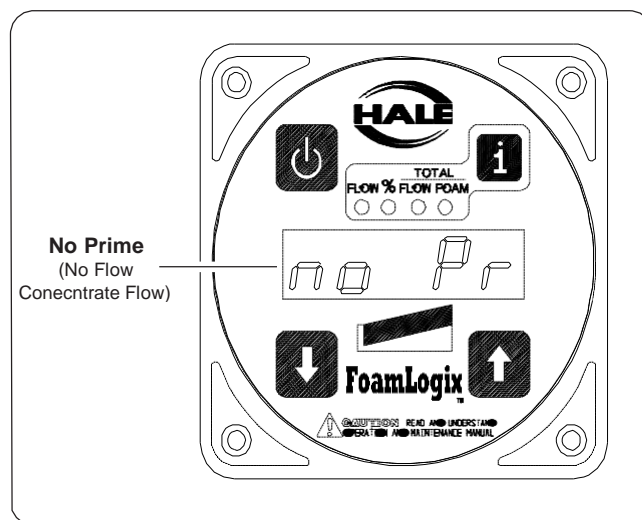


Figure 39: Display - Priming Error

## High Ambient Temperature

If the Hale FoamLogix system is operating in an environment of excessive ambient temperatures, the display shows **HIGH**.

If the circuitry in the Hale FoamLogix system is being affected by a drop in power supply voltage the display shows **Lo SP**.

See Figure 40: “Display - High Temperature and Low Battery” on page 63.

**Note:** This is not necessarily an indication of apparatus battery level or condition. It is only an indication of adverse operating conditions. For instance a bad battery cable can cause the system to see low power even though the batteries are fully charged.

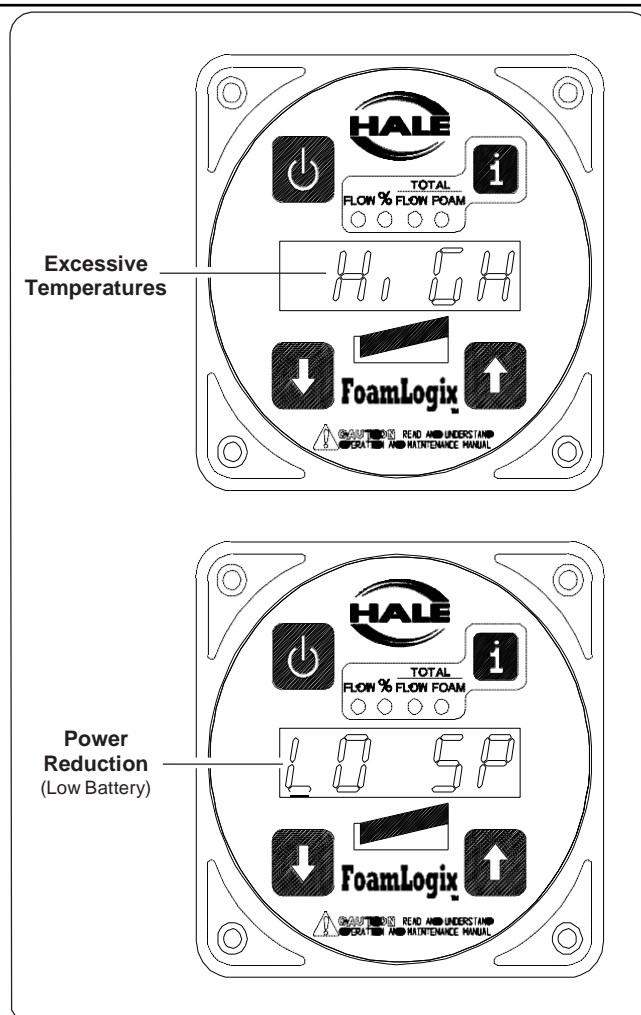
In either case the system continues to run. If conditions deteriorate to the point of potential system damage, due to heat or low power, the system returns to the STANDBY mode and the error message remains until **ON** is pushed again.

## PRIMING THE FOAM PUMP (When the Foam Tank Runs Dry)

In some instances, the foam tank may run dry while operating the Hale FoamLogix system. The foam pump is designed to pump liquid. When the fire pump is running the foam pump may not pump efficiently against 100 to 150 PSI (7 to 10 BAR) back pressure. To re-establish foam concentrate flow quickly the following procedure is used.

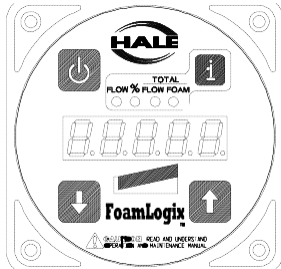
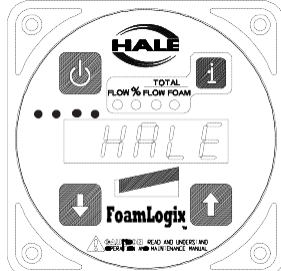
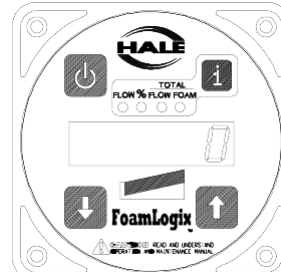
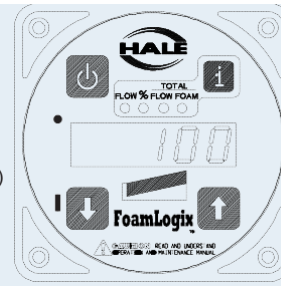
1. Turn the bypass valve to the **BYPASS** position.
2. With the fire pump flowing water from foam discharge and the Hale FoamLogix ON, observe the hose from the bypass valve.
3. When foam concentrate flows from the hose turn the bypass valve back to the **INJECT** position.

The pump is now primed and ready for normal operation.

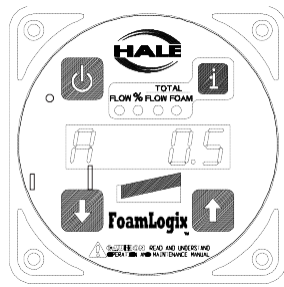
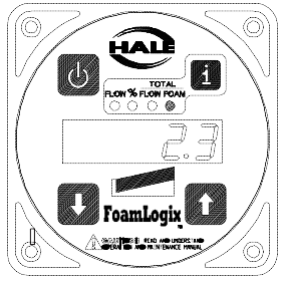



**Figure 40: Display - High Temperature and Low Battery**

## NORMAL OPERATION SUMMARY

OPERATION	ACTION	DISPLAY
Energize the system	Energize apparatus and turn FoamLogix power switch to <b>ON</b> .	<p>Initial StarUp</p>  <p>Self Diagnostics</p>  <p>STANDBY Display (Single Flow Sensor: FLOW MULTIPLE Flow Sensor: % FOAM)</p> 
Select foam tank	If System equipped with dual foam tanks place selector to proper tank.	
Begin foam injection	Establish water flow and press <b>ON</b> button.	<p>Water Flow Established (ON Button Pressed)</p> 



OPERATION	ACTION	DISPLAY
Change injection rate	Press <b>↑</b> or <b>↓</b> and hold for 2 seconds. Release once rate is set.	 <p>Foam Concentrate Injection Rate</p>
Read injection rate	Press and release <b>↑</b> or <b>↓</b> Display shows injection rate and returns to selected function after 2 seconds.	
Read total water or foam solution	Press <b>i</b> until LED below TOTAL FLOW turns ON.	Total Flow
Read total foam concentrate	Press <b>i</b> until concentrate LED below TOTAL FOAM turns ON.	 <p>Total Foam</p>
Reset totalized values	While in TOTAL FLOW or TOTAL FOAM press and release <b>↑</b> and <b>↓</b>	
End foam injection	Press <b>ON</b> button.	 <p><b>STANDBY MODE</b> (Single flowsensor: Flow multiple Flow sensors: % FOAM)</p>

## SIMULATED FLOW OPERATION

The Simulated Flow mode of the Hale FoamLogix system allows operation of the foam pump without discharging water through a foam capable discharge or when the flow sensor is not functioning. The simulated flow mode is used for draining the foam tank for:

- ❑ Cleaning
- ❑ Checking calibration of the feedback sensor
- ❑ Verifying foam pump operation
- ❑ Manually controlling foam injection if the flow sensor malfunctions.

The factory default simulated flow rate is 150 GPM (568 LPM). The simulated flow rate and the concentrate injection percentage rate are set by the rate adjustment buttons on the control unit display, while in simulated flow mode.

The simulated flow function provides manual operation of the foam injection system required by NFPA standards.



### CAUTION!

**WHEN OPERATING THE HALE FOAMLOGIX IN SIMULATED FLOW MODE AN OUTLET FOR THE FOAM CONCENTRATE MUST BE PROVIDED TO PREVENT EXCESSIVE PRESSURE BUILDUP IN DISCHARGE PIPING OR HOSES.**

### Simulated flow sequence

1. Uncoil and place the end of the bypass hose into a suitable container to collect the foam concentrate.
2. Place the BYPASS valve in the **BYPASS** position.
3. Energize the apparatus electrical system and press Hale FoamLogix power button ( **i** ) to turn ON the system.
4. The Hale FoamLogix enters the STANDBY mode. (See Figure 41: “Display - Simulated Flow Operation.”)

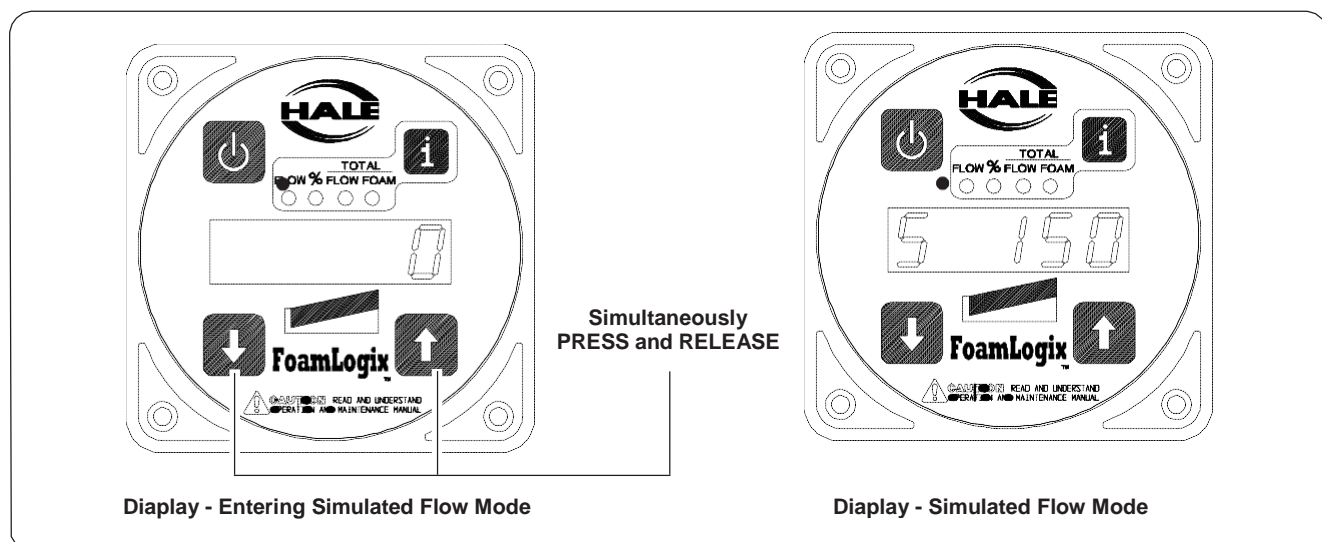


Figure 41: Display - Simulated Flow Operation

- 1 When the **FLOW** LED lights, press and release the **↑** and **↓** buttons at the same time.
- 2 The display shows **S 150** (or other preset default value) and the **FLOW** LED lights. (See Figure 41: "Display - Simulated Flow Operation" on page 64.)
- 3 Press the **ON** button. The left-most LED on the bar graph lights and the foam pump begins running.

Foam concentrate flows out of the end of the bypass hose.

### To End Simulated Flow

1. First press the **ON** button to STOP the foam pump.
2. Press the **i** button until the FLOW LED lights.
3. Press and release the **↑** and **↓** buttons at the same time. The display shows the current water flow value and the FLOW LED lights.
4. De-energize the apparatus electrical system.
5. Place the bypass valve to the INJECT position.
6. Secure bypass hose in the appropriate compartment.
7. Return apparatus to normal ready condition.



---

## NOTES

## SECTION 5 MAINTENANCE

### MAINTENANCE PROCEDURES

#### 1. After each use

Inspect wiring, hoses, flow sensors and connections for tightness, corrosion, leaks and or damage. Refer to Figure 3 on page 21.

Flush foam pump if a non-approved foam concentrate is used. Also see appendix A, "Hale Foam concentrate Compatibility" beginning on page 87 for recommended foam concentrates.

#### 2. Monthly

Remove and clean the foam strainer screen. Flush as required.

#### 3. Monthly

Verify water flow calibration.

#### 4. Annually

Verify foam feedback calibration.

#### 5. Every two (2) months

If an approved foam concentrate has been left in the system, operate foam system to remove the foam concentrate and prevent jelling.

### FREEZE PROTECTION

Cold weather transport and cold weather storage of FoamLogix systems:

- When transporting the completed fire apparatus from the OEM to the dealer, and the dealer to the end-user, or, when the end-user decides to store the finished apparatus in an unheated area subject to below freezing temperatures, a FoamLogix winterization process must be used.
- Any water and/or foam concentrate that is in the foam concentrate reservoir, foam

concentrate pump, and associated foam system piping/tubing will freeze and then break system components when the system is subjected to subfreezing temperatures commonly found in over-the-road driving during fire truck delivery and transport. The following precautions must also be taken by OEMs, end-users, re-sellers, fire truck dealers, transport agencies, etc., that will be transporting and/or storing the apparatus in below freezing temperatures:

- o Drain the foam concentrate storage reservoir in accordance with safe foam concentrate handling practices as outlined by the foam concentrate manufacturer. If the foam reservoir is filled with only water, completely drain the storage compartment of water. After empty, close all drain valves.
- o Pour in five gallons (18.93L) of an appropriate antifreeze solution in the foam concentrate reservoir. Consider using an environmentally friendly biodegradable formulation.
- o Follow the Installation and operation manual procedure to "prime" the foam pump.
- o With the apparatus fire pump in gear, a water supply established, and a discharge hose and nozzle attached to the discharge side of the fire pump, discharge over 100-gpm (380 LPM) from a foam capable discharge.
- o Turn the FoamLogix system "on." Depress the "up" arrow and raise the proportioning rate to 3.0%.
- o Continue to discharge water out of the discharge hose for one-minute.
- o Shut the FoamLogix system "Off."
- o Shut off the discharge valve and shut the fire pump down. Remove the water supply connection to the fire pump.



- 
- o Drain the fire pump, valves and fire pump system accessories.

The foam system is now winterized and ready for cold weather duty transport and/or cold weather storage.

After transport, prior to the placing the unit in service:

- Drain the foam concentrate reservoir of anti-freeze in an environmentally friendly fashion.
- Shut all foam reservoir drain valves.
- Fill the foam reservoir with a Hale approved compatible Class A foam concentrate.
- Establish a water supply to the fire pump and install a discharge hose and nozzle.
- Operate the fire pump and discharge 100-gpm (380 LPM) of water from a foam capable apparatus discharge. Be sure to collect the discharge in an area, to be cleaned-up later, to mitigate any environmental impact that the anti-freeze / foam solution may cause.
- Turn the foam system “on.”
- Depress the “up” arrow and raise the foam injection rate to 3.0%.
- Operate the discharge hose for one minute.
- Shut the foam system “off.” Turn the fire pump “off.” Remove the hose and nozzle. Disconnect the water supply.
- The unit is now ready for service.

## SECTION 6 TROUBLESHOOTING

### USER DIAGNOSTICS

Diagnostic LED indicators are provided on the distribution box and on the feedback sensor. The LED on the feedback sensor flashes when the sensor is receiving pulses from the flow sensor rotor targets. These LEDs help to ease tracing of power supply faults and eliminates some of the guesswork in troubleshooting. If the system malfunctions make sure the following conditions are checked:

- ❑ All hose connections are correct and tight (Refer to appropriate system plumbing diagram in the INSTALLATION section).
- ❑ All electrical connections are correct and tight (Refer to appropriate system electrical diagram in the INSTALLATION section).
- ❑ Apparatus electrical system energized with power supplied to pump panel and Hale Foamlogix controller.

Once the above conditions are met, proceed to the system troubleshooting section to determine the cause of the malfunction.

Hale Foamlogix systems consist of individual subsystems working together to provide finished foam solution at the proper percentage. Also see the SYSTEM OVERVIEW section.

The system is designed using modular components making troubleshooting and repair easier. Each subsystem has its own set of troubleshooting procedures. The procedures that follow provide a logical flow path to isolate and correct a system failure.

**Note:** Hale Foamlogix system electronic components have no user serviceable components inside and are replaced as a unit. Opening of Hale Foamlogix electronic components voids the manufacturer warranty.

### System Overview

The Foamlogix proportioner is a closed-loop system. The “brain” behind the system is the computer-controlled Foamlogix Controller Display. A basic understanding of how the system functions makes troubleshooting easier (refer to Figure 1: **Closed Loop Control Diagram** while reading the following control steps).

1. Water flows through the discharge manifold and past the water flow sensor spinning its paddlewheel.

2. The water flow sensor sends the raw digital pulses to the Foamlogix controller display.
3. The Foamlogix controller display calculates the desired foam flow rate based on the water flow rate and the currently set foam concentrate percentage. The Foamlogix controller display transmits a requested motor rate (0% to 100%) to the distribution box via CAN communication.
4. The distribution box sends pulse-width-modulated control voltage (0% to 100%) to the motor which turns the pump at the desired speed.
5. The pump begins discharging foam concentrate into the discharge manifold where it mixes with the water.
6. The foam sensor detects the foam concentrate flowing past the target rotors and sends the raw digital pulses to the distribution box.
7. The distribution box sends the foam flow rate to the Foamlogix controller display where it is evaluated and the process starts again at step 1.

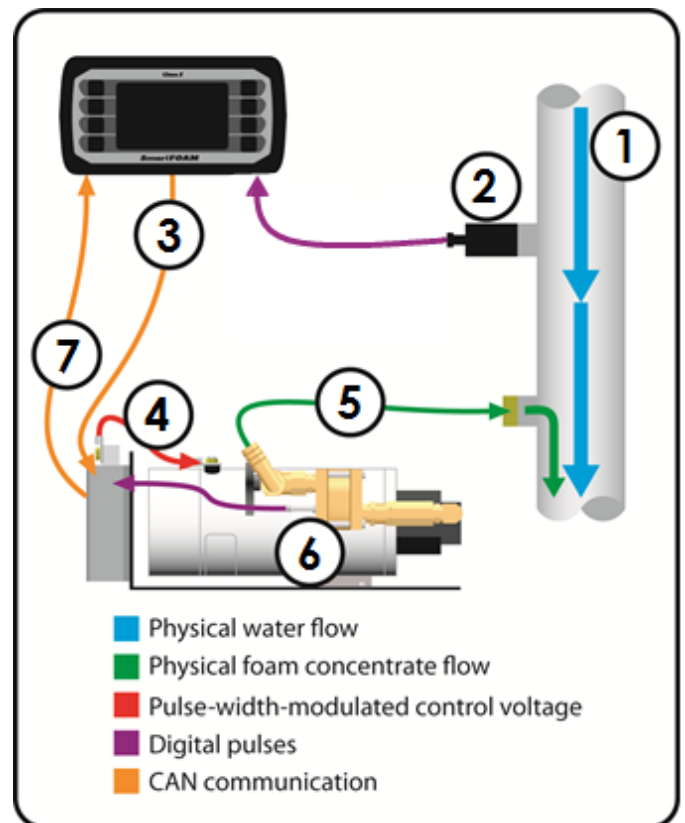


Figure 1: Closed Loop Control Diagram

**Note:** The Foamlogix system has a simulated flow function described in the SIMULATED FLOW OPERATION section. This allows troubleshooting without flowing water yet simulates an actual water flow.



## Distribution Box

The Distribution Box (part of the pump/motor assembly) controls the speed of the pump/motor based on commands from the Foamlogix controller display. The distribution box also receives the signal from the foam feedback sensor, low tank sensor(s), and tank selector and relays that information back to the Foamlogix controller display.

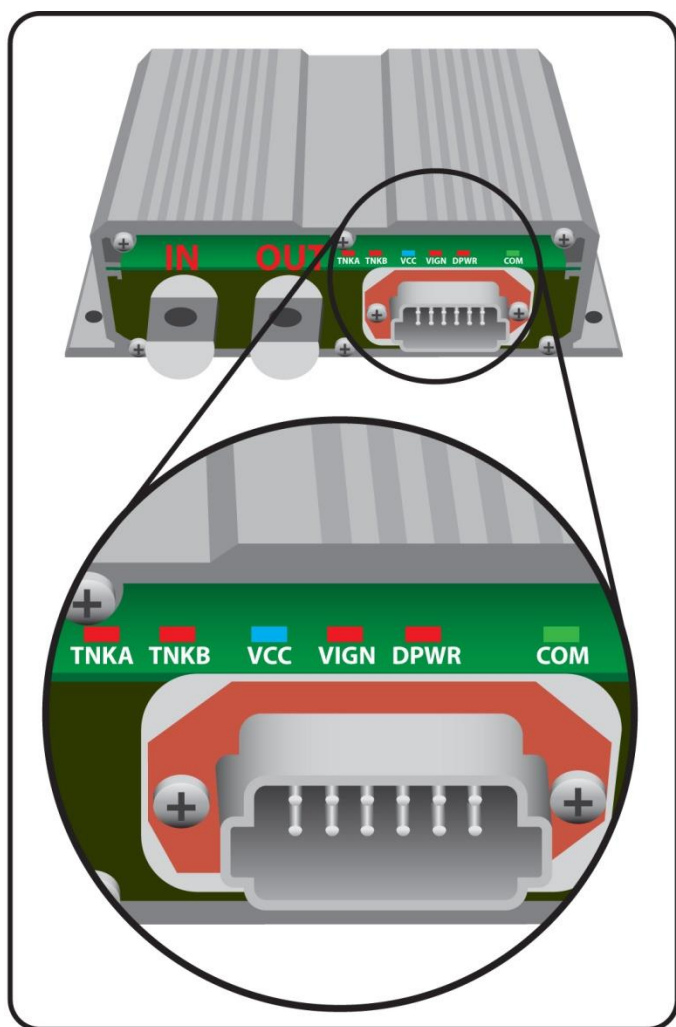


Figure 2: Distribution Box LEDs

The distribution box contains six internal LEDs to help with diagnostics (refer to Figure 2: **Distribution Box LEDs**).

- ❑ **TNKA** is illuminated when the tank selector is set to “tank A”. This is based on a physical input into pin 4 of the gray connector on the front of the distribution box. (When the TNKA and TNKB LEDs are OFF the system is in FLUSH mode).
- ❑ **TNKB** is illuminated when the tank selector is set to “tank B”. This is based on a physical input into pin 5 of the gray connector on the front of the distribution

box. (When the TNKA and TNKB LEDs are OFF the system is in FLUSH mode).

- ❑ **VCC** is illuminated when power and ground are applied to the distribution box’s pins 1 and 12. This indicates that the internal 5 volt regulator is functioning for the internal components.
- ❑ **VIGN** is illuminated when power and ground are applied to the distribution box’s pins 1 and 12. This indicates that system power and ground are recognized within the unit.
- ❑ **DPWR** is illuminated when the “IN” power stud is energized with system voltage. This power is required to drive the motor attached to the pump.
- ❑ **COM** is illuminated when the distribution box is communicating with the Foamlogix controller display via the CAN. This LED will be flashing if there is a CAN communication problem and it cannot communicate with the Foamlogix controller display.

If no tank selector (MST, MDTII, ADT) is used a connector plug is installed to connector C8 to lock the system in the Tank A mode. Removing this plug or disconnecting the tank selector cable places the system in the FLUSH mode.



Figure 3: 610-00044 New Distribution Box

The distribution box was upgraded Fall 2017 to 610-00044. This new distribution box has improved protection against overcurrent. There are three inputs (green, black, and grey), but only the grey is utilized for foam units. The black connector is power. There are three standalone indicator lights on the top of the case:

- ❑ **SYSTEM PWR** is illuminated when the “IN” power stud is energized with system voltage. This power is required to drive the motor attached to the pump.
- ❑ **MOTOR PWR** is illuminated when there is power output to the foam motor.
- ❑ **COM** is illuminated when the distribution box is communicating with the Foamlogix controller display via the CAN. This LED will be flashing if there is a CAN communication problem and it cannot communicate with the Foamlogix controller display.



The COM LED indicates the module's CAN communication status.

- On Solid* = Module on-line
- Flashing slow (2Hz)* = CAN bus okay, but the module is not receiving messages from the Foam Controller.
- Flashing fast (8Hz)* = CAN bus error, no communications.

Gray connector (this connector is the same between the old and new motor drivers)

Mating connector:		Deutsch DT06-12SA GRAY
Mating sockets:		Deutsch 0462-201-16141
Gold mating sockets:		Deutsch 0462-201-1631
Recommended wire gage:		16-20 AWG
Wedge lock:		W125
PIN	CIRCUIT	DESCRIPTION
1	SYS POWER	(INPUT) – Battery voltage (+9VDC...+32VDC)
2	CAN HIGH	(DATA) – SAE J1939 CAN 2.0B, 250Kbits/s
3	CAN SHIELD	(DATA) – SAE J1939 CAN 2.0B, 250Kbits/s
4	TANK A ACTIVE	(INPUT) – Positive polarity
5	TANK B ACTIVE	(INPUT) – Positive polarity
6	TANK A LOW	(INPUT) – Positive polarity
7	TANK B LOW	(INPUT) – Positive polarity
8	FOAM SENS PWR	(OUTPUT) – Reference voltage for foam sensor (battery power)
9	FOAM SENS SIG	(INPUT) – Positive pulse signal
10	FOAM SENS GND	(OUTPUT) – Battery ground
11	CAN LOW	(DATA) – SAE J1939 CAN 2.0B, 250Kbits/s
12	SYS GROUND	(INPUT) – Battery ground

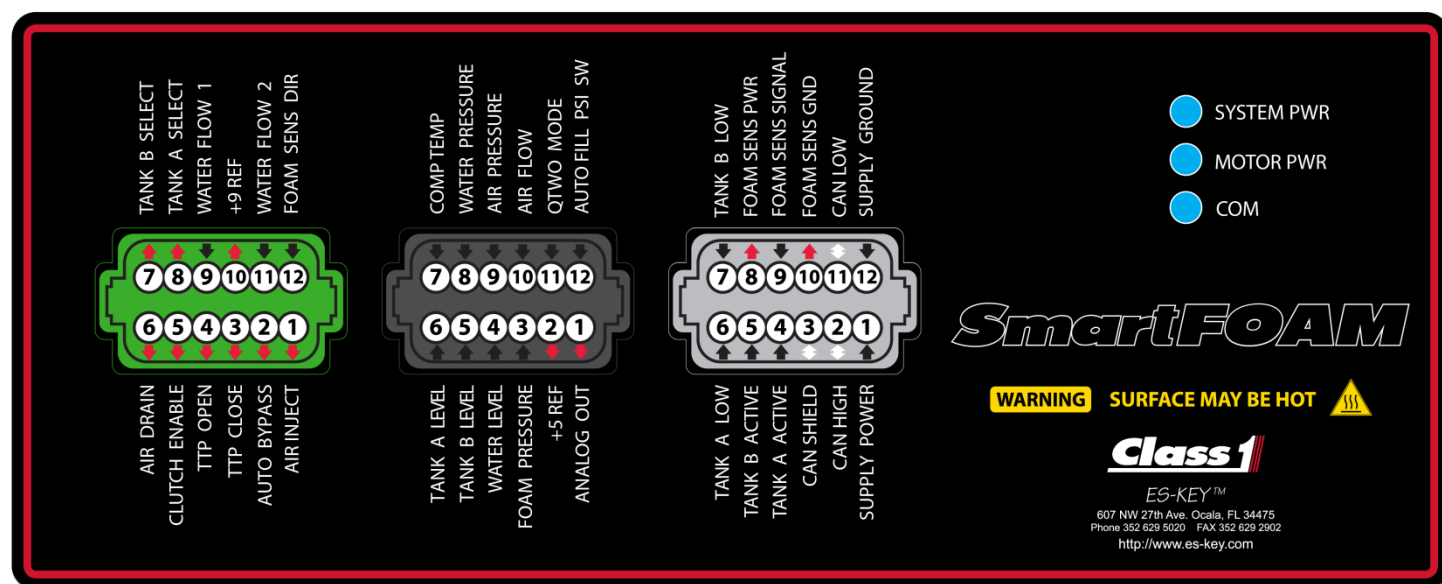


Figure 4 610-00044 pinouts

## System Overview

See Figure 43: “FoamLogix 2.1A and 1.7AHP System Closed-Loop Flow Diagram.”

The FoamLogix 2.1A and 1.7AHP are “closed-loop” systems. The brains behind the system is the computer-controlled FoamLogix Control Display Unit. As an electronic system, the flow of data “runs” the system. A basic understanding of how the system functions makes troubleshooting easier.

Water flow data is fed to the control unit computer. Since the injection rate (%) is preset, the control unit calculates the required motor speed of the foam pump and sends this data to the motor. The output of the pump is measured by a foam flow feedback sensor.

The discharge of the foam pump directs foam to the rotary lobe flow meter. The rotors are a composite material containing small stainless steel targets. As the foam is being pumped these targets are detected by the inductive sensor which sends pulses to the distribution box. An LED indicator on the inductive sensor flashes as a target passes the tip of the sensor. The speed of the foam being pumped determines how quickly the rotors are turning and how quickly the inductive sensor’s LED flashes (which could be so fast that the indicator light actually appears to be constant).

The foam flow feedback sensor tells the control unit how much foam is actually pumped so the display can make

the required motor speed adjustments. This closed-loop runs several times per second and is what makes the system so accurate. If the sensor does fail then the system enters into “open-loop” or limp mode. The Open-Loop Operating Mode uses a precisely engineered table of pump speed versus foam flow rate. If the foam feedback sensor should fail the system uses this table in place of the sensor data to keep the foam system operating as accurately as possible until the unit can be serviced.

Note: The FoamLogix unit has a “simulated flow” function, described in Section 4: “Operation” heading “Simulated Flow Operation” beginning on page 66. This allows troubleshooting without flowing water, yet simulates an actual water flow.

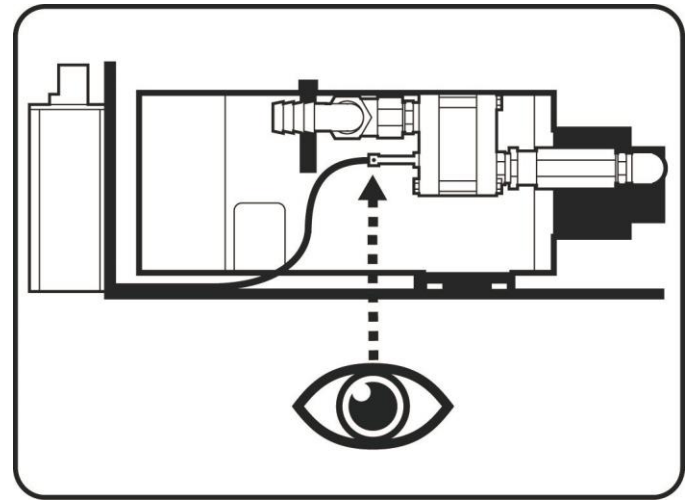


Figure 42: Flow Sensor Location

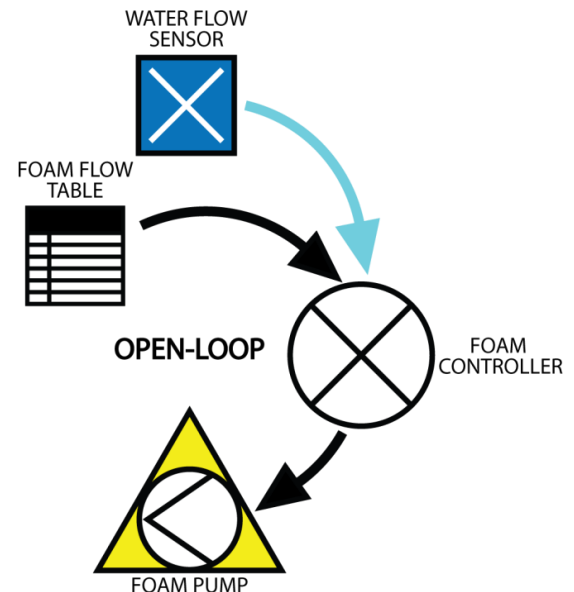
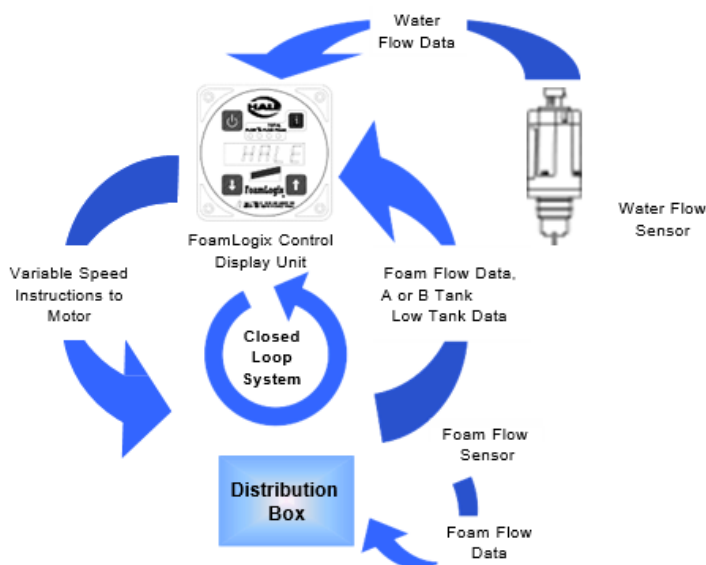


Figure 43: “FoamLogix 2.1A and 1.7AHP System Closed-Loop and Open Loop Flow Diagram.”

## Bar Graph

The bar graph on the control display unit, indicates the system capacity and is a good troubleshooting tool.

If the display does not see foam feedback data indicating foam is being pumped, the bar graph lights all segments and “flashes.” The display runs the pump fast attempting to prime it and achieve the proper foam concentrate flow.

If the display does not receive data that foam concentrate is flowing, it displays the “**No Pri**” error message, indicating no prime, and turns the system OFF. Pressing ON starts the cycle again. There must be water flow or the unit must be in the simulated flow mode. Operation of the bar graph and no prime warnings are discussed in Section 4, “Operation”.

## Summary

Starting with the troubleshooting charts (see Figure 44: “Hale FoamLogix System Troubleshooting Flow Diagram,” to show the flow data, a field problem can be traced to a particular component for replacement.

FoamLogix replacement parts are “plug and-play” type devices that do not require specialized equipment to service. Normal water flow and foam calibration is usually necessary after a major component service.

## PROBLEM ISOLATION

The first step in troubleshooting is to determine which subsystem caused the system failure. To make this determination operate the apparatus and Hale FoamLogix system in accordance with standard operating procedures and isolate where the problem occurs.

See Figure 44: “Hale FoamLogix System Troubleshooting Flow Diagram,” beginning on page 74, to assist in isolating the cause. Also review the following steps.

1. Setup the apparatus for normal operation.
2. Power-up the apparatus and energize the pump operator panel. Take notice of the Hale FoamLogix control unit. If the display is NOT illuminated proceed to Figure 44: “Hale FoamLogix System Troubleshooting Flow Diagram,” beginning on page 74.
3. If the Hale FoamLogix control unit is illuminated, engage the apparatus water pump and establish discharge. If water flow CANNOT be established, troubleshoot the water pump system.
4. If there is no indication of water flow on the control unit display troubleshoot the flow sensor.
5. If water flow is established, turn the Hale FoamLogix system ON to flow foam.
6. Observe foam pump discharge. If foam is NOT flowing troubleshoot the foam pump.
7. Check accuracy of system using calibration procedures in Section 4 “Operation” of this manual, making adjustments as required.

## TROUBLESHOOTING CHARTS

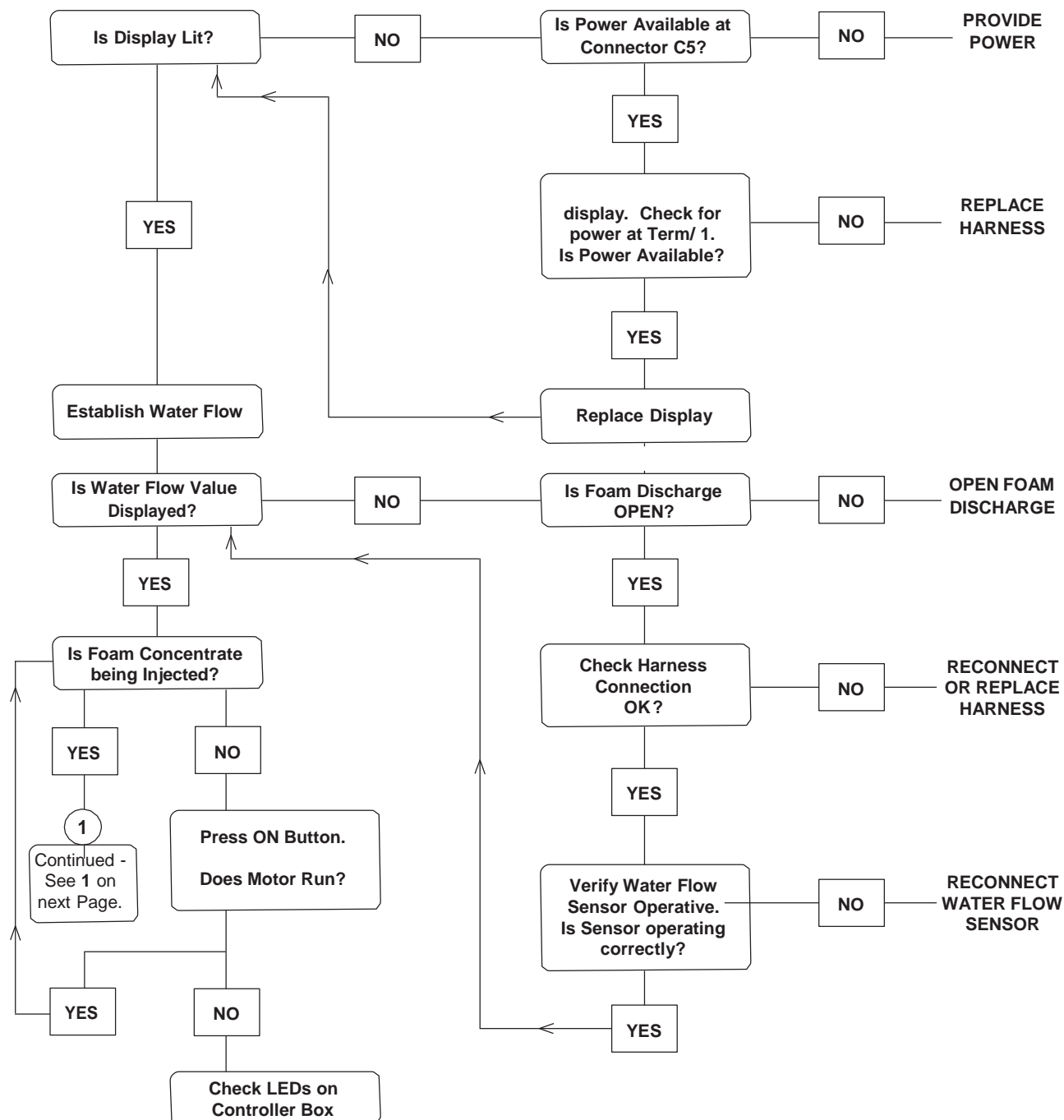


Figure 44: Hale FoamLogix System Troubleshooting Flow Diagram

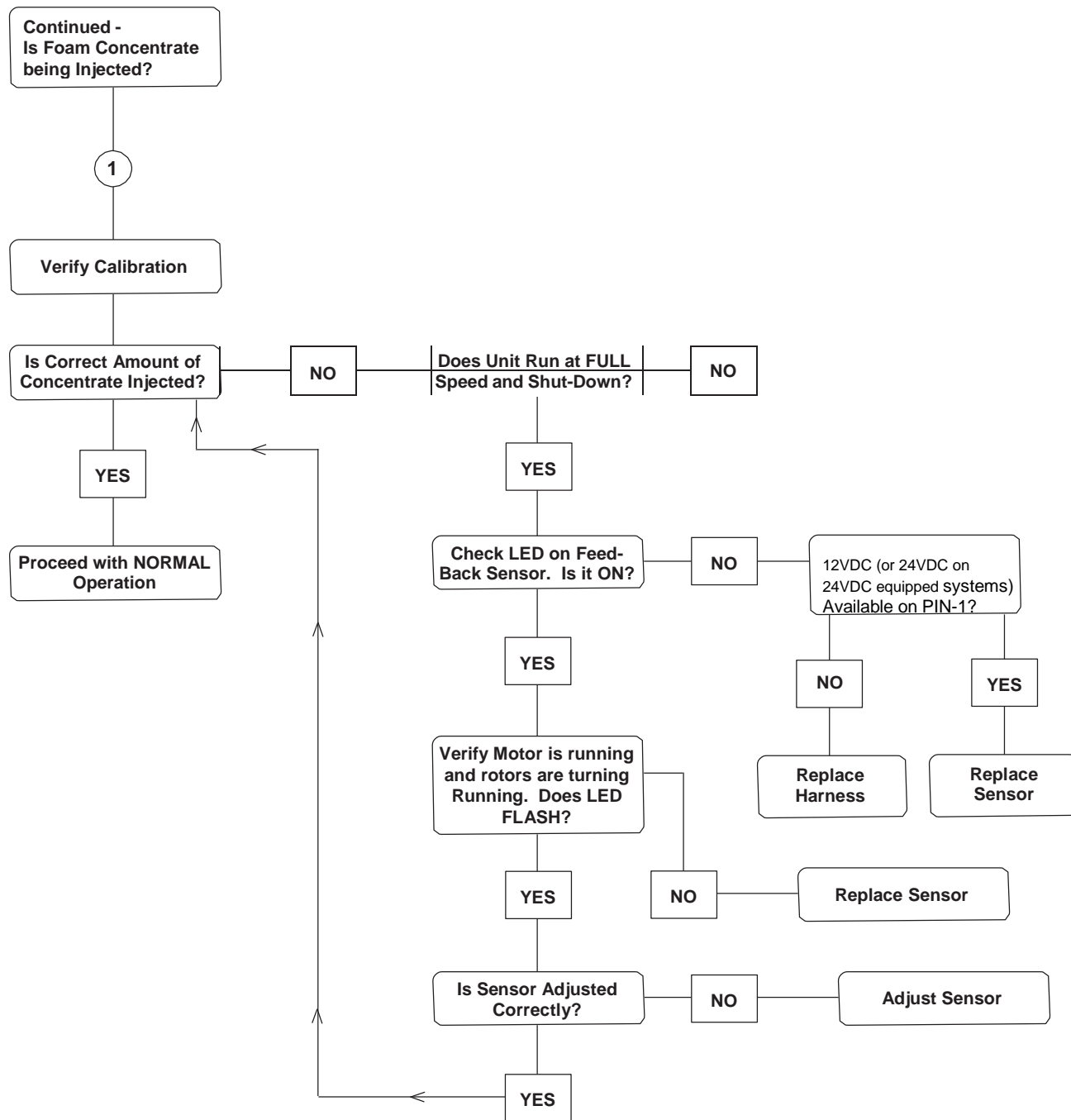


Figure 44: Hale FoamLogix System Troubleshooting Flow Diagram - continued



## SECTION 7 ILLUSTRATED PARTS BREAKDOWN

### GENERAL

This section contains drawings and the parts breakdown for the serviceable assemblies, components and most commonly used options for the FoamLogix, Model 2.1A Class “A” Electronic Foam Proportioning System.

### ABBREVIATIONS

The following abbreviations may be used in this IPB:

A/R.....	As required
Cm.....	Centimeters
Ext. ....	External
Fwd.....	Forward
Ga.....	Gauge
Grd, Gr.....	Grade – when hardware lists a grade rating, it is imperative to maintain that rating when replacing parts.
HS .....	Hardened Steel
Hex .....	Hexagonal
Id, ID.....	Inner diameter
IPB.....	Illustrated Parts Breakdown
JIC .....	Joint Industry Conference – an industry standard used to describe a fitting.
Lh, LH.....	Left Hand
MM.....	Millimeters
Mtg .....	Mounting
n/s .....	Not Shown – parts that are not shown but are servicable.
No.....	Number
NPT .....	National Pipe thread
NPTF .....	National Pipe Thread, Fine
OD .....	Outer diameter
p/n .....	Part number
Ref.....	Reference
Rev .....	Reverse Rh
RH .....	Right hand
Str.....	Straight – usually to describe a hydraulic or pneumatic fitting (vs. elbow)



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## NOTES





## FOAM PUMP ASSEMBLY

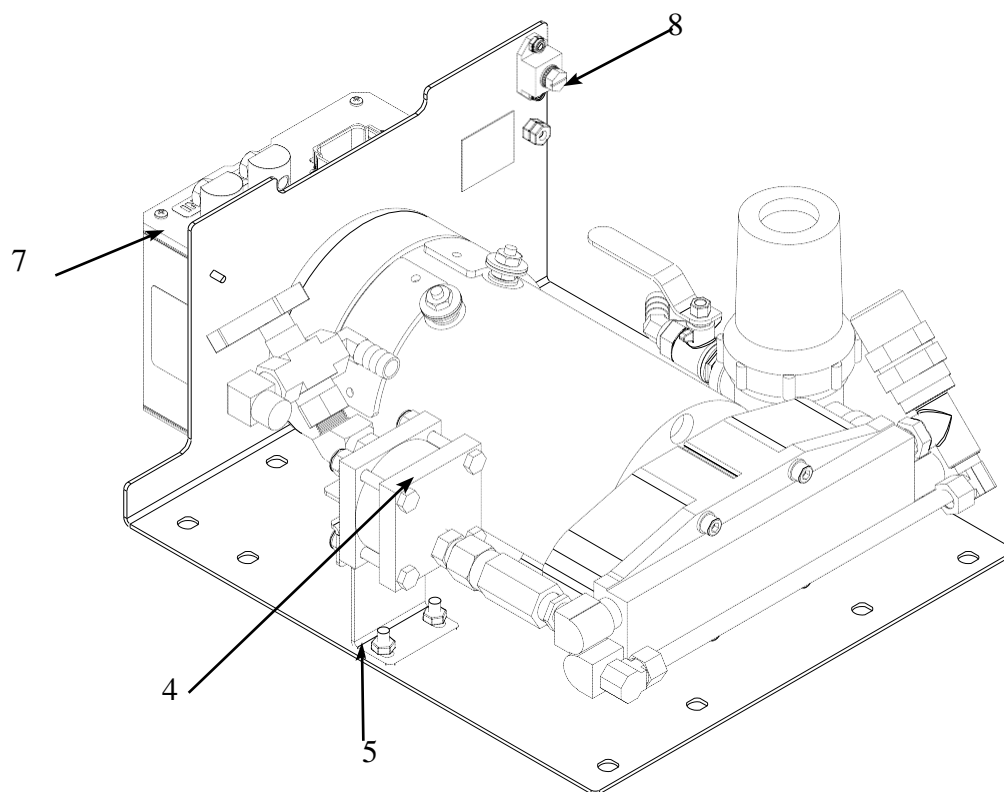
- |      |                    |        |   |
|------|--------------------|--------|---|
| 1.   | 114034.....        | 1..... | Motor/Pump Assembly - 2.1A - 12 Volt              |
|      | 114035.....        | 1..... | Motor/Pump Assembly - 2.1A - 24 Volt              |
|      | 119274.....        | 1..... | Motor/Pump Assembly - 1.7AHP - 12 Volt            |
|      | 119275.....        | 1..... | Motor/Pump Assembly - 1.7AHP - 24 Volt            |
| <br> |                    |        |   |
| A.   | 110521.....        | 1..... | Motor 1/2 HP - 2.1A/1.7AHP - 12 Volt              |
|      | 110393.....        | 1..... | Motor 1/2 HP - 2.1A/1.7AHP - 24 Volt              |
| B.   | 110522.....        | 1..... | Pump Assembly (without motor) - 2.1A              |
|      | 119345.....        | 1..... | Pump Assembly (without motor) - 1.7AHP            |
| C.   | 538-1750-01-0..... | 1..... | Relief Valve - 2.1A - 250 PSI                     |
|      | 119346.....        | 1..... | Relief Valve - 1.7AHP - 400 PSI                   |
| D.   | 510-0200-02-0..... | 1..... | Strainer Assembly                                 |
| <br> |                    |        |   |
| 2.   | 119266.....        | 1..... | Ball Valve 3/8" MNPT x FNPT with Handle           |
| 3.   | 082-0328-02-0..... | 1..... | Elbow 45° 3/8" MNPT x Hose Barb                   |
| 4.   | 115497.....        | 1..... | Flowmeter Assembly (see next page for parts list) |
| 5.   | 019-3770-00-0..... | 1..... | Flowmeter Mounting Bracket                        |
| 6.   | 110618.....        | 1..... | Mounting Base                                     |
| 7.   | 110586.....        | 1..... | Motor Controller                                  |
| 8.   | 110589.....        | 1..... | Diode 45V 240A                                    |

#1 = Main Assembly

Individual replacement parts are available and shown as "A", "B", "C" and "D"

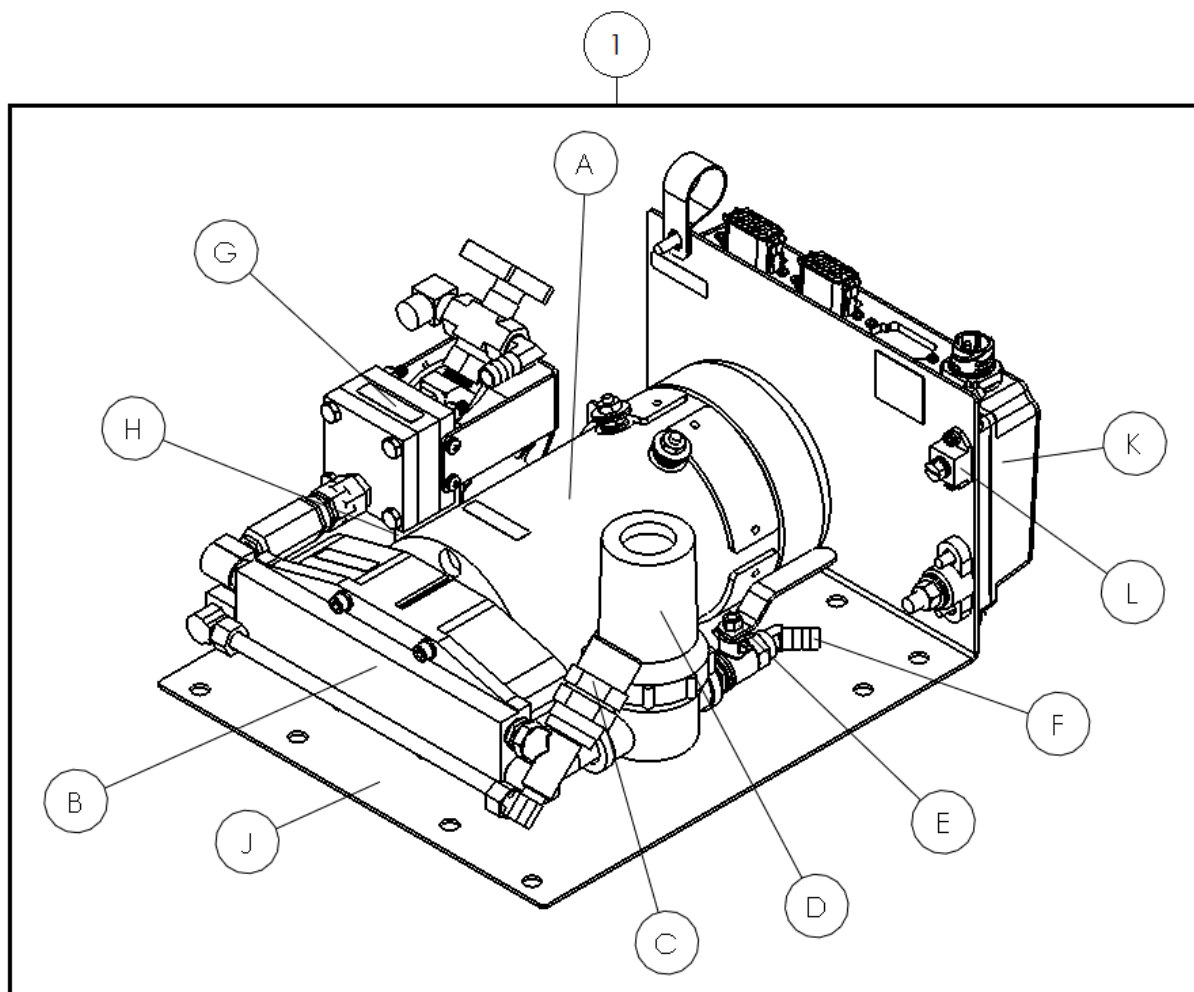
This exploded perspective view shows the assembly of the mechanical device. The main components are labeled as follows:

- 1**: The main body of the device, which includes a base plate and a central cylindrical component.
- 1A**: A top plate or cover that fits over the main body.
- 1B**: A side plate or support structure that fits onto the side of the main body.
- 1C**: A component that fits into the side of the main body, possibly a connector or a support.
- 1D**: A component that fits into the front of the main body, possibly a connector or a support.
- 2**: A small component, possibly a pin or a screw, that fits into the side of the main body.
- 3**: A small component, possibly a pin or a screw, that fits into the side of the main body.
- 6**: A base plate or support structure that fits under the main body.



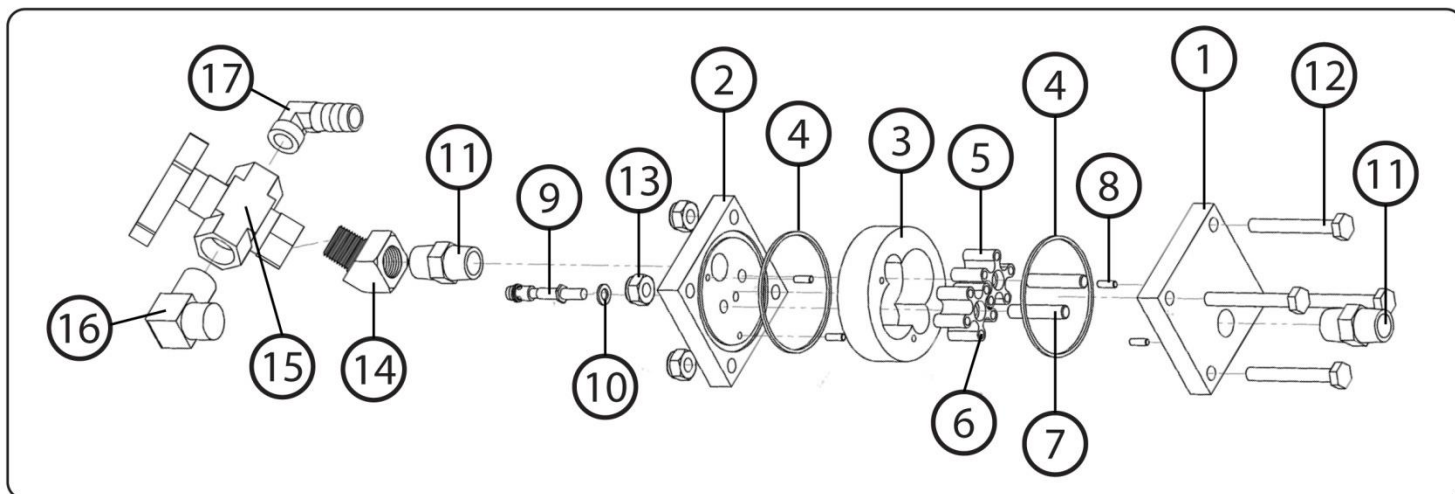
## FOAM PUMP ASSEMBLY – 1.7AHP AND 2.1A

Item	Part number	Qty	Description
1.	114034	1	Motor/Pump Assembly - 2.1A - 12 Volt
	114035	1	Motor/Pump Assembly - 2.1A - 24 Volt
	119274	1	Motor/Pump Assembly - 1.7AHP - 12 Volt
	119275	1	Motor/Pump Assembly - 1.7AHP - 24 Volt
A.	110521	1	Motor 1/2 HP - 2.1A/1.7AHP - 12 Volt
	110393	1	Motor 1/2 HP - 2.1A/1.7AHP - 24 Volt
B.	110522	1	Pump Assembly (without motor) - 2.1A
	119345	1	Pump Assembly (without motor) - 1.7AHP
C.	538-1750-01-0	1	Relief Valve - 2.1A - 250 PSI
	119346	1	Relief Valve - 1.7AHP - 400 PSI
D.	510-0200-02-0	1	Strainer Assembly
E.	119266	1	Ball Valve 3/8" MNPT x FNPT with Handle
F.	082-0328-02-0	1	Elbow 45° 3/8" MNPT x Hose Barb
G.	115497	1	Flowmeter Assembly (see next page for parts list)
H.	019-3770-00-0	1	Flowmeter Mounting Bracket
J.	019-02275	1	Mounting Base
K.	610-00044	1	Motor Controller
L.	122609	1	Diode 45V 240A



## FLOW METER ASSEMBLY – 1.7AHP AND 2.1A (115497)

Item	Part number	Qty	Description
1.	044-1920-01-0	1	Flowmeter Right Cover
2.	044-1920-00-0	1	Flowmeter Left Cover
3.	062-0910-00-0	1	Flowmeter Housing
4.	040-0340-00-0	2	O-ring 2-034 Buna-N 70 Durometer
5.	016-1010-00-0	2	Flowmeter Rotor
6.	064-6390-00-0	10	Sensor Target for Flowmeter Rotor
7.	064-6680-00-0	2	Dowel Pin Ø0.25" x 1.25" SST
8.	064-6260-01-0	4	Dowel Pin Ø0.13" x 0.38" SST
9.	200-2483-00-0	1	Speed Sensor
10.	097-1971-00-0	1	Sealing Washer #10
11.	082-0364-02-0	2	Hex Adapter 2X 3/8" MNPT
12.	018-1220-12-0	4	Hex Head Bolt 1/4-20 x 2.00" SST
13.	110-1206-02-0	4	Nut Nylock 1/4-20
14.	116964	1	Street Elbow 45° 3/8" NPT
15.	038-2220-00-0	1	Ball Valve 3/8" FNPT 3-way
16.	082-0317-02-0	1	Elbow 90o 3/8" MNPT x 1/2" Tube
17.	082-0327-02-0	1	Elbow 90o 3/8" MNPT x 1/2" Hose Barb



### Speed sensor replacement kit – part number 119348 includes:

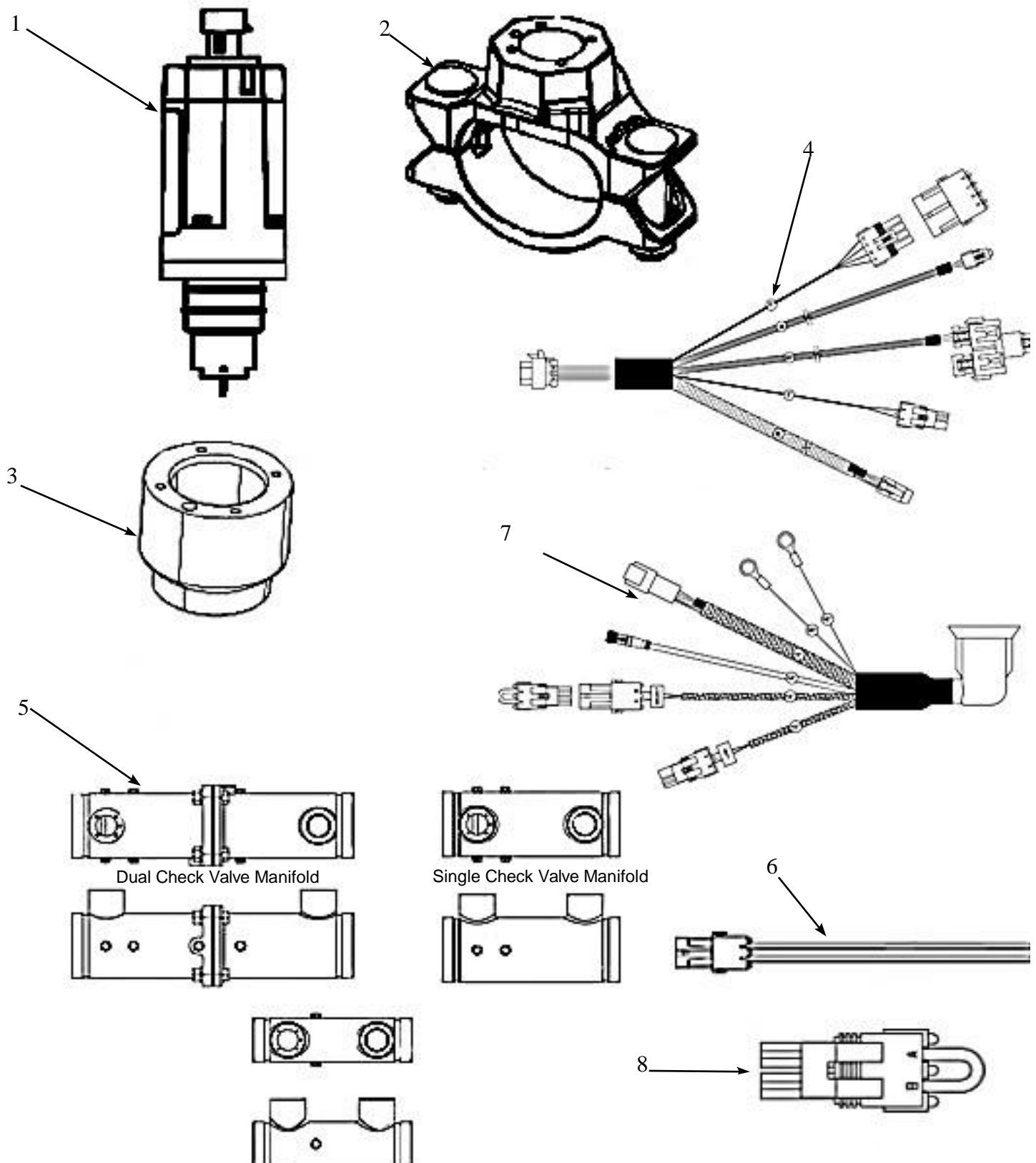
Item	Part number	Qty	Description
9.	200-2483-00-0	1	Speed Sensor
4.	040-0340-00-0	2	O-ring 2-034 Buna-N 70 Durometer
10.	097-1971-00-0	1	Sealing Washer #10

Figure 46: Foam Flow Meter Assembly

## FLOW SENSOR COMPONENTS

1. 102714 ..... Paddlewheel Flow Sensor
2. 4842010..... Saddle Clamp 2" with Flowmeter Port
- 4843010..... Saddle Clamp 2.5" with Flowmeter Port
- 4844010..... Saddle Clamp 3" with Flowmeter Port
- 4846010..... Saddle Clamp 4" with Flowmeter Port
- 4845010..... Saddle Clamp 5" with Flowmeter Port
3. SFM ..... Weld Fitting for Paddlewheel Flow Sensor - Stainless Steel
- 309010..... Weld Fitting for Paddlewheel Flow Sensor - Aluminum
- 309020..... Weld Fitting for Paddlewheel Flow Sensor - Steel
4. 113438-A..... FoamLogix Control Head Harness - 10' x 14"
- 113439-B ..... FoamLogix Control Head Harness - 15' x 19'
5. 108995..... Dual Check Valve Manifold Assembly - 3.0"
- 108966..... Single Check Valve Manifold Assembly - 3.0"
- 112074..... Single Check Valve Manifold Assembly - 2.0"
6. H513-0270-040-D ..... Power Wire Harness
7. 113434-B ..... FoamLogix Distribution Box Harness - Single Tank (Included in  
   base system - 115498)
8. 513-0320-23-0 ..... Tank Select Plug (included in 113434-B Harness)

Figure 47: Flow Sensor Components

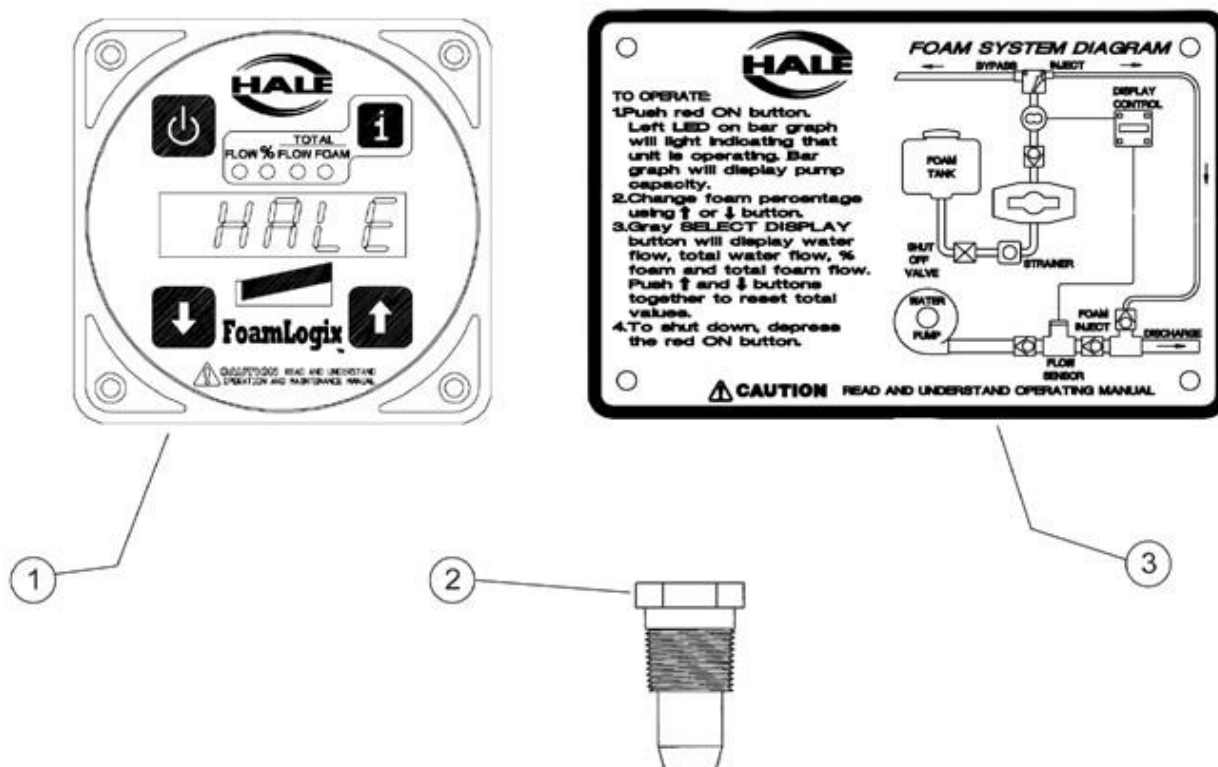




## Additional Foam Logix Components

1. 111530 FoamLogix Control Head
2. 038-1790-00-0 Injector Check Valve
3. 101-1630-70-0 FoamLogix Placard
4. 200-2110-02-0 Side Mount Low Level Tank Sensor
5. 200-2110-04-0 Bottom Mount Low Level Tank Sensor
6. 200-2110-06-0 Top Mount Low Level Tank Sensor
7. 513-0330-01-0 Remote Control Switch Assembly
8. 513-0680-00-0 Remote Control Cable - 16' (4.88m)

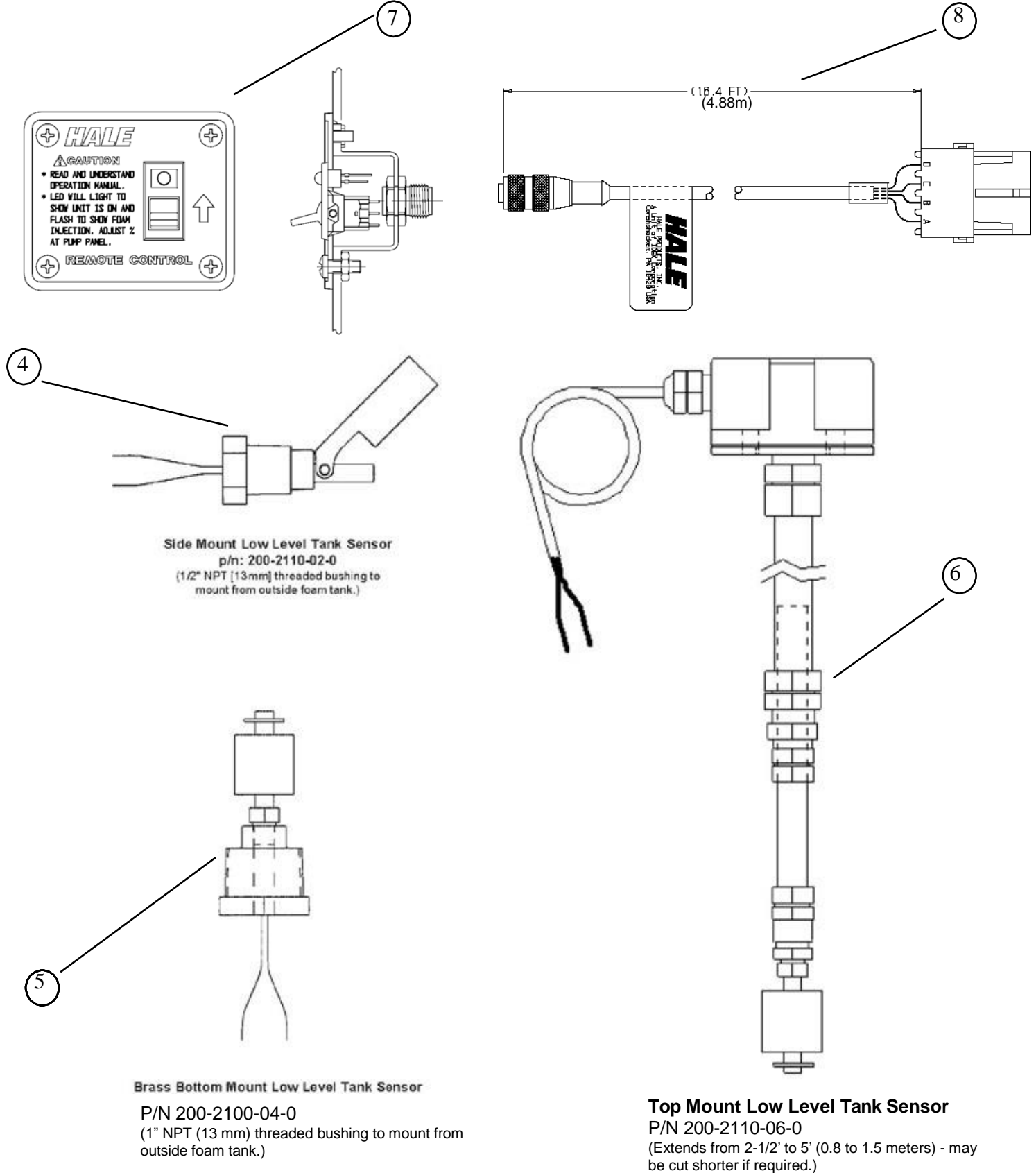
Figure 48: Additional FoamLogix Components



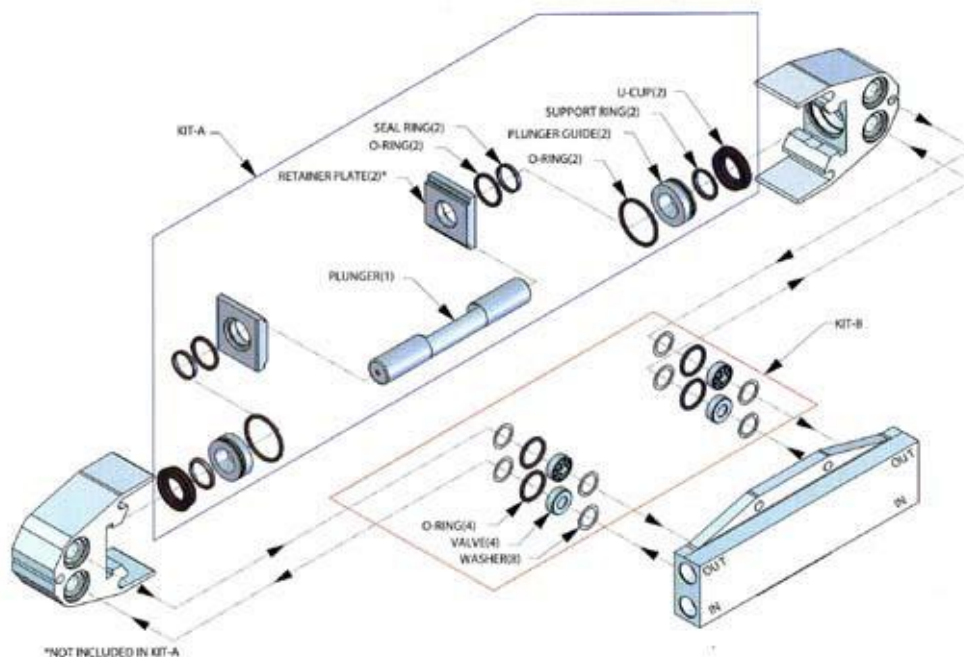


## ADDITIONAL FOAMLOGIX COMPONENTS

Figure 49 Additional FoamLogix Components



## FoamLogix Pump Repair Kit



Item #	Part Number	Qty.	Description
Kit A.....	117495 .....	1 .....	Plunger and Seals
Kit B	117496 .....	1 .....	Valve and Seals
Kit C .....	117497 .....	1 .....	Cam Bearing

## Appendix A Hale Foam Concentrate Compatibility

The following foam concentrates are approved for use in Hale Foam Proportioning Systems.

The Class A foam concentrates are approved for use in all Hale Foam Proportioning systems (Hale FoamLogix 5.0, 3.3, 2.1A and 1.7AHP and Hale V Series.

TYPE OF FOAM CONCENTRATE	MANUFACTURER	NAME
CLASS A FOAM		
US Forestry Service Approved - Reference *&**	Ansul	Silvex Class A Foam Concentrate
	Kidde fire Fighting/Angus Fire	Forexpan S (0.1% - 1.0%)
	Kidde fire Fighting/Angus Fire	Hi Combat Class A (1st Defense Class A cold Water Foam
	Kidde fire Fighting/Angus Fire	Knock-Down
	Monsanto	PhosCheck WD881
	Chemonics	Fire-Trol Fire Foam 103
	Chemonics	Fire-Trol Fire Foam 104
	3M	Light Water FT-1150
	Chemguard	First Class - Class A foam P/N S100-307
	ABC Macintosh Agent	Bio-For N
	Enchem Products Ltd	Enchem 207
* For use in FoamLogix® models 5.0, 3.3, 2.1A , 1.7AHP and Hale V Series ** USFS approved foams have been tested for corrosion and biodegradability toxicity by the US Forest Service in addition to the Hale testing described on the following page.		
Non U.S. forestry Service Approved - Reference *	Chem Guard	Class A Plus
	Unifoam Co. Ltd.	UniA 1%
	3M	Light Water SFFF
	Kidde Fire Fighting/National Foam	Responder
	Kidde Fire Fighting/Angus fire	FirePower Class A
	3M-Australia	Fire Brake Bush Fire Fighting Foam P/N 0295337

**Table 50: Hale Foam Concentrate Compatibility**

## Reference

The preceding foam concentrates have been tested by Hale Products in a Hale FoamLogix® system to ensure compatibility with Hale FoamLogix® models 2.1A, 1.7AHP, 3.3 and 5.0 Foam Proportioning Systems. These Chemicals were ran for several hundred hours over several months under nominal conditions to make sure they do not harm the Foam System. This list is solely intended to assist the end user in selection of foam concentrate(s) compatible with a Hale FoamLogix® Model 5.0 and 3.3 and is not a determination of the fire fighting effectiveness of one product over another.

Always consult with NFPA standards, U.L. Listings, Federal, State, and local regulations, and requirements pertaining to application and environmental regulations before selecting a foam concentrate. Some of the foam chemicals listed may require special hardware considerations. (Refer to FoamLogix® user manual for additional information).

Many Fire Fighting Foam Chemical Manufacturers have specific instructions on handling and use of their products including, but not limited to, shelf life, tank life, temperature limits, and intervals between use. Always follow Manufacturers instructions for use.

This Appendix applies to Hale Foamlogix® foam pumps built after April 17, 1997. For Hale FoamMaster foam pumps built prior April 17, 1997 refer to Bulletin 650, Rev 2.

If a particular foam concentrate you wish to use does not appear on this list, please contact your Hale representative for information concerning compatibility with Hale FoamLogix® Foam Proportioning System. As further testing is completed, Hale Products Inc. updates this list and expands capabilities and features to keep the Hale FoamLogix® the best system available for all the fires you fight.

# FoamLogix 2.1A

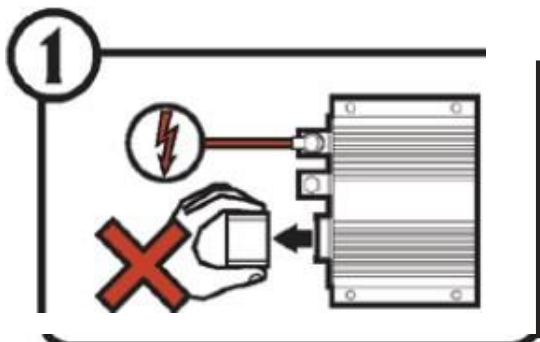
DC Motor Driver Installation Check List

**Class 1**  
A unit of IDEX Corporation



Please perform the following steps to verify the FoamLogix system integrity after replacing the DC Motor Driver.

Realice por favor los pasos siguientes para verificar la integridad de sistema de FoamLogix después de substituir el DC Motor Driver.



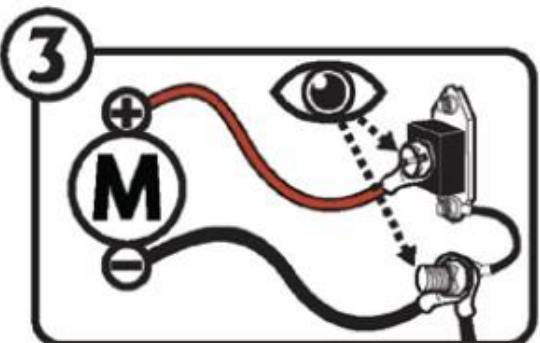
Never disconnect when power is applied.

Nunca desconecte cuando la energía es aplicada.



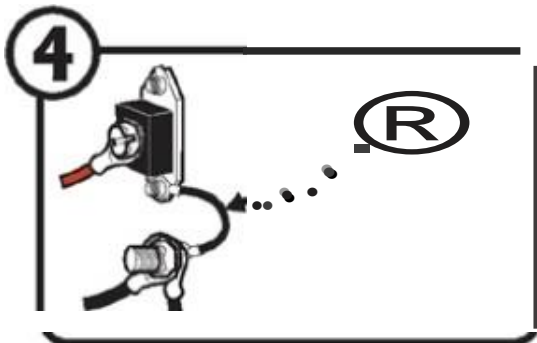
Find the location of the suppression diode and the main ground.

Encuentre la localización del diodo de la supresión y del perno de tierra principal.



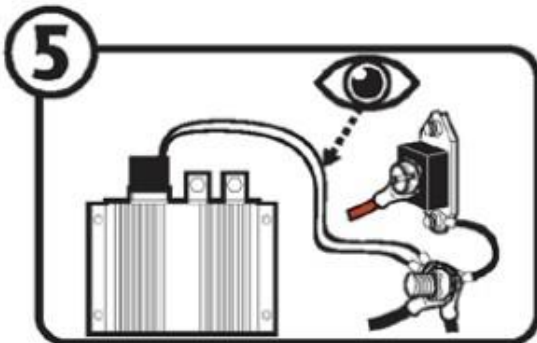
Verify the motor is connected to the diode and main ground.

Verifica el motor este conectado con el diodo y la tierra principal.



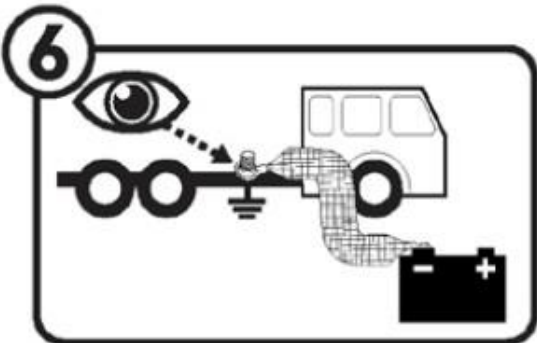
Verify the base of the diode is connected to the main ground.

Verifica la base del diodo este conectada con la tierra principal.



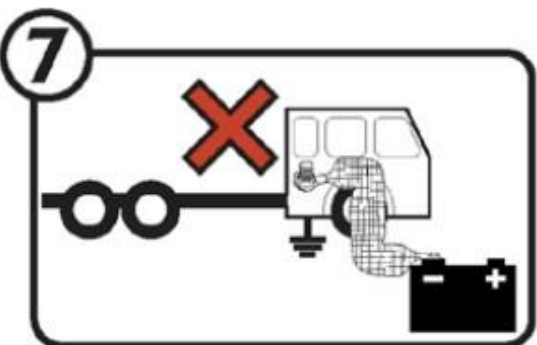
Verify two ground wires from the DC Motor Driver are connected to the main ground.

Verifica dos alambres de tierra del conductor del DC Motor Driver esten conectados con la tierra principal.



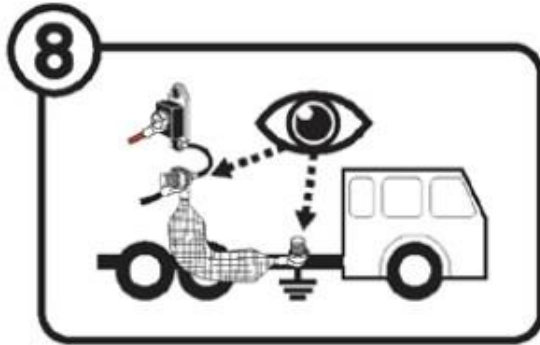
Verify the battery negative is connected to the vehicle chassis.

Verifica la negativa de la batería este conectada con el chasis del vehículo.



Do not use the vehicle body as a grounding point.

No utilice el cuerpo del vehículo como punto que pone a tierra.



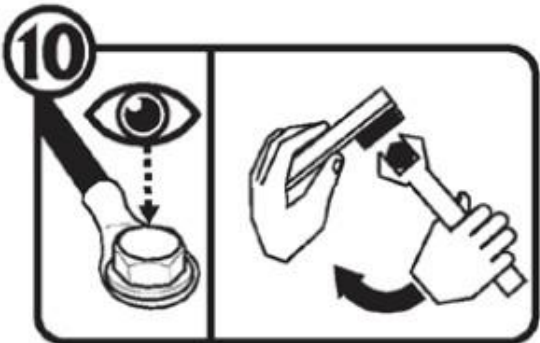
Verify the main ground is connected to the vehicle chassis ground.

Verifica la tierra principal este conectada con la tierra del chasis del vehículo.



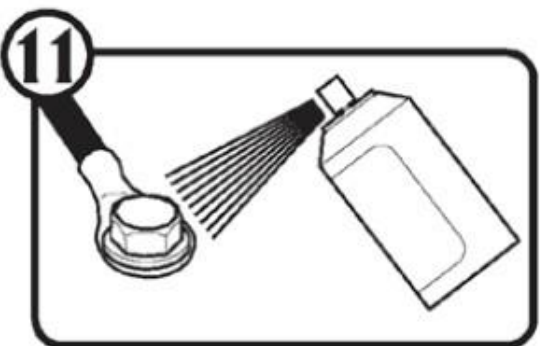
Do not use the vehicle body as a grounding point.

No utilice el cuerpo del vehículo como punto que pone a tierra.



Verify that all electrical connections are tightened and do not have corrosion. Clean and tighten as necessary.

Verifica todas las conexiones eléctricas estén apretadas y no tenga corrosión. Limpie y apriete cuanto sea necesario.



Recommended: Spray all electrical ground and power connections with battery terminal protectant.

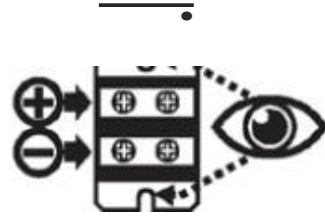
Recomendado: Rode todas las conexiones eléctricas de la tierra y de energía con el terminal de la batería protectant.



**Note**

The diode may be similar to the one shown above.

El diode puede ser similar a el que esta demostrado arriba.



Verify the positive connection is toward the mounting hole.

Verifica la conexión positiva est hacia el agujero de montaje.

## Foam Flow Sensor Replacement Instructions

### 1 REPAIR KIT 119348 INCLUDES:

- Foam Flow Sensor (200-2481-00-0)
- Sealing Washer (097-1971-00-0)
- 119376 - Product/Service Bulletin 0017

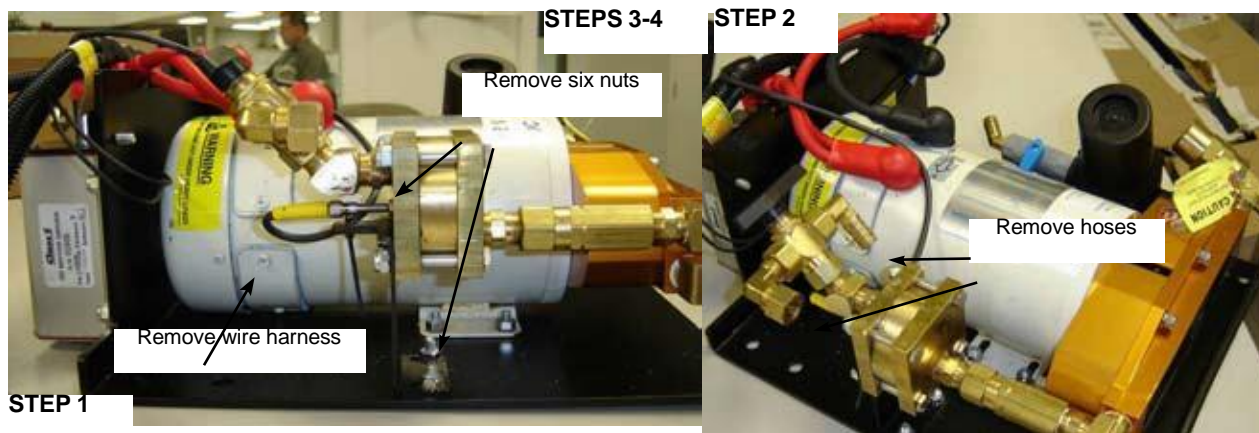
### 2 REQUIRED TOOLS:

- 7/16" wrench (2X)
- 5/16" wrench

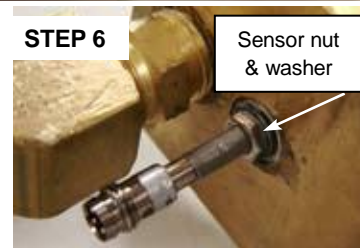
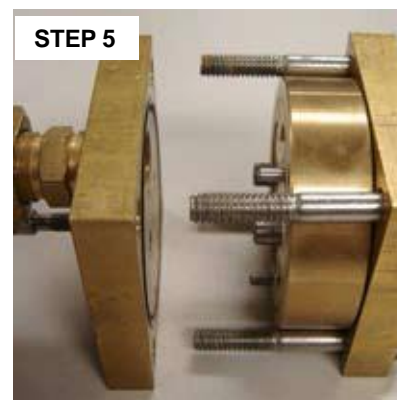
### 3 SAFETY INFORMATION

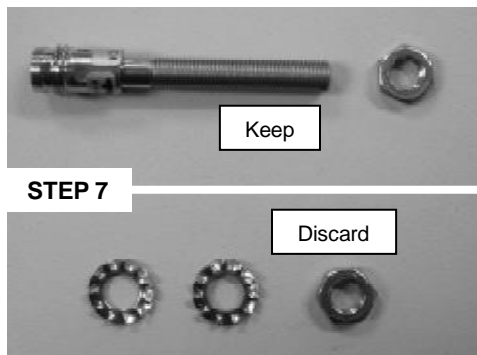
- Remove system power from the FoamLogix system and relieve any trapped pressure.
- Shut off foam tank supply valve.
- Open bypass valve to drain foam lines and use suitable containers to collect residual foam concentrate.
- Protect eyes and skin from foam concentrate per manufacturer's Material Safety Data Sheet or MSDS.

### 4 REPLACEMENT INSTRUCTIONS



1. Carefully disconnect the wire harness from the old foam flow sensor.
  - Connect the NEW foam flow sensor to the wire harness.
  - Apply system power and verify sensor diagnostic LED is off.
  - Touch end of sensor to brass housing → LED should light.
  - Disconnect the wire harness from the new sensor.
  - Remove system power from the FoamLogix system.
  - (This test verifies that the new sensor is operating correctly.)
2. Disconnect both hoses from the 3-way bypass valve.
3. Remove the four (4) nuts on the brass flowmeter assembly with the two 7/16" wrenches.
4. Remove the two (2) nuts on the bracket bottom with the 7/16" wrench.
5. Remove the sensor side cover of the flowmeter assembly.
  - Inspect o-ring inside the cover for damage or cuts.
6. With the 5/16" wrench, loosen the small retaining nut on the foam flow sensor, and unscrew the sensor by hand.
  - Depending on the return instructions provided by the dealer or manufacturer, it may be necessary to return the old sensor. If not, then the old sensor, nut, and seal washer can be discarded.
7. The foam flow sensor packaging includes two (2) nuts and two (2) lock washers. Only one nut is required for the remaining steps.

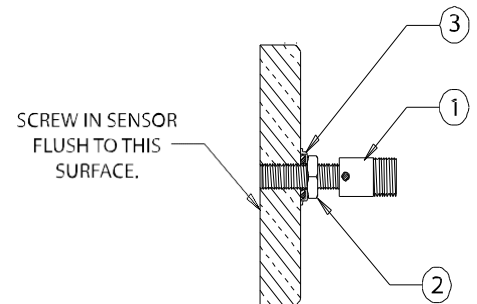




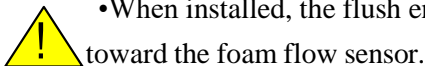
8. Thread the new foam flow sensor nut onto the sensor about 1/2" (12mm).
9. Thread (do NOT push) the new seal washer onto the foam flow sensor about 1/2" (12mm).
  - This seal washer should be silver in color, with a black, rubber seal on the inner diameter.
10. Thread the new foam flow sensor into the brass cover by hand, so that the sensor tip is flush with the inside face of the cover.

**• DO NOT USE LOCTITE OR THREAD SEALANT ON THE FOAM FLOW SENSOR.**

- Use a straight edge or flat object to verify the flush position.
  - TIP – When installing the foam flow sensor, it may be easier to lay the brass cover on a flat surface (carefully remove o-ring), and check for flush position after the nut is secure.
11. While holding the new foam flow sensor, lightly tighten the nut with the 5/16" wrench to set the seal washer on the outer face of the brass cover.
  12. Verify that the sensor tip is flush with the inner surface and torque the jam nut to a maximum 10.0 in-lb (1.1 N-m).
    - Do not bend or over-tighten the sensor.
    - Use a fine stone to lightly remove any flashing that might stick out after tightening the sensor nut.
  13. Remove and inspect the two plastic rotors inside the flowmeter assembly for cracks, burrs, etc.
  14. Inspect the inner housing for debris, metal shavings, etc. and remove as necessary.
  15. Reinstall both rotors, making sure that each spins freely without binding.
    - When installed, the flush end of the metal targets in the rotors must face out,

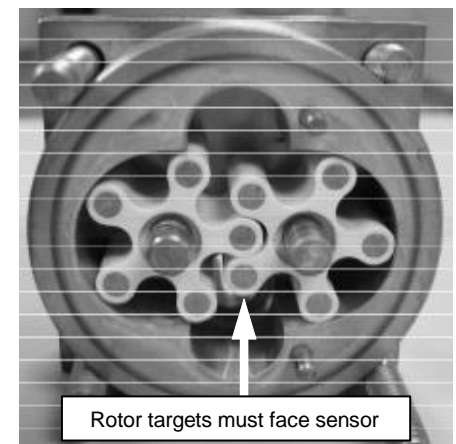


1	200-2481-00-0	FOAM FLOW SENSOR
2	INCLUDED WITH SENSOR	SENSOR NUT
3	097-1971-00-0	SEAL WASHER



16. Reinstall the o-ring (if necessary) and reattach the brass cover and the bracket with the six (6) nuts.
  - Tighten all nuts securely and torque to a maximum 6.5 ft-lb (8.5 N-m). Use a criss-cross torque pattern on the four brass housing nuts and bolts.
17. Reattach foam lines and foam flow sensor harness.
18. Apply system power to the FoamLogix system and recalibrate the system per the user manual instructions.

**STEP 15**



## Express Warranty

See website for product specific warranty details.



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