

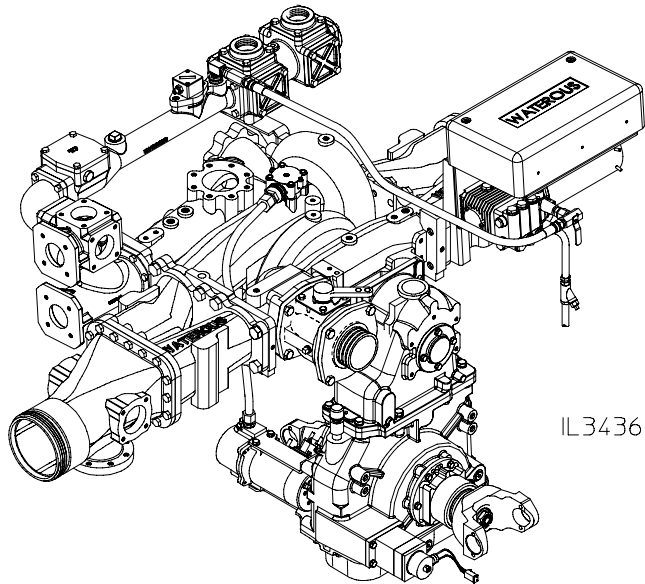
Foam Manager™ System with Aquis™

Installation Instructions

Form No.	Section	Issue Date	Rev. Date
F-1031	3031	03/11/10	05/11/12

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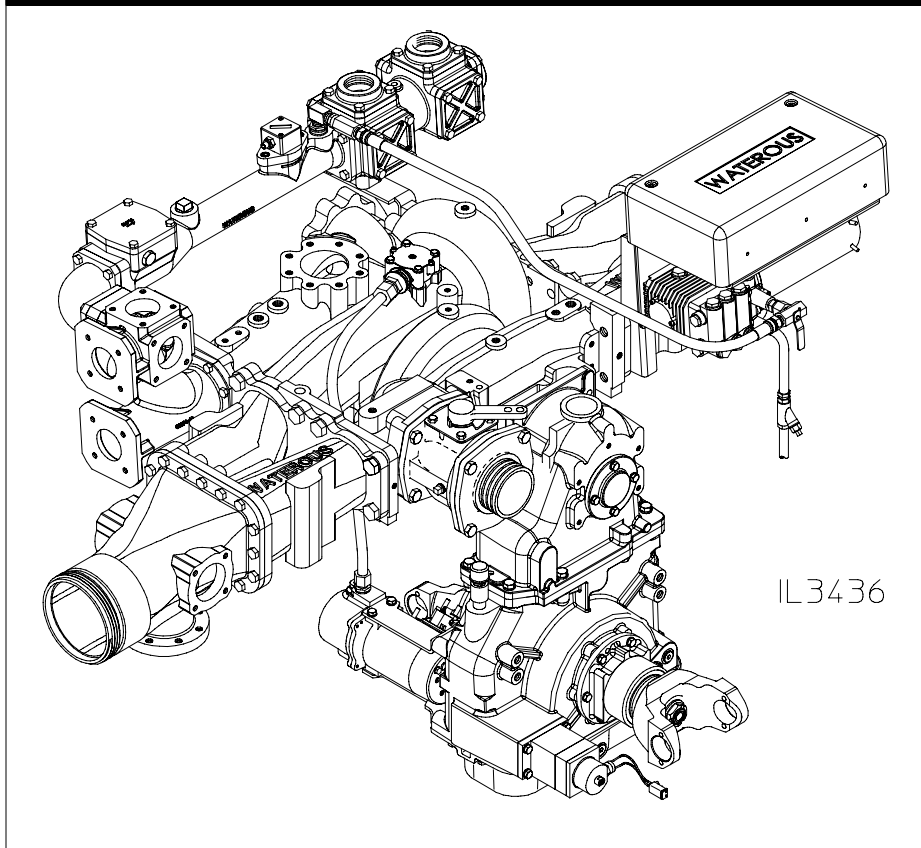
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Introduction

This instruction covers the installation of a Foam Manager™ Foam System. The Foam Manager™ system is factory mounted on a Waterous CS, CSU, CM or CMU midship pump.

Foam Manager™ System



Other installation instructions available:

- CS, CSU, CM, CMU Series Fire Pump, F-1031, Section 3011
- Priming System, F-1031, Section 3006
- Manifold Drain Valves, F-1031, Section 3008
- Pressure Control System, F-1031, Section 3010

Before proceeding with the installation of the Foam Manager™, read all the instructions carefully. Check the appropriate dimensional drawings in the Engineering Manual as needed.

System Components

Listed below are the Foam Manager™ Foam System's standard items furnished, optional items from Waterous and items not furnished by Waterous.





Standard Items Furnished	
Ref. No.	Description
1	Aquis™ Foam Pump (Proportioner) Pump Mounted (Shown) or Shipped Loose for Remote Mounting by OEM
2	Foam Pump Inject/Bypass Valve
3	In-Line Foam Concentrate Strainer
4	Foam Manifold
5	Aquis™ Foam Pump OIT (Control Panel)
6	Aquis™ Operation Instruction Panel Plate
7	OIT Cable

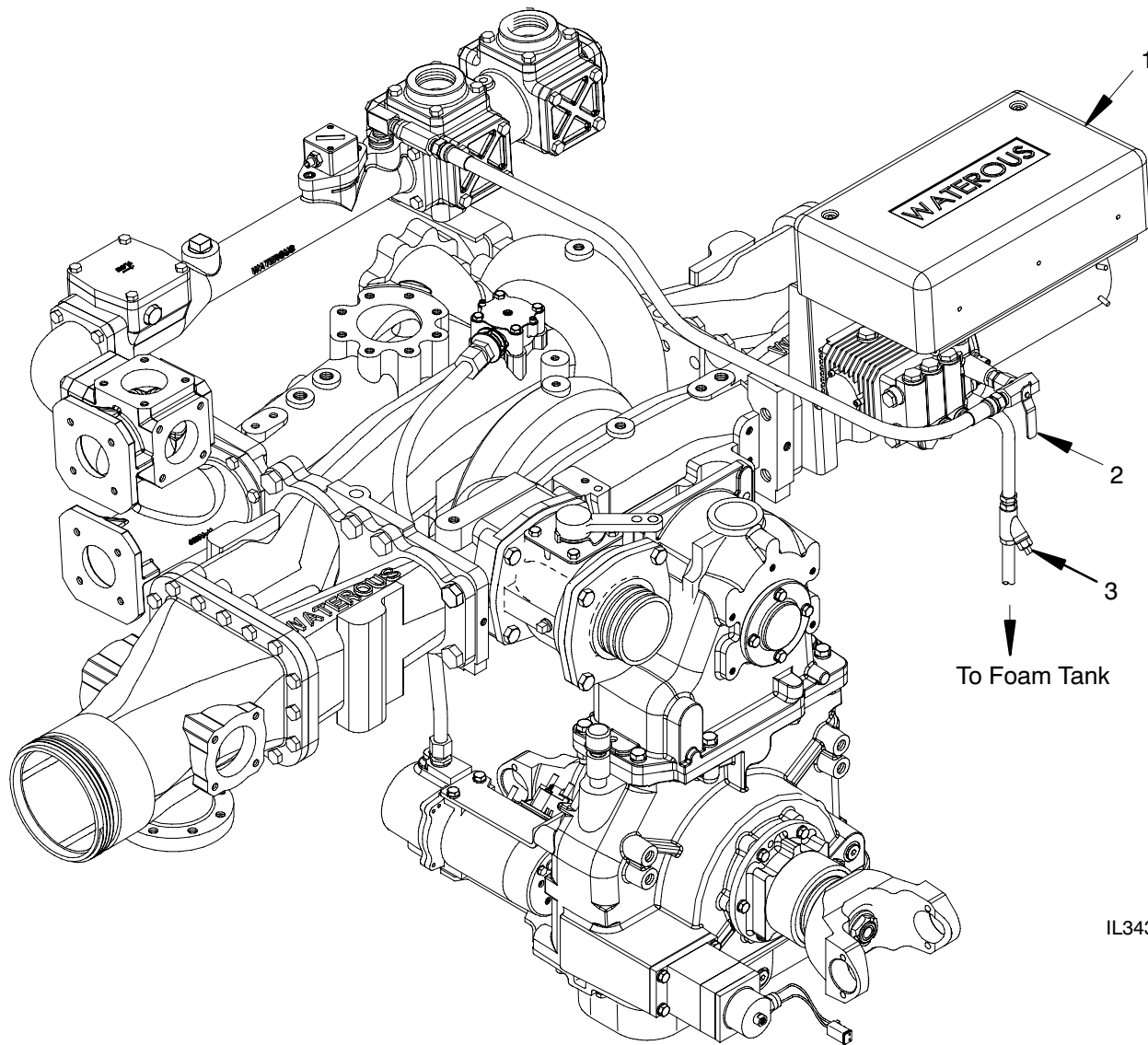
Optional Items from Waterous	
Description	
Foam Tank Level Switch	
Aquis Rating Panel Plate	
Aquis System Schematic Panel Plate	
OIT (Control Panel) Extension Cable	

Items not Furnished by Waterous	
Description	
Discharge Ball Valves and Check Valves	
Foam Concentrate Tank and Plumbing	
Drain Lines from Manifold and Discharge Check Valves	

Note: See the next page for diagram.

System Components

4		5	
3		6	
Items Shipped Loose with Aquis Foam Pump			



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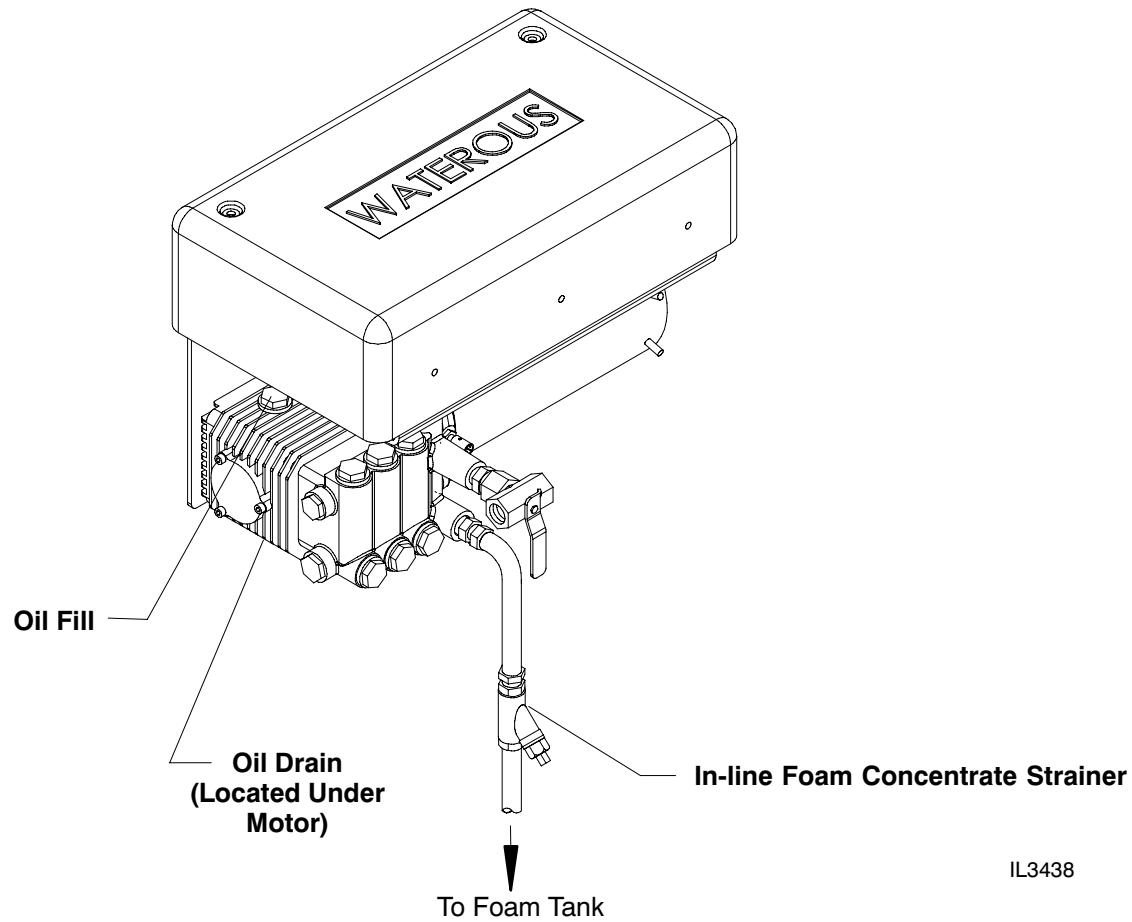
Lubrication

Foam Pump Oil Fill

Check the oil level of the foam pump and add if necessary:

Aquis™ Foam Pump Oil		
Foam Pump Model	Level from Top of Oil Fill Port	Use Oil
Aquis 2.5	1/4 inch (6mm)	Synthetic 10W-30 (Mobil 1 recommended)

Aquis 2.5 Systems



Installation

Fire Pump Mounting

For fire pump mounting instructions, see F-1031, Section 3011, *CM/CS Installation Instructions*.

Foam Pump Mounting

Required if the Foam Pump is not mounted on the Fire Pump at the factory (shipped loose).

Install Foam Pump in Apparatus:

The Motor / Pump Assembly must be mounted horizontally. The base must be anchored to a surface or structure that is rigid and of adequate strength to withstand the vibration and stresses of apparatus operation. For dimensions of mounting bracket, see page 7.

Flexible hose is required to make the hose connections from the Motor / Pump Assembly to the foam tank.

DO NOT hard pipe the system.

Consider access requirements for checking the foam pump. Be sure the foam concentrate hoses can be properly routed to the inlets and outlets on the foam pump.

Foam concentrates should gravity feed to the foam pump inlet from the foam tank. However the systems are capable of drafting up to one meter vertically. The Motor / Pump Assembly must be mounted in an area to avoid excessive exhaust system heat buildup.

Protect the hoses and wiring to prevent chafing and abrasion during operation of the foam system.

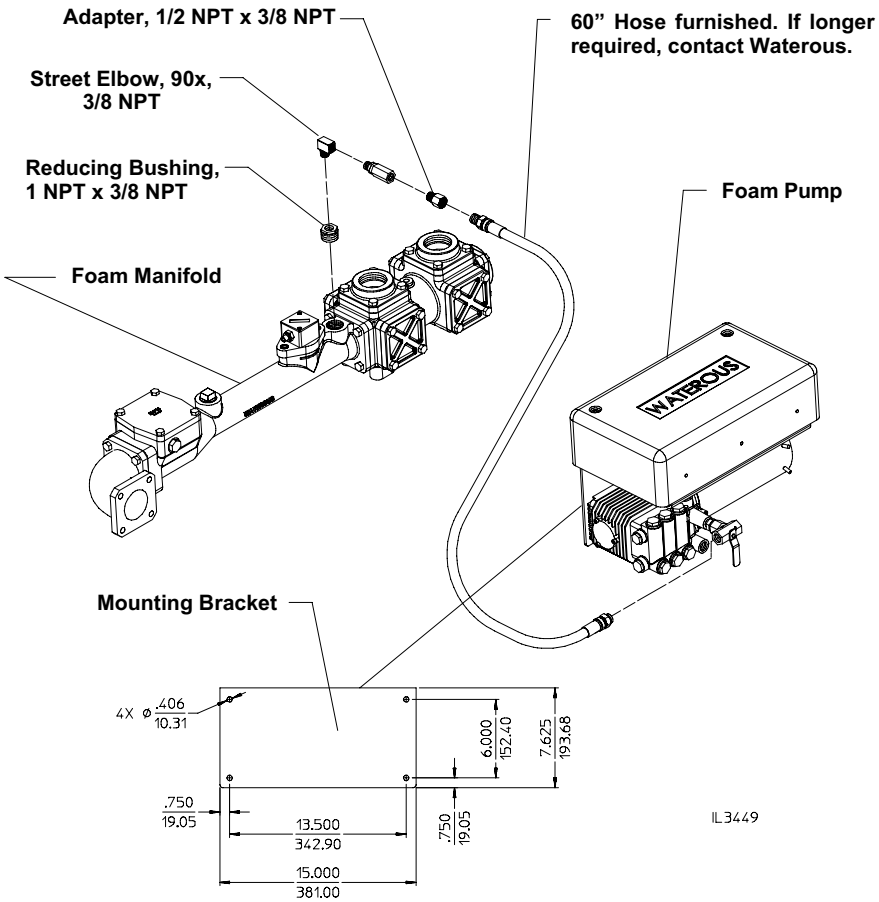
Protect the Motor / Pump Assembly from excessive road spray and debris. Although the system is sealed and designed to be resistant to the harsh environment of fire fighting apparatus, a protected compartment with easy operator access is the recommended installation location.

Install foam injection hose and cables between Foam Pump and Foam Manifold.

Foam Pump Mounting (Continued)

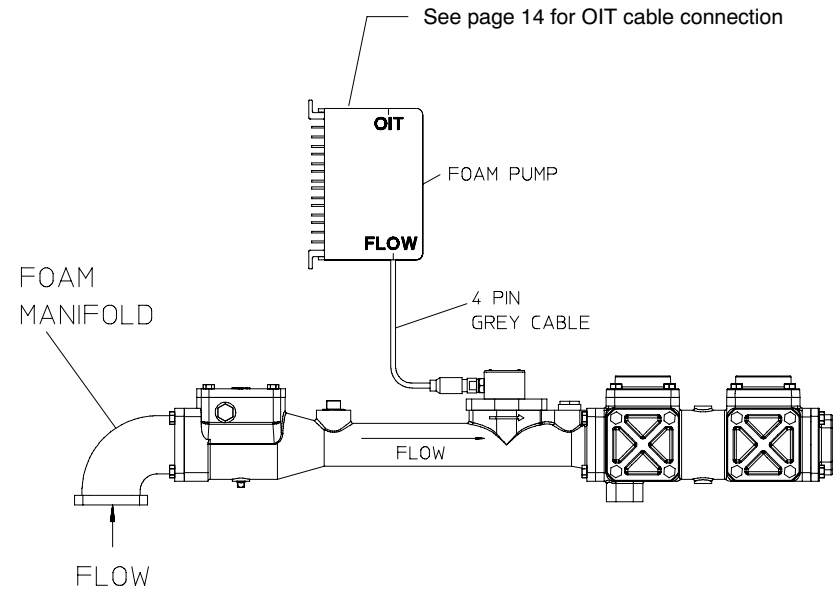
Aquis™ Hose, Cables and Mounting Bracket

Foam Injection Hose Connections, Mounting Bracket Dimensions



Cable Connections

Note: If longer cables are required, cable extensions are available, contact Waterous.



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Follow electrical wiring instructions on pages 12 through 15.

Panel Components

OIT (Control Panel)

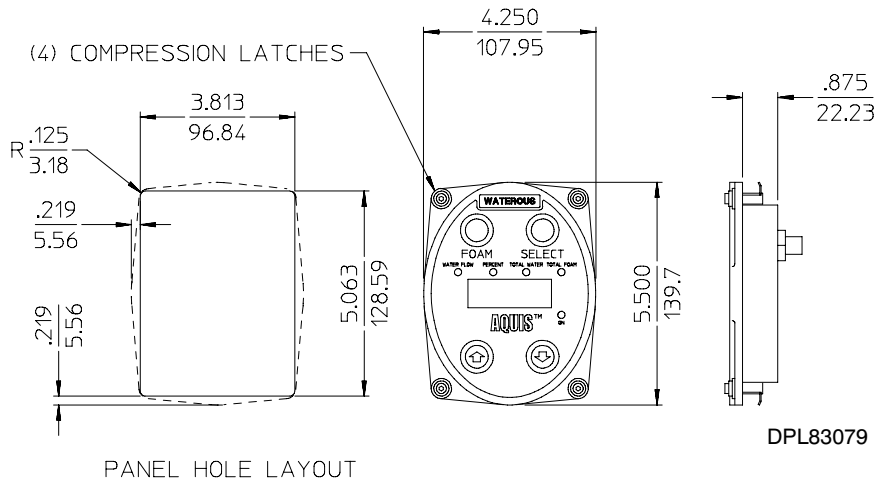
Determine a location for the Operator Interface Terminal (OIT) on the operator panel of the equipment.

- Consider the routing path of the cable from the OIT to the pump / motor driver assembly (see Page 12).
- If necessary, order longer or short cable assemblies to suit the location demands

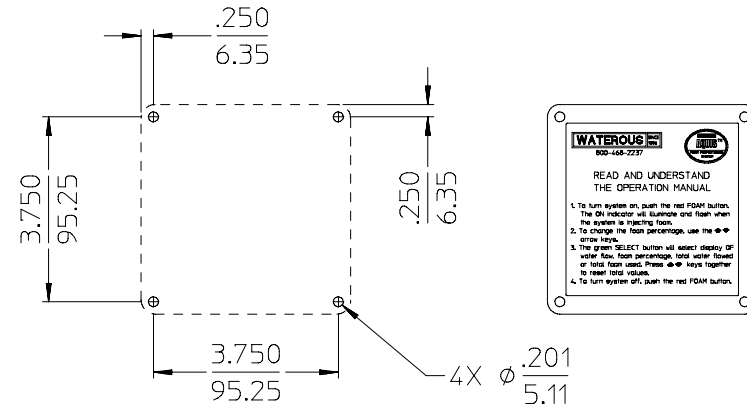
NOTE: Make sure there is enough clearance behind the OIT assembly for the cable.

Optional Dual OIT (Control Panel) - Follow instructions furnished with kit.

OIT (Control Panel) - See Page 12 for Cable Connections

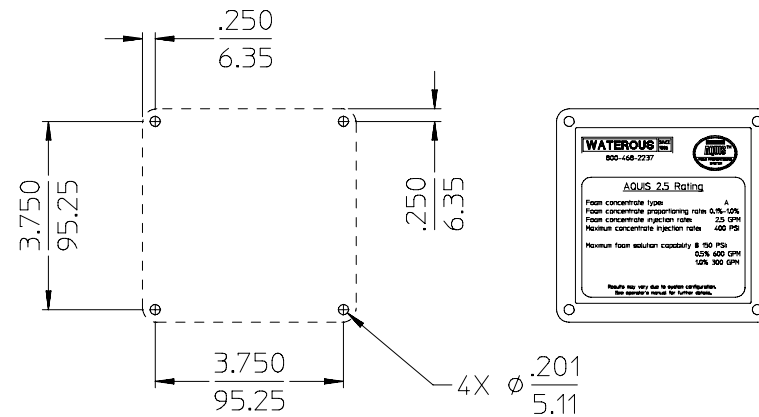


Instruction Panel



PANEL HOLE LAYOUT

Optional Schematic and Rating Panels



PANEL HOLE LAYOUT

Foam Concentrate Connection

Foam Tank - *Not Furnished by Waterous*

When specifying an integral foam tank, make sure provisions are made for installation of the optional low tank level sensor as well as foam suction connections and tank drainage according to NFPA.

Most water tank manufacturers will build the foam tank into the booster tank.

1. Place the foam tank so that refilling can be done safely.
2. Foam concentrates should gravity feed to the foam pump inlet from the foam tank. However, the systems are capable of drafting up to 1 meter vertically.

CAUTION

Shut-Off Valves. May cause damage to the foam pump.

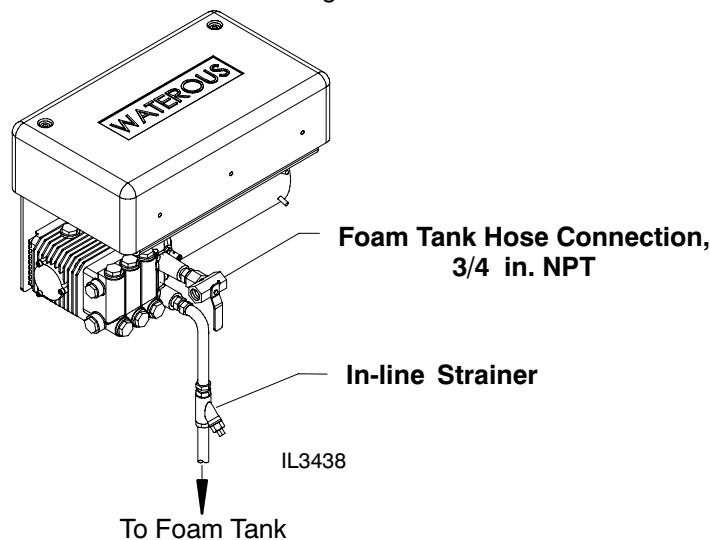
Never install shut-off valves between the pump and discharge pressure regulator or in the regulator bypass line.

Foam Tank Connection to Aquis® Foam Pump

Flexible hose is required to make the hose connections from the foam pump to the foam tank. Note hose from the foam tank to the foam pump is not furnished by Waterous. The in-line foam concentrate strainer must be installed in the line and be accessible for maintenance.

To ensure adequate concentrate supply, size hose as follows:

- Aquis 2.5 - minimum of 3/4 inch ID tubing

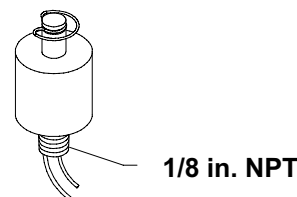


Optional Foam Tank Level Switch

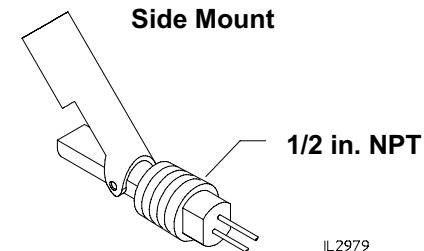
Waterous offers two types of tank level switches as shown below.

1. Install in tank according to NFPA (see Page 12 for wiring details).

Bottom Mount



Side Mount



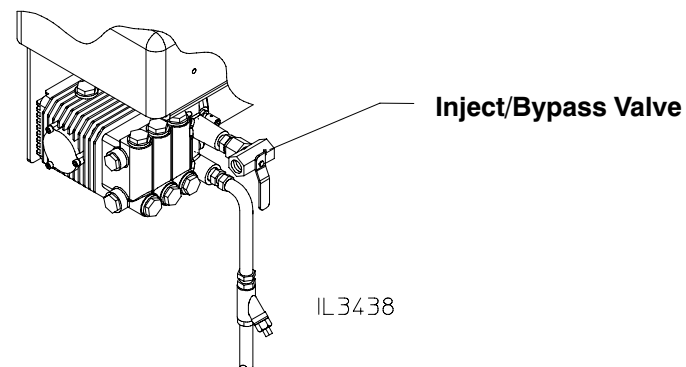
Inject / Bypass Valve

The Inject / Bypass valve is mounted on the discharge side of the foam pump. This valve shall be accessible by the pump operator during normal operations. The valve is a 3-way directional valve that selects where the output of the foam pump will go.

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

The hose and fittings from the inject port to the foam injector fitting should have a minimum rating of 3/8 of the maximum fire pump discharge pressure.

The hose from the bypass port may have a lower pressure rating since it is plumbed to the atmosphere and will not receive high pressures. This hose is used for pumping the concentrate into a container to empty the 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. This hose must be coiled for storage when not in use.



Water / Foam Solution Distribution

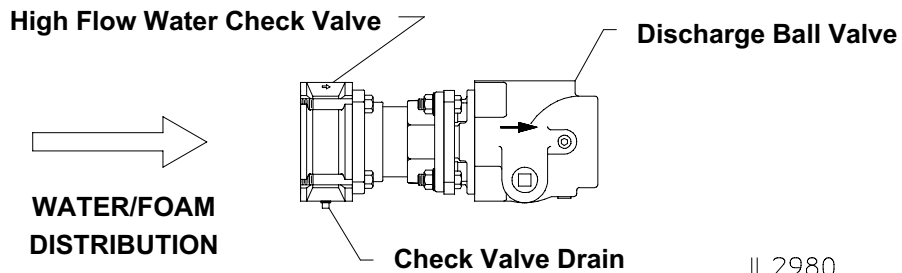
1. Waterous furnishes a mix manifold mounted on the pump with 2-1/2 in. Victaulic or 3 in. Victaulic discharge.
2. Distribution manifolds, piping and valves are not furnished by Waterous.
3. All Discharges should be equipped with water check valves.
4. Optional static mixers feature a six element mixing array inside a stainless steel pipe. Measuring 14 inches in overall length and 2-1/2" inches in diameter, the static mixers can be fitted with Victaulic, NPT or both connections on the inlet or outlet.
The optional static mixers are mounted downstream of the valve.
5. See drawing below for draining of check valves.

Water Drains

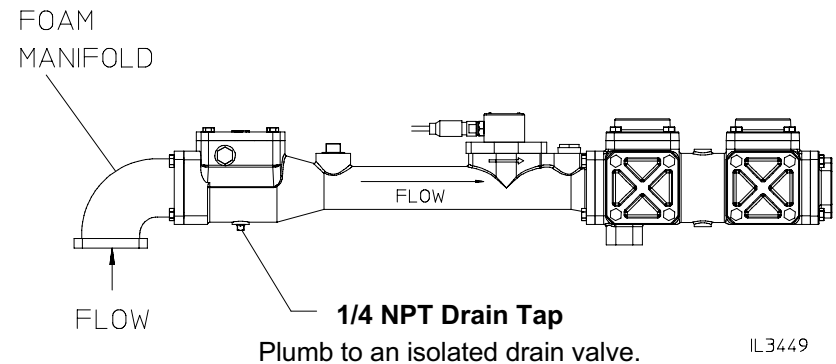
(Also refer to F-1031, Section 3008, *Drain Valve Installation Instructions.*)

Water Distribution Check Valves

All CAFS discharges should be equipped with water check valves. Water and foam can be trapped between the check valve and the discharge valve. In order for all water/foam to properly drain, water drains need to be plumbed to each check valve. These drains should be isolated drains.



Foam Manifold



Electrical Wiring

Electrical Components

CAUTION

Follow the systems electrical diagrams on the following pages for proper hookup of each of the electrical components. Complete molded cable sets are provided with each Aquis system to make all the necessary connections.

1. The cables and receptacles are keyed so they only go in the correct receptacle and they can only go in one way.
2. DO NOT force mismatched cable connections. The system can only perform when the electrical connections are sound, so make sure one is right.
3. DO NOT hook up the main power cables until all of the connections are made to each of the electrical components. The last connection should be the power cable to the foam pump/motor base assembly.
4. Disconnect the leads of the battery.
5. DO NOT cut molded cables.
6. Make sure you provide at least 60 Amps of electrical power for 12 VDC systems or 30 Amps for 24 VDC systems from the battery to the main power terminal. Use 8 AWG (minimum) wire directly to the battery or battery switch.
7. The system is designed for 12 or 24 volt negative ground direct current systems only.
8. Use care when installing molded cables. Count pins before connecting. Bent pins caused by improper hookup can prevent proper operation even when cables are reattached properly.
9. If the seal washer is missing or damaged, water can enter the connector and cause corrosion of the pins and terminals that will cause system failure.
10. The cables shipped with each Aquis unit are tested at the factory with that unit. Improper handling and forcing connections can damage these cables which could result in other system damage.
11. Always disconnect the ground straps and control cables from the Operator Interface Terminal (OIT) or other Aquis equipment **before** electric arc welding at any point on the apparatus. Failures to do so may result in a power surge through the unit that could cause irreparable damage to the system components.

Power to Foam Pump

The large circuit breaker (see Page 12) is used to connect the 12 or 24 VDC input power.

Make sure you provide adequate electrical power from the battery. Use 8 AWG (minimum) wire directly to the battery or battery switch. Long wire runs may require 6 or 4 AWG wire for proper operation.

Recommended Wire Sizes

Wire Size	Wire Length (approx.)
8 AWG	10-20 feet
6 AWG	20 feet to 30 feet
4 AWG	30 feet or more

Power Requirements

Aquis System	Power Required	
	12 VDC	24 VDC
2.5	60 Amps	30 Amps

Power Supply

Electrical devices can be easily damaged by a weak or erratic power supply. The better the power supply, the better the Aquis systems will perform. At maximum output, the Aquis 2.5 system can draw 60 Amps at 12 VDC (30 Amps at 24 VDC).

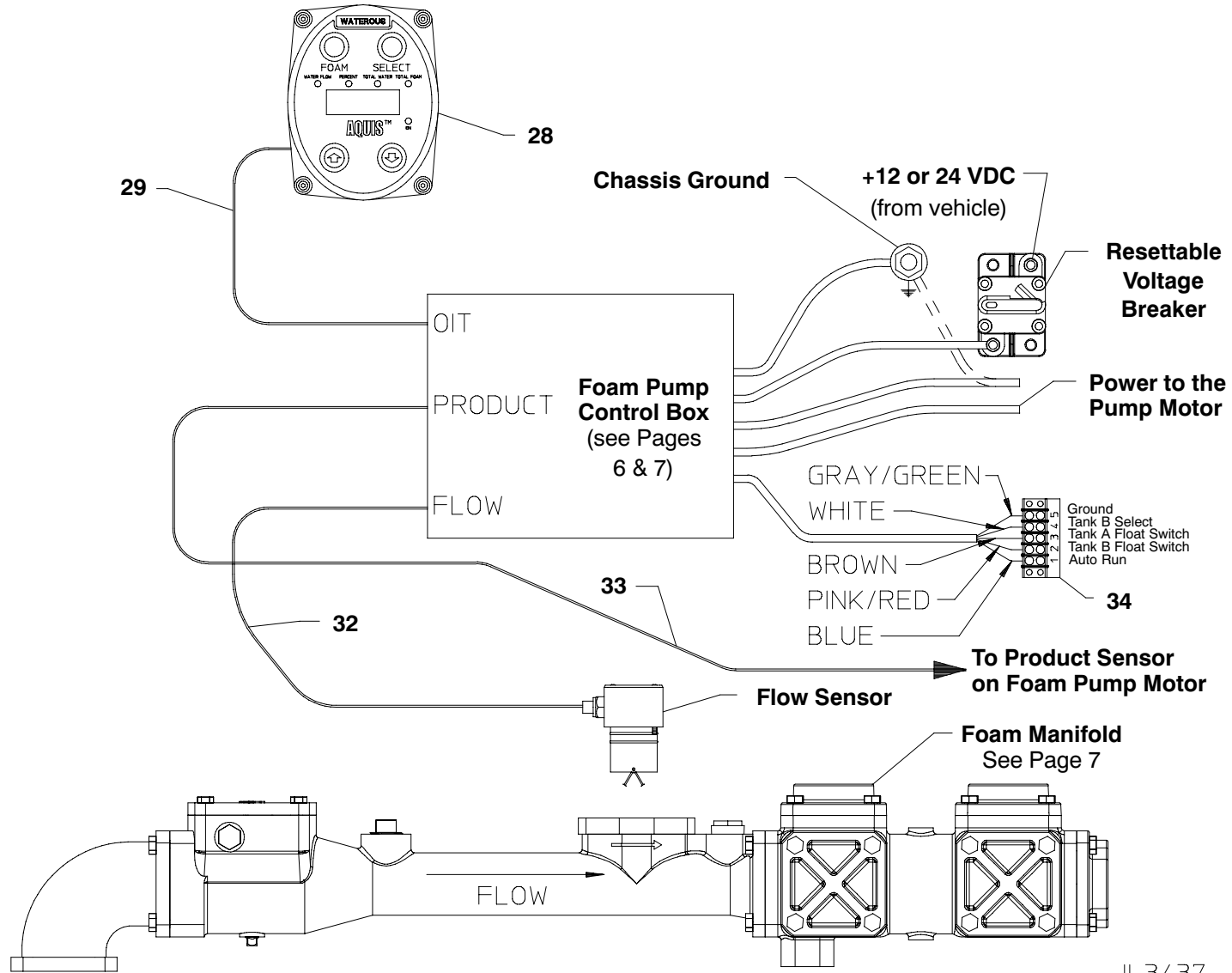
Connect the ground lead from the chassis frame or the negative battery terminal. Use the same size wire as the power lead.

DO NOT connect the main power leads to small leads that are supplying some other device such as a light bar or siren.

CAUTION

Be careful not to damage or short circuit the wires leading to the circuit breaker. Only the Aquis system is protected by the circuit breaker.

Aquis Foam Pump Schematic



Foam Pump Cables

1. Connect the control cable (8 pin) from the control box terminal to the back of the OIT control panel. Labels on the control box identify the terminal as "OIT". See Page 12, *Aquis Foam Pump Schematic*.
2. All other cables for the manifold flow sensors.
 - Foam pump installed on fire pump at factory:
Cable connections completed at factory.
 - Foam pump shipped loose for installation by OEM:
See page 7 for cable connections.
3. Making round coils of extra OIT and flow sensor cables in the pump compartment can act as an antenna. While the flow sensor and OIT cables cannot be shortened, various lengths of cable are available to minimize the "extra" cable in the truck. When routing cables, take care to avoid routing them next to antenna cables, radio power lines and radio components. When there is extra cable, double the cable back on itself and secure in a flat bundle with plastic wire ties instead of making a round coil.

CAUTION

Never attempt to cut or lengthen the molded cables. Cables can be daisy-chained to obtain longer lengths.

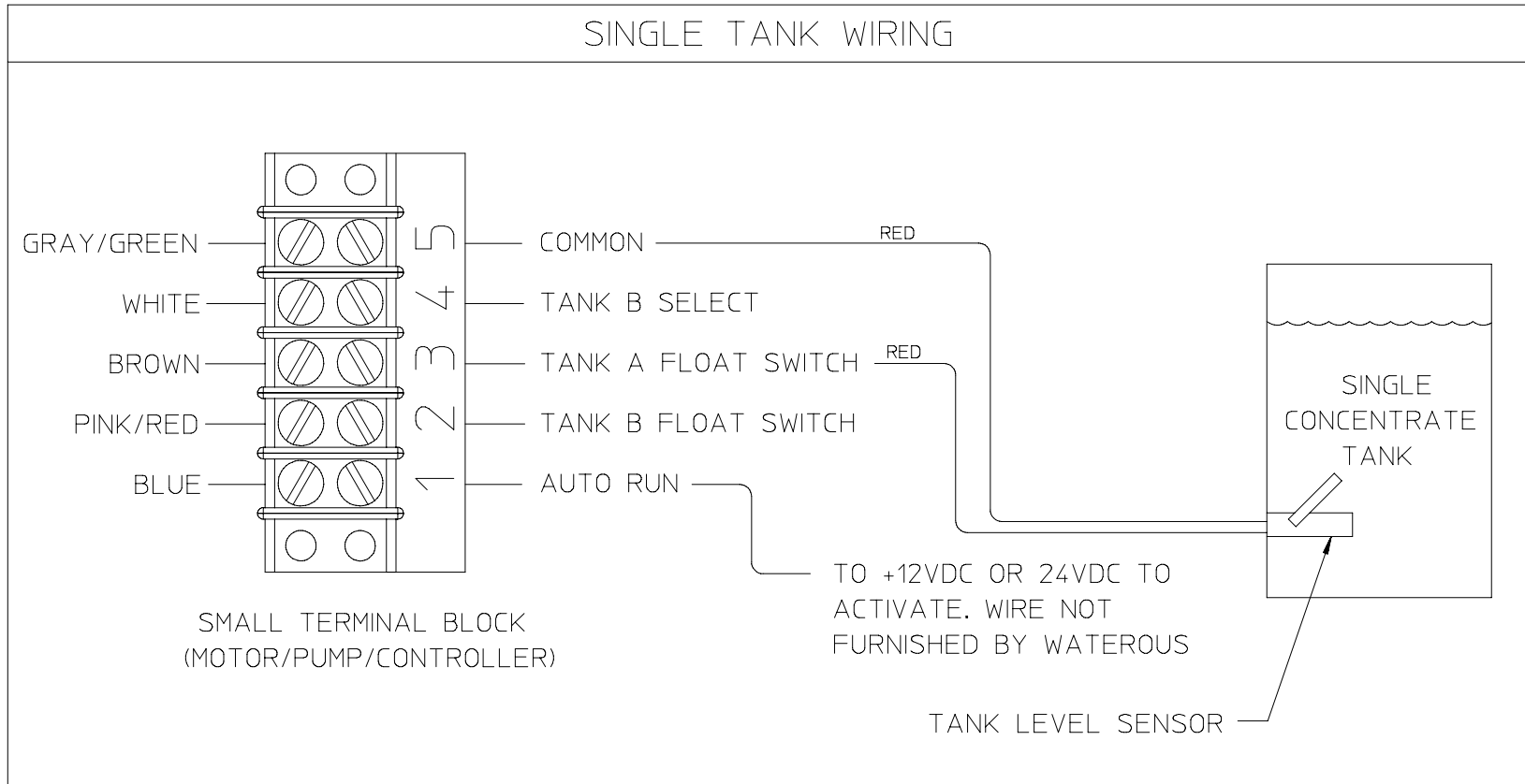
CAUTION

Always disconnect the ground straps and control cables from the Operator Interface Terminal (OIT) or other Aquis 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 to the electronic components.

Foam Manifold Grounding

The manifolds must be grounded. If metal piping is used, sufficient grounding may be present. However, Victaulic joints, plastic pipe, rubber hoses and rubber mounted pumps interfere with proper grounding and an additional ground wire may be required.

Foam Tank Switch - Single



from DPL83079

Foam Pump Calibration

The Aquis system is able to be field calibrated using the control function buttons on the operating interface terminal (OIT), see figure below. Only units of measure, water flow and the foam percentage default can be field set.

A. Entering Calibration Mode

1. Entering calibration is accomplished by using the control unit functions buttons.
2. To enter this function, press and hold the **SELECT** button for minimum of five (5) seconds. The OIT will display "5 SEC".
3. Continue to hold the **SELECT** button.
4. While the **SELECT** button is depressed, push the **UP** and **DOWN** arrow buttons at the same time. The display will show **CAL** for two (2) seconds and then display **F1**.
5. Use the **UP** button to advance to the next parameter (F2, F3, F4).
6. Use the **DOWN** button to back up to a previous parameter (F2, F1).
7. To edit a parameter, press the **SELECT** button at the associated Fn prompt.

B. F1 - Default Mix Percentage

1. At the **F1** prompt, press the **SELECT** button.
2. Use the **UP** and **DOWN** arrow buttons to select the default **FOAM %**. The only foam % selections will be .1%, .2%, .3%, .4%, .5%, .6%, .7%, .8%, .9%, 1.0%, 3.0% and 6.0%.
3. When finished, press the **SELECT** button to save the displayed value.

C. F2 - Units of Measurement

The units of measurement must be selected prior to any calibration functions. Units of measurement are U.S. Gallons, Imperial Gallons and Liters.

1. Push the **SELECT** button at the **F2** prompt. The display will show the current setting.
2. Use the **UP** and **DOWN** arrow buttons to select one of the following measurement units:
 - **GAL** will select U.S. Gallons
 - **IPL** will select Imperial Gallons
 - **LTR** will select Metric Liters
3. Pushing the **SELECT** button will save the displayed selection. This will allow for calibration of the water flow in the units of measurement selected.

D. F3 - Flow Rate Calibration

1. Press the **SELECT** button at the **F3** prompt. The current measured flow rate will be displayed. Establish a flow using an accurate flow measuring device.
2. Once this is established, press the **UP** or **DOWN** button to advance to the calibration step. If the displayed flow rate is correct, press the **SELECT** button to return back to the **F3** prompt. If there is insufficient flow, the display will show **LoFL** for two (2) seconds, then return back to the **F3** prompt.

3. The display will now display **50** (starting value) or the last calibration value entered.
4. Use the **UP** and **DOWN** arrow buttons to change the displayed value to match the actual flow rate according to the flow measuring device. If the button is only pressed momentarily, the display increments or decrements by one (1). If the button is held, the display will increment or decrement by five (5).
5. Once the correct flow is achieved, pushing the **SELECT** will save the setting and return to the **F3** prompt.

E. F4 - System Lock

System can be locked out after calibration and setup to avoid accidental changing.

WARNING

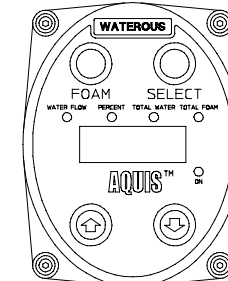
A locked out system can only be unlocked at a qualified Waterous Service Center.

1. Press the **SELECT** button at the F4 prompt and "EnAb" (enabled) will be displayed.
2. Pressing the **UP** button will toggle between "LoC" (locked) and "EnAb" (enabled). Settings will not be permanent until the calibration settings are saved.
3. Press the **SELECT** button and "F4" will be displayed.
4. Pressing the **FOAM** button saves the settings, locks the system and cannot be unlocked except at a qualified Waterous Service Center.

F. Saving Calibration

To save all the calibration settings to flash memory, press the **FOAM** button while at the **Fn** (n=1-4) prompt. The data will be stored and the unit will return to normal operation.

Operator Interface Terminal



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Troubleshooting Guide

It is important to know what to do if your foam system is not operating properly. This troubleshooting guide should help you diagnose, isolate and fix the problem encountered.

Problem	Cause	Fix
Poor foam solution (wet or dry)	Using wetting agent in place of foam	Flush system and install Class "A" foam.
	Lack of foam	Check if the Foam Pump is on. Check if there is foam in the reservoir. Make sure the foam supply valve is on and the Y strainer clean.
Foam in water system	Foam dumped into the water tank	Flush water tank and pump until foam is cleared.
	Foam cell is leaking into water tank	Condition applies to tanks utilizing a common wall(s) between the foam tank and the water tank. If a leak is confirmed, repair the foam tank and flush the water tank and pump until foam is cleared.
	Foam proportioning manifold check valve malfunction	If the above conditions have been corrected, the final cause for foam in the water tank may be the result of a malfunctioning foam manifold check valve. To troubleshoot, cap off one foam discharge that is plumbed to the foam manifold, open that discharge valve and increase the pump discharge to 30-40 PSI. Disengage the pump and monitor the corresponding discharge PSI gauge, looking for a drop in discharge pressure. If the PSI drops, it indicates the foam manifold check valve is leaking and requires repair.
	Foam manifold drain plumbed into master drain	Supply a separate drain for foam manifold.