

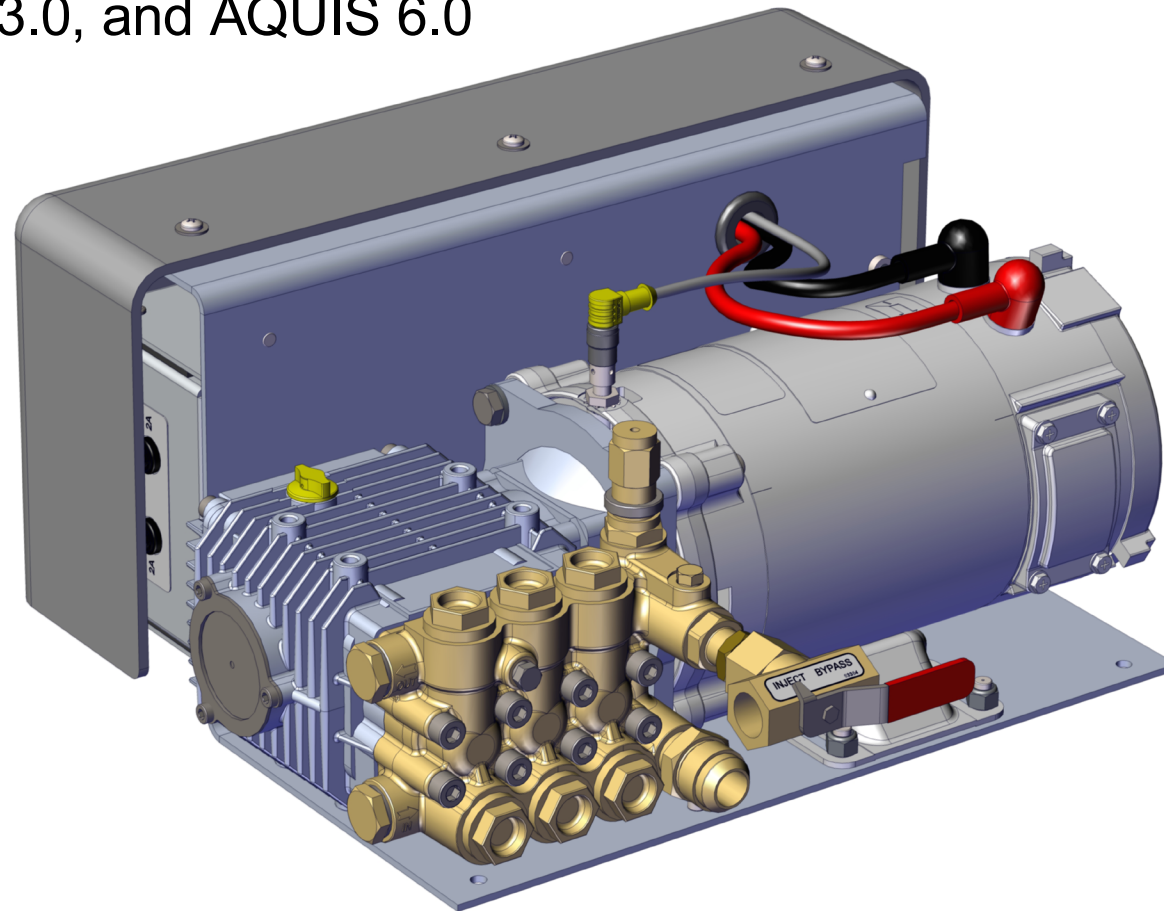
# WATEROUS

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## AQUIS™ Foam System

Installation, Operation, and Maintenance Instructions  
AQUIS 1.5, AQUIS 3.0, and AQUIS 6.0



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## Safety Precautions

- Read and understand this document before you begin the installation.
- Read and understand all the notices and safety precautions.
- Be aware that these instructions are only guidelines and are not meant to be definitive. Contact Waterous when you have questions about installing or operating this equipment.
- Do not install this equipment if you are not familiar with the tools and skills needed to safely perform required procedures—proper installation is the responsibility of the purchaser.
- Do not operate the equipment when safety guards are removed.
- Do not modify the equipment.
- Regularly check for leaks, worn, or deteriorated parts.
- Waterous reserves the right to make modifications to the system without notice.

## NOTICE

### Before operating the AQUIS™ Foam Proportioning System:

- Check the foam pump oil level and fill if necessary.
- Remove the foam pump shipping plug and replace it with this vented oil cap.

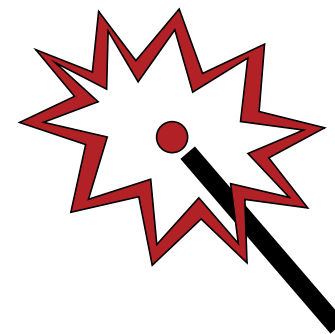


Refer to instruction  
F-1031-2447 for  
detailed information.

## NOTICE

### High Current

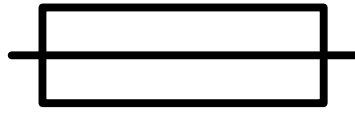
- High current from welding or jump start can damage electronic components.
- Disconnect all ground wire connections before jumping or welding.



## Safety Precautions—Continued

**NOTICE****Equipment Damage**

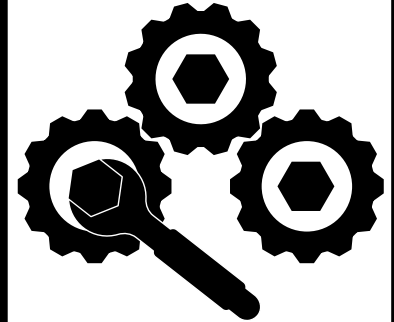
- Using the wrong fuse may damage the equipment.
- Only use the specified fuse rating.



**250 V**  
**2.0 A**

**NOTICE****Modification**

- Modifying the equipment can damage components and void your warranty.
- Do not modify the foam system.

**! WARNING****Hot Surface**

- Hot surface can burn you.
- Do not touch the surface during operation—allow it to cool after operating.

**! WARNING****Hot Liquid**

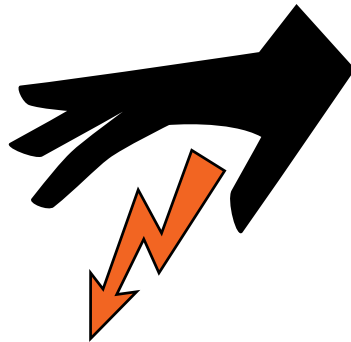
- Hot liquid can scald you.
- Do not operate if the water temperature exceeds 160°F (71°C).



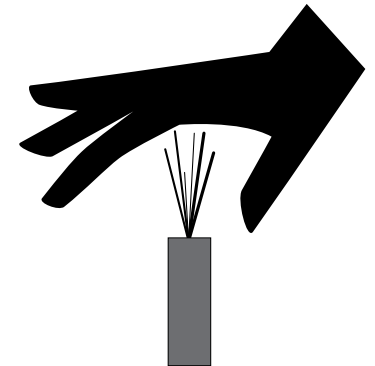
## Safety Precautions—Continued

**! WARNING****High Current**

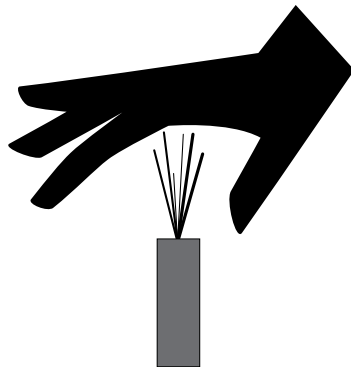
- Current can cause serious injury or death.
- Disconnect the power before servicing the pump.

**! WARNING****High Pressure**

- Liquid ejected at high pressure can cause serious injury.
- Drain the lines before servicing.

**! WARNING****High Pressure**

- Liquid ejected at high pressure can cause serious injury.
- Do not operate beyond recommended pressure.



Use this document to install, operate and maintain your AQUIS™ foam proportioning system. Please understand the following conditions before continuing with the document:

- The instructions may refer to options or equipment that you may not have purchased with your system.
- The graphics in this document are intended to illustrate concepts. Do not use them to determine physical attributes, placement, or proportion.
- Do not install this equipment if you do not have the necessary skills, knowledge, and experience installing similar equipment.
- The equipment described in this document is intended to be operated by a person, or persons, with the basic knowledge of operating similar equipment.
- Read and understand this document before installing or operating the equipment. Contact Waterous for more information.

This document is divided into the following sections:

#### **SAFETY**

This section describes general precautions and alert symbols that are in this document.

#### **INTRODUCTION**

This section is an overview of the document.

#### **PRODUCT OVERVIEW**

This section describes the parts and associated components that make up the system.

#### **INSTALLATION**

This section describes the initial setup procedures

#### **OPERATION**

This section describes how to operate the equipment.

#### **MAINTENANCE**

This section describes typical maintenance procedures.

#### **TROUBLESHOOTING**

This section provides information to troubleshooting system.

## Using this Document

Use the guidelines below when viewing this document.

### Viewing the Document Electronically

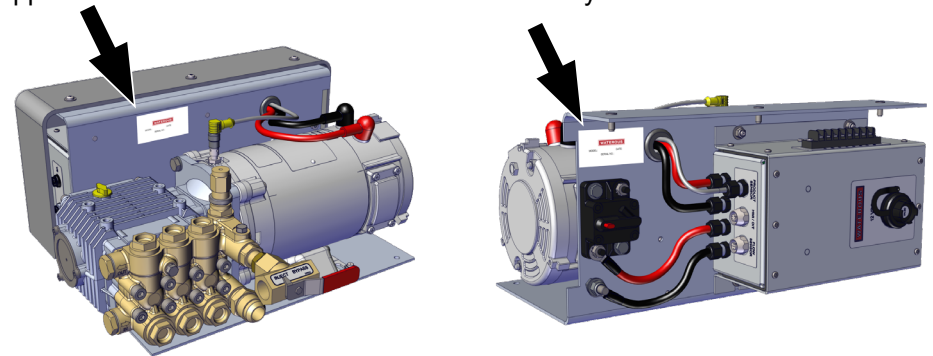
- View this document in landscape orientation.
- Use the table of contents to navigate directly to that section.
- Text **with this appearance** is linked to a reference.

### Printing the Document

- The document is viewed the best when printed in color.
- The *print on both sides* and *flip on long edge* features can provide the best results.
- Use a 3-ring binder to store the document.

## Locating the Serial Number

Locate and record the model and serial number of the equipment in your application. Have this information available when you call Waterous.



Typical Label Locations

**Model number-**

**Date-**

**Serial number-**



## Standard Components

This table shows the standard components that are associated with the different AQUIS foam system configurations.

		Foam Only or Traditional CAFSystems™			ONE STEP™ and Eclipse GEN 2.0™			Included with Kit L1210
		AQUIS 1.5	AQUIS 3.0	AQUIS 6.0	AQUIS 1.5	AQUIS 3.0	AQUIS 6.0	
Concentrate Wye Strainer		3/4 inch	3/4 inch	1 inch	3/4 inch	3/4 inch	1 inch	X
Concentrate Injection Check Valve		3/8 inch	3/8 inch	3/8 inch	3/8 inch	3/8 inch	3/8 inch	X
Cables	OIT/HMI (8-pin)	6 Meter	6 Meter	6 Meter	6 Meter	6 Meter	6 Meter	X
	Flowmeter (4-pin)	3 Meter	3 Meter	3 Meter	3 Meter	3 Meter	3 Meter	X
	Tank Level Switch (2 wire)	4 Meter	4 Meter	4 Meter	4 Meter	4 Meter	4 Meter	X
Foam Tee or Manifold	Tee with Flowmeter	Standard	Standard	Standard	Not Available	Not Available	Not Available	—
	Master Waterway Check Valve (Includes a concentrate injection port)	Upgrade	Upgrade	Upgrade	Not Available	Not Available	Not Available	
	Manifold (Includes waterway check valve, flowmeter and concentrate injection port)	Upgrade	Upgrade	Upgrade	Standard	Standard	Standard	
Operator Interface Terminal (OIT)	Manual	Standard	Not Available	Not Available	Not Used (See Note 1)			X
	Digital	Upgrade	Standard	Standard				
Operation Instruction Panel Plate	Manual OIT	No (See Note 2)	Not Available	Not Available	Not Used (See Note 1)			X
	Digital OIT	Yes	Yes	Yes				

1. For ONE STEP and Eclipse GEN 2.0 CAFSystems, the OIT port on the controller is connected to the system PLC which connects to the Tellurus™ HMI panel.
2. Manual OIT plate includes operation instructions.

## Optional Components

This table shows additional components that are available to meet the requirements of your application.

Component	Purpose	Available with:	
		Traditional CAFS or Foam Only	ONE STEP and Eclipse GEN 2.0 CAFS
Supply level sensor	This sensor alerts you when the concentrate in the supply tank reaches a predetermined level.	Yes	Yes
Supply hose kit	This kit provides hoses and fittings to transfer concentrate from the supply tank to the foam system.	Yes	Yes
Concentrate inject/bypass hose kit	This kit provides hoses and fittings that transfer concentrate from the inject/bypass tee.	Yes	Yes
OIT/HMI extension cable	This cable extends the routing distance of the OIT/HMI cable. It is available in a 3 meter and 6 meter length.	Yes	Yes
Flowmeter extension cable	This cable extends the routing distance of the flowmeter cable. It is available in a 3 meter length.	Yes	Yes
Concentrate level sensor extension cable	This cable extends the routing distance of the level sensor cable. It is available in a 4 meter length.	Yes	Yes
Rating panel plate	This panel plate displays the foam system rating and performance.	Yes	Yes
System schematic panel plate	This panel plate displays a schematic of the foam system components.	Yes	No
Foam concentrate fill Kit	This kit includes a pump, pick-up hose, panels and 2 supply level switches to fill an on-board supply tank. <b>Note:</b> <i>This kit does not include additional hoses or fittings.</i>	Yes	Yes
Dual OIT kit	This kit provides an additional OIT to add foam system control from a second location.	Yes	No
Dual tank selector kit	This kit allows drawing the concentrate from 2 on-board supply tanks, or an on-board tank and an external container. <b>Note:</b> <i>This kit is not available for AQUIS 1.5.</i>	Yes	Yes
Overboard foam pick-up kit	This kit includes a pump, a pick-up hose and fittings to transfer concentrate from an external container. <b>Note:</b> <i>This option requires the dual tank selector kit.</i>	Yes	Yes
Pick-up hose kit	This kit includes a pick-up hose and wand to transfer concentrate to the foam system, or to an on-board tank, from an external container.	Yes	Yes
Dual foam injection kit	This kit provides a pushbutton control that allows for an additional flowmeter to communicate with the AQUIS foam system.	Yes	No
Panel mounted concentrate strainer	This kit includes a strainer that is mounted to the panel.	Yes	Yes
Flush kit	This kit includes a 3-way valve and fittings to allow a garden hose to flush the foam system.	Yes	Yes

## AQUIS 1.5 Components

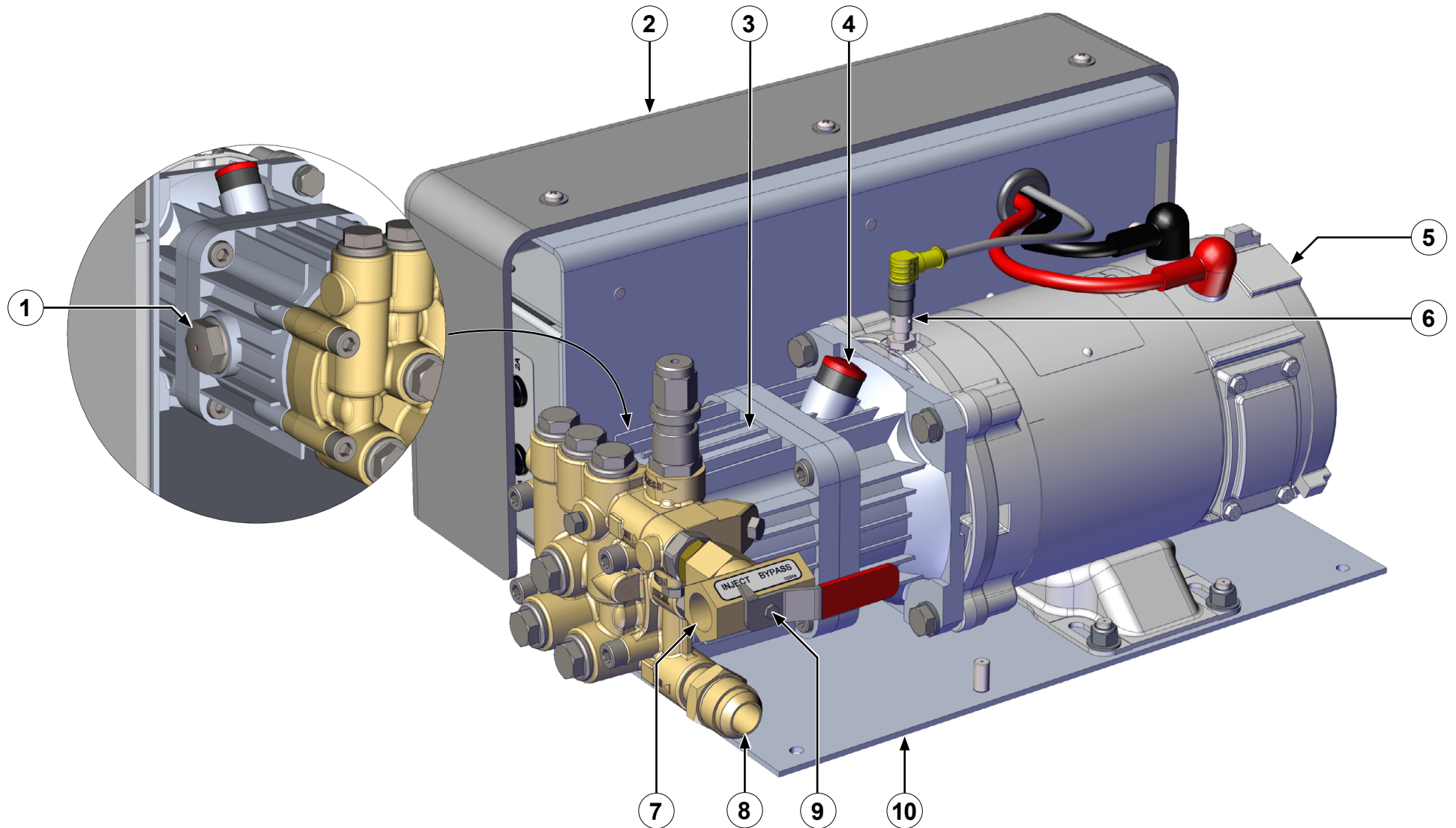


Figure 1

## AQUIS 1.5 Components

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Feature	Description
1 Oil level window	This shows the oil level in the pump.
2 Cover	This covers the control box and terminal strip.
3 Pump	This is the pump assembly.
4 Vented oil cap	This is cap replaces the shipping cap.
5 Motor	This operates the pump.
6 Product sensor	This senses the pump speed.
7 Pump outlet	This outputs the concentrate.
8 Pump inlet	This is the input for the concentrate supply.
9 Inject/Bypass valve	This routes the concentrate to the injector or to an external container.
10 Mounting bracket	This is the mounting bracket for foam pump assembly.

## AQUIS 3.0 Components

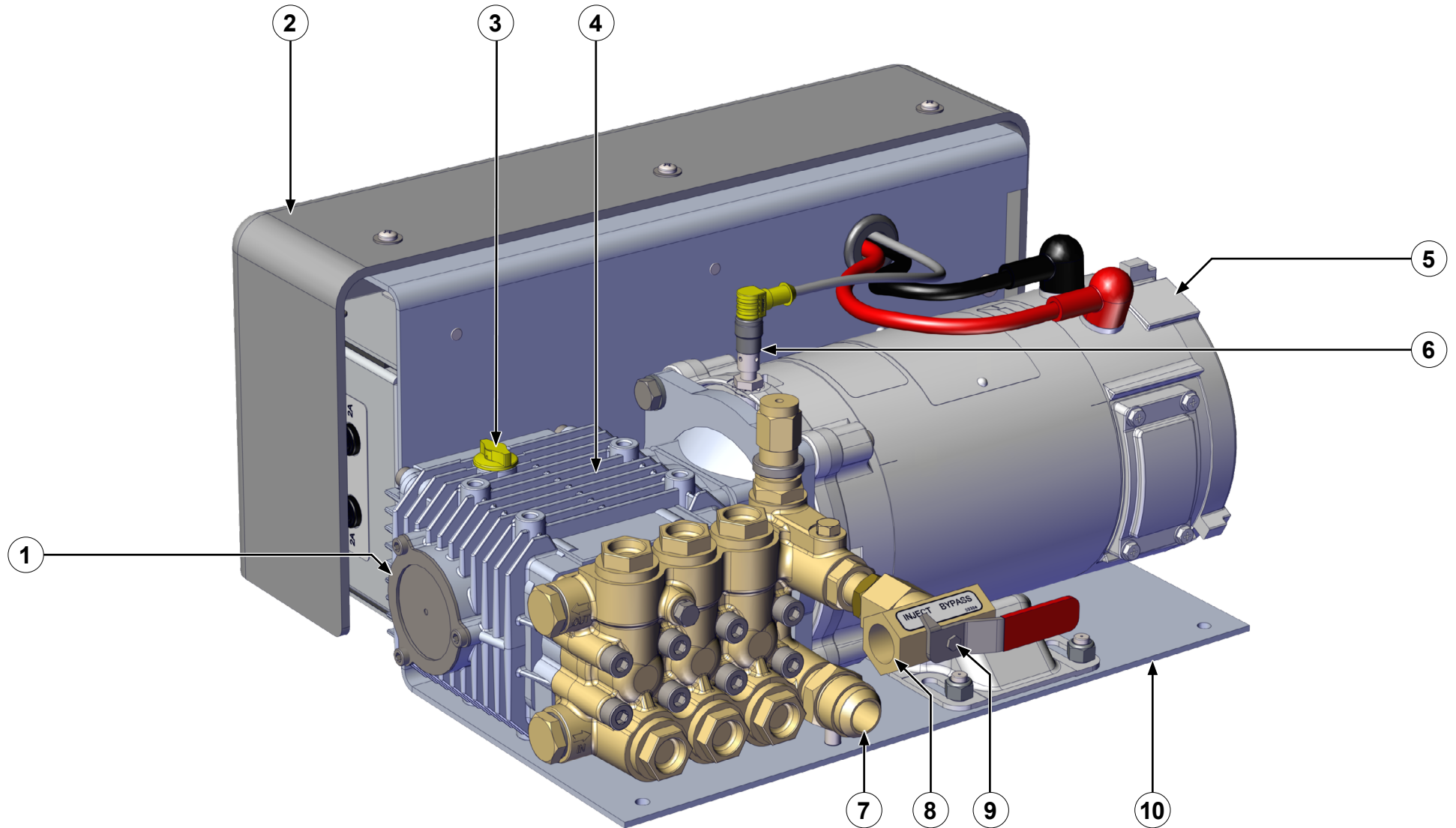


Figure 2

## AQUIS 3.0 Components

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Feature	Description
1 Oil level window	This shows the oil level in the pump.
2 Cover	This covers the control box and terminal strip.
3 Vented oil cap	This is cap replaces the shipping cap.
4 Pump	This is the pump assembly.
5 Motor	This operates the pump.
6 Product sensor	This senses the pump speed.
7 Pump inlet	This is the input for the concentrate supply.
8 Pump outlet	This outputs the concentrate.
9 Inject/Bypass valve	This routes the concentrate to the injector or to an external container.
10 Mounting bracket	This is the mounting bracket for foam pump assembly.

## AQUIS 1.5 and 3.0—Under the Cover

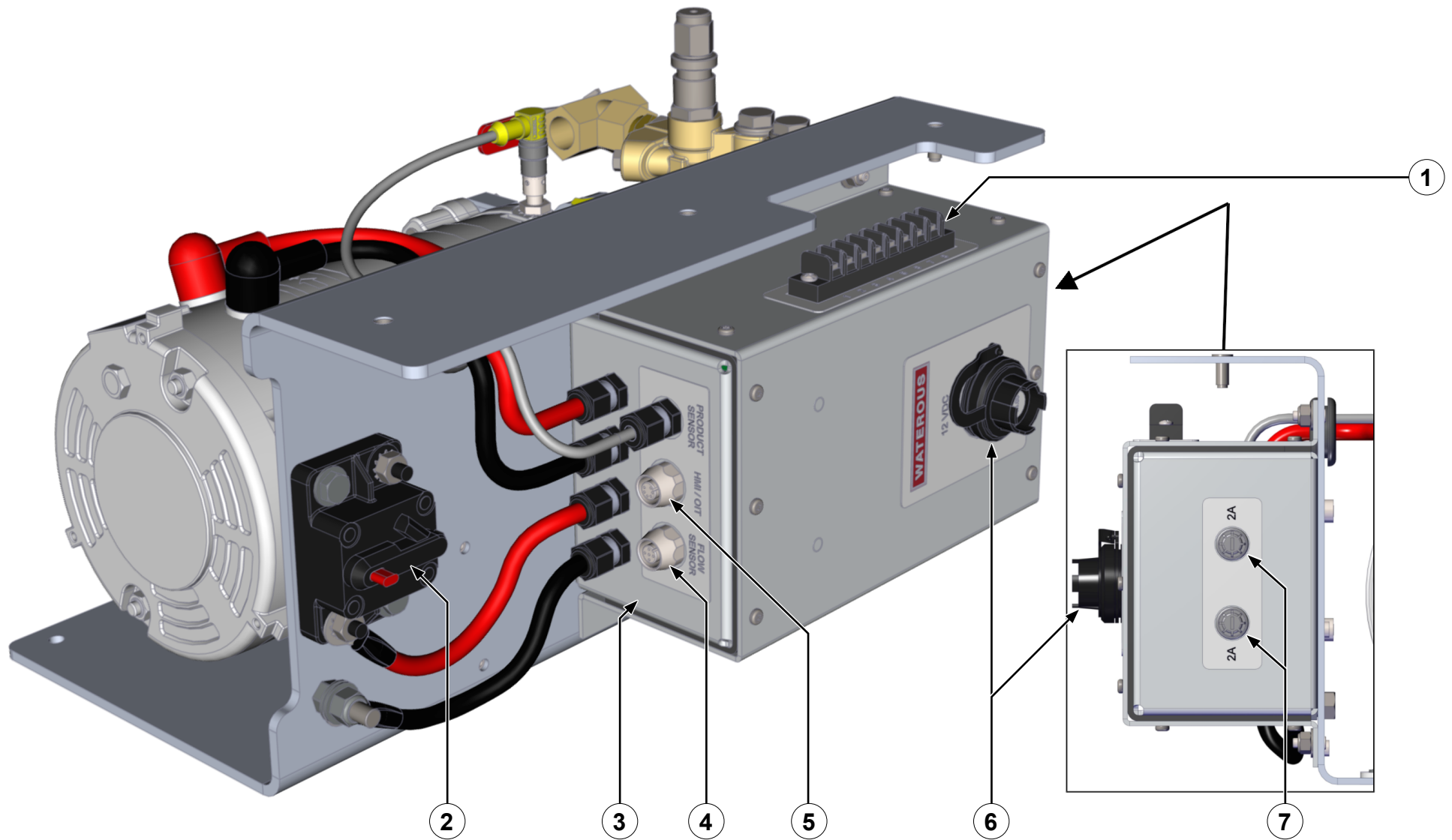


Figure 3

## AQUIS 1.5 and 3.0—Under the Cover

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Feature	Description
1 Accessory terminal strip	This connects accessories to the control box.
2 Circuit breaker	This prevents over-current.
3 Control box	This houses the electric components.
4 Flowmeter connection	This connects control box to the flowmeter.
5 HMI/OIT connection	This connects the controller to the HMI or OIT.
6 USB connection	This connects control box to upgrade equipment.
7 Fuse housing	This is the fuse location.



# AQUIS 6.0 Components

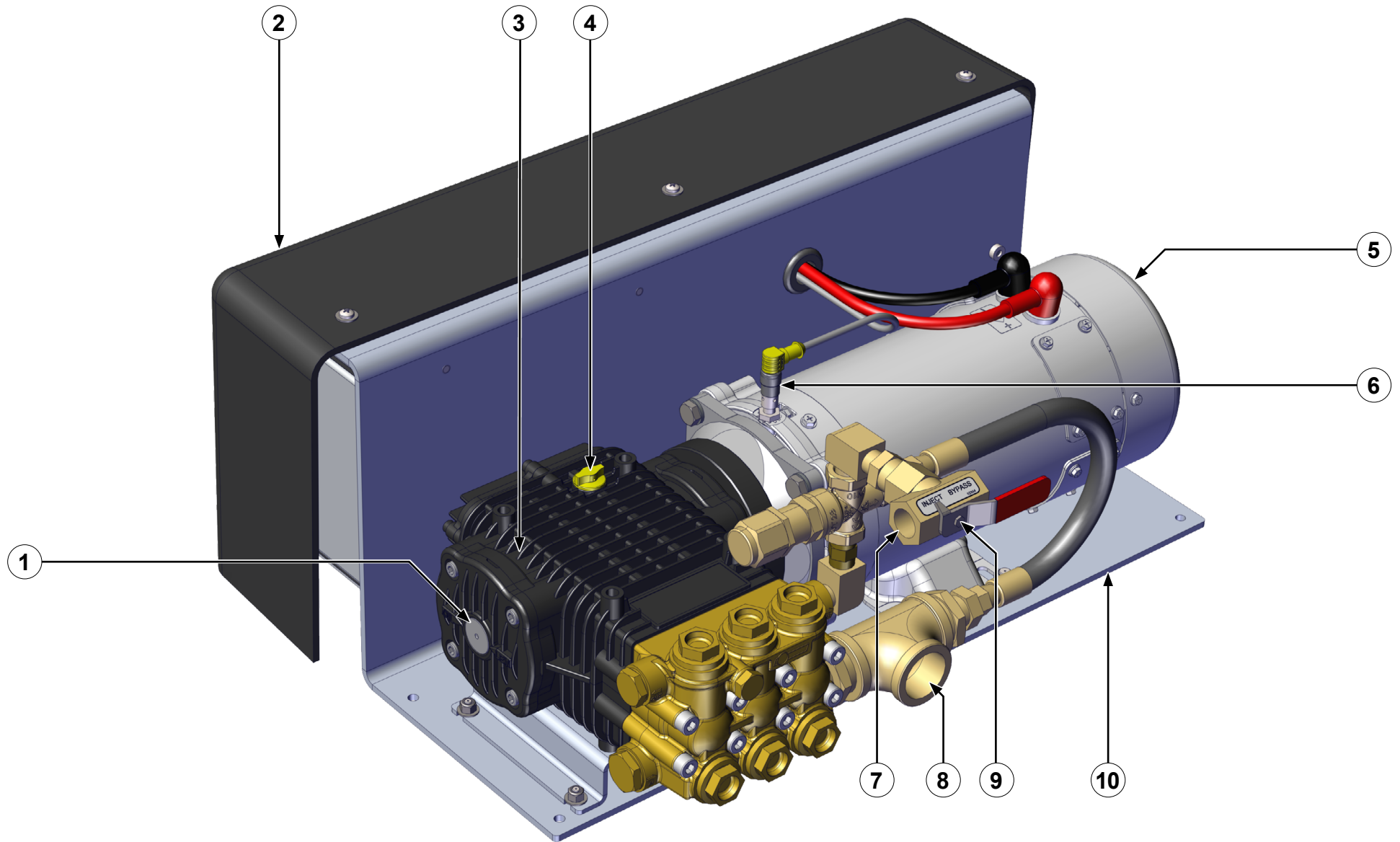


Figure 4

## AQUIS 6.0 Components

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Feature	Description
1 Oil level window	This shows the oil level in the pump.
2 Cover	This covers the control box and terminal strip.
3 Pump	This is the pump assembly.
4 Vented oil cap	This is cap replaces the shipping cap.
5 Motor	This operates the pump.
6 Product sensor	This senses the pump speed.
7 Pump outlet	This outputs the concentrate.
8 Pump inlet	This is the input for the concentrate supply.
9 Inject/Bypass valve	This routes the concentrate to the injector or to an external container.
10 Mounting bracket	This is the mounting bracket for foam pump assembly.

# AQUIS 6.0—Under the Cover

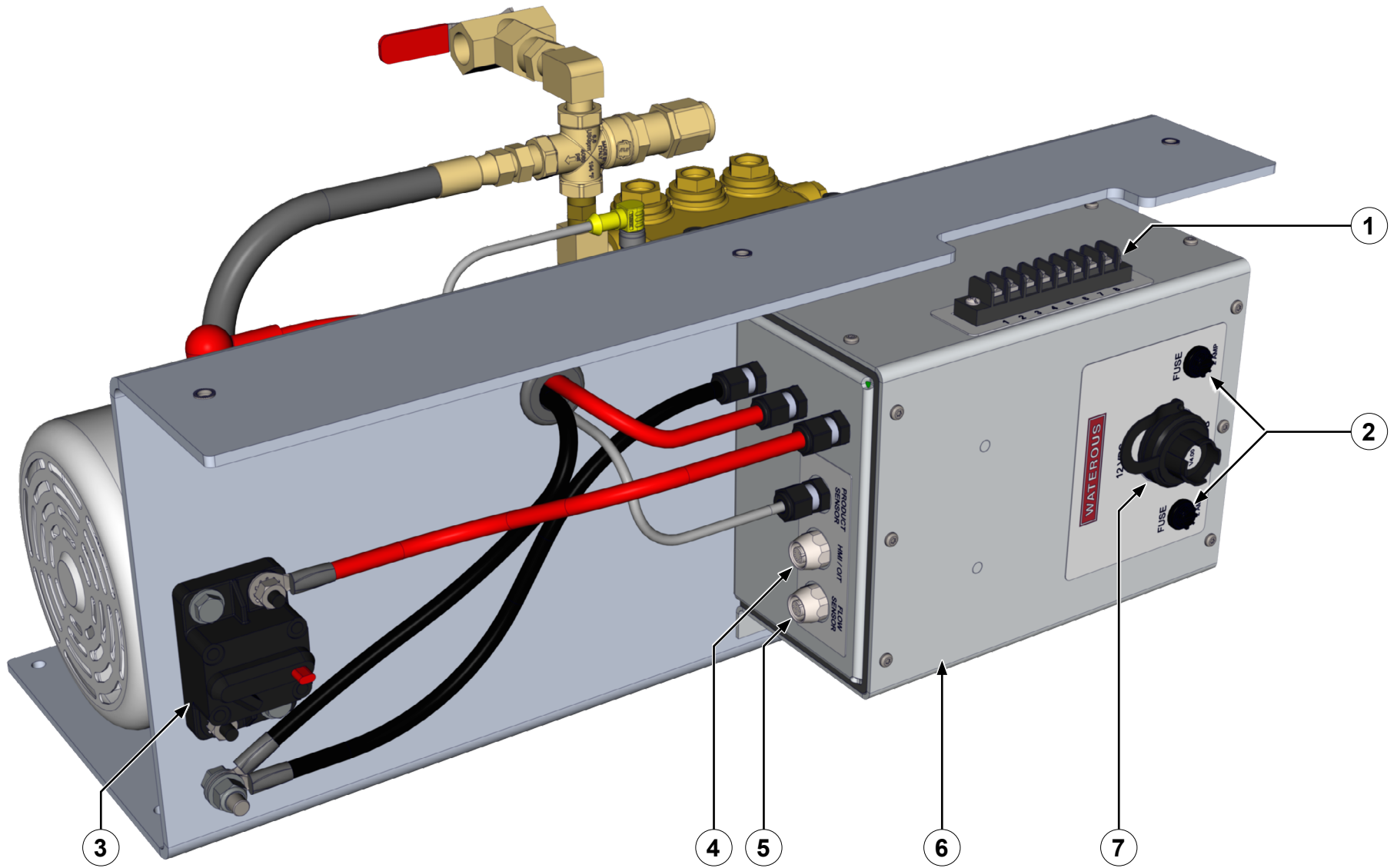


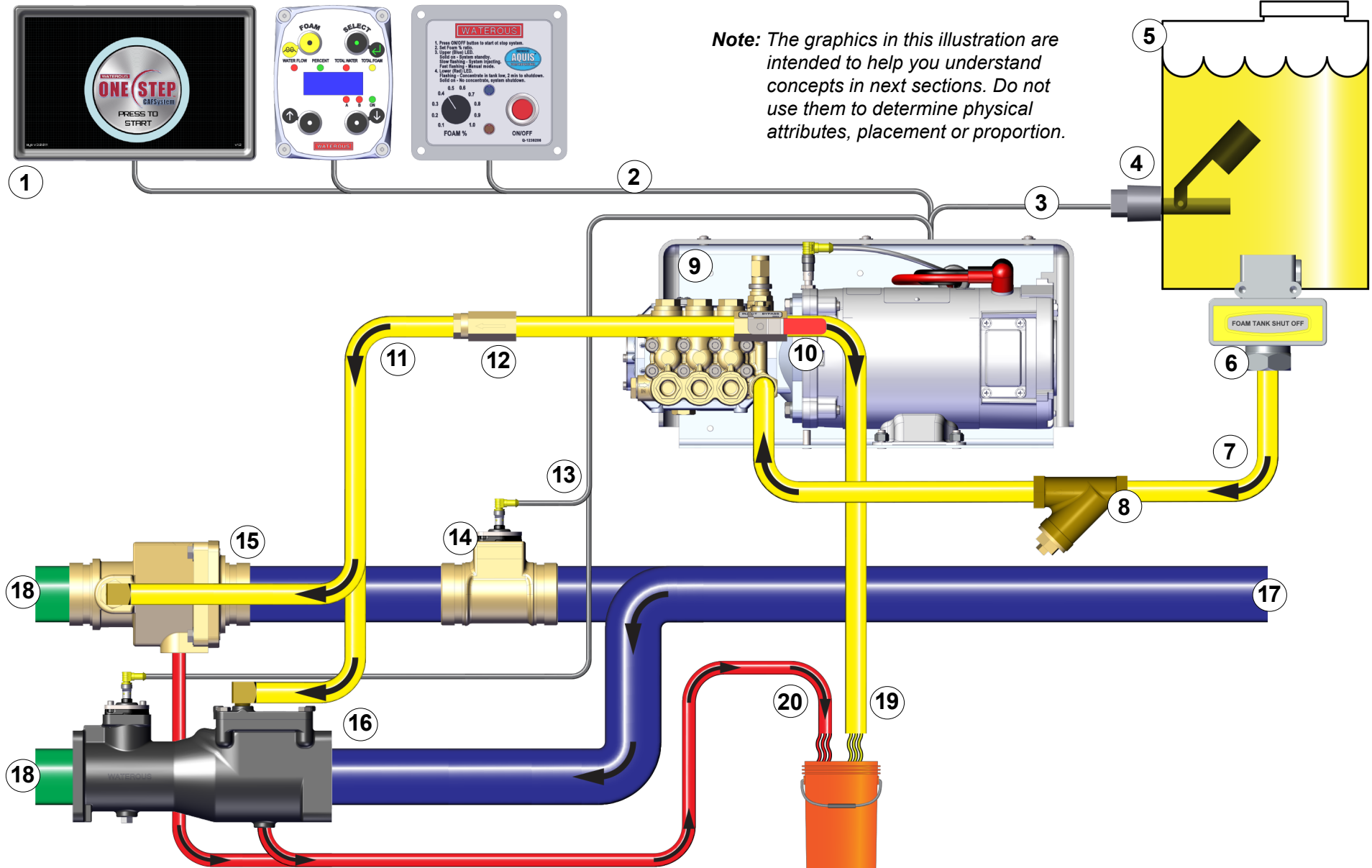
Figure 5

## AQUIS 6.0—Under the Cover

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Feature	Description
1 Accessory terminal strip	This connects accessories to the control box.
2 Fuse housing	This is the fuse location.
3 Circuit breaker	This prevents over-current.
4 HMI/OIT connection	This connects the controller to the HMI or OIT.
5 Flowmeter connection	This connects control box to the flowmeter.
6 Control box	This houses the electric components.
7 USB connection	This connects control box to upgrade equipment.

### Overview Diagram—Typical



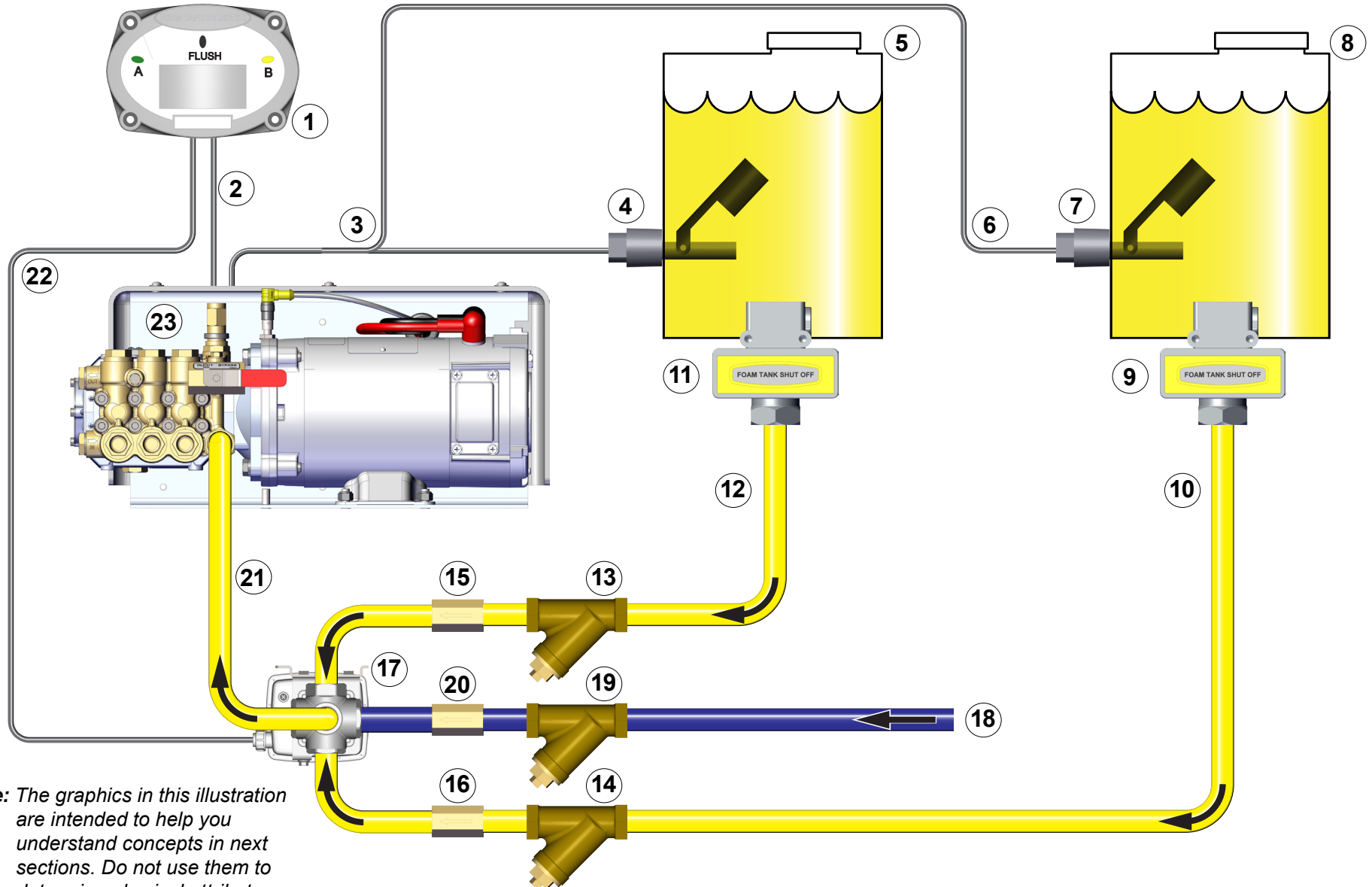
*Note: The graphics in this illustration are intended to help you understand concepts in next sections. Do not use them to determine physical attributes, placement or proportion.*

## System Overview

The following information describes the components that are used in a typical foam system setup. Your application may not include all, or contain additional components than the ones described below. Contact Waterous for more information.

Component/Accessory	DESCRIPTION
1 OIT or HMI	The operator interface terminal (OIT) or a human machine interface (HMI) controls the foam system, depending on your configuration. An OIT used with a traditional CAFS or a foam only (non CAF) system and an HMI when you use it with a ONE STEP or an Eclipse GEN 2.0 CAFSystem.
2 OIT/HMI cable	This cable connects the OIT or HMI to the control box.
3 Tank level sensor wire	This wire connects the level sensor to the control box.
4 Tank level sensor	This sensor alerts the operator when the supply reaches a predetermined level in the supply tank. It is available as a horizontal or vertical mount.
5 Supply tank	The supply tank contains the foam concentrate.
6 Tank shutoff valve	The shutoff valve stops the concentrate from transferring into the supply hose.
7 Supply tank hose	The supply hose transfers the concentrate from the supply tank to the pump.
8 Wye fitting with strainer	The wye fitting with strainer traps debris that is in the concentrate.
9 Foam pump	The foam pump transfers pressurized concentrate from the supply tank into the waterway.
10 Inject/bypass valve	The inject/bypass valve directs the concentrate into the waterway, or removes it from the foam system.
11 Injector hose	This hose transfers the concentrate from the pump to the injector.
12 Injector check valve	This valve is installed in-line with the injector hose and prevents the concentrate from reversing direction.
13 Flowmeter sensor cable	This cable connects the flowmeter to the control box.
14 Flowmeter tee	The flowmeter tee measures the amount of water flowing through the waterway.
15 Master waterway check valve with injector	This valve is installed in-line with the waterway and prevents the concentrate from reversing direction. The injector is installed on the valve and directs the concentrate into the waterway.
16 Foam manifold	The foam manifold is an assembly that contains a waterway check valve, injector and flowmeter.
17 Waterway supply line	The waterway supply line is the line that is connected to the fire pump.
18 Foam solution	The foam solution is the product created when the concentrate is combined with the water from the fire pump.
19 Bypass hose	The bypass hose transfers the concentrate from the pump to an external container.
20 Drain line	Drain lines are provided by the apparatus manufacture and are used to drain your system.

## Dual Tank System Overview—Optional



**Note:** The graphics in this illustration are intended to help you understand concepts in next sections. Do not use them to determine physical attributes, placement or proportion.

## Dual Tank System Overview—Optional

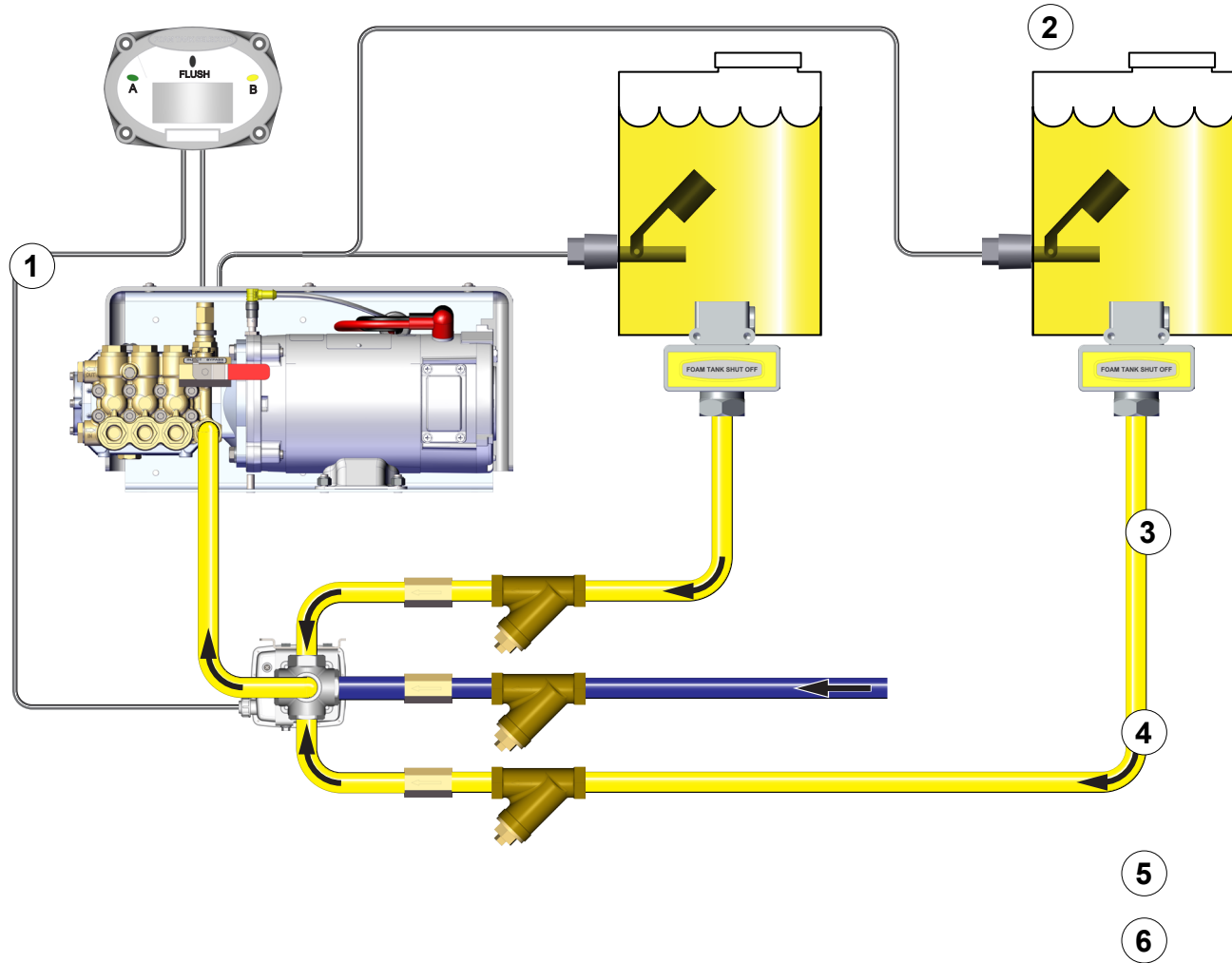
In addition to the typical setup, you can add additional flexibility by incorporating the dual tank option. Below is a description of the additional components used in most applications. Contact Waterous for more information.

Component/Accessory	DESCRIPTION
1 Dual tank controller	This controller switches the source that supplies concentrate to the pump.
2 Dual tank signal wire	This cable connects the dual tank controller to the control box on the pump.
3 Tank-A sensor cable	This cable connects the tank-A sensor to the control box.
4 Tank-A level sensor	This sensor alerts the operator when the concentrate reaches a predetermined level in tank-A. This sensor is available in horizontal or vertical mount configurations.
5 Tank-A	This tank is part of the apparatus and holds the foam concentrate.
6 Tank-B sensor cable	This cable connects the tank-B sensor to the control box.
7 Tank-B level sensor	This sensor alerts the operator when the concentrate reaches a predetermined level in tank-B. This sensor is available in horizontal or vertical mount configurations.
8 Tank-B	This is added to the apparatus to provide a secondary supply of foam concentrate.
9 Tank-B shutoff valve	The tank-B shutoff valve stops the concentrate from flowing into the supply hose.
10 Tank-B supply hose	This hose supplies concentrate between tank-B supply and the electric valve.
11 Tank-A shutoff valve	The tank-A shutoff valve stops the concentrate from flowing into the supply hose.
12 Tank-A supply hose	This hose supplies concentrate between tank-A supply and the electric valve.
13 Tank-A wye with strainer	This fitting is installed in-line with the tank-A supply hose.
14 Tank-B wye with strainer	This fitting is installed in-line with the tank-B supply hose.
15 Tank-A check valve—3/4 or 1 NPT	This check valve is installed in-line with the tank-A supply hose.
16 Tank-B check valve—3/4 or 1 NPT	This check valve is installed in-line with the tank-B supply hose.
17 Electric valve	This valve determines which tank supplies the concentrate.
18 Flush system supply hose	Provides a method of flushing the foam system.
19 Flush system wye with strainer	This fitting is installed in-line with the flush system supply hose.
20 Flush check valve—3/4 or 1 NPT	This check valve is installed in-line with the flush system supply hose.
21 Concentrate supply hose	This hose connects the electric valve to the pump.
22 Electric valve cable	This cable connects the electric valve to the dual tank controller.
23 Foam pump	The foam pump transfers pressurized concentrate from the supply tank into the injector.

**Note:** Tank-B can take the form of a tank installed in the apparatus, or as an external container.



# Flush System Overview—Optional



## Flush Kit Overview—Optional

You can add the flush kit to the AQUIS to flush the system when necessary. The environment, the concentrate used, and other factors determine if or when you need to flush the foam pump. Refer to the apparatus and/or concentrate manufacturer to determine a protocol for flushing. Contact Waterous for more information.

Component/Accessory	DESCRIPTION
1 Foam pump	The foam pump transfers pressurized concentrate from the supply tank into the injector.
2 Supply tank	The supply tank contains the foam concentrate.
3 Tank shutoff valve	The shutoff valve stops the concentrate from transferring into the supply hose.
4 3-Way tee valve	The valve directs the flow of clear-water or concentrate into the foam pump.
5 Garden hose fitting	This allows a garden hose to connect to the flush system. <b>Note:</b> A reducer fitting is included with the 1 inch NPT kit.
6 End cap	This protects the garden hose fitting when not in use.

## Component Overview

---

The AQUIS foam proportioning system injects a foam concentrate into the waterway to create a solution that is delivered to the apparatus discharge lines. The AQUIS system consists of many components that control and distribute the concentrate. This section describes the components, appropriate specification, and how they are used in the system.

## Hose Lines and Fittings

---

Hose lines distribute the concentrate between the foam system components. Hoses are not supplied in this kit. Contact Waterous for more information.

### Supply Hose

---

The supply hose routes the concentrate from the supply tank to pump. Contact Waterous for information about obtaining hose lines or you can source them locally.

### Inject Hose

---

The inject hose routes the concentrate from the pump to the injector.

### Fittings

---

Fittings connect the hoses to the various components in the system.

### Bypass Hose

---

The bypass hose routes the concentrate from the inject/bypass valve to outside the apparatus.

## Pump Mounting Hardware

---

The mounting hardware is required to secure the pump assembly to the apparatus. The hardware is not supplied with the kit. Source the hardware locally.

## Power Cables

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Power cables bring power to the pump. Make sure that you use the same length and gauge for both the positive and the ground cable. The cables are not supplied in this kit. Source power cables from a local supplier. Refer to **"Connecting the Power Supply" on page 43** for specific requirements.

## Concentrate Tank

---

The concentrate tank holds the concentrate until it is required.

## OIT/HMI Cable

---

This cable connects the OIT or HMI to the control box (**Figure 3** and **Figure 5**). This cable is an M12, 8-pin connector.

## Flowmeter Cable

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This cable connects the flowmeter to the control box (**Figure 3** and **Figure 5**). This cable is an M12, 5-pin connector.

## Cable Extension

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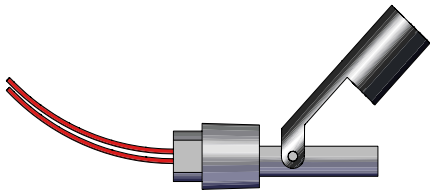
Extension cables extend the routing distance of the flowmeter or OIT/HMI cable. Contact Waterous for information about obtaining extension cables. Cables are available in a 3 and 6 meter lengths.

## USB Port

The USB port is used to install program updates to the controller. It is a USB type-B connector to connect to the control box (**Figure 3** and **Figure 5**).

## Supply Tank Level Sensor

This sensor alerts you when the concentrate reaches a predetermined level in the supply tank. A sensor not supplied in this kit. Contact Waterous for information about obtaining a sensor.



Horizontal Sensor

**Figure 6**



Vertical Sensor

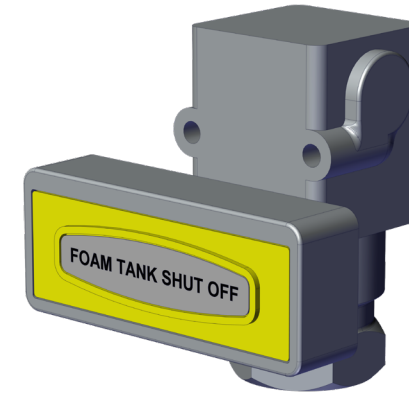
**Figure 7**

## Supply Tank Level Sensor Cable

This cable connects the level sensor to the control box. It is 2 bare wires, without connectors.

## Supply Tank Shutoff Valve

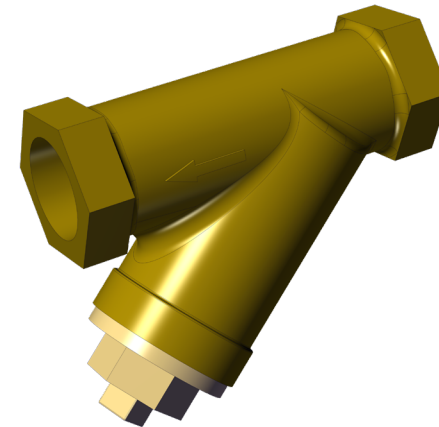
This valve stops the flow of concentrate into the supply hose lines (**Figure 8**). The valve is an optional component available through Waterous. A supply tank shutoff valve is required per NFPA.



**Figure 8**

## Wye Fitting with Strainer

This fitting incorporates a strainer that collects debris that could damage your foam system (**Figure 9**). It is available in 3/4 and 1 inch NPT.



**Figure 9**

## Concentrate Inject Check Valve

This check valve is installed in the injector fitting and prevents the foam solution from entering the concentrate hose (Figure 10). The valve is 3/8 inch NPT.

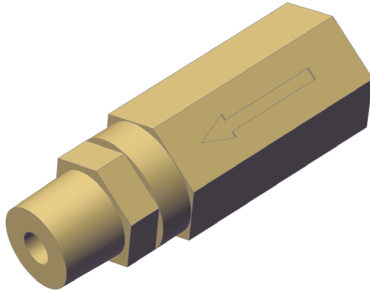
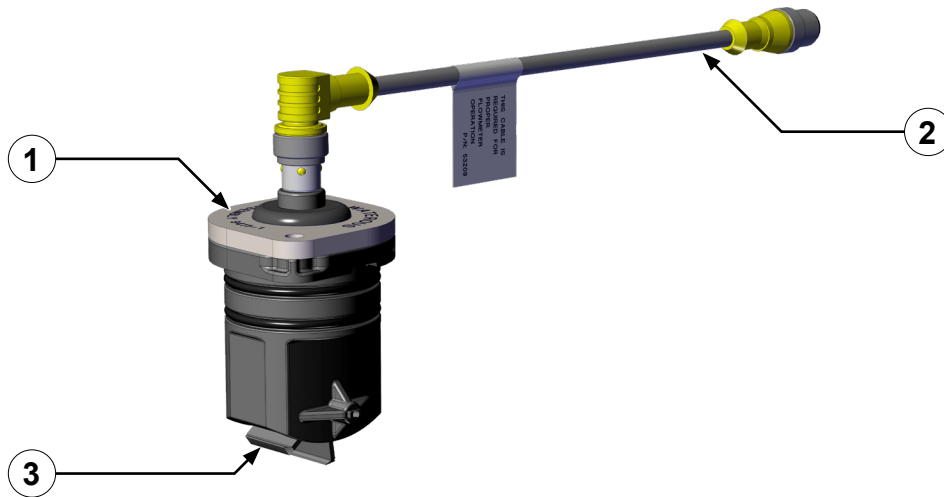


Figure 10

## Flowmeter

The flowmeter paddlewheels measure the amount of water flowing (Figure 11). The flowmeter is installed in the flowmeter tee or foam manifold.



1. Flowmeter

2. Cable

3. Paddlewheel

Figure 11

## Inject/Bypass Valve

Use the inject/bypass valve (Figure 12) to manually direct the concentrate as follows:

- Rotate the handle to the inject position to create a foam solution.
- Rotate the handle to the bypass position to direct the concentrate out of the system.

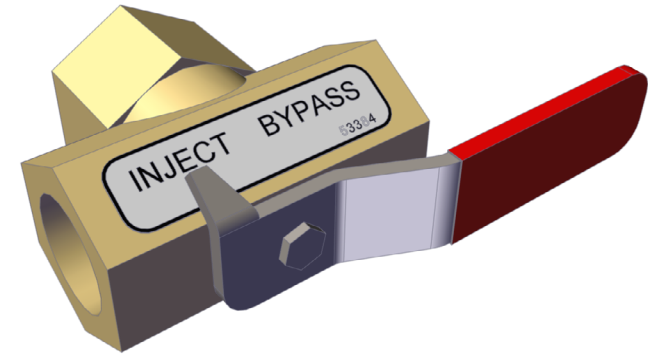
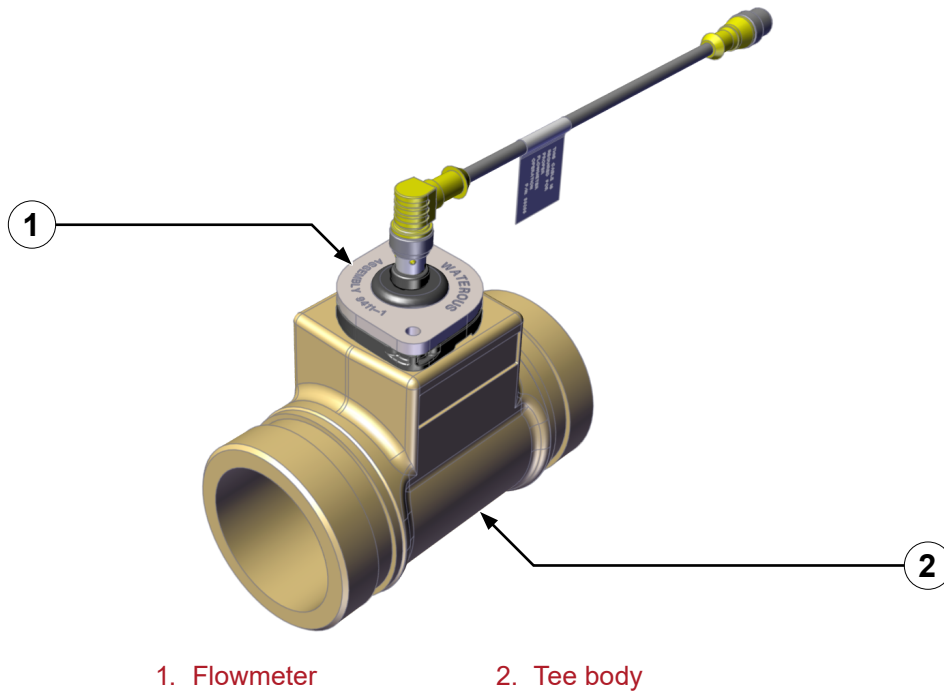


Figure 12

## Flowmeter Tee

The flowmeter tee houses the flowmeter and measures the amount of water flowing from the waterway supply line (**Figure 13**).



**Figure 13**

The flowmeter tee is available in the following configurations:

**2-inch tee**

Inlet/Outlet: Combination Victaulic (2 inches) and FNPT (1-1/2 inches)

**2-1/2-inch tee**

Inlet/Outlet: Combination Victaulic (2-1/2 inches) and FNPT (2 inches)

**3-inch tee**

Inlet/Outlet: Combination Victaulic (3 inches) and FNPT (2-1/2 inches)

## Master Waterway Check Valve

This valve ensures that the water and concentrate flow in one direction (**Figure 14**). It prevents the mix flowing into the water tank or pump. The check valve is available in the following configurations:

### 1-1/2-inch valve

Inlet: Victaulic (1-1/2 inches) FNPT (1-1/2 inches)

Outlet: Combination: Victaulic (2 inches) and FNPT (1-1/2 inches)

### 2-inch valve

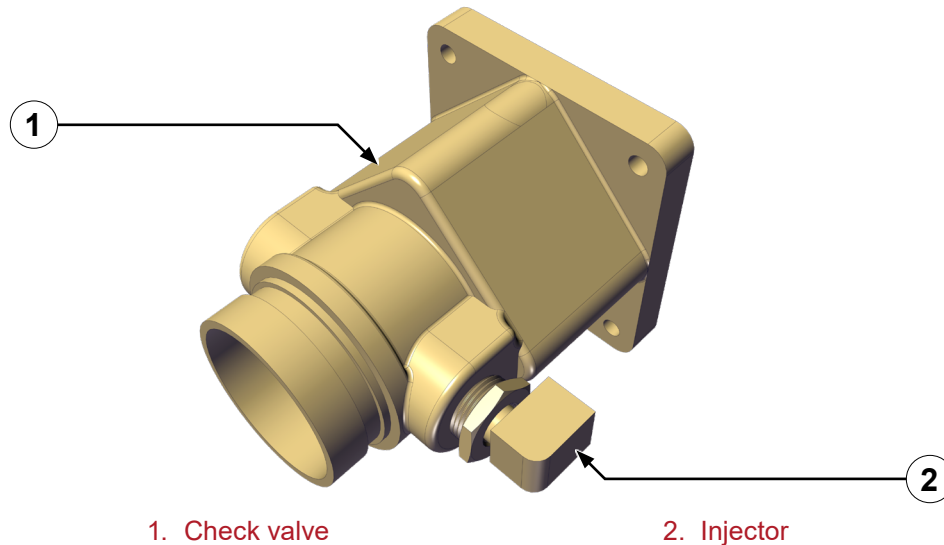
Inlet: Victaulic (2 inches) Victaulic (2 inches)

Outlet: Victaulic (2 inches) FNPT (2 inches)

### 2-1/2-inch valve

Inlet: Victaulic (2-1/2 inches) Victaulic (2-1/2 inches)

Outlet: Victaulic (2-1/2 inches) FNPT (2-1/2 inches)



**Figure 14**

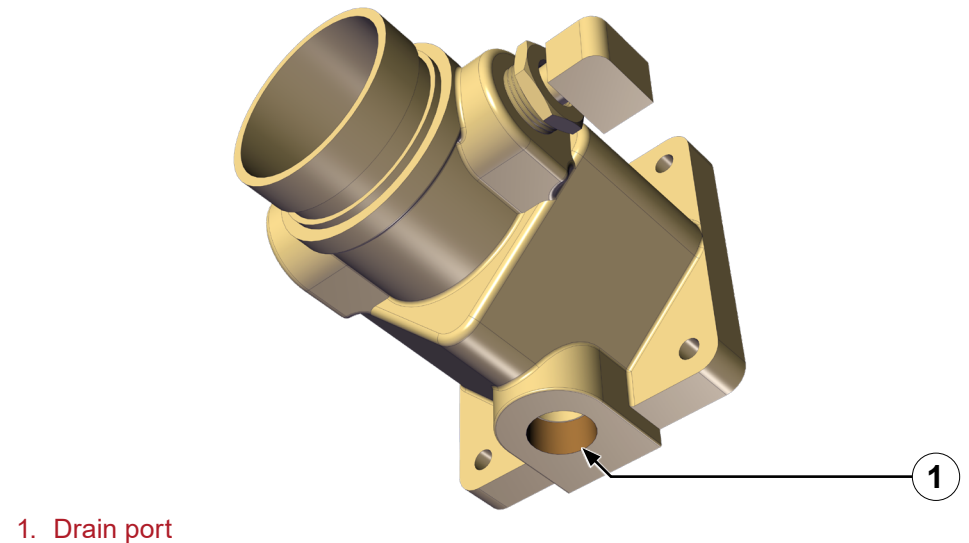
## Concentrate Injector

This fitting injects the concentrate into the waterway to create the solution in the apparatus (**Figure 14**).

**Note:** You can move the fitting to the opposite side to fit your application.

## Drain Port

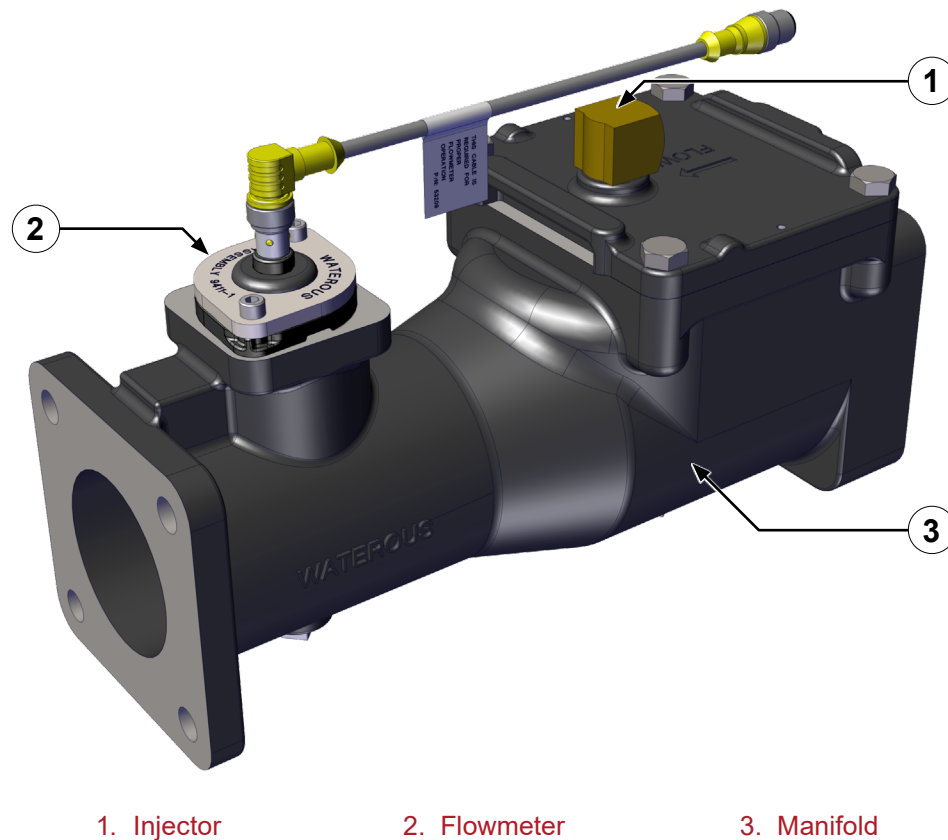
The drain port on the check valve allows the unused solution to empty through a dedicated line after use (**Figure 15**).



**Figure 15**

## Foam Manifold

The foam manifold combines the concentrate injector, waterway check valve and flowmeter into one assembly (**Figure 16**).



**Figure 16**

### Inlet/Outlet

2-1/2 inches Waterous 4-bolt flange (4-3/8 B.C.)

Combination: Victaulic (2 inches) and FNPT (1-1/2 inches)

Combination: Victaulic (2-1/2 inches) and FNPT (2 inches)

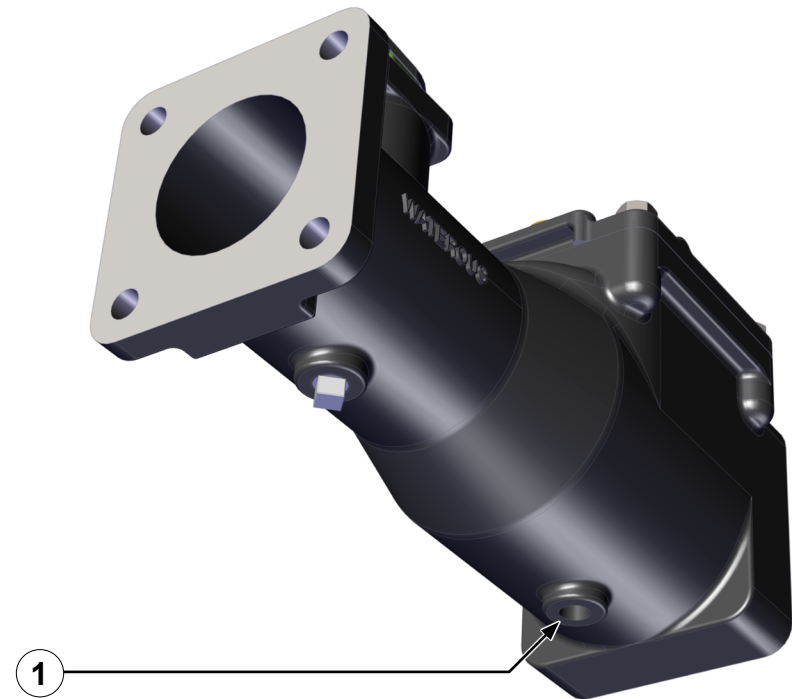
Combination: Victaulic (3 inches) and FNPT (2-1/2 inches)

## Concentrate Injector

This fitting injects the concentrate in to the waterway to create the solution in the fire apparatus (**Figure 16**).

## Drain Port

The drain port on the foam manifold allows the unused mixture to empty through a dedicated line after use (**Figure 17**).



**Figure 17**



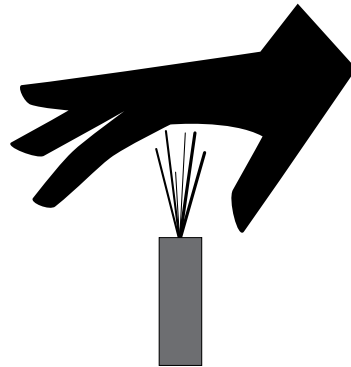
## Pressure Regulator Valve

This valve is set at the factory to bypass at 450 psi (31 bar). When the pressure reaches 450 psi (31 bar), the valve opens and the concentrate is routed from the output side of the pump to the input side of the pump.

### WARNING

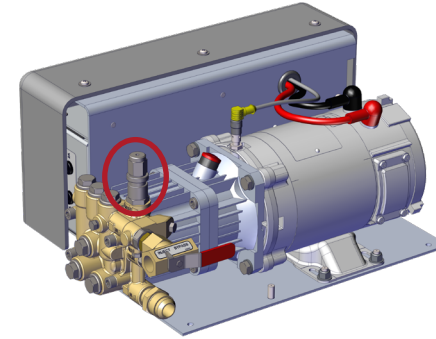
#### High Pressure

- Liquid ejected at high pressure can cause serious injury.
- Do not operate beyond recommended pressure.

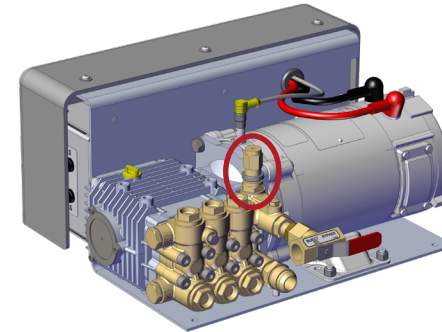


*Do not tamper with the pressure regulator valve or operate the pump with a damaged pressure regulator valve.*

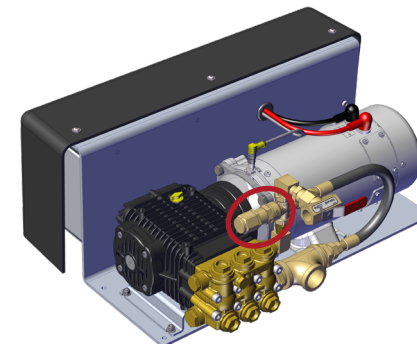
- Use **Figure 18** to locate the regulator valve on the AQUIS 1.5.
- Use **Figure 19** to locate the regulator valve on the AQUIS 3.0.
- Use **Figure 20** to locate the regulator valve on the AQUIS 6.0.



**Figure 18**



**Figure 19**



**Figure 20**

## Operator Interface Terminal (OIT)

The OIT enables or disables the foam system operation and adjusts the amount of concentrate that is injected into the waterway. It is available in digital and manual versions.

### Digital OIT

The digital OIT (**Figure 21**) communicates with the pump controller to perform the following functions:

- Push button control of foam proportioning rate from 0.1% to 1.0% in 0.1 increments and 3% to 6% depending on the concentrate.
- Calibration of water flow rate.
- LED displayed warning of low concentrate supply.
- Indicating light for A and B tank when dual supply tanks are installed.
- Manual operating mode for backup.



Figure 21

### Manual OIT

The manual OIT (**Figure 22**) communicates with the pump controller to perform the following functions:

- Rotary dial control of foam proportioning rates from 0.1% to 1.0% in infinite increments.
- Quick calibration of water flow rate.
- Low supply warning.

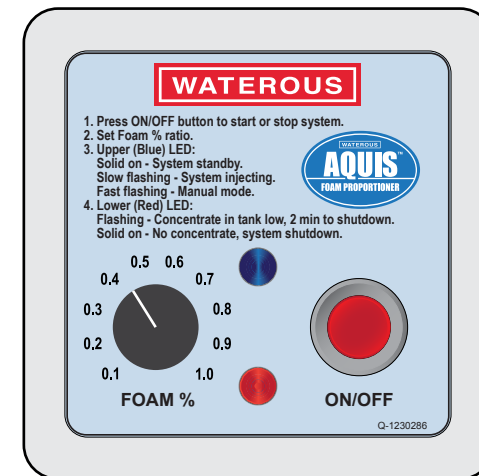
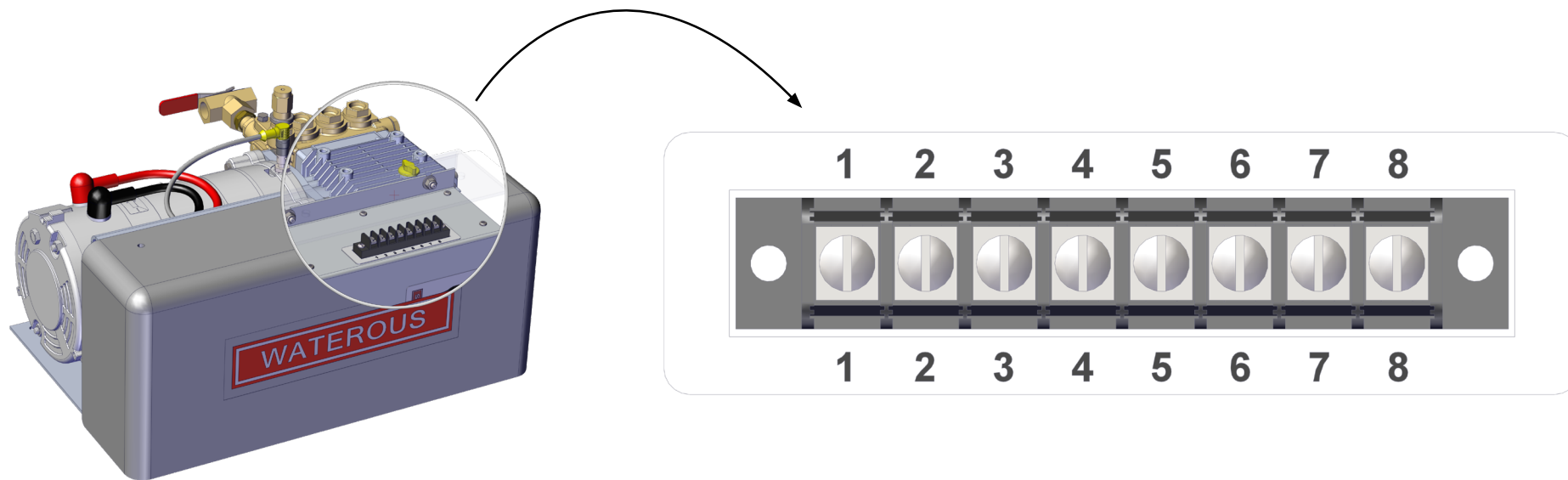


Figure 22

## Accessory Terminal Strip

The terminal strip adds accessories and functionality to the pump. The terminal strip (**Figure 24**) is located under the cover on the controller (**Figure 23**).



**Figure 23**

**Figure 24**

Description	Comments
1 Auto run—Enable	Apply +Vdc to terminal 1 to enable the foam system. This allows you to operate the pump remotely or simultaneously with other equipment.
2 Tank level sensor—tank-B	Connect one wire from the level sensor that is in tank-B to terminal 2 and the other to terminal 5 or 8. This sensor alerts you when the concentrate reaches a predetermined level.
3 Tank level sensor—tank-A	Connect one wire from the level sensor that is in tank-A to terminal 3 and the other to terminal 5 or 8. This sensor alerts you when the concentrate reaches a predetermined level.
4 Tank-B selected—enable	Connect orange wire from the dual tank selector controller. This allows you to toggle between tank-A, flush, or tank-B.
5 Supply tank level sensor—ground	Ground terminal for the tank level sensors.
6 Not used	Not used
7 Overboard foam pick-up or Prime the pump—enable	Connect the wire from overboard foam pickup switch. This allows you to enable a remote pick-up pump for priming the pump.
8 Supply tank level sensor—ground	Ground terminal for the tank level sensors.

## Installation Precautions

The foam system is intended to be installed by a person or persons with the basic knowledge of installing similar equipment. Contact Waterous with questions about installing the foam system.

### Disconnecting the Frame Ground

The foam system uses a frame ground to operate. Performing high voltage or high current operations, while the foam system is connected to the frame, can damage the electronics in the control box.

## NOTICE

### High Current

- High current from welding or jump start can damage electronic components.
- Disconnect all ground wire connections before jumping or welding.



*Avoid damaging the electronics in the control box. Disconnect the frame ground before jump starting, welding, plasma cutting or conducting other high voltage or high current operations to the apparatus.*

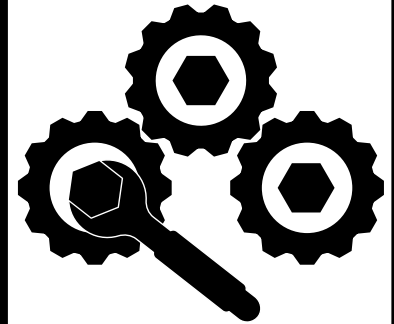
## Modifying the Foam System

The foam system components are designed to operate mounted to the mounting bracket. Removing the components from the mounting bracket (**Figure 1**, **Figure 2** and **Figure 3**) and installing them independently, can damage the components, and will void your warranty.

## NOTICE

### Modification

- Modifying the equipment can damage components and void your warranty.
- Do not modify the foam system.



*Do not modify the foam system or any of its components. Doing so will void your warranty.*

## Preparing for the Install

Consider the information below before you begin installing the foam system.

- Determine the install location for the components, consider wire and hose routing, mounting locations and maintenance requirements.
- Locate the pump as close to the supply source as possible. Install it in a clean space where it can be easily inspected and maintained. Allow room for checking the oil level, changing the oil and general servicing.
- Do not remove the components from the bracket and install them directly to the apparatus. Doing so will void your warranty.
- Position the pump assembly in an area that is protected from road debris and excessive heat buildup.
- Be aware that most water tank manufacturers incorporate a foam tank into the booster tank.
- When specifying an integrated foam tank, ensure that you include the installation of the optional low tank level sensor as well as the foam suction connections and tank drainage according to NFPA guidelines.
- Determine a location for the OIT on the operator panel of the equipment.

## Installing the Vented Oil Cap

# NOTICE

### Before operating the AQUIS™ Foam Proportioning System:

- Check the foam pump oil level and fill if necessary.
- Remove the foam pump shipping plug and replace it with this vented oil cap.



Refer to instruction  
F-1031-2447 for  
detailed information.

***The foam system ships with a non-vented oil cap. Replace it with the vented oil cap that is provided before you operate the pump.***

1. Locate and remove the oil cap that was shipped with the pump (**Figure 1, Figure 2** and **Figure 4**).
2. Check the oil level. Refer to: **"Checking the Oil Level" on page 59.**
3. Add oil if necessary. Refer to: **"Adding Oil" on page 60.**
4. Install the vented oil cap that is supplied with the pump kit (**Figure 1, Figure 2** and **Figure 4**).

## Determining the Pump Assembly Location

Use the following guidelines to determine a location to mount the pump assembly:

- The pump assembly must be mounted on a horizontal surface.
- The surface must withstand the pump assembly operation.
- Install the pump assembly where it has minimal exposure to excessive dirt, road debris and heat buildup.
- The pump is capable of a 1 meter draft of foam concentrate, however, a gravity feed setup is preferred.

## Locating the Pump Assembly Mounting Holes

Locate and drill the holes for the mounting bracket.

## Locating the OIT Mounting Holes

Locate and drill the mounting and opening holes for the OIT.

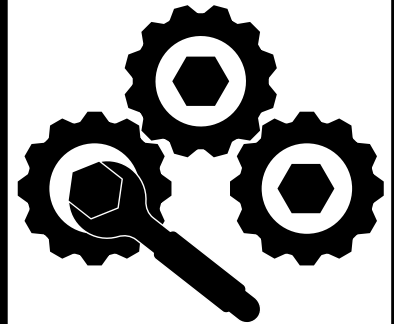
## Installing the Pump Assembly

The foam system components are designed to operate as installed on the mounting bracket (**Figure 1**, **Figure 2** and **Figure 3**). Do not remove the components from the mounting bracket and install them independently. Doing so can damage the components, and will void your warranty.

# NOTICE

## Modification

- Modifying the equipment can damage components and void your warranty.
- Do not modify the foam system.



***Do not remove the components from the bracket and install them directly to the apparatus. Doing so will void your warranty.***

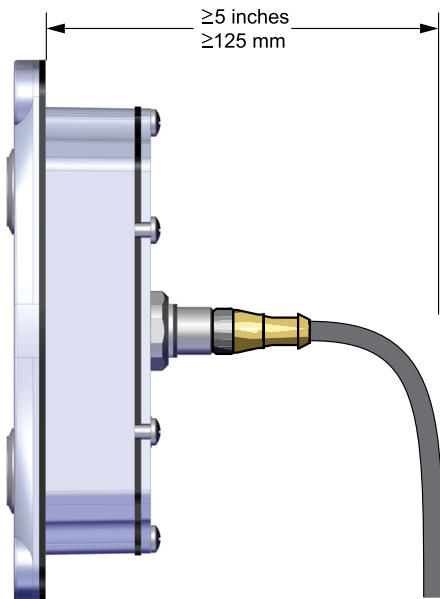
1. Align the holes in the mounting bracket to the holes that you drilled in apparatus.
2. Use the appropriate hardware to secure the pump to the apparatus.

## Installing the OIT

1. Locate one end of the M12, 8-pin cable.
2. Align the pins and key in the plug to the connector.
3. Secure the plug into the connector.

**Note:** Do not force the plug into the connector, you will damage it.

4. Ensure that there is a minimum of 5 inches (125 mm) behind the panel opening to give the cable enough room to bend (**Figure 25**).



**Figure 25**

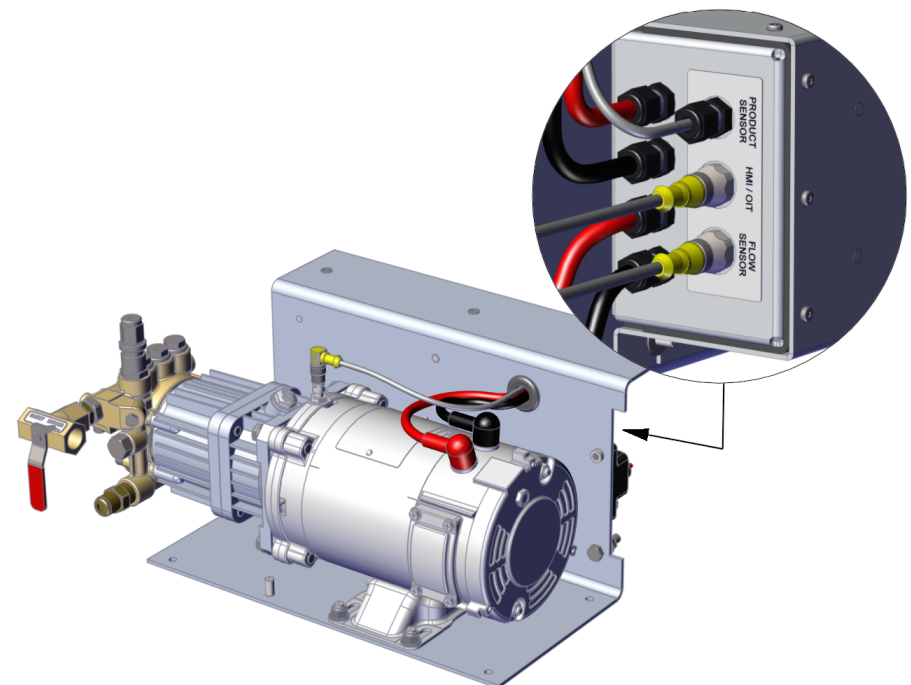
5. Use the included hardware (digital OIT) or locally source the appropriate hardware (manual OIT) to secure the OIT to the panel.
6. Route the cable to the control box.
7. Connect the cable to the control box. Refer to: "**Connecting M12 Cables to the Control Box**" on page 39.

## Connecting M12 Cables to the Control Box

1. Remove the cover. Refer to: "**Removing the Cover**" on page 43.
2. Align the pins and key in the plug to the connector.

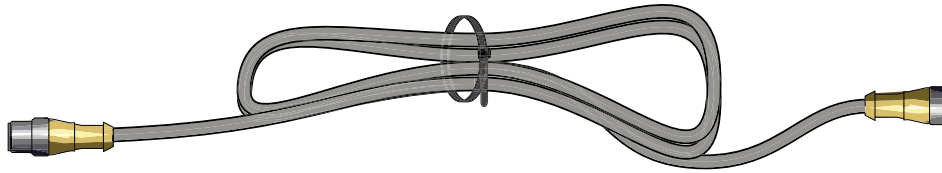
**Note:** Do not force the plug into the connector, you will damage it.

3. Secure the plug into the connector.
4. Connect the cable to the appropriate connector on the control box (**Figure 26**).



**Figure 26**

1. Loop the excess cable by bringing 2 sides of the loop together to flatten it (**Figure 27**).



**Figure 27**

2. Use a cable tie to secure the excess cable into a flat loop (**Figure 27**).
3. Use cable ties to secure the cable to the apparatus.

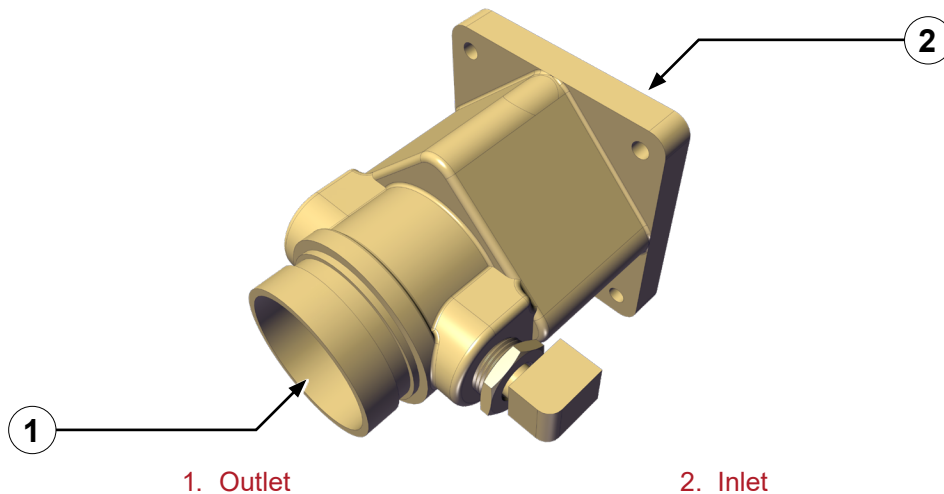
**Note:** Do not secure the wire harness to hot or moving parts.

**Note:** Waterous for information about obtaining a cable extension.

4. Install the cover. Refer to: "**Installing the Cover**" on page 46.

## Installing the Master Waterway Check Valve

**Note:** Refer to "**Overview Diagram—Typical**" on page 21 for the instructions in this section.

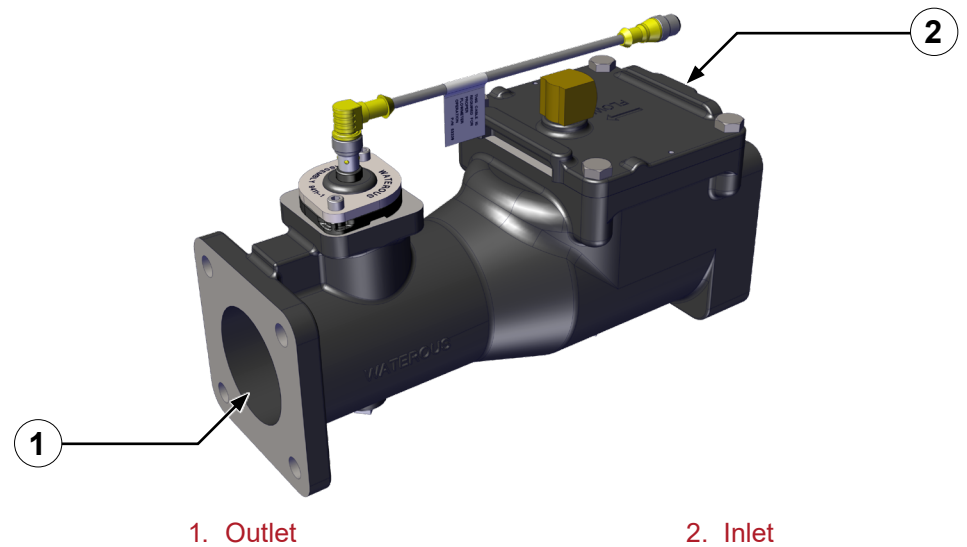


**Figure 28**

1. Use the victaulic or FNPT connections to install the waterway check valve in-line with the waterway.
2. Install the inlet side of the waterway check valve towards the water pump.

## Installing the Foam Manifold

**Note:** Refer to "**Overview Diagram—Typical**" on page 21 for the instructions in this section.



**Figure 29**

1. Ensure that the manifold is oriented with the flowmeter towards the top (**Figure 30**).



2. Install the inlet side of the manifold towards the water pump.

**Important:** Installing the foam manifold at more than a  $\pm 15^\circ$  tilt may cause inaccurate readings (Figure 30).

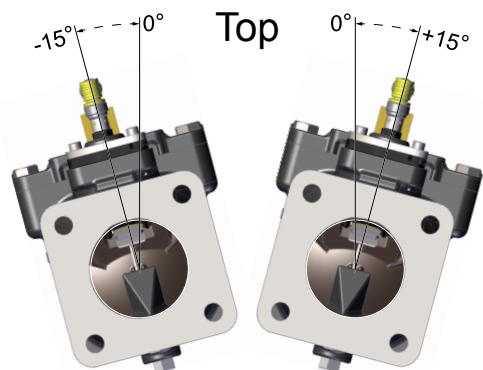


Figure 30

3. Connect the 3 meter, M12, 4-pin extension cable to the cable attached to the flowmeter.

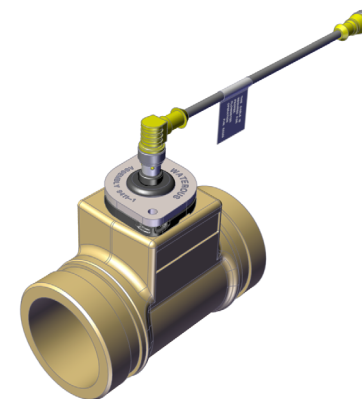
**Note:** The sensor is calibrated at the factory and secured into place. Do not rotate the  $90^\circ$  connector attached to the sensor. Doing so causes inaccurate readings.

**Note:** Do not force the plug into the connector, you will damage it.

4. Route the cable to the control box.
5. 3 meter, M12, 4-pin extension cable Connect the cable to the control box. Refer to: **"Connecting M12 Cables to the Control Box"** on page 39.

## Installing the Flowmeter Tee

1. Orient the flowmeter with the connector at the top (Figure 32).



2-1/2-inch tee shown

Figure 31

2. Install the flowmeter tee into the waterway.

**Note:** The flowmeter tee can be installed before or after the waterway check valve.

3. Connect the 3 meter, M12, 4-pin extension cable to the cable attached to the flowmeter.

**Note:** The sensor is calibrated at the factory and secured into place. Do not rotate the  $90^\circ$  connector attached to the sensor. Doing so cause inaccurate readings.

**Note:** Do not force the plug into the connector, you will damage it.

4. Route the cable to the control box.

5. Connect the cable to the control box. Refer to: "**Connecting M12 Cables to the Control Box**" on page 39.

**Important:** Installing the foam manifold at more than a  $\pm 15^\circ$  tilt may cause inaccurate readings (Figure 32).

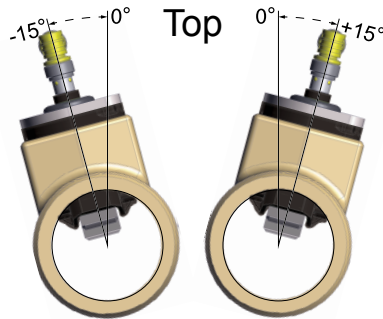


Figure 32

## Installing the Supply Hose

The supply hose routes the concentrate from the supply tank to pump. Refer to the "**Overview Diagram—Typical**" on page 21 for the instructions in this section. The supply hose is required to meet the following specifications:

- Minimum 3/4 inch inside diameter for AQUIS 1.5 and 3.0
  - Minimum 1 inch inside diameter for AQUIS 6.0
  - Minimum 23 inHg (0.78 bar) of vacuum
  - Maximum 50 psi (3.45 bar) of pressure
  - Reinforced clear wall as required by NFPA
1. Route and connect the supply hose from the supply tank shutoff valve to the foam pump intake.

**Note:** Make sure that you plumb the wye fitting with strainer in-line with the supply hose.

2. Use cable ties to secure the hoses and wye fitting to the apparatus.

**Note:** Do not pinch or kink the hose.

**Note:** Do not secure the hose to hot or moving parts.

**Note:** An optional hose kit is available, contact your Waterous for more information.

## Installing the Injector Hose

The injector hose routes the concentrate from the foam pump to the injector. Refer to the "**Overview Diagram—Typical**" on page 21 for the instructions in this section. The hose is required to meet the following specifications:

- Minimum 3/8 inch inside diameter—AQUIS 1.5 and AQUIS 3.0
  - Minimum 1/2 inch inside diameter—AQUIS 6.0
  - Minimum 450 psi (31 bar) of pressure
1. Connect one end of the hose to the output on the foam pump.
  2. Connect the other end of the hose to the concentrate injector check valve.
  3. Use cable ties to secure the hoses to the apparatus.

**Note:** Do not pinch or kink the hose.

**Note:** Do not secure the hose to hot or moving parts.

**Note:** An optional hose kit is available, contact your Waterous for more information.

## Connecting the Bypass Hose

Refer to "**Overview Diagram—Typical**" on page 21 for the instructions in this section. The hose is required to meet the following specifications:

- Minimum 3/8 inch inside diameter.
- Long enough to reach a container outside the apparatus and can be coiled when not in use.

1. Connect the hose to the bypass port on the inject/bypass valve.
2. Secure the bypass hose until it is used.

**Note:** Do not pinch or kink the hose.

**Note:** Do not secure the hose to hot or moving parts.

**Note:** Coil when not in use.

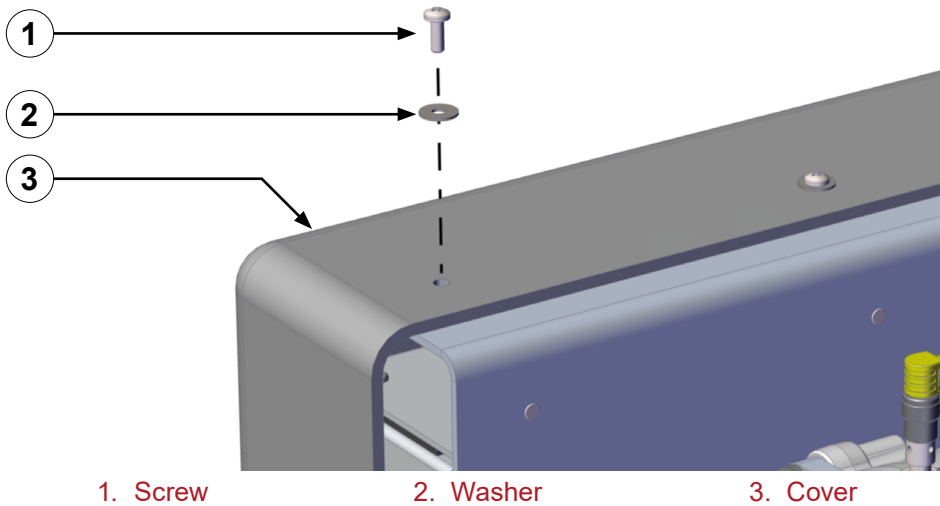
## Fittings

Fittings connect the hoses to the various components in the system. The fittings are required to meet the following specifications:

- Complement the appropriate hose specification
- Compatible with the foam concentrate
- Corrosion resistant

## Removing the Cover

1. Remove the 3 screws and washers that are used to secure the cover to the frame and set them aside (Figure 33).



**Figure 33**

2. Remove the cover and set it aside.

## Connecting the Power Supply

! **WARNING**

### High Current

- Current can cause serious injury or death.
- Disconnect the power before servicing the pump.

**Read and understand the following statements before continuing:**

- The pump motor uses 30 A to 100 A of current to operate.
- Electrical current is dangerous and can cause serious injury or death.
- Do not attempt to connect the pump motor to the power source if you have not been trained and understand the safety practices needed to install devices requiring 30 A to 100 A to operate.

Ensure the power source used meets the following specifications:

Model	Voltage	Amps
AQUIS 1.5	12 Vdc	50 A
	24 Vdc	30 A
AQUIS 3.0	12 Vdc	80 A
	24 Vdc	50 A
AQUIS 6.0	12 Vdc	100 A
	24 Vdc	80 A

The electrical requirements vary based on your specific application. The following tables are calculated using the SAE J1128 standard with a 2% drop.

12 V	Length of Wire				
	10 ft	15 ft	20 ft	25 ft	30 ft
Amps					
50 A	6 AWG	4 AWG	2 AWG	2 AWG	2 AWG
80 A	4 AWG	2 AWG	1 AWG	0 AWG	0 AWG
100 A	2 AWG	2 AWG	0 AWG	00 AWG	00 AWG

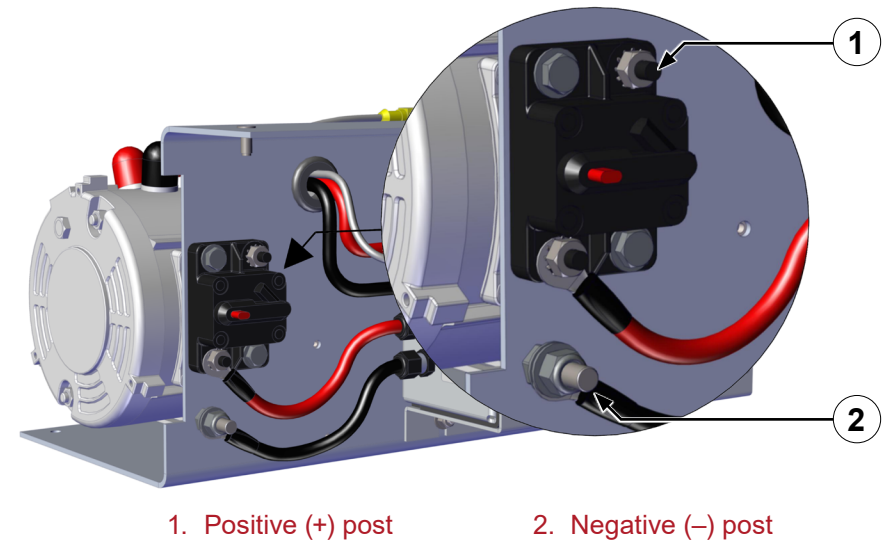
24 V	Length of Wire				
	10 ft	15 ft	20 ft	25 ft	30 ft
Amps					
30 A	12 AWG	10 AWG	8 AWG	8 AWG	6 AWG
50 A	8 AWG	8 AWG	6 AWG	4 AWG	4 AWG
80 A	6 AWG	6 AWG	4 AWG	2 AWG	2 AWG

**Important:** The foam pump requires a frame ground.

**Important:** Make sure that you use the same gauge for the ground cable as you use for the power cable.

1. Remove the cover. Refer to: **"Removing the Cover" on page 43.**
2. Route the positive (+) cable from the power source to the foam pump.
3. Connect one end of the positive (+) cable to the Vdc source.

4. Connect the other end of the positive (+) cable to the positive (+) post of the foam pump (**Figure 34**).



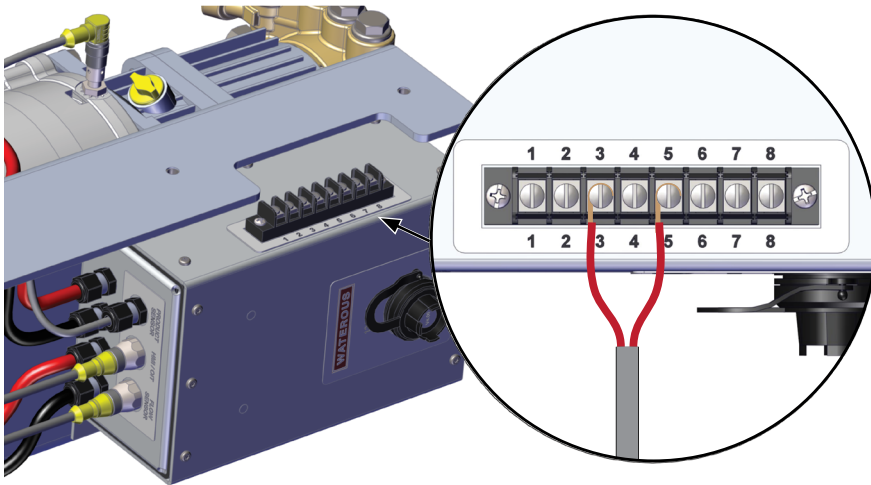
**Figure 34**

5. Connect the negative (-) post to the frame ground.
6. Install the cover. Refer to: **"Installing the Cover" on page 46.**

## Installing the Tank Level—Sensor Cable

1. Connect the sensor wires to the wires on the foam concentrate sensor.
2. Remove the cover. Refer to **"Removing the Cover" on page 43**.
3. Secure one wire to terminal 3 and the other wire to terminal 5 on the terminal strip (**Figure 35**).

**Note:** Add the appropriate connectors as required by your application.



**Figure 35**

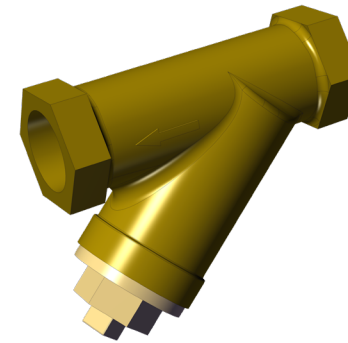
4. Install the cover. Refer to **"Installing the Cover" on page 46**.
5. Loop the excess cable by bringing 2 sides of the loop together to flatten it (**Figure 27**).
6. Use a cable tie to secure the excess cable into a flat loop (**Figure 27**).

**Note:** Use the previous instructions to install a second tank level sensor to the controller. Connect the wires from the sensor to terminals 2 and 5 on the terminal strip.

## Installing the Wye Fitting with Strainer

The wye fitting with strainer is installed in-line with the supply shutoff valve and the supply hose. The wye fitting can be hard plumbed to the tank shutoff valve, it may be remotely mounted, or mounted to the intake of the foam pump.

1. Determine a location to install the wye fitting with strainer that is accessible for maintenance.
2. Use the arrow on the body of the wye strainer to determine the flow direction of the foam concentrate (**Figure 36**).

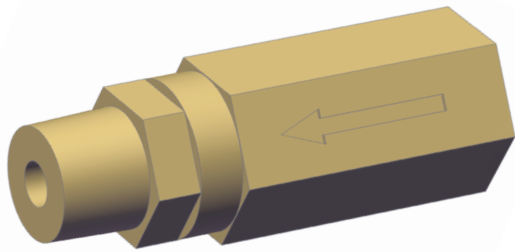


**Figure 36**

3. Make sure that the stainer feature is pointing down.
4. Secure the wye fitting to the apparatus.

## Installing the Concentrate Inject Check Valve

1. Use the arrow on the check valve to determine the flow direction of the concentrate (**Figure 37**).

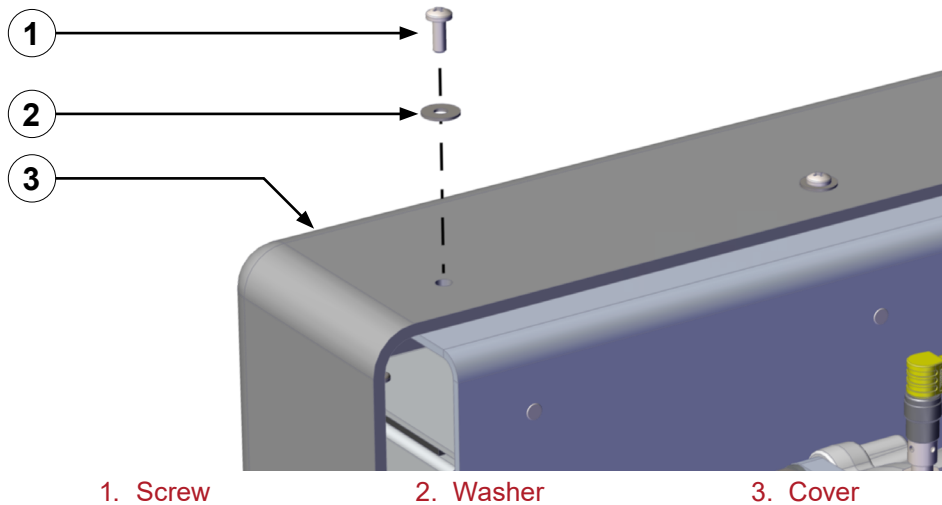


**Figure 37**

2. Install the check valve into the injector fitting in the proper orientation.

## Installing the Cover

1. Locate the 3 screws and washers that you removed from the cover.
2. Use the 3 screws and washers to secure the cover to the bracket (**Figure 38**).



1. Screw

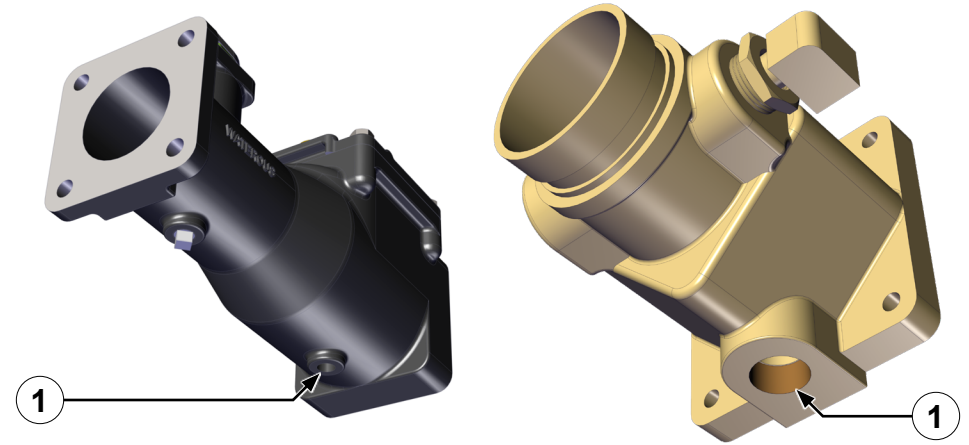
2. Washer

3. Cover

**Figure 38**

## Installing the Drain Lines

Install a dedicated line to the drain port on the check valve or manifold to remove the unused solution and to relieve pressure (**Figure 39** and **Figure 40**).








1. Drain port

**Figure 39**

**Figure 40**

## Calibrating—Manual OIT










1. Rotate the  (FOAM % dial) to 0.
2. Press and hold the  (ON/OFF button) for 6 seconds.
3. Establish a water flow of 50 gallons per minute.
4. Press the  (ON/OFF button), the LEDs flash as follows:
  - The  (blue LED) flashes 3 times to indicate that the pump is calibrated.
  - The  (red LED) flashes continuously if there was an error during the calibration process. The value was not changed.

		Default mix percentage									
		0.1%	0.2%	0.3%	0.4%	.05%	0.6%	0.7%	0.8%	0.9%	1.0%
Flow rate US gallons	100	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
	200	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0
	300	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0









**Note:** Refer to NFPA guidelines for flow testing.

## Calibrating and Setup—Digital OIT











### Entering the Calibration/Setup Mode

1. Press and hold the  (SELECT button).
2. After 5 seconds, the  (5 second value) is displayed.
3. Continue holding the  (SELECT button) and then press the  (up and down buttons) simultaneously.
4. The  (calibration value) is displayed, then after 2 seconds the  (function value) displays.
5. Press the  or  (up or down button) to navigate to the desired parameter.
6. Press the  (FOAM button) to save the value and exit the calibration and setup mode.

## Editing the Default Mix Percentage—F1

1. Enter the calibration/setup mode. Refer to: **"Entering the Calibration/Setup Mode" on page 47.**
2. Navigate to  (F1 parameter).
3. Press the  (SELECT button) to edit the parameter.
4. Press the  or  (up or down button) to display the desired foam percent.  
  
The value displayed is between  (0.1 percent) to  (1.0 percent).
5. Press the  (SELECT button) to select the displayed value.
6. Press the  (FOAM button) to save the value and exit the calibration and setup mode.


## Editing the Units of Measure—F2


1. Enter the calibration/setup mode. Refer to: **"Entering the Calibration/Setup Mode" on page 47.**
2. Navigate to  (F2 parameter).
3. Press the  (SELECT button) to edit the parameter.
4. Press the  or  (up or down button) to display the desired unit of measure from the following choices:
  -  US gallon
  -  Imperial gallon
  -  Metric liter
  -  Liters per second
5. Press the  (SELECT button) to select the displayed value.
6. Press the  (FOAM button) to save the value and exit the calibration and setup mode.




## Calibrating the Flow Rate—F3



**Note:** Ensure that you selected the desired units of measure before you perform this calibration.


1. Use your preferred method of measurement to determine the actual flow rate of water at the flowmeter. Remember this value.
2. Enter the calibration/setup mode. Refer to: **"Entering the Calibration/Setup Mode" on page 47.**
3. Navigate to  (F3 parameter).



4. Press the  (SELECT button) to enter the parameter.


5. The display shows the value that the flowmeter is measuring.
  - If the value that you measured and the displayed value match,

press the  (FOAM button) to save the value and exit the calibration and setup mode.

- If the value that you measured and the displayed value do not match, press  or  (up or down button) to adjust the display value to match the value that you measured.

- When the  (low flow) value is displayed, an insufficient amount of water is flowing through the flowmeter.

6. Press the  (SELECT button) to return to the  (F3 parameter).


7. Press the  (FOAM button) to save the value and exit the calibration and setup mode.


## Enabling System Lockout—F4



**Note:** Use the menu lockout to prevent unintentional changes to a parameter.



1. Enter the calibration/setup mode. Refer to: **"Entering the Calibration/Setup Mode" on page 47.**


2. Navigate to  (F4 parameter).

3. Press the  (select button) to edit the parameter. The

 (enable setting) is displayed.












4. Use the  (up button) to display the  (lock setting).

5. Press the  (SELECT button) to return to the  (F4 parameter).

6. Press the  (FOAM button) to save the value and exit the calibration and setup mode.

**Note:** Contact Waterous for more information about locking and unlocking the OIT.





## Selecting the Concentrate Source—F5

- Enter the calibration/setup mode. Refer to: **"Entering the Calibration/Setup Mode" on page 47.**
- Navigate to  (F5 parameter).
- Press the  (SELECT button) to edit the parameter.
- Use the  or  (up or down button) to display the desired foam tank pairing:
  - Select  (AA) when you source from a single tank that supplies A foam or when you source from 2 tanks that supply A foam. The proportioning value for this setting is between 0.1% to 1.0% for both tanks.
  - Select  (Ab) when you source from 2 tanks that supply A foam from one tank (tank A) and B foam from the other tank (tank B). The proportioning value for this setting is between 0.1% to 1.0% for the A foam tank and 1.0%, 3.0% and, 6.0% from the B foam tank.
  - Select  (bb) when you source from a single tank that supplies B foam or when you source from 2 tanks that supply B foam. The proportioning value for this setting is 1.0%, 3.0% or, 6.0% for both tanks.
  - Select  (AF) when you source from a 2 tanks that supply combination A/B foam. The proportioning value for this setting is between 0.1% to 1.0%, 3.0% or, 6.0% for both tanks.
- Press the  (SELECT button) to return to the  (F5 parameter).
- Press the  (FOAM button) to save the value and exit the



calibration and setup mode.


## Simulating Water Flow—F6

Use this mode to test and verify the foam system operation. This function is available for the AQUIS 1.5 with digital head, AQUIS 3.0 and AQUIS 6.0.

- Enter the calibration/setup mode. Refer to: **"Entering the Calibration/Setup Mode" on page 47.**
- Navigate to  (F6 parameter).
- Press the  (SELECT button) to edit the parameter.
- Use the  or  (up or down button) to display the desired simulated flow rate from the following choices:

Flow Rate Settings				
AQUIS 1.5	0	50	100	200
AQUIS 3.0	0	50	100	200
AQUIS 6.0	0	100	200	300

- Press the  (SELECT button) to save the value.
- Position the inject/bypass valve to bypass. Refer to: **"Operating the Inject/Bypass Valve" on page 58.**
- Press the  (FOAM button) to start the pump.
 

**Note:** Make sure that the output has equalized for up to 3 minutes before you collect the concentrate.
- Collect the concentrate that flows from the bypass hose for 1 minute.
- Press the  (FOAM button) to stop the pump.
- Measure the volume of concentrate.

11. Use the following chart to determine your flow rate.



		Default mix percentage									
		0.1%	0.2%	0.3%	0.4%	.05%	0.6%	0.7%	0.8%	0.9%	1.0%
Flow rate US gallons	100	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
	200	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0
	300	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0

12. Enter the calibration mode. Refer to:


**"Entering the Calibration/Setup Mode" on page 47.**

13. Navigate to  (F6 parameter).

14. Press the  (SELECT button) to edit the parameter.

15. Use the  (down button) to display the  (zero flow).

16. Press the  (SELECT button) to save the value.


17. Press the  (FOAM button) to save the value and exit the calibration and setup mode.



## Setting Default Mix Percent for B Foam—F7




1. Enter the calibration/setup mode. Refer to:

**"Entering the Calibration/Setup Mode" on page 47.**


2. Navigate to  (F7 parameter).

3. Press the  (SELECT button) to edit the parameter.

4. Use the  or  (up or down button) to display the desired foam percent.

The value displayed is  (1.0 percent),  (3.0 percent), or  (6.0 percent).

5. Press the  (SELECT button) to select the displayed value.

6. Press the  (FOAM button) to save the value and exit the calibration and setup mode.

## Auto Run Mode



Apply voltage (+12 Vdc or +24 Vdc) to terminal 1 on the accessory terminal strip to enable run mode. Refer to: **"Accessory Terminal Strip" on page 35**

## Operating Precautions

The foam system is intended to be operated by a person, or persons, with the basic knowledge of operating similar equipment. Contact Waterous with questions about operating the foam system. Be aware of the following precautions when using the foam system:

### Hot Liquid

Certain operating conditions cause the solution temperature to reach and exceed 160 °F (71 °C).

 <b>WARNING</b>	
<h3 style="text-align: center;">Hot Liquid</h3> <ul style="list-style-type: none"> <li>• Hot liquid can scald you.</li> <li>• Do not operate if the water temperature exceeds 160°F (71°C).</li> </ul>	

*Avoid conditions the result it high temperature solution. Do not operate when solution temperature exceeds 160 °F (71 °C).*

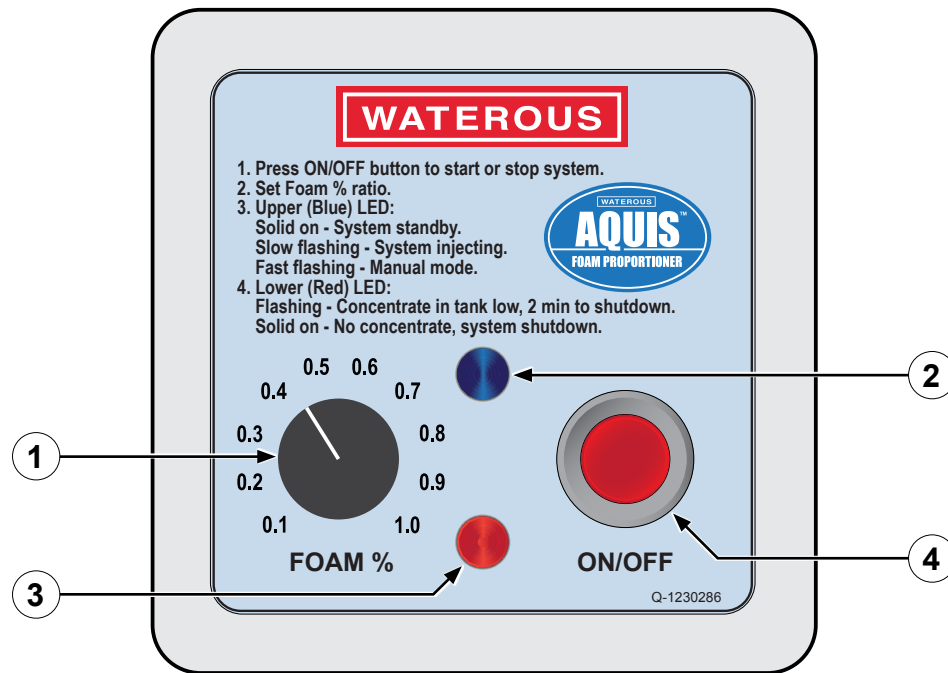
## Hot Surface

Components in the foam system may become hot during operation.

 <b>WARNING</b>	
<h3 style="text-align: center;">Hot Surface</h3> <ul style="list-style-type: none"> <li>• Hot surface can burn you.</li> <li>• Do not touch the surface during operation—allow it to cool after operating.</li> </ul>	

*Do not touch the hot components and allow components to cool before handling.*

## Operating the Manual OIT





**Figure 41**

Feature	Description
1 Foam percent dial	This dial adjust the percentage of concentrate injected into the waterway.
2 Blue LED	The blue LED indicates the modes and status of the pump operation.
3 Red LED	The red LED indicates the modes and status of the pump operation.
4 ON/OFF button	The ON/OFF button enables and disables the foam operation.


## Operating in Normal Mode

In normal operating mode, the OIT uses information from the flowmeter and the FOAM % dial to produce the desired mix.

### Starting and Stopping the Pump

1. Press the  (ON/OFF button) to start the pump and begin injecting concentrate into the waterway.
2. Press the  (ON/OFF button) to stop the pump and end injecting concentrate into the waterway.

### Adjusting the Mix Ratio

Rotate the  (FOAM % dial) to the desired percent of concentrate in the mix at the nozzle.

## Operating in Manual Mode

The foam system can operate in manual mode as required by the NFPA regulation. While in manual mode, the foam system injects concentrate into the waterway with or without water flowing. The OIT is used to increase or decrease the motor speed and FOAM % is controlled manually.

# WARNING

## High Pressure

- Liquid ejected at high pressure can cause serious injury.
- Do not operate beyond recommended pressure.

## Understanding the LED Indicators

### Blue LED

- Solid on—The system is in standby mode.
- Flashing, slowly (1 Hz)—The system is injecting the concentrate.
- Flashing, quickly (2 Hz)—The system is in manual mode.

### Red LED

- Solid on—No concentrate, the system is off line.
- Flashing —The concentrate in the tank is low.

***Do not operate while all discharges or drains are closed. High pressure results and damages the foam system, its components.***

1. Press and hold the (ON/OFF button) for 2 seconds. The blue indicator blinks at a faster (2 Hz) rate.
2. Turn the (FOAM % dial) to increase or decrease the motor speed.
3. Press the (ON/OFF button) to exit manual mode.

## Operating the Digital OIT

1	Mounting hardware	The hardware mounts OIT to the apparatus.
2	FOAM button	This button starts and stops the pump operation.
3	Display	The display shows 4 characters that represent the value for the current mode.
4	Supply tank LED	The supply tank LED shows the concentrate tank that is in operation.
5	Increase button	This button increases the value in the display.
6	SELECT button	This button selects the value in the display.
7	Display mode LED	The display mode LED indicates what information that is currently display.
8	ON LED	The ON LED indicates when the foam system is on, off, or in standby.
9	Decrease button	This button decreases the value in the display.

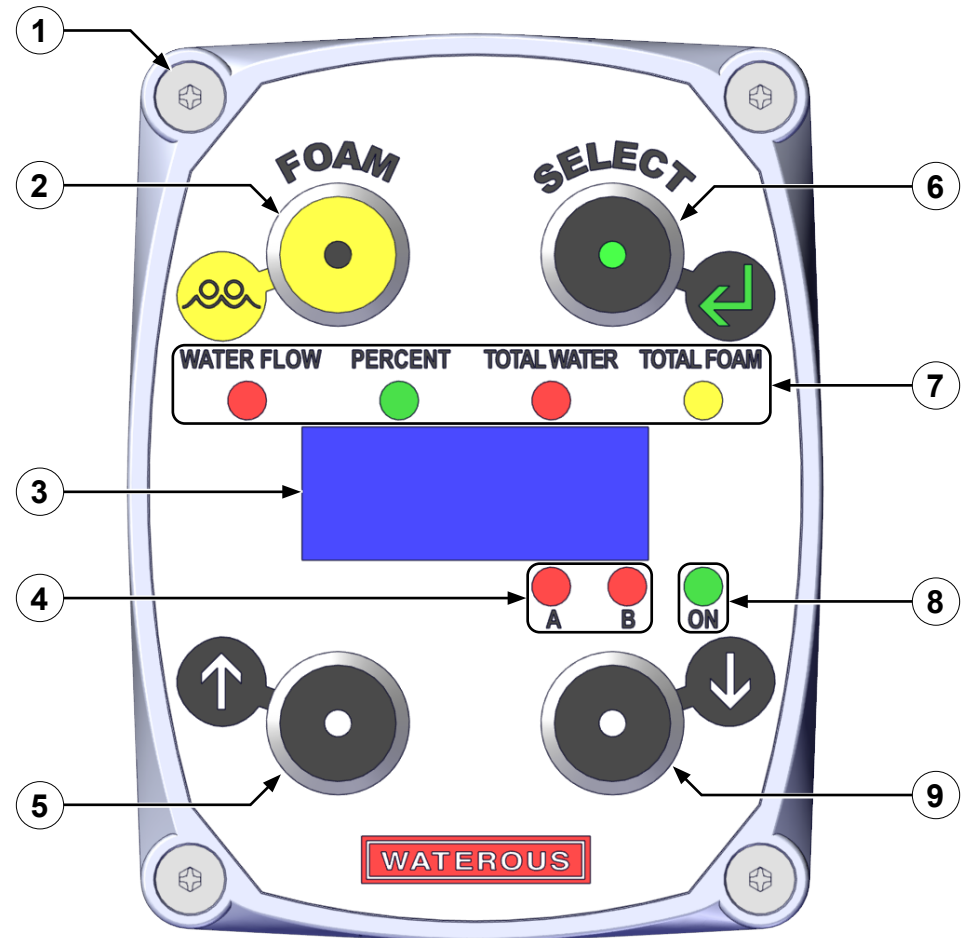



Figure 42

## Powering Up the OIT

The apparatus manufacturer determines how the foam system powers up in your application. However, when power is applied to the foam system, the OIT displays the software version and then displays the water flow value.

## Understanding the ON LED



The  (ON LED) indicates 3 states:

- Solid on—The system is in standby mode waiting for a signal from the flowmeter.
- Flashing—The system is injecting foam concentrate.
- Off—The system is not enabled.




## Operating in Normal Mode

In normal operating mode, the OIT displays information from the flowmeter and the foam % value to produce the desired mix.

### Starting and Stopping the Pump

1. Press the  (FOAM button) to start the foam system and begin injecting concentrate into the waterway.
2. Press the  (FOAM button) to stop the foam system and end injecting concentrate into the waterway.

### Adjusting the Mix Percentage

3. Press the  (SELECT button) until the PERCENT LED illuminates.
4. Press the  (up button) to increase the percent by 0.1%.
5. Press the  (down button) to decrease the percent by 0.1%.
6. The display returns to FLOW RATE after 10 seconds without use.

## Operating in Manual Mode

The foam system can operate in manual mode as required by the NFPA regulation. While in manual mode, the foam system injects concentrate into the waterway with or without water flowing. Use manual mode to troubleshoot, prime and flush the pump.

 **WARNING**



### High Pressure

- Liquid ejected at high pressure can cause serious injury.
- Do not operate beyond recommended pressure.



**Do not operate while all discharges or drains are closed. High pressure results and damages the foam system, its components.**







### Enabling Manual Mode

1. Press the  (SELECT button) until the WATER FLOW LED illuminates.
  2. Press the  (up and down buttons) simultaneously for 2 seconds.
- Note:** The foam system begins injecting the foam concentrate.
3. The percent LED illuminates.
  4. The display shows the last value used. The pump is in manual mode.




## Operating and Disabling Manual Mode



In manual mode you can start or stop the pump and increase or decrease the foam percent.

1. Press the  (FOAM button) to pause the foam system.
2. Press the  (up and down buttons) to adjust the amount of concentrate that is injected into the waterway.
  - Press the  (up button) to increase the value by 0.5.
  - Press the  (down button) to decrease the value by 0.5.
3. Press the  (FOAM button) to start the pump.
4. Press the  (up and down buttons) simultaneously to stop the pump and exit manual mode.



## Auto Run Mode—If Equipped

The foam system activates automatically when auto run mode is enabled and water is flowing. This eliminates the need to press the  (FOAM button) to activate the system.



## Changing the Display Mode

1. Press the  (SELECT button) to scroll through the following modes: WATER FLOW → PERCENT → TOTAL WATER → TOTAL FOAM and then back to WATER FLOW.
2. Press and hold the  (SELECT button) for 3 seconds to lock the display to the current mode.



## Displaying Default Mix Percent

1. Press the  (SELECT button) until the PERCENT LED illuminates.
2. Press the  (up and down buttons) simultaneously. The value displayed is the default mix percent.

## Zeroing the Total Water Value



1. Press the  (SELECT button) until the TOTAL WATER LED illuminates.
2. Press the  (up and down buttons) simultaneously. The TOTAL WATER value is set to 0.

## Zeroing the Total Foam Value

1. Press the  (SELECT button) until the total foam LED illuminates.
2. Press the  (up and down buttons) simultaneously. The TOTAL FOAM value is set to 0.

## Displaying the Supply Tank

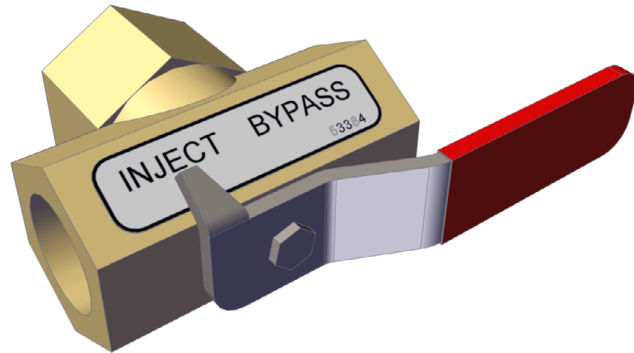
Supply tank A LED is illuminated by default. Supply B tank LED is reserved for applications that include a B supply tank with a dual tank selector kit installed.

The  **A**  **B** (supply tank LED) indicates tank that is supplying the concentrate.

## Operating the Inject/Bypass Valve

**Note:** Refer to "**Overview Diagram—Typical**" on page 21 when you review the following instructions.

Use the inject/bypass (Figure 43) valve to direct the concentrate to the injector port or the bypass hose.



**Figure 43**

- Rotate the handle on the inject/bypass valve to the inject position to route the concentrate into the waterway and produce a solution.
- Rotate the handle on the inject/bypass valve to the bypass position to route the foam concentrate into the bypass hose.

## Draining the Foam System

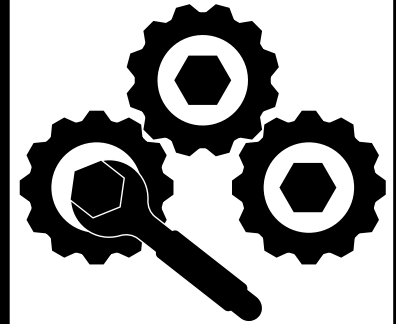
Follow the instructions from the apparatus manufacturer to drain the valve. Contact Waterous for more information.

## Flushing the Foam System

# NOTICE

### Maintenance

- Not following maintenance procedures can damage your equipment.
- Perform all maintenance procedures as required.



**Leaving corrosive solution in the foam system damages the equipment.**

You must flush the system under certain conditions. The environment, the concentrate used and other factors determine if or when you need to flush the pump. Refer to the apparatus and/or concentrate manufacturer to determine a protocol for flushing.

## Flushing the AQUIS Foam System

1. Make the apparatus ready for flushing. Refer to the documentation provided by the apparatus manufacturer for more information.
2. Enable manual mode on the OIT. Refer to:
  - Manual OIT—"**Operating in Manual Mode**" on page 54.
  - Digital OIT—"**Operating in Manual Mode**" on page 56.
3. Manually operate the pump to flow clear-water through the system until the concentrate is removed.

## Maintenance Schedule

Perform the following procedures at the recommended intervals.

Operation	Every 8 Hours	Every 50 Hours	Every 500 Hours
Check the oil level	X		
Inspect the hoses and fittings		X	
Clean the wye fitting with strainer		X	
Change the oil		After the first 50 hours, then every 500 hours.	
Inspect the mounting hardware			X

## Servicing the Oil

Check the oil level after every 8 hours of use. Change the oil after the first 50 hours of use and then every 500 hours thereafter.

### Checking the Oil Level

1. Locate the oil level window to determine the oil level (**Figure 1**, **Figure 2** and **Figure 4**).
2. Ensure that the oil level is centered in the window.
3. Add oil if necessary. Refer to:

**"Adding Oil" on page 60.**

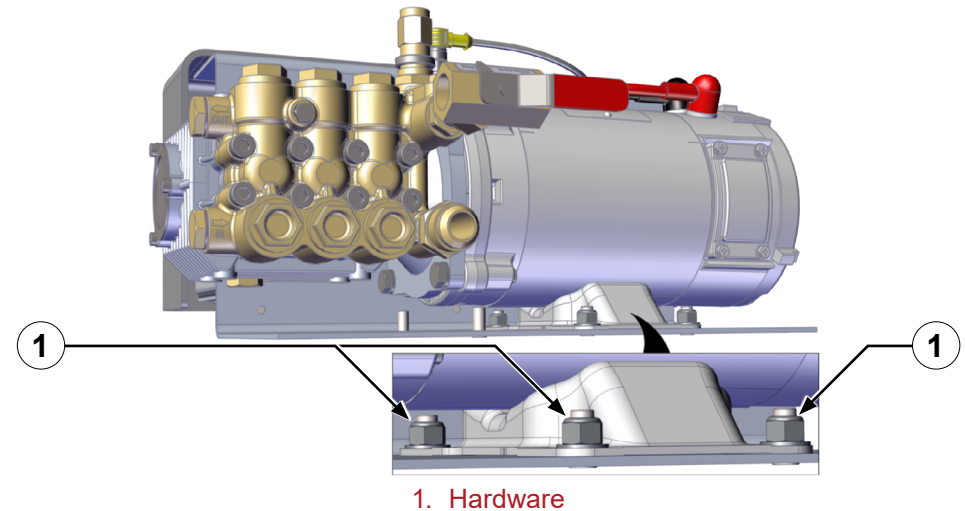
### Changing the Oil

Change the oil after the first 50 hours of operation and then every 500 hours thereafter.

### Draining the Oil

1. Trip the circuit breaker. Refer to: **"Tripping and Resetting the Circuit Breaker" on page 61.**
2. Remove the hardware that secure the pump to the mounting bracket and set them aside (**Figure 44**).

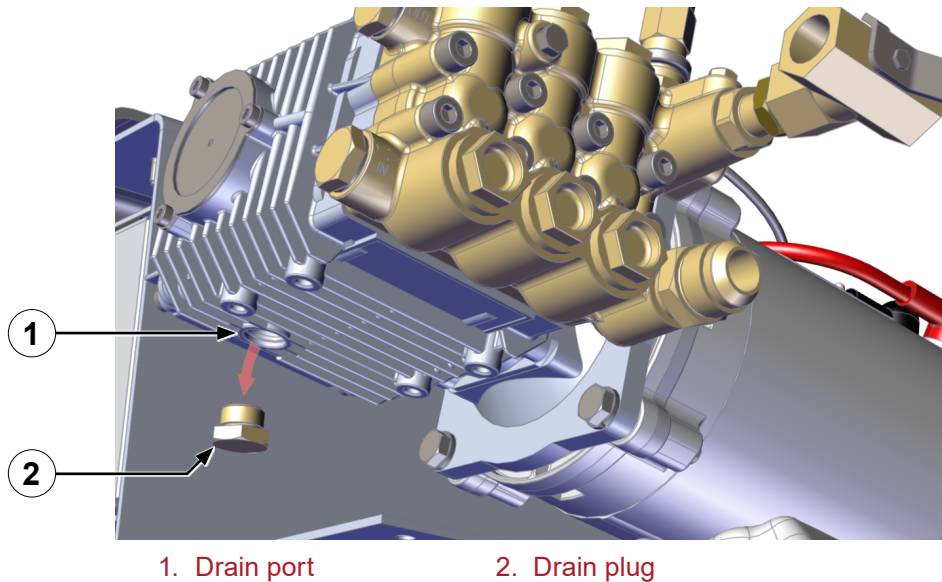
**Note:** The AQUIS 1.5 and 3.0 use 4 and the AQUIS 6.0 uses 6 nuts and washers to secure the pump to the mounting bracket.



**Figure 44**

3. Place a container under the pump that is large enough to collect all the oil that drains from the oil reserve.

- Loosen and remove the drain plug on the bottom of the pump (**Figure 45**).



**Figure 45**

- Allow the oil to drain.
- Install the drain plug to the pump (**Figure 45**).
- Use the hardware that you set aside to secure the pump to the mounting bracket (**Figure 45**).

## Adding Oil

**Note:** Only use SAE 30, non-detergent oil.

- Remove the vented oil cap and set it aside (**Figure 1**, **Figure 2**, and **Figure 4**).
- Use the chart below to determine the oil capacity of your model.

Model	Oil Capacity
AQUIS 1.5	6.1 oz (0.18 L)
AQUIS 3.0	10.8 oz (0.32 L)
AQUIS 6.0	18.9 oz (0.56 L)

- Add the specified amount of oil into the oil reserve.
- Use the sight window to determine the oil level in the reserve.

**Note:** The oil cap on the AQUIS 3.0 and 6.0 can be used to determine the oil is at capacity.

- Install the oil cap to the oil reserve.

## Completing the Oil Change

- Set the circuit breaker to operating position.
- Install the cover. Refer to: **"Installing the Cover" on page 46**.

## Replacing a Fuse

**Note:** Only use a fuse with the following specifications:

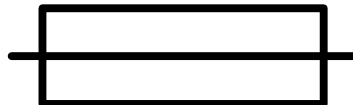
- 20 mm x 5 mm
- 250 V 2.0 A, time lag (slow blow)
- low breaking capacity

1. Remove the cover. Refer to: "**Removing the Cover**" on page 43.
2. Trip the circuit breaker. Refer to: "**Tripping and Resetting the Circuit Breaker**" on page 61
3. Locate the fuse holder/cap on the control box and remove it.
4. Remove the fuse from the holder/cap.
5. Install the replacement fuse. Refer to fuse specifications.

## NOTICE

### Equipment Damage

- Using the wrong fuse may damage the equipment.
- Only use the specified fuse rating.



**250 V**  
**2.0 A**

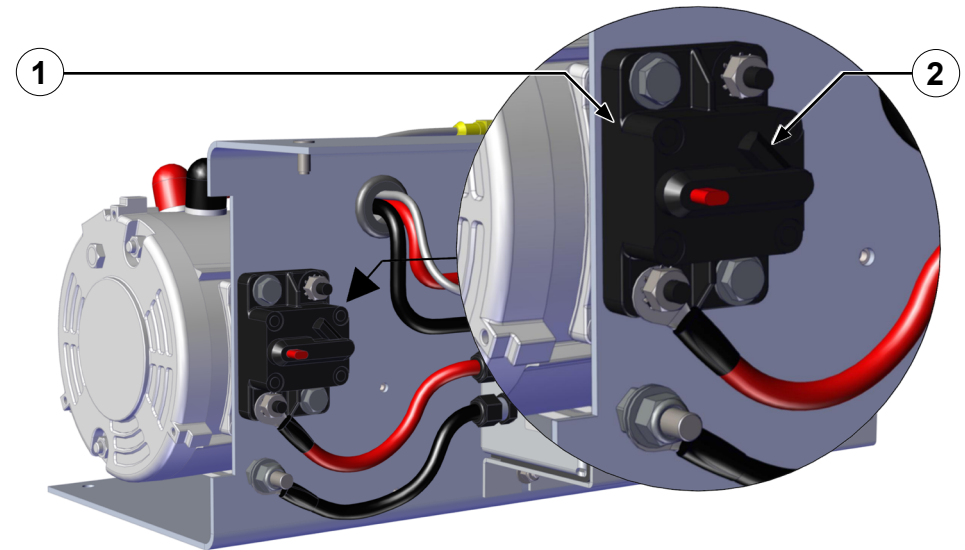
**Do not replace the fuse with a value different than specified. Doing so causes poor performance or damages the foam system.**

6. Install the fuse holder/cap into the control box.
7. Install the cover. Refer to: "**Installing the Cover**" on page 46.

## Tripping and Resetting the Circuit Breaker

1. Remove the cover. Refer to: "**Removing the Cover**" on page 43.
2. Locate the circuit breaker (**Figure 46**).
3. Press the red button to trip the breaker.

**Note:** Pressing the red button swings out the black contact lever to the causes the black contact lever to swing-out to a tripped position.



1. Foam pump 2. Inject/discharge valve

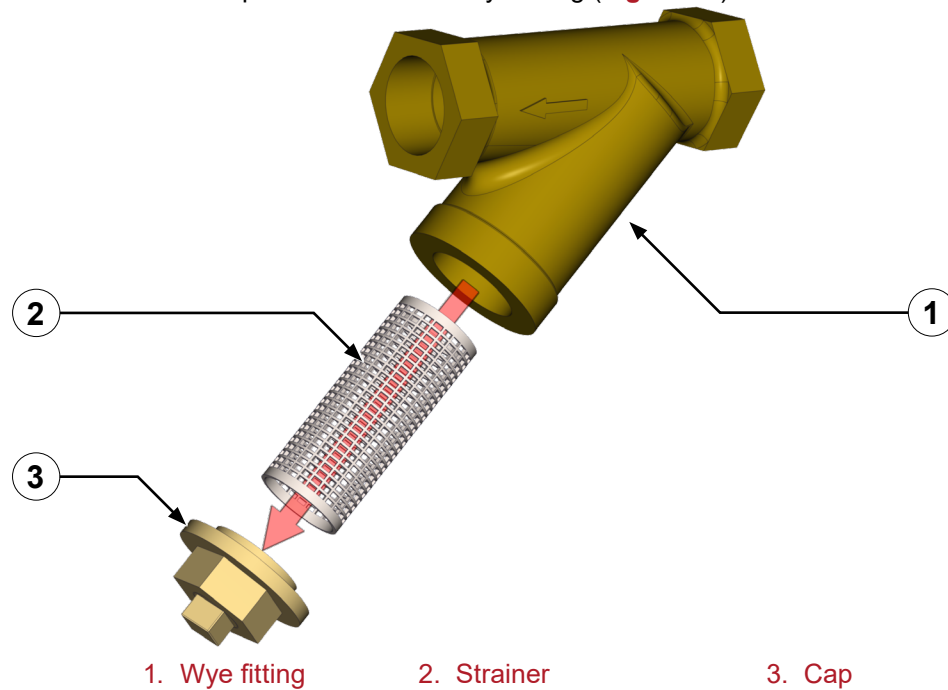
**Figure 46**

4. Swing the black contact lever into operating position to reset the circuit breaker.

## Cleaning the Wye Fitting with Strainer

Clean the wye fitting every 50 hours of use.

1. Close the shutoff valve at the supply tank.
2. Understand and follow the safety instructions from the foam concentrate manufacturer.
3. Place a container underneath the strainer to collect the concentrate that drains from the strainer.
4. Remove the cap at the end of the wye fitting (**Figure 47**).



1. Wye fitting

2. Strainer

3. Cap

**Figure 47**

5. Remove the strainer from the wye fitting.
6. Flush the debris from the strainer.
7. Insert the strainer into the wye fitting.
8. Secure the cap to the wye fitting (**Figure 47**).
9. Open the shutoff valve at the supply.

## Inspecting the Hoses and Fittings

Check the hoses and fittings every 50 hours of use.

- Check the hoses for wear, deterioration, and leaks.
- Check the fittings for deterioration and leaks.

## Inspect the Mounting Hardware

Inspect the mounting hardware every 500 hours of use.

- Make sure the mounting hardware is free from oxidation.
- Make sure the mounting hardware secures the pump to the apparatus. Tighten if necessary.

## Trouble Shooting Chart

Symptom	Possible Cause	Corrective Action
The foam pump is operating but does not produce a flow.	<ul style="list-style-type: none"> <li>The foam pump is not primed.</li> <li>The concentrate tank is empty.</li> <li>The strainer is plugged.</li> <li>The check valve does not open.</li> </ul>	<ul style="list-style-type: none"> <li>Prime the foam pump</li> <li>Add concentrate to the tank.</li> <li>Clean or replace the strainer.</li> <li>Clean or replace the check valve.</li> </ul>
The pump loses prime.	<ul style="list-style-type: none"> <li>Air is entering the into the concentrate supply hose.</li> <li>The concentrate supply hose is blocked, collapsed, or too small.</li> </ul>	<ul style="list-style-type: none"> <li>Repair or replace deteriorated hose or improperly sealed fitting.</li> <li>Repair or replace the blocked, damaged, or improperly specified hose.</li> </ul>
Excessive concentrate is being injected into the solution.	<ul style="list-style-type: none"> <li>The speed sensor position is misaligned.</li> <li>The flowmeter is out of calibration.</li> <li>The system is operating in manual mode.</li> <li>The foam system is out of calibration.</li> </ul>	<ul style="list-style-type: none"> <li>Align the speed sensor.</li> <li>Calibrate the flowmeter.</li> <li>Press the up and down buttons simultaneously.</li> <li>The controller requires reprogramming, contact Waterous.</li> </ul>
Insufficient concentrate is being injected into the solution.	<ul style="list-style-type: none"> <li>The flowmeter is out of calibration.</li> <li>The foam system is out of calibration.</li> </ul>	<ul style="list-style-type: none"> <li>Calibrate the flowmeter.</li> <li>The controller requires reprogramming, contact Waterous.</li> </ul>
The pump runs at full speed whether the foam pump is on or off.	<ul style="list-style-type: none"> <li>The controller is faulty.</li> </ul>	<ul style="list-style-type: none"> <li>Contact Waterous to replace the controller.</li> </ul>
The foam pump runs at full speed whenever the foam system is on.	<ul style="list-style-type: none"> <li>There is a bad ground between the controller and chassis.</li> </ul>	<ul style="list-style-type: none"> <li>Repair or replace ground wire or ground connection.</li> </ul>
The green light on the OIT does not illuminate when the foam system is enabled.	<ul style="list-style-type: none"> <li>The LED has failed.</li> <li>The cables are not proper connected.</li> <li>There is a bad ground between the controller and chassis.</li> <li>Improper voltage.</li> </ul>	<ul style="list-style-type: none"> <li>Contact Waterous for a replacement.</li> <li>Ensure that all the cables are properly connected.</li> <li>Repair or replace ground wire or ground connection.</li> <li>Check that the voltage supplied are correct.</li> </ul>
The foam system does not output the concentrate.	<ul style="list-style-type: none"> <li>The power is not on.</li> <li>The pressure relief valve is set too low.</li> <li>Inject/bypass valve is set to the bypass position.</li> </ul>	<ul style="list-style-type: none"> <li>Turn on the power.</li> <li>Reset or replace the pressure relief valve.</li> <li>Set the valve to the inject position.</li> </ul>
The foam pump and OIT has power but does not inject concentrate when it is enabled.	<ul style="list-style-type: none"> <li>No water is flowing in any of the foam discharges.</li> <li>The flowmeter cable is malfunctioning.</li> <li>The paddle wheels on the flowmeter are obstructed, damaged, or the flowmeter does not function.</li> </ul>	<ul style="list-style-type: none"> <li>Flow water through a foam capable discharge.</li> <li>Replace the flowmeter cable.</li> <li>Clear or replace the flowmeter.</li> </ul>
Unexpected flow measurement	<ul style="list-style-type: none"> <li>Measuring for incorrect unit of measure setting in menu.</li> </ul>	<ul style="list-style-type: none"> <li>Use the correct measurement method or change the unit of measure in the menu.</li> </ul>

## Trouble Shooting Chart—Continued

Symptom	Possible Cause	Corrective Action
The OIT displays nCon.	<ul style="list-style-type: none"> <li>The concentrate supply tank is empty.</li> <li>The concentrate level sensor is malfunctioning.</li> </ul>	<ul style="list-style-type: none"> <li>Add concentrate to the tank.</li> <li>Repair or replace the sensor or cable.</li> </ul>
The mix does not output from the nozzle as expected.	<ul style="list-style-type: none"> <li>The mix percentage is set too low.</li> <li>The foam system is not primed.</li> <li>Low foam volume.</li> </ul>	<ul style="list-style-type: none"> <li>Increase the mix percentage.</li> <li>Prime the foam system.</li> <li>Increase the mix percentage.</li> </ul>
The OIT does not light up.	<ul style="list-style-type: none"> <li>No power to the OIT.</li> <li>The master power on vehicle is not enabled.</li> <li>The circuit breaker switch has tripped.</li> </ul>	<ul style="list-style-type: none"> <li>Check the power cable to the controller and the OIT cable.</li> <li>Enable the master power.</li> <li>Reset the circuit breaker.</li> </ul>
The green LED on the OIT does not flash when you flow water though the flowmeter tee or manifold.	<ul style="list-style-type: none"> <li>The flowmeter cable is malfunctioning.</li> <li>The paddle wheel on the flowmeter is obstructed, damaged, or the flowmeter does not function.</li> </ul>	<ul style="list-style-type: none"> <li>Replace the flowmeter cable.</li> <li>Clear or replace the flowmeter.</li> </ul>
The OIT displays horizontal bars.	<ul style="list-style-type: none"> <li>There is a communication error between the OIT and the controller.</li> </ul>	<ul style="list-style-type: none"> <li>Verify that the pins on the cable are not bent, replace the cable if they are damaged. Contact Waterous to replace the control box.</li> </ul>
The concentrate enters the water tank.	<ul style="list-style-type: none"> <li>Concentrate was poured into the water tank.</li> <li>A check valve in the waterway is malfunctioning.</li> <li>The drain for the foam manifold is not isolated.</li> </ul>	<ul style="list-style-type: none"> <li>Flush the water tank.</li> <li>Clean, clear, or replace check valve.</li> <li>Isolate the drain for the foam manifold.</li> </ul>
The green LED does not light up but a value is displayed.	<ul style="list-style-type: none"> <li>The foam system is not on.</li> </ul>	<ul style="list-style-type: none"> <li>Press the foam button.</li> </ul>



**WATEROUS**

Waterous Company  
125 Hardman Avenue South  
South Saint Paul, MN 55075  
(651) 450-5000  
[www.waterousco.com](http://www.waterousco.com)