Form Number: F-2931 Issue Date: Aug 6, 2021

WATEROUS

Slide-In CAFS Unit—90-45 DS

Installation, Operation, and Maintenance Instructions

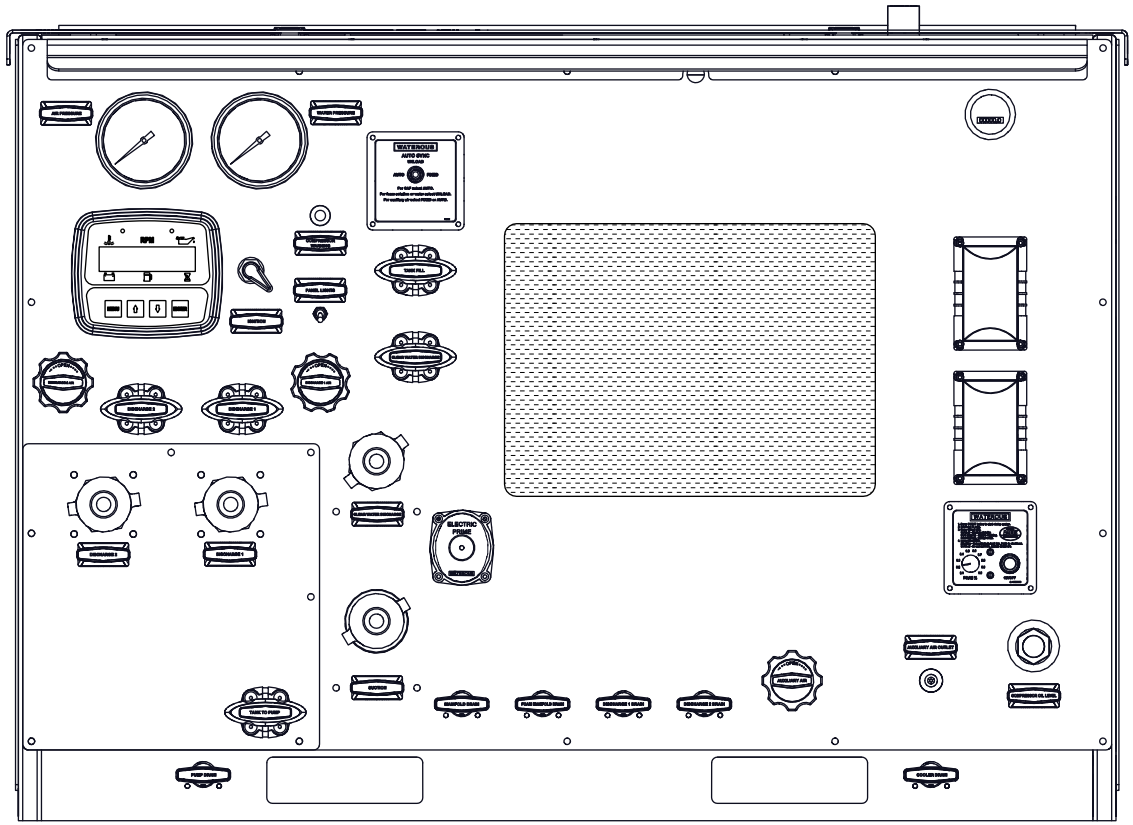

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Table of Contents

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

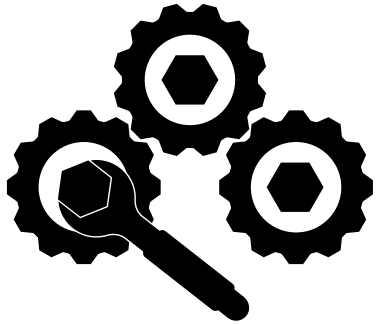
Before Operation

- **Read and understand all the instructions provided.**
- **Check all fluid levels and replenish if necessary.**
- **Remove the all shipping plugs and install the operation plugs or caps.**

NOTICE

Maintenance

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



NOTICE

High Current

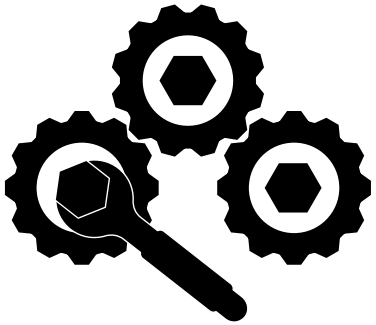
- **High current from welding or jump start can damage electronic components.**
- **Disconnect all ground wire connections before jumping or welding.**

Safety Precautions

NOTICE

Modification

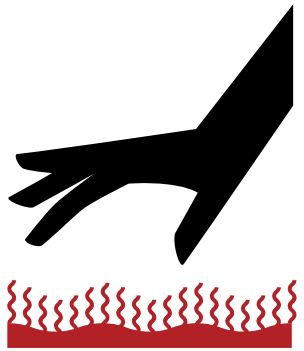
- Modifying the equipment can damage components and void your warranty.
- Do not modify the foam system.



⚠ WARNING

Hot Liquid

- Hot liquid can scald you.
- Do not operate if the water temperature exceeds 160ºF (71ºC).



⚠ WARNING

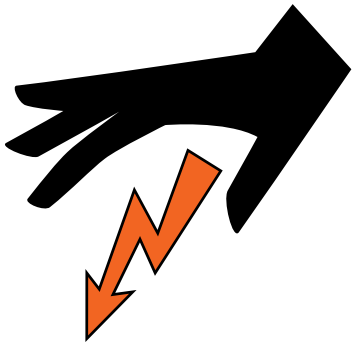
Hot Surface

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

⚠ WARNING

High Current

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

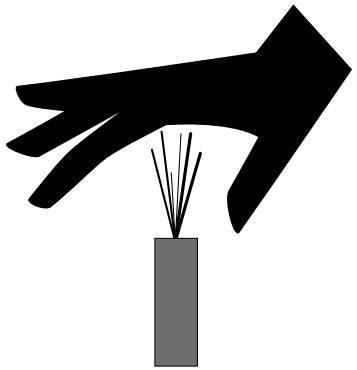


Safety Precautions

WARNING

High Pressure

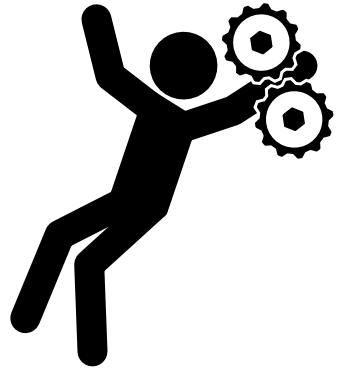
- Liquid ejected at high pressure can cause serious injury.
- Drain the pump after use and before servicing.



WARNING

Moving Parts

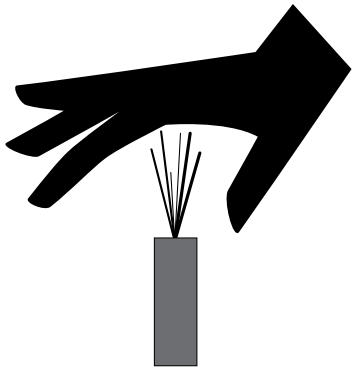
- Rotating parts can cause severe injury or death.
- Do not reach into or enter the compartment when the equipment is on.



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 Waterous equipment. 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 used in this document are intended to illustrate concepts. Do not use them to determine physical attributes, placement, or proportion.
- The equipment described in this document is intended to be installed by a person or persons with the necessary skills and knowledge to perform the installation.
- The equipment described in this document is intended to be operated by a person or persons with the basic knowledge of operating similar equipment.

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 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.

WARRANTY
This section provides warranty information.

Using this Document

Use the guidelines below when viewing this document.

Viewing the Document Electronically

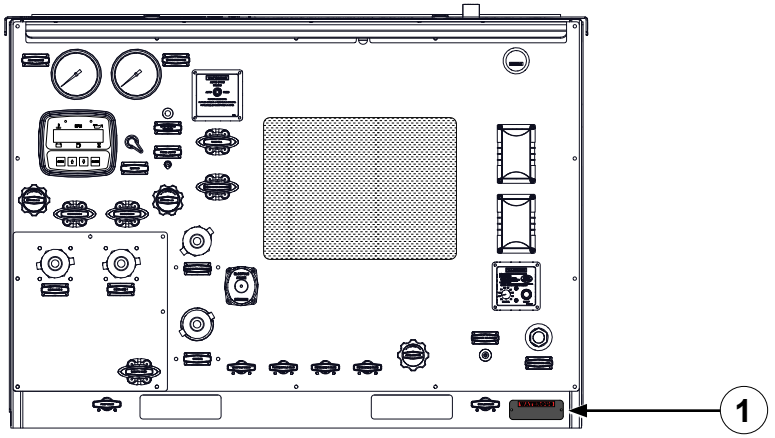
- View this document in landscape orientation.
- Use the table of contents to navigate directly to that section.
- Text **with this appearance** is linked to a reference.

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.



1 Serial number plate

Figure 1

Model number- **Date-**

Serial number-

Operator Panel—Controls and Indicators

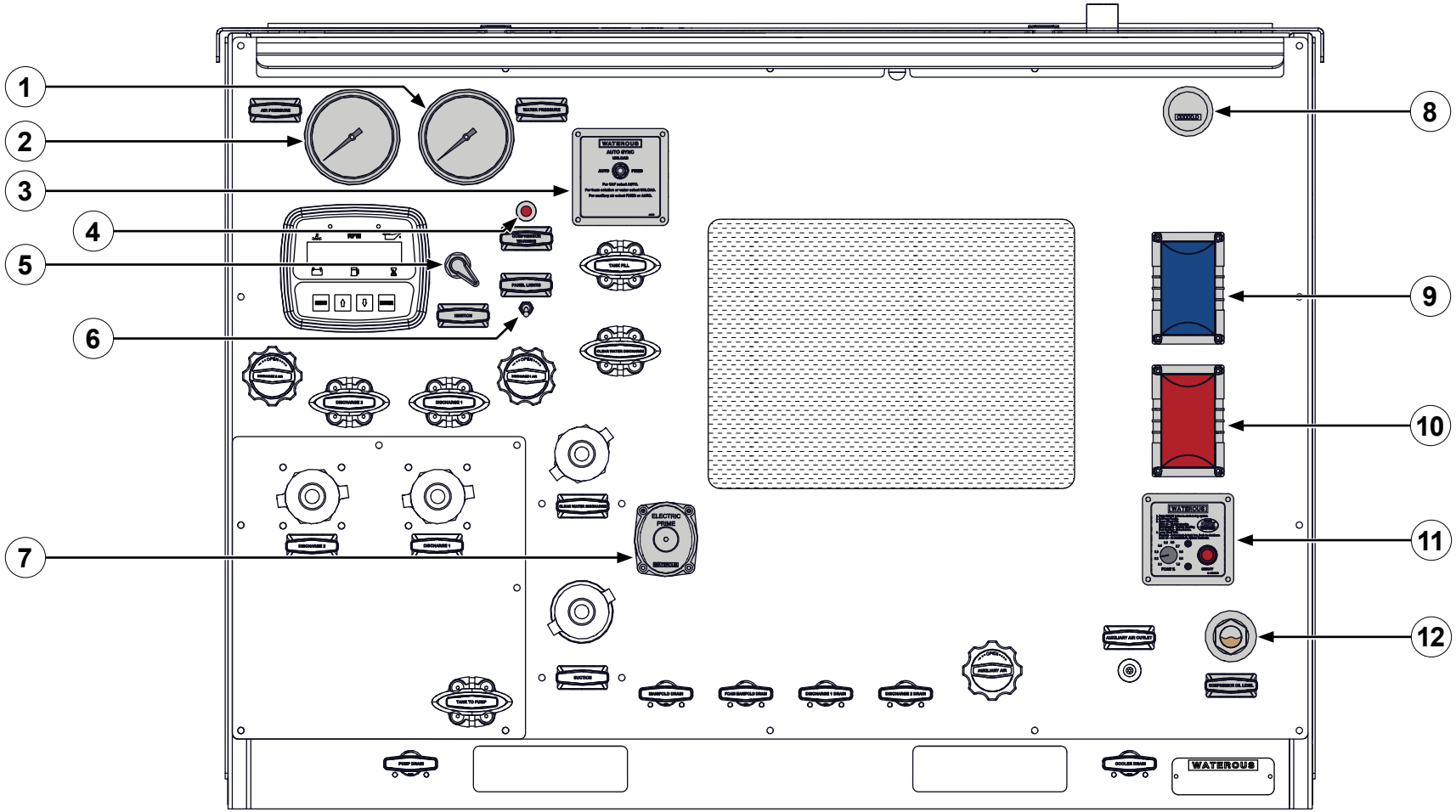


Figure 2

Operator Panel—Controls and Indicators

	Feature	Description
1	Water pressure gauge	This displays the water pressure.
2	Air pressure gauge	This displays the air pressure.
3	Compressor mode switch	This switches between the compressor modes.
4	Compressor warning indicator	This is a warning light for the compressor.
5	Ignition switch	This starts the engine.
6	Panel light switch	This switches the panel light on and off.
7	Electric prime button	This button initiates the pump priming process.
8	Hour meter	This measures the equipment run time.
9	Foam level LED	This displays the foam supply level.
10	Water tank level LED	This displays the water supply level.
11	OIT	This controls the concentrate pump.
12	Sump oil level window	This displays the sump oil level.

Operator Panel—Valve Controls

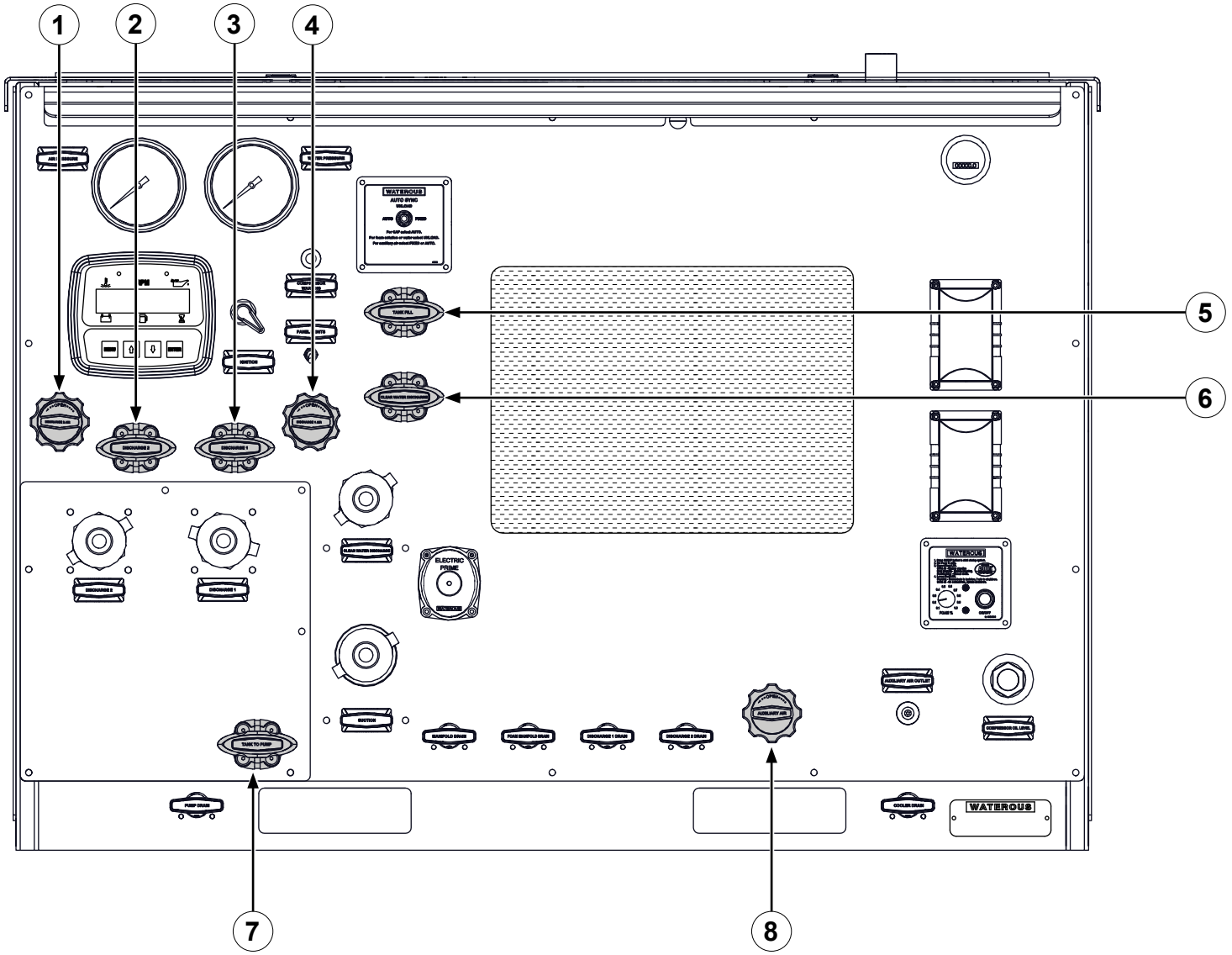


Figure 3

Operator Panel—Valve Controls

	Feature	Description
1	Discharge 2 air valve control	This operates the discharge 2 air valve.
2	Discharge 2 valve control	This operates the discharge 2 valve.
3	Discharge 1 valve control	This operates the discharge 1 valve.
4	Discharge 1 air valve control	This operates the discharge 1 air valve.
5	Tank fill valve control	This operates the tank fill valve.
6	Clear water valve control	This operates the clear water valve.
7	Tank to pump valve control	This operates the tank to pump valve.
8	Auxiliary air valve control	This operates the auxiliary air valve.

Operator Panel—Intake and Discharges

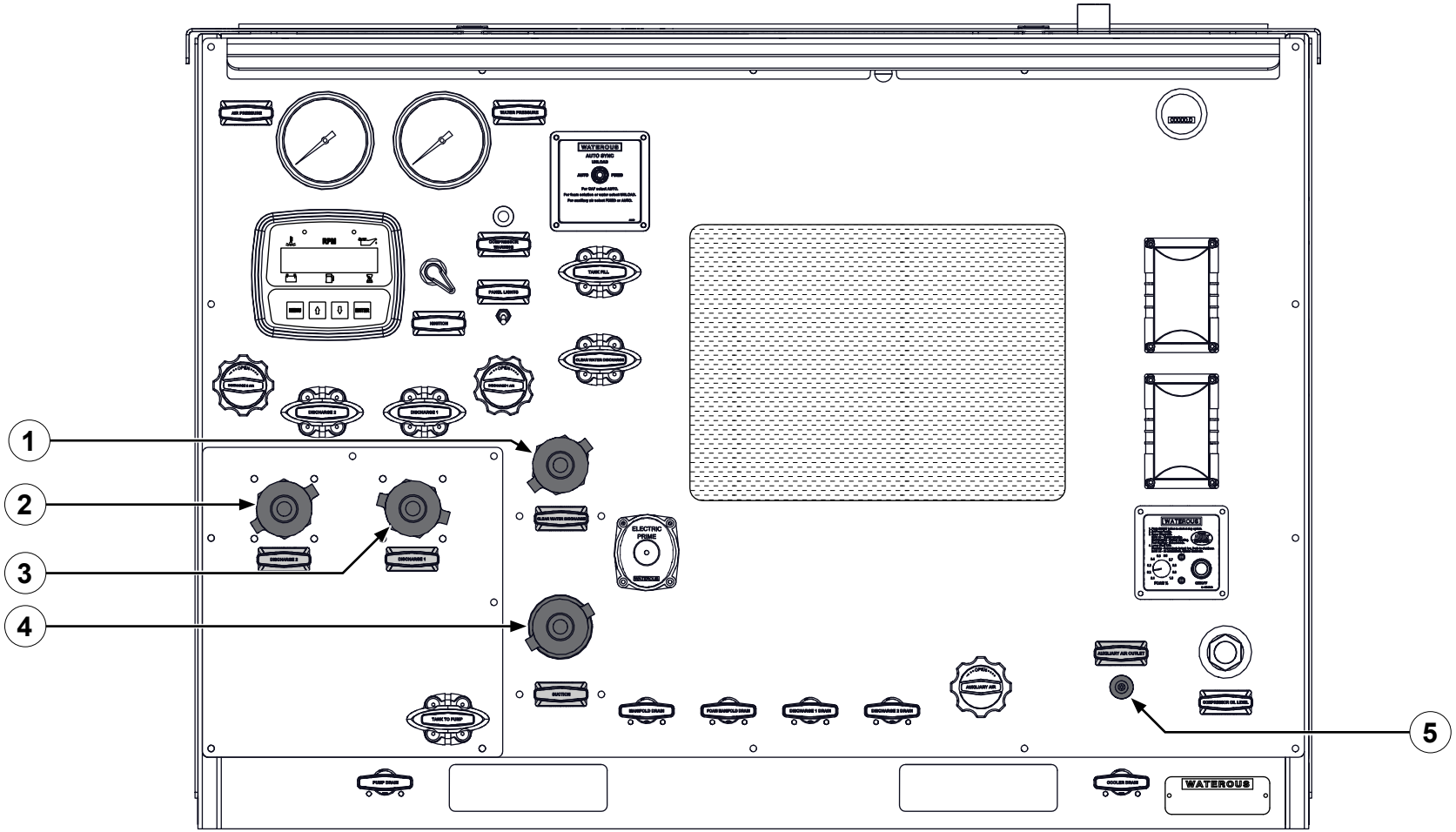


Figure 4

Operator Panel—Intake and Discharges

	Feature	Description
1	Clear water discharge	This is the clear water outlet.
2	Discharge 2 discharge	This is the panel mounted foam solution discharge and hose connection.
3	Discharge 1 discharge	This is the panel mounted foam solution discharge and hose connection.
4	Suction intake	This is an intake for externally sourced water supply.
5	Auxiliary air outlet	This port provides an outlet for compressed air.

Operator Panel—Drain Valves

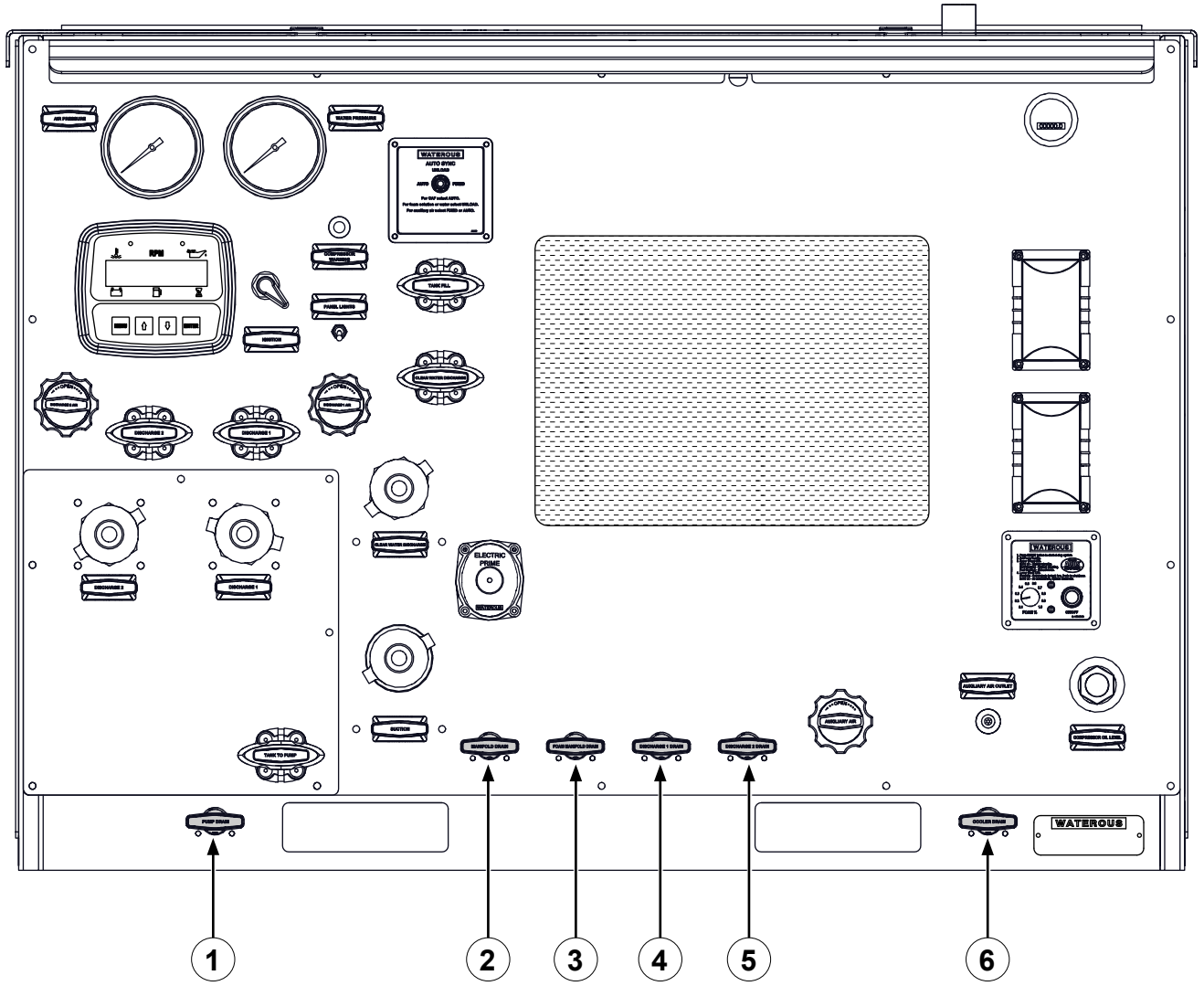


Figure 5

Operator Panel—Drain Valves

	Feature	Description
1	Pump drain valve control	This operates the pump drain.
2	Manifold drain valve control	This operates the manifold drain.
3	Foam manifold drain valve control	This operates the foam drain.
4	Discharge 1 drain valve control	This operates the discharge 1 drain.
5	Discharge 2 drain valve control	This operates the discharge 2 drain.
6	Cooler drain valve control	This operates the cooler drain.

Exterior Features

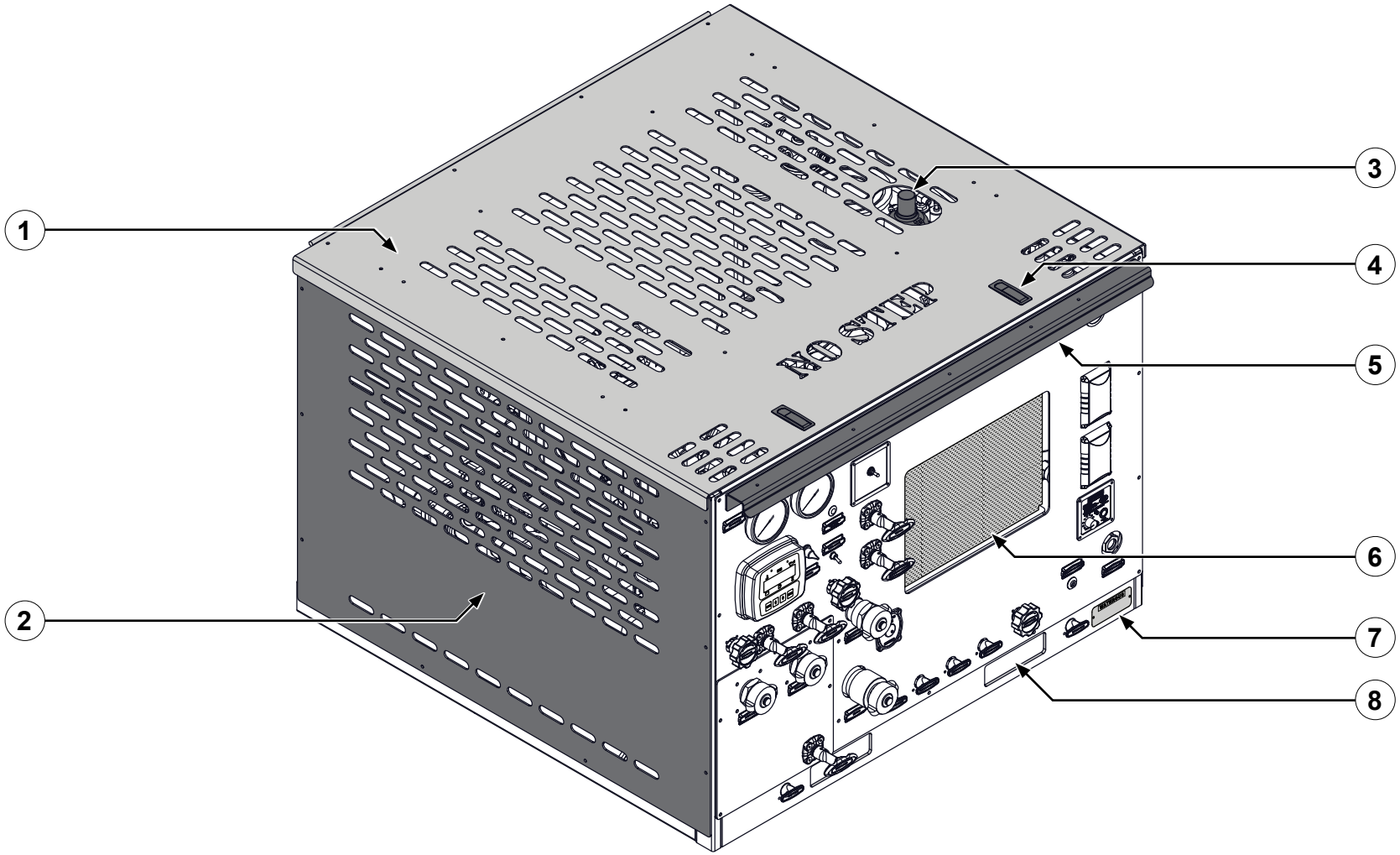


Figure 6

Exterior Features

	Feature	Description
1	Top panel	This panel covers the top of the module—optional.
2	Side panels	This panel covers each side of the module—optional.
3	Exhaust pipe	This routes the engine exhaust to atmosphere.
4	Top panel latch	This secures the panel to the frame.
5	Light bar	This light illuminates the operator panel.
6	Engine radiator	This controls the engine temperature.
7	Serial plate	This is where the serial number is located.
8	Fork lift opening	This allows a forklift to transport the equipment.

Control Panel

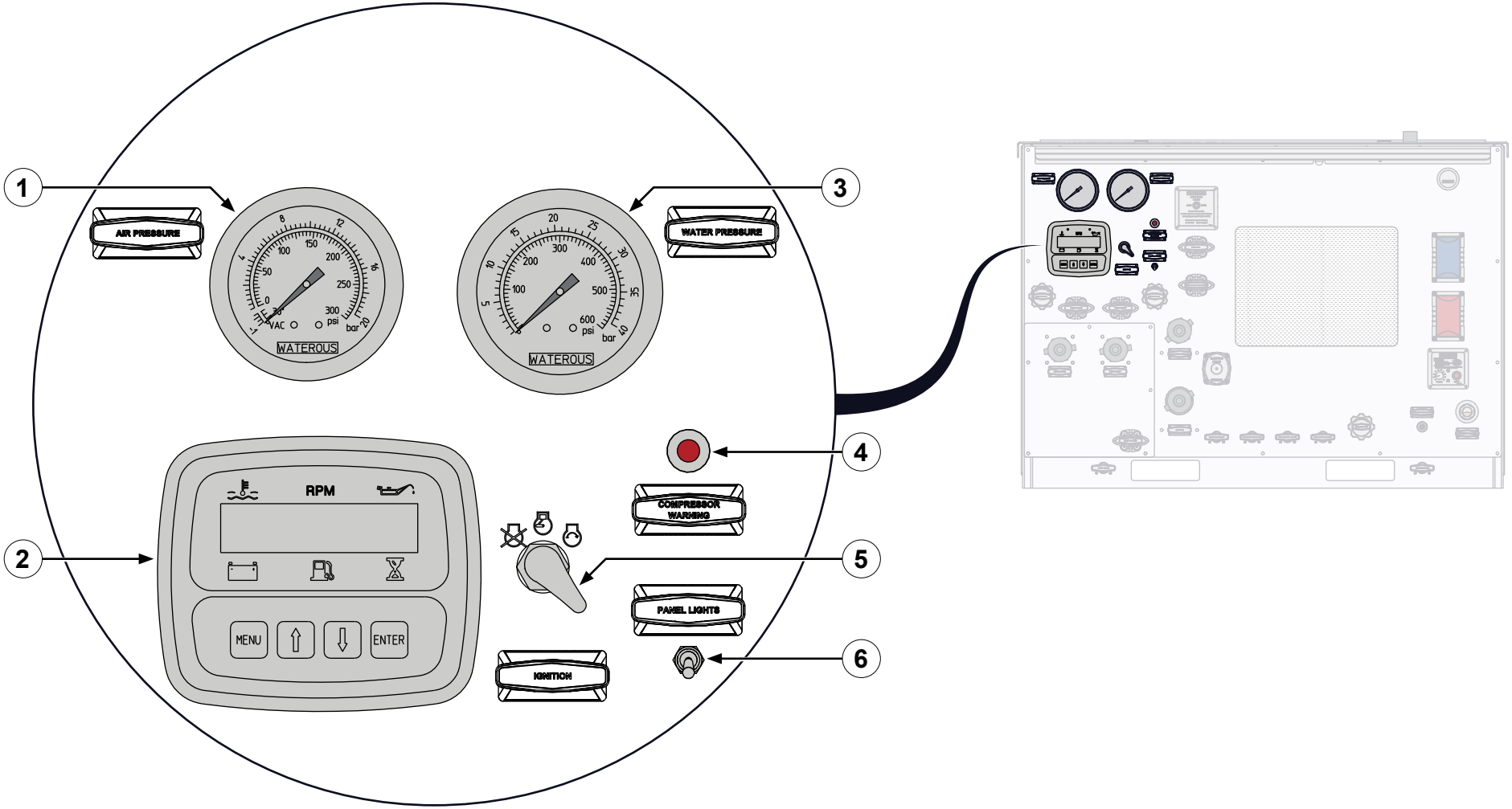


Figure 7

Control Panel

	Feature	Description
1	Air pressure gauge	This displays the air pressure.
2	Engine controller	The controls and displays engine parameters.
3	Water pressure gauge	This displays the water pressure.
4	Compressor warning light	This enables the panel lights.
5	Ignition switch	This starts and stops the engine. *START*  , *RUN*  , *STOP*  .
6	Panel light switch	This indicates the compressor is above operating temperature.

Engine Controller

The engine controller manages the engine. Refer to the engine controller manual for addition information.

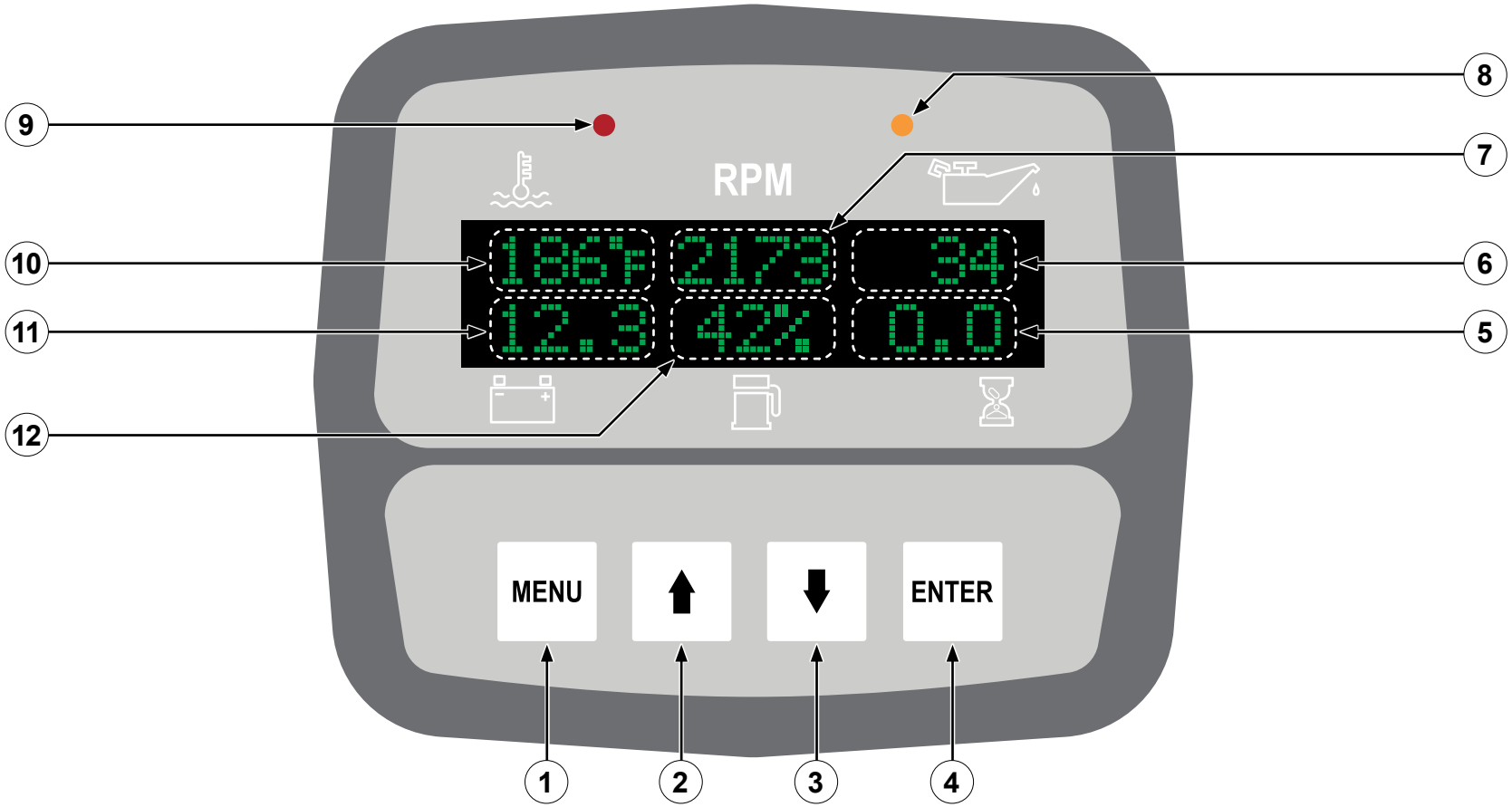


Figure 8

Engine Controller

	Feature	Description
1	Menu button	This accesses and navigates the menu.
2	Up arrow	This changes menu parameters and adjusts the engine speed.
3	Down arrow	This changes menu parameters and adjusts the engine speed.
4	Enter button	This affirms menu changes.
5	Engine hours	This displays the engine run time.
6	Oil pressure	This displays the oil pressure.
7	Engine RPM	This displays the engine speed.
8	Water temperature	This displays the water temperature.
9	Pre-alarm warning—amber	This is a warning LED.
10	Alarm warning—red	This is an alarm LED.
11	Battery voltage	This displays the battery voltage.
12	Fuel level	This displays the fuel level.

Auto-Sync Mode Switch

The auto-sync mode switch changes the CAFS operating mode. Refer to the traditional CAFS 80-P, 140-P, and 200-P instructions for more information.

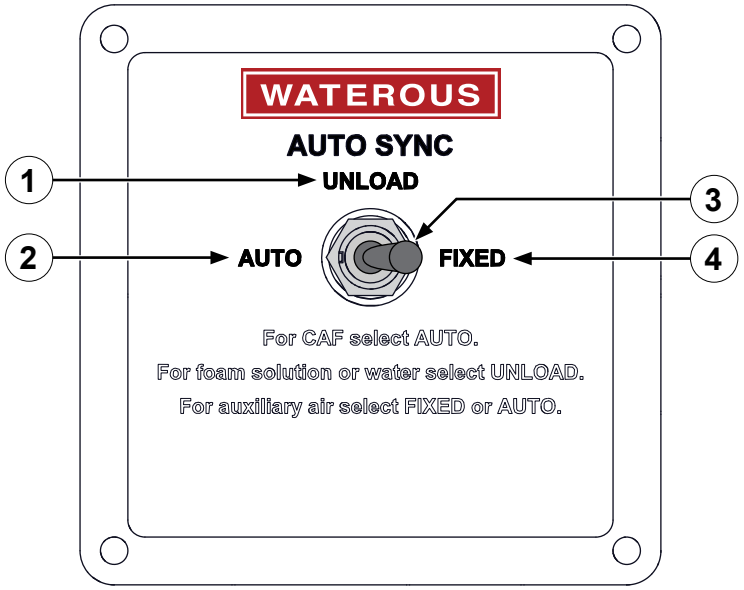


Figure 9

	Feature	Description
1	Unload mode	This mode operates the compressor at approximately 40 psi (2.8 bar). The compressor generates a minimum pressure of approximately 40 psi (2.8 bar) to circulate the compressor oil and cool the system. Always start the compressor in this mode or auto mode.
2	Auto mode	This mode operates the compressor from 50 to 150 psi (3.4 to 10.3 bar). The system raises and lowers the air pressure automatically as you raise and lower the water pressure. Always start the compressor in this mode or unload mode.
3	Fixed mode	This mode operates the compressor at 150 psi (10.3 bar) regardless of the water pressure.
4	3-Way switch	This switches between the 3 modes.

Manual OIT

The manual OIT controls the foam pump. Refer to the AQUIS™ foam pump instructions for more information.

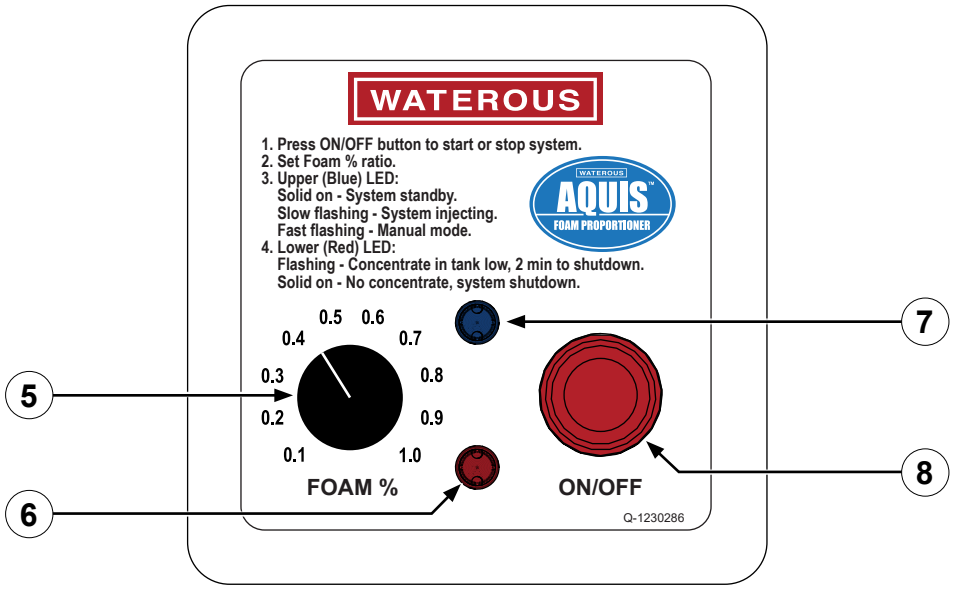


Figure 10

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

Electric Prime

The priming button primes the water pump when sourcing water from an auxiliary source.

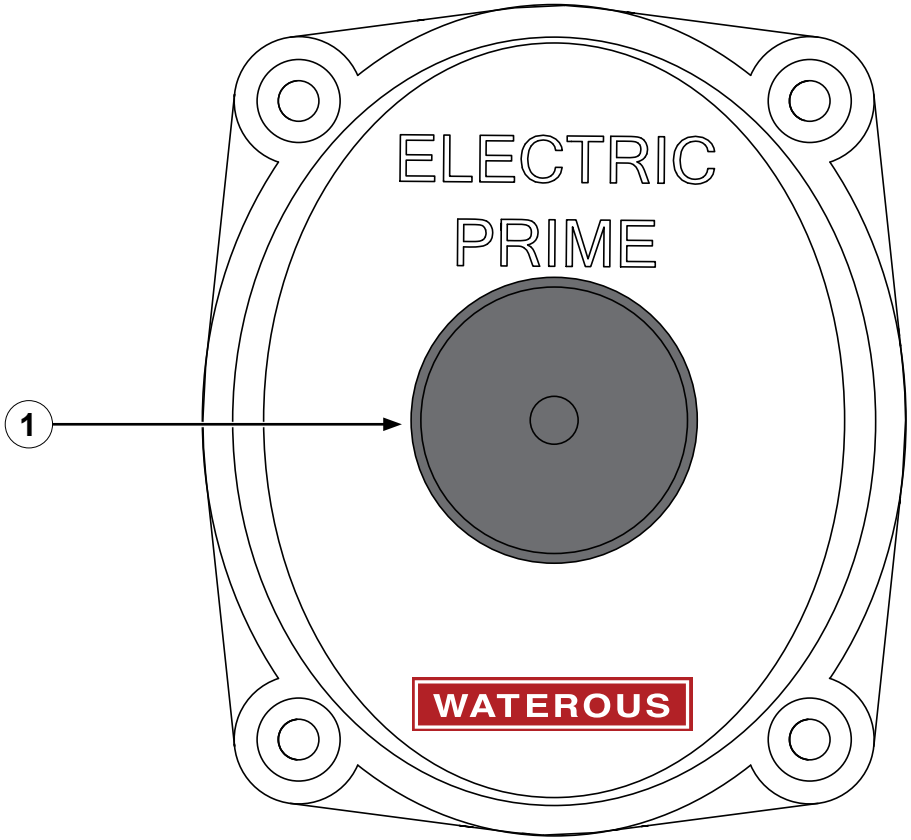


Figure 11

	Feature	Description
1	Electric prime button	This button initiates the pump priming process.

Minimum Spacing for Airflow

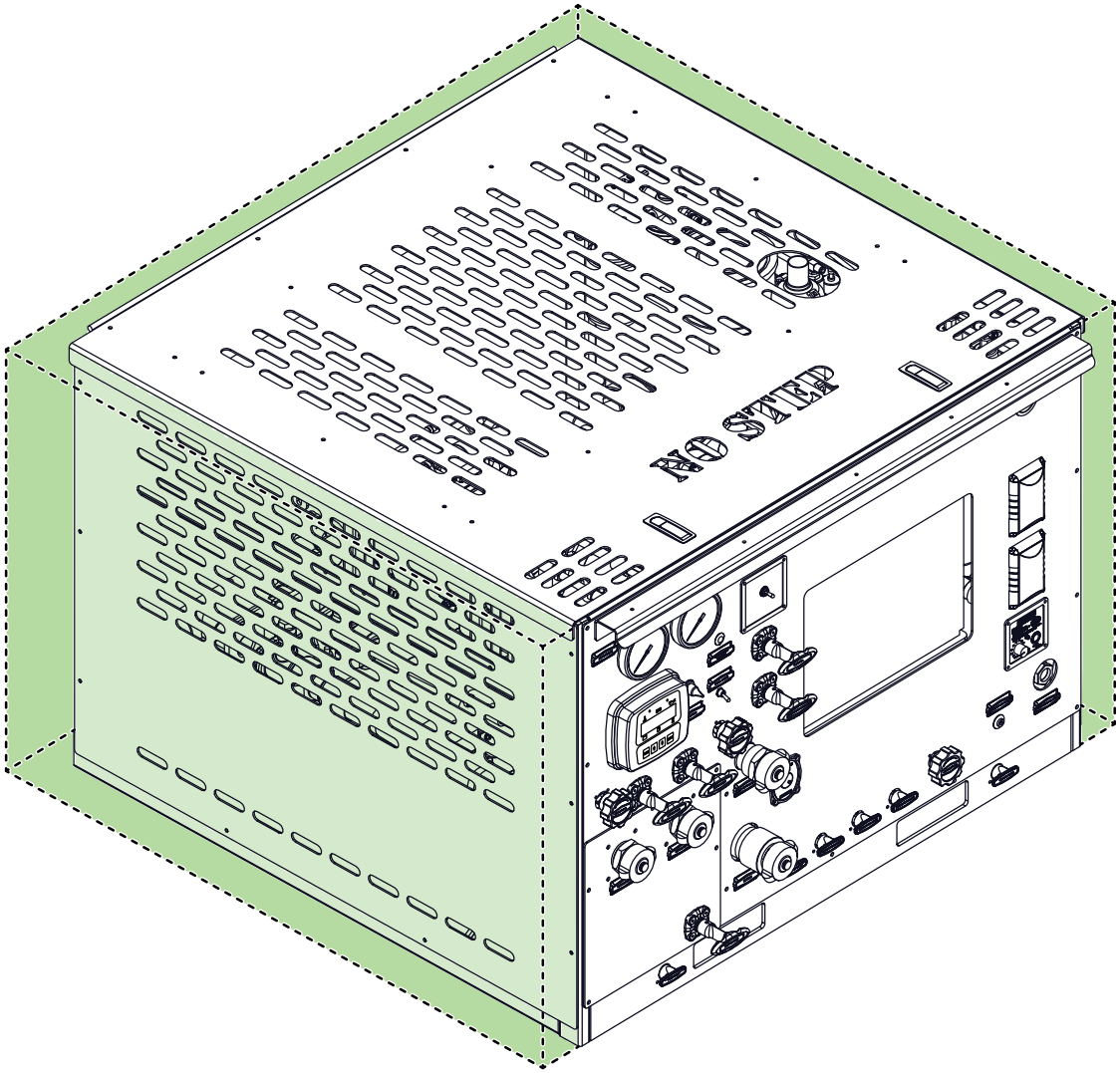


Figure 12

Important: *It is preferred that a minimum of 3 inches (75 mm) of space is provided around the sides and back of the module for airflow. If this is not possible, it may be necessary to drill ventilation holes in the apparatus. Not providing suitable airflow will void your warranty. Never place anything on the top panel.*

Installation overview

The slide-in module consists of an engine, compressor, foam pump, water pump, and control panel, mounted on a steel frame. They are designed to slide into commercially available vehicles. You can add a water tank to make an all in one system. Otherwise, the equipment can draw from auxiliary water source.

This equipment 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 equipment. The installation, in part, requires the following tasks and abilities:

- Lifting the equipment into a vehicle
- Locating, drilling, and cutting features into the vehicle
- Connecting the fuel supply and return to the motor
- Connecting power to the equipment
- Checking, adding or filling fluids
- Final testing

Locate, read, understand, and follow all the instructions for the components that make up your system. The following documents may be required complete the installation, operation, and maintenance for your application:

- The AQUIS foam pump instructions.
- The traditional CAFS 80-P, 140-P, and 200-P instructions.
- The engine manufacturer's instructions.
- The engine controller manufacturer's instructions.

Equipment Requirements

- The engine requires fresh air suitable for combustion and cooling. Do not enclose the equipment within the apparatus without providing adequate ventilation for heat buildup and suitable fresh air intake. Not providing adequate ventilation and suitable fresh air intake will cause premature equipment failure and void your warranty.
- The system requires 12 Vdc and a frame ground to operate. Make sure that you provide suitable electrical cables to power your application.

  Note: *Some modules use 24 Vdc.*
- The system requires a fuel lift pump and hoses suitable for your application.

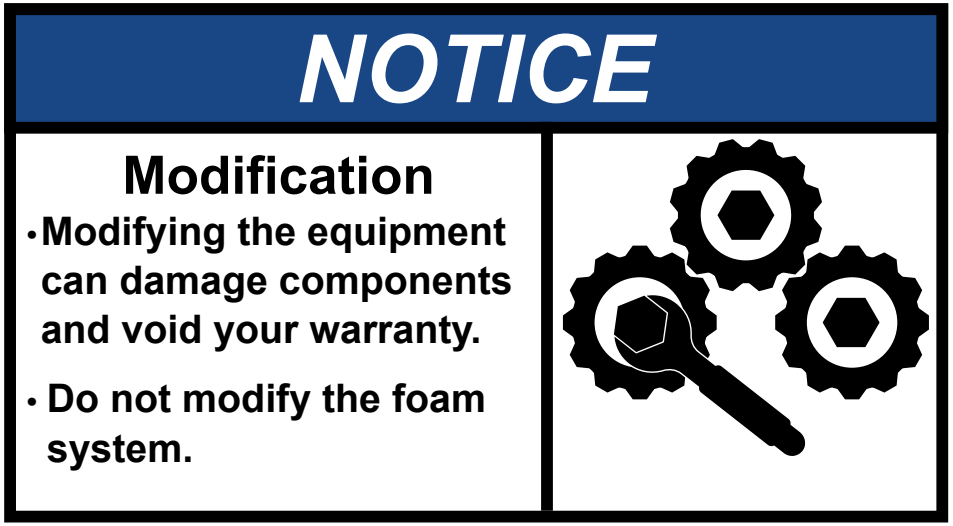
Preparing for the Install

Read and understand the install instructions before installing the equipment—Contact Waterous with questions about installing the equipment. Make sure that you do the following before you install the equipment:

- Prepare a suitable, well-lit, area, and gather all the necessary tools before you install the equipment:
- Make sure that the forklift is rated to lift the equipment.
- Make sure that the vehicle is rated to operate with the equipment and supply tanks used in your application.
- Ensure that you provide adequate ventilation.

Modifying the Equipment

This equipment is intended to operate as designed. Do not remove, modify, or change the components in the system. Doing so will void the warranty.



Do not modify the system or any components. Doing so will void your warranty.

Installing the Module

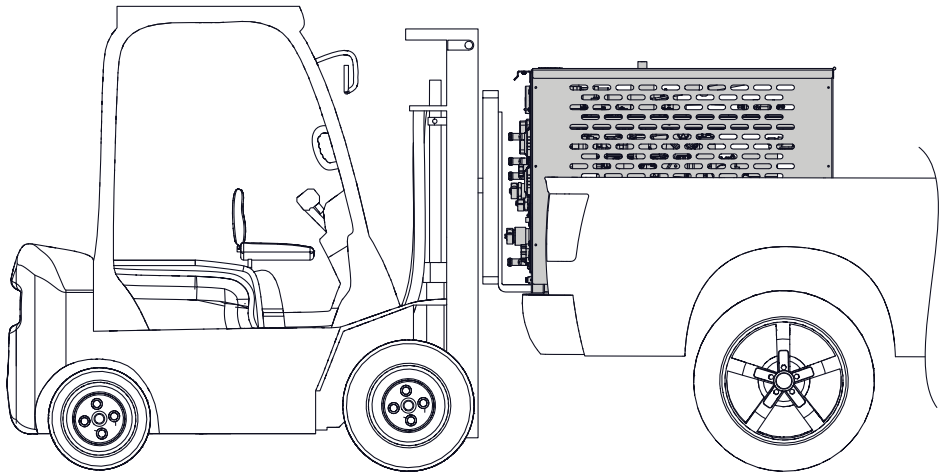


Figure 13

1 Determine drain hose routing and make the appropriate cutouts in the vehicle.

2 Use a forklift and the forklift openings to position the system into the install location (**Figure 13**).

Note: *Make sure that you do not shear the bolts in the channel of the forklift opening.*

3 Route the drain hoses.

Locating and Drilling the Mounting Holes

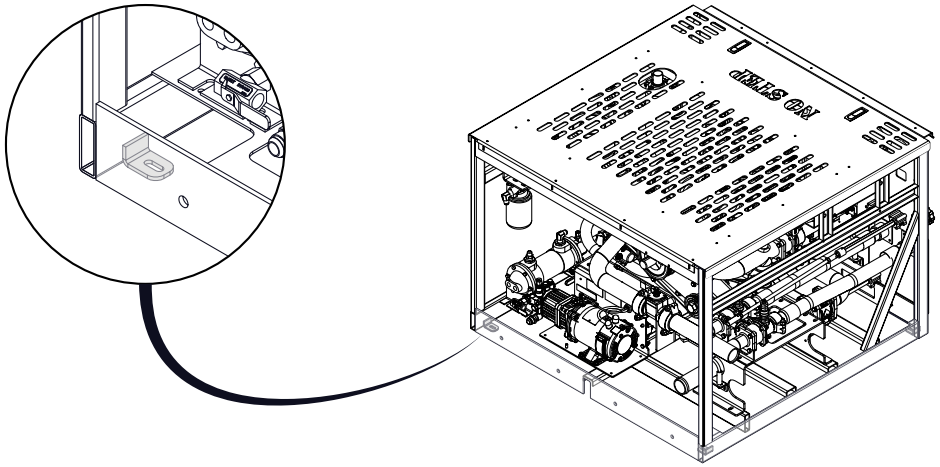


Figure 14

Determine a location that allows you to secure the system to the apparatus. Locally source the appropriate mounting hardware for your specific application.

1 Locate the mounting tabs on the frame (**Figure 14**).

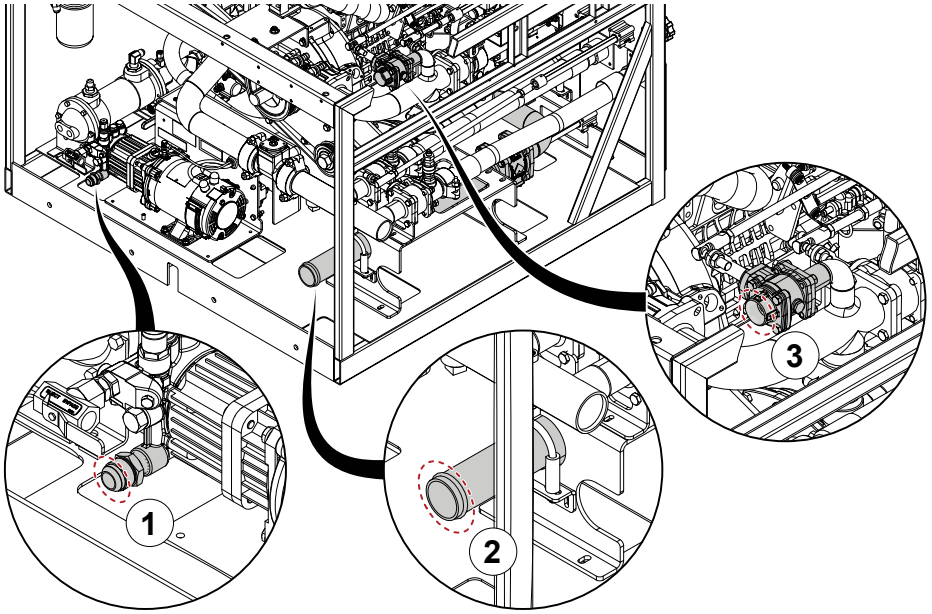
2 Drill the mounting holes.

3 Locally source the appropriate mounting hardware and securely install the module to the vehicle.

Note: *Be aware when you drill though the mounting surface. Do not drill into items behind the mounting surface.*

Removing the Shipping Plugs

Remove the shipping plugs as you install that portion of the module.



1 Concentrate inlet 2 Tank to pump inlet 3 Tank fill inlet

Figure 15

Connecting the Foam Concentrate Supply

1 Route a hose from the concentrate supply tank to the concentrate inlet on the foam pump (**Figure 15**).

2 Refer to the AQUIS foam system manual for supply hose installation details and requirements.

Connecting the Tank to Pump

1 Connect a hose to the tank to pump inlet (**Figure 15**).

2 Route and connect the hose to the supply tank outlet.

Connecting the Tank Fill

1 Locate the water supply inlet (**Figure 15**).

2 Route a supply hose from the supply tank to the tank fill inlet.

Installing the Auxiliary Air Fitting

1 Determine the required fitting for your application.

2 Wrap plumbing tape or apply sealant to the threads on the fitting.

3 Install the fitting to the auxiliary air port (**Figure 4**).

Installing the Drain Lines

The drain hoses for the engine and compressor oil are coiled and stored in the module for shipping. However, hoses for the water and foam drain lines are supplied by the apparatus manufacturer.

1 Install and route a hose to each drain valve to the discharge location on the apparatus.

2 Use cable ties to secure the hose to the apparatus.

Note: *Make sure that the hose does not contact hot, abrasive, or sharp parts.*

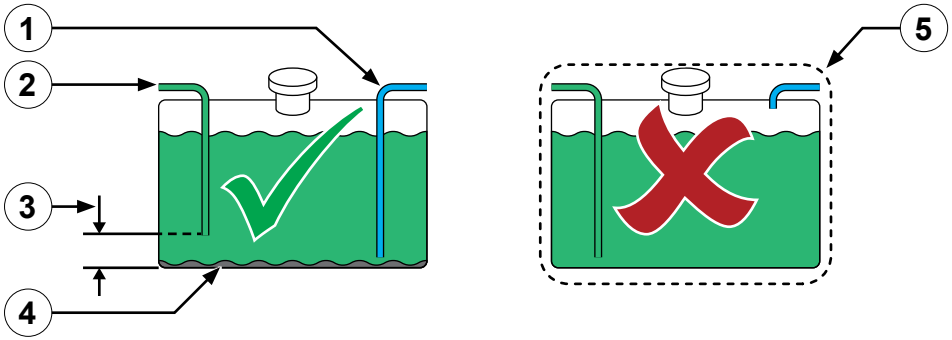
Connecting the Fuel Supply

The fuel tank configuration is determined by your application. The fuel can be supplied by a dedicated fuel tank or a fuel tank that supplies the apparatus. Use the information from this section and the engine manual to configure your application.

Note: *Use a fuel supply line with a minimum cross-section of 5/16 inch (8 mm) and a fuel return line with a minimum cross section of 1/4 inch (6 mm).*

Filtering the Fuel

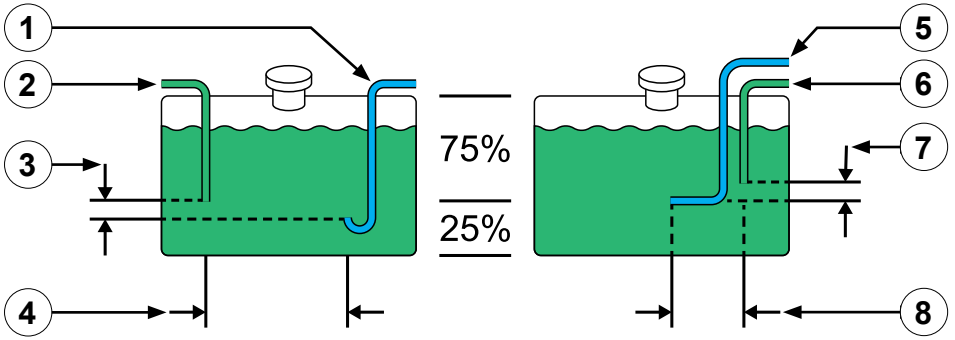
- Connect the fuel line to the fuel filter on the engine. Refer to the engine manufacturer manual.
- Additional strainers and fuel filters are required when poor quality fuel is used.
- An additional water separation filter is required if your fuel supply contains or conditions cause it to contain high water content.
- Use **Figure 16** to configure the supply and return lines when connecting to a dedicated fuel tank.



1 Return line
2 Supply line
3 1-1/2 inch (35 mm)
4 Sludge buildup
5 This configuration is not recommended

Figure 16

- Set the supply line 1-1/2 inches (35 mm) from the tank bottom for sludge buildup.
- Use **Figure 17** to configure the supply and return lines when connecting to the apparatus fuel tank.



1 Return line
2 Supply line
3 1/2 inch (13 mm)
4 12 inches (305 mm) minimum
5 Return line
6 Supply line
7 1/2 inch (13 mm)
8 6 inches (152 mm) minimum

Figure 17

- Do not allow the module to draw fuel below 75% of the fuel tank capacity. This is required by NFPA standards to ensure that there is fuel remaining to move the apparatus.
- Set the return line 1/2 inch (13 mm) below the supply line.
- Non-metal lines must withstand operating at 212 °F (100 °C).
- Route the lines as straight and as short as possible.
- Make sure that the line doesn't kink.

Choosing the Fuel Tank

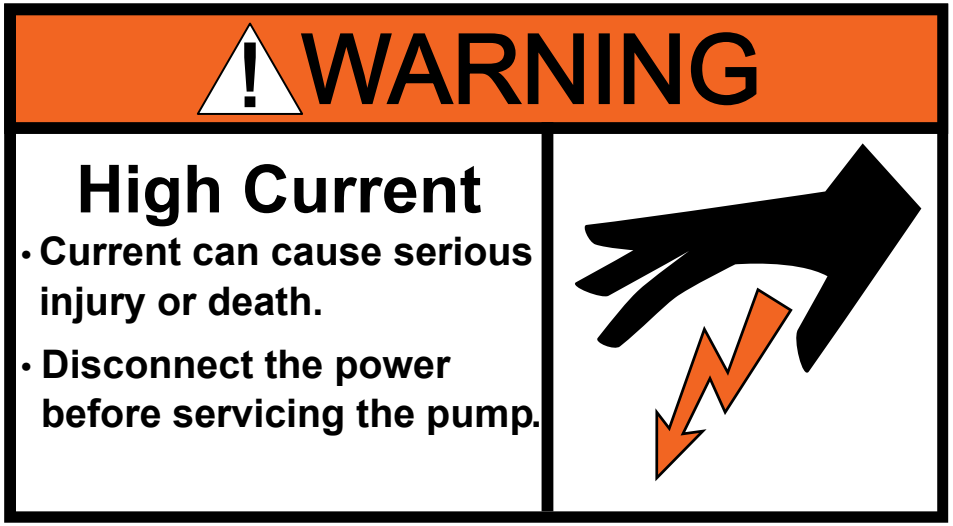
- The fuel tank must vent at any operating angle.
- The tank cannot be made with or contain a high level of zinc.
- The tank must allow sludge to drain.
- The fuel inlet cannot be lower than 78 inches (2 m) from engine fuel pump.

Installing the Fuel Pump

Follow the instructions provided by the engine manufacturer to locate and install the fuel pump.

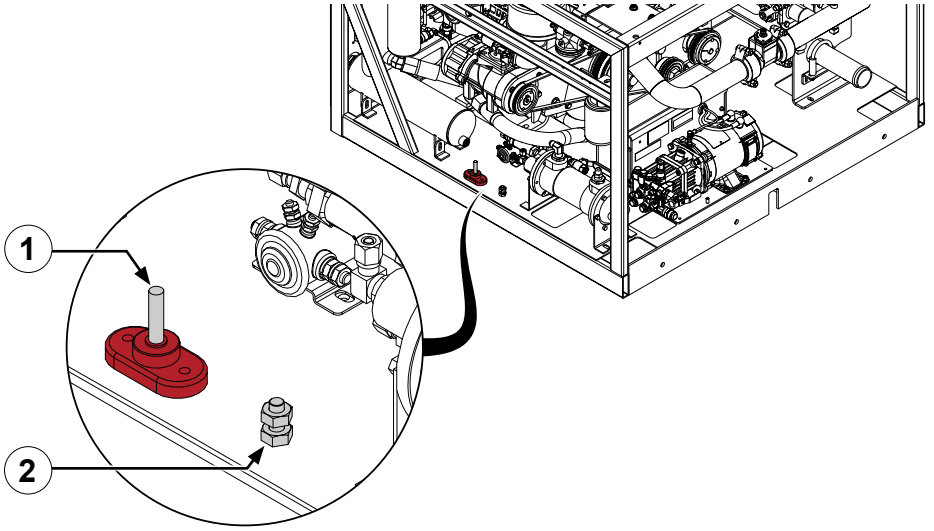
Connecting the Power Supply

Use a minimum of a 4 gauge wire to power the module.



Read and understand the following statements before continuing:

- **The module uses and generates high current during operation.**
- **Electrical current is dangerous and can cause serious injury or death.**
- **Do not attempt to connect the module to the power source if you have not been trained and understand the safety practices needed to install devices requiring high current.**



1 Positive (+) post 2 Negative (–) post

Figure 18

Note: *Make sure that the positive (+) and negative (–) cables are equal length.*

1 Locate the terminal posts on the compressor side of the module (**Figure 18**).

2 Connect the positive (+) cable from the power supply to the positive (+) post.

3 Connect the negative (–) cable from the negative (–) post to chassis ground.

Note: *Make sure that the module ground is connected to the chassis ground and the chassis is connected to the negative (–) battery post.*

4 Use cable ties to secure the cables.

Note: *Make sure that you do not secure the cables to hot, abrasive, or sharp parts.*

Checking and Adding Fluids

The oil is drained from the motor and sump before shipping. Add oil before you operate the equipment.

1 Add oil to the engine; refer to the engine instructions.

2 Add oil to the sump; refer to the traditional CAFS 80-P, 140-P, and 200-P instructions.

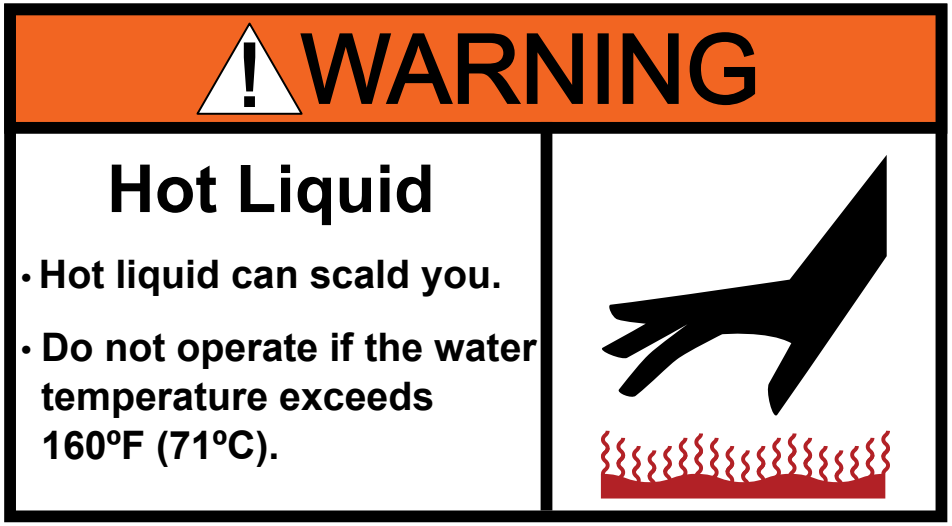
3 Check the oil in the foam pump; refer to the AQUIS foam pump instructions.

Operation Overview

The system can operate in several pumping modes; water only, water with foam solution only, water with foam solution and compressed air, and (where regulations permit) compressed air only.

Hot Liquid

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



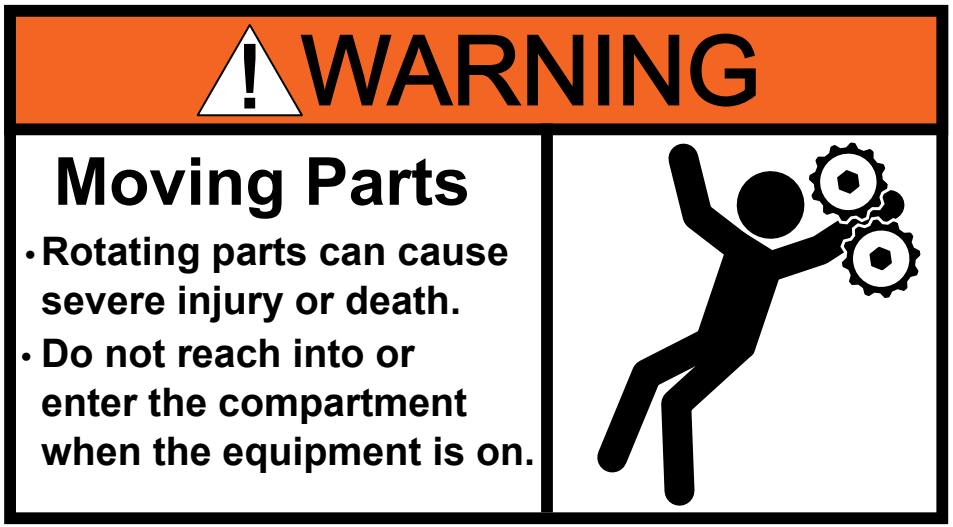
Avoid conditions the result in high temperature solution. Do not operate when solution temperature exceeds 160 °F (71 °C).

Hot Surface

Components in the system become hot during operation. Allow components to cool after operation. Do not place equipment on the module cover.

Do not touch the hot components and allow components to cool before handling. Never place anything on the top panel.

Do not operate while all discharges or drains are closed. High pressure will result in damage to the system, its components or high pressure leaks could occur.



Rotating parts when the equipment is operating. Do not enter or reach into the module while the equipment is running.

Understanding the Waterway Valves

Use the valves to manage the water flow in the system. The valves perform the following functions:

Tank to Pump Valve

- Controls whether the water source is the on-board tank or the suction intake on the operator panel.
- Always operate the valve fully open or fully closed.

Clear Water Discharge Valve

- Controls whether the water flows to the clear-water outlet on the operator panel.
- It is possible to operate the CAFS and clear water discharge given an adequate water supply is flowing through the pump.

Tank fill

- This allows water to flow from the intake suction to fill the on-board tank.
- This allows water to recirculate to prevent the pump from overheating.

Selecting the Hose

Select a hose rated for CAFS use for best performance.

Selecting the Nozzle

You can use a variety of nozzle types and sizes to discharge compressed air foam. Consider the following when selecting the nozzle:

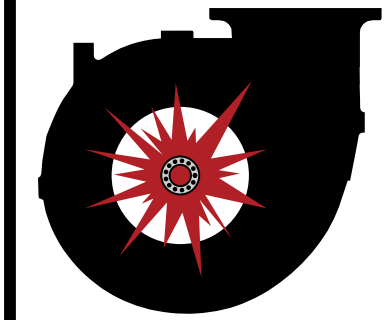
- Smooth bore nozzles provide best foam performance.
- Smaller diameter nozzle tip produce a wetter foam and larger diameter nozzle tip produce a dryer foam.
- Fog nozzles tend to break down the foam structure making a wetter less expansive foam.

Starting and Stopping the Engine

NOTICE

Pump Damage

- **Pump damage occurs when operating without adequate water supply.**
- **Do not operate the pump without adequate water supply.**



Operating the engine also operates the water pump. Make sure that you provide adequate water to the pump while operating the engine to prevent damage.

- Move the ignition switch to the *START* position (**Figure 7**) to start the engine.
- Move the ignition switch to the *STOP* position (**Figure 7**) to stop the engine.

Operating the Waterway Valves

The waterway valve handles are mechanically linked to the valve. The valve can be opened and locked in the partially or fully opened position.

Note: *Keep the valves pushed in and closed when not operating the equipment. In some wild-land applications, the valves operate in reverse.*

Opening the Valve

The valve is completely open when the handle is fully pulled out.

1 Pull the handle out to open the valve.

2 Turn the handle 90° vertical to lock the handle into position.

Closing the Valve

The valve is closed when the handle is fully pushed in.

1 Turn the handle 90° horizontal to unlock the handle.

2 Push the handle in to close the valve.

Using Water Sources

The system can draw water from a tank on the apparatus or from an auxiliary source, such as a fire hydrant. The following instructions describe how to operate the system for common applications.

Drawing From the On-Board Tank

1 Fully open the tank to pump valve (**Figure 3**).

2 Partially open the tank fill valve (**Figure 3**).

3 Close the clear water discharge valve (**Figure 3**).

4 Start the engine. Refer to: **"Starting and Stopping the Engine" on page 32**.

5 Begin operating the system.

Drawing From an External Source

1 Close the tank to pump valve (**Figure 3**).

2 Close the tank fill valve (**Figure 3**).

3 Close the clear water discharge valve (**Figure 3**).

4 Connect a hose from the source to the suction intake (**Figure 4**).

5 Start the engine. Refer to: **"Starting and Stopping the Engine" on page 32**.

6 Press and hold the electric prime button until water fills the water pump and adequate pressure builds up (**Figure 11**).

7 Begin operating the system.

Filling the On-Board Tank

1 Close the tank to pump valve (**Figure 3**).

2 Close the tank fill valve (**Figure 3**).

3 Close the clear water discharge valve (**Figure 3**).

4 Connect a hose from the source to the suction intake (**Figure 4**).

5 Start the engine. Refer to: **"Starting and Stopping the Engine" on page 32**.

6 Press and hold the electric prime button until water fills the water pump and adequate pressure builds up (**Figure 11**).

7 Open tank fill valve.

8 Once the on-board tank is full, stop or idle the engine and close the tank fill valve or begin operating the system as previously described.

Priming the Water Pump

Priming the pump is only required when sourcing water from an auxiliary source such as an open body of water, a fire hydrant, or when filling the water supply tank on the apparatus.

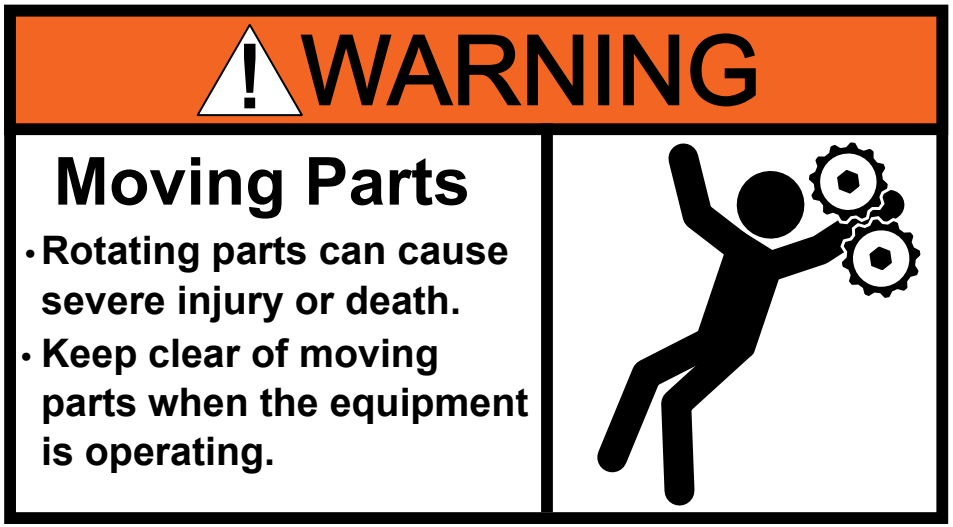
1 Start the engine. Refer to: **"Starting and Stopping the Engine" on page 32**.

2 Press and hold the prime pump button until water fills the water pump and adequate pressure builds up (**Figure 11**).

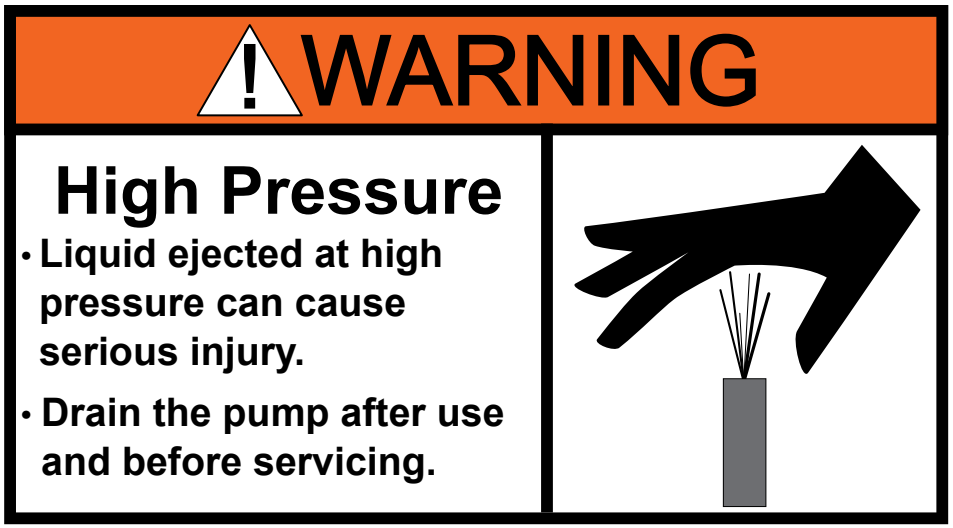
3 Begin operating the system.

Priming the Concentrate Pump

Refer to the AQUIS foam pump instructions to prime the concentrate pump by operating the OIT in manual mode or by using the optional overboard pick-up.



Preparing for Operation



1 Check the compressor oil level. Refer to the traditional CAFS 80-P, 140-P, and 200-P instructions.

2 Relieve pressure in the lines. **Refer to: "Accessing the Interior Components" on page 36**.

3 Connect the hose to the discharge outlet (**Figure 4**).

4 Start the engine, refer to **"Starting and Stopping the Engine" on page 32** to establish water circulating in the water pump.

Operating the Panel Light

Press the panel light button to turn the panel lights on and off (**Figure 2**).

Typical Operation Sequence

Note: *Make sure that you have sufficient fuel, concentrate, water, and oil in the system before operation.*

Operating the Module

1 Open and close all drains to relieve pressure in the system. Refer to **"Operating the Drain Valve" on page 34**.

2 Connect the discharge hoses.

3 Start the engine. Refer to: **"Starting and Stopping the Engine" on page 32**.

4 Prime the pump if you are sourcing the water externally. Refer to: **"Priming the Water Pump" on page 36**.

After Operating the Module

1 Flush the discharges after operation. Refer to: **"Flushing the System" on page 36**.

2 Drain the lines. Refer to: **"Operating the Drain Valve" on page 34**.

Operating the CAFS

The CAFS has a variety of adjustments that determine the output, foam characteristics, and other operation parameters. Use the following instructions to operate and adjust the system.

Enabling the Foam Pump

Press the *ON/OFF* button on the manual OIT (**Figure 10**) to enable and disable the foam pump. The foam pump will operate in conjunction with the water pump.

Adjusting the Solution Percent

Use the dial on the manual OIT to increase or decrease the amount of concentrate injected into the discharge (**Figure 10**).

Using the Clearwater Discharge

1 Connect a hose to the clear water outlet on the operator panel (**Figure 3**).

2 Open the clear water discharge valve. Refer to: **"Opening the Valve" on page 32**.

Using the Auxiliary Air Outlet

1 Rotate the auxiliary air knob counterclockwise to open the valve (**Figure 4**).

2 Rotate the knob clockwise to close the valve.

Operating the Drain Valve

Use the drain valves to remove the remaining liquids after flushing the system.

1 Rotate the drain valve knob counterclockwise to open the valve (**Figure 5**).

2 Rotate the knob clockwise to close the valve.

3 Make sure that you close the valve completely before operating the system.

Maintenance Precautions

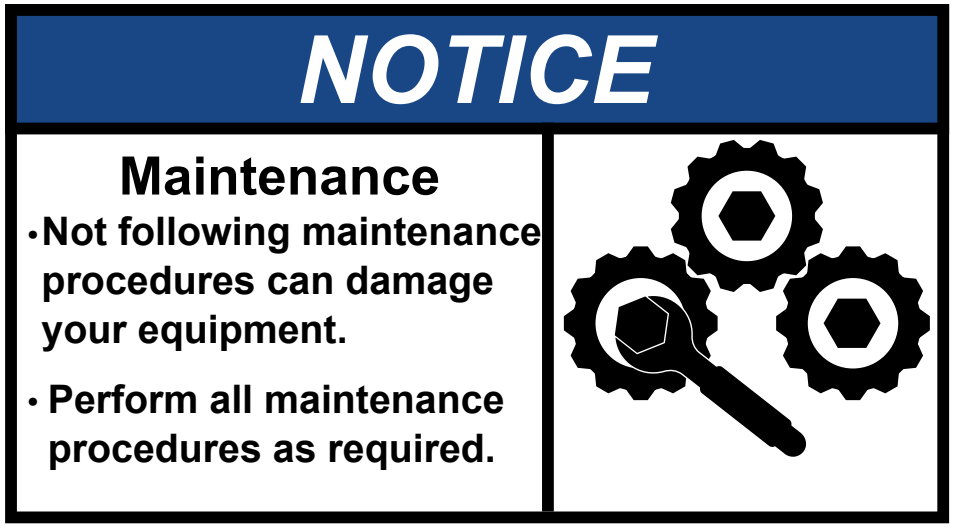
Do not service this equipment if you are not familiar with the tools and skills needed to safely perform required procedures—proper maintenance is the responsibility of the purchaser. This document is not all inclusive to your system.

Locate, read, understand, and follow all the instructions for the components that make up your system. The following documents may be required complete the installation, operation, and maintenance for your application:

- The AQUIS foam pump instructions.
- The traditional CAFS 80-P, 140-P, and 200-P instructions.
- The engine manufacturer's instructions.

Do the following before you begin servicing the equipment:

- Park the apparatus on a level surface.
- Allow the equipment to cool if it was recently operated.
- Disconnect the power supply to prevent accidental operation.
- Relieve waterline pressure before servicing.
- Relieve airline pressure before servicing.
- Clean up fluid spills and debris.



Preform all maintenance procedures as required. Not performing maintenance procedures damages equipment and voids your warranty

Maintenance Schedule

Perform the following procedures at the recommended intervals.

Procedure	Interval
Check the compressor the oil level	Before operation and 10 minutes after operation—add oil if necessary.
Check the compressor oil	After each use, or during daily or weekly apparatus inspection.
Check the compressor oil filter	With each compressor oil change.
Check the foam pump oil	After the first 50 hours, then every 500 hours.
Check the compressor air filter	Replace the air filter every year—Replace more frequently if the operating conditions are dusty.
Check the air separator	Replace the oil separator cartridge every 2 years, or if the oil consumption suddenly increases.
Maintaining the engine	Refer to the engine instructions.
Maintaining the compressor	Refer to the compressor instructions.
Maintaining the foam pump	Refer to the AQUIS foam pump instructions.

Do not operate while all discharges or drains are closed. High pressure will result and damage to foam system, its components or leaks may occur.

Do not service the equipment directly after operation. Allow the equipment to cool before servicing.

Relieving Waterline Pressure

Open and close the pump drain valve to relieve pressure in the water line (**Figure 5**).

Relieving Airline Pressure

The sump pressure will bleed-off, over time, after system shut down, as required by NFPA requirements. Open the auxiliary air outlet to vent the compressed air (**Figure 4**), or pull the pop-off valve to immediately relieve pressure, refer to the traditional CAFS 80-P, 140-P, and 200-P instructions.

Accessing the Interior Components

Note: *The outer panels are optional equipment and not used in every application. Use the following instructions if your application is equipped with outer panels.*

Opening the Top Panel

1 Locate the latches on the top panel (**Figure 12**).

2 Pull up on the latches to unlock the panel from the frame.

3 Lift the panel up.

Closing the Top Panel

1 Push down on the panel (**Figure 12**).

2 Push down on the latches to lock the panel from the frame.

Servicing the Sump

For comprehensive service instructions, refer to the traditional CAFS 80-P, 140-P, and 200-P instructions.

Checking the Sump Oil Level

1 Use the window on the operator panel to determine the compressor oil level (**Figure 2**).

2 Make sure that the oil is in the middle of the window.

Draining the Sump Oil

1 Relieve airline pressure before servicing. Refer to: **"Relieving Airline Pressure" on page 36**.

2 Locate the sump drain hose.

3 Direct the hose into a container large enough to collect all the oil.

4 Drain the sump oil.

5 Store the hose after you complete the process.

Adding Sump Oil

Refer to the traditional CAFS 80-P, 140-P, and 200-P instructions.

Replacing the Oil Separator

Refer to the traditional CAFS 80-P, 140-P, and 200-P instructions.

Replacing the Compressor Air Filter

Refer to the traditional CAFS 80-P, 140-P, and 200-P instructions.

Servicing the Foam Pump

For comprehensive service instructions, refer to the AQUIS foam pump instructions.

Checking the Foam Pump Oil

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

Flushing the Foam Pump

Refer to the AQUIS foam pump instructions.

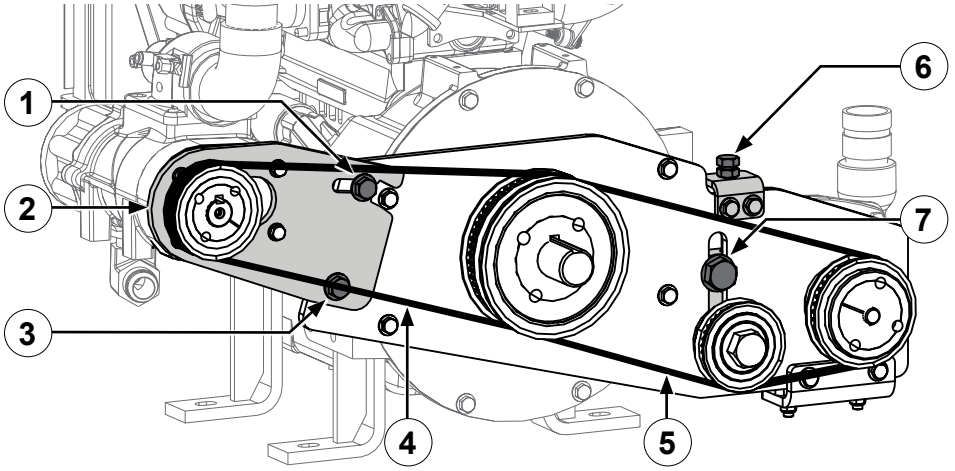
Servicing the Engine

For comprehensive service instructions, refer to the engine manufacturer's instructions.

Servicing the Engine Oil

Follow the instructions provided by the engine manufacturer to service the engine oil.

Servicing the Compressor/Pump Drive Belt



1 Tension hardware
2 Belt tension plate
3 Pivot hardware
4 Compressor belt
5 Pump belt
6 Slide block bolt
7 Slide block locking hardware

Figure 20

1 Locate and loosen the jam nut on the slide block bolt (**Figure 20**).

2 Turn the slide block bolt to loosen the belt tension enough to remove the pump belt.

3 Loosen the hardware that secures the compressor belt tension plate (**Figure 20**).

4 Loosen the tension and remove the belt.

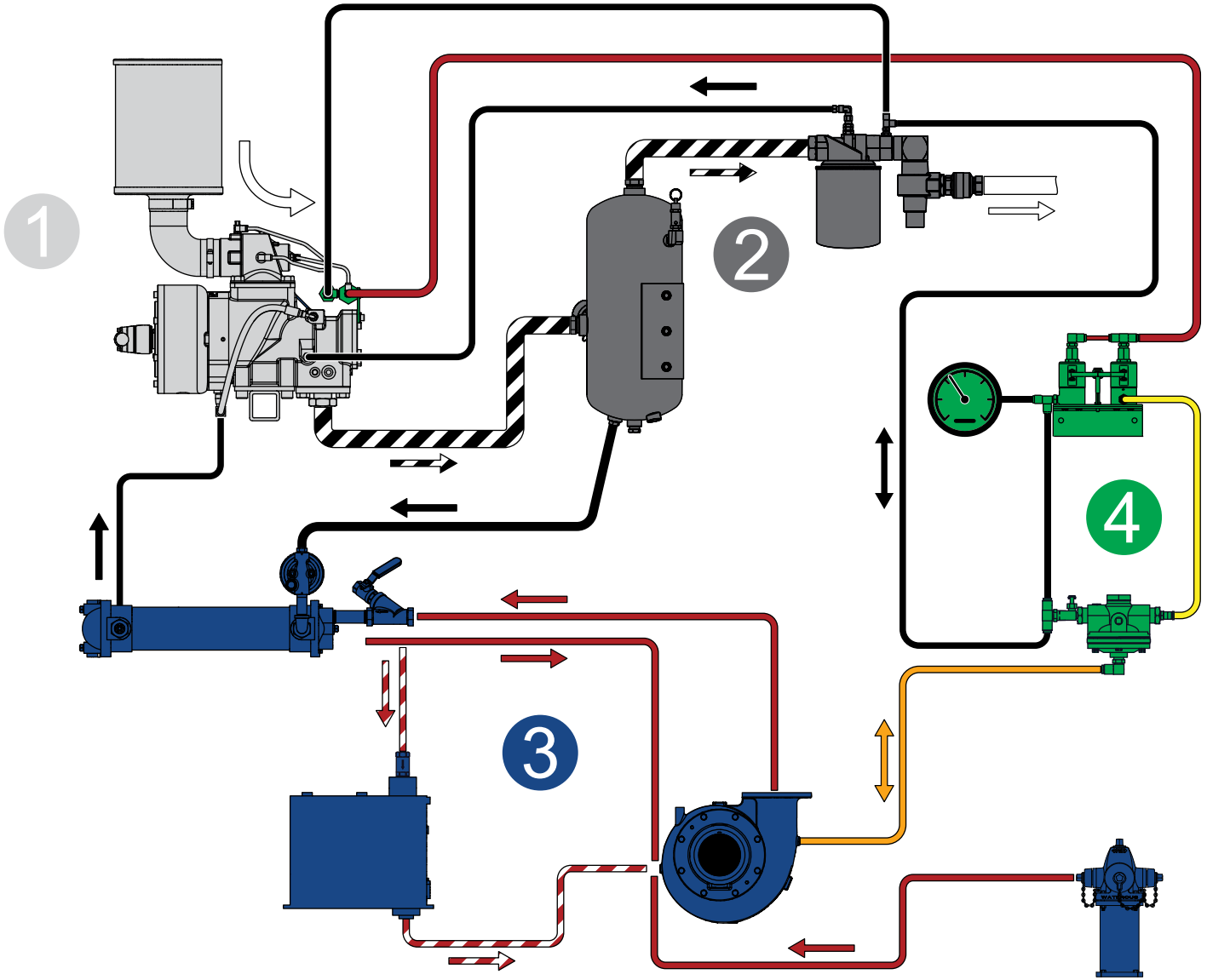
5 Install the replacement belt.

6 Set the belt tension to 70-80 lb (32-36 kg).

7 Tighten the hardware to secure the compressor belt tension plate.

Compressor System Overview

Use the following compressed air foam system operation information to help troubleshoot your application. Additional information is available in the traditional CAFS 80-P, 140-P, and 200-P instructions.



Operation Overview

	Description
1 Compressor	The compressor portion of the system includes the compressor and the components needed to drive the compressor such as the power take-off, or engine. Air enters the compressor through the air filter. The air is entrained, or mixed into the oil, and sent to the sump.
2 Compressed air	The compressed air portion of the system includes the sump, air/oil separator filter, and the supporting hoses. The air/oil mixture moves to the sump and separates. The separated oil collects at the bottom of the sump before it is sent to the oil cooler. After the oil is cooled it is sent back to the compressor to repeat the cycle. The air in the sump moves to the air/oil separator filter. The air/oil separator scavenges any oil remain and sends it back to the compressor. The compressed air is filtered and moves to the air distribution manifold. A port on the air/oil separator also sends air (pressure) to the balance valve and the pressure modulation control (PMC) assembly, where it is used to synchronize air and water pressure in auto mode.
3 Cooling	The cooling portion of the system includes the oil cooler, supporting hoses, the water pump, and a water source. In this stage, the oil moves from the sump to the oil cooler. Flowing water circulated by the water pump removes heat from the oil as it flows through the oil cooler. Typical applications source an external water source to cool the compressor oil. Alternatively, an internal water source, such as an on-board water tank, can be used to cool the compressor oil. However, an internal water source can retain heat and become ineffective in cooling the compressor oil, and the compressor oil temperature must be closely monitored. An additional fan style cooler is available to supplement the cooling capability by your application.
4 Balance	The components used to balance the air to the water pressure when in auto mode include the balance valve, the auto-sync solenoid assembly, the PMC assembly, and supporting hoses. When operating in auto mode, the air pressure produced by the compressor is synchronized to the water pressure. The components in this portion of the system also purge the system of air pressure when the operation is finished.

Trouble Shooting Chart

Symptom	Possible Cause	Corrective Action
System overheating	• Low compressor oil level • Temperature sending unit and/or gauge circuit malfunction • Inadequate ventilation	• Check oil level • Check the hydraulic lines for kinks, change oil filters • Check wire connections at sending unit • Provide adequate ventilation • Make sure nothing is obstructing cooling or venting channels.
High oil consumption	• Overfull compressor oil • Running in excess of 150 CFM air flow • Air/Oil Separator Filter damaged (could be caused by air flow of higher than 150 CFM)	• Adjust the oil level to the middle of the sight window • Lower the engine speed and flow CAFS to relieve pressure, then recheck • Replace air/oil separator filter • System being operated at higher than capacity
Engine stalls upon compressor engagement	• Engaging compressor while under load • Running system without flowing air causes oil to accumulate in compressor acting like hydraulic pump • Underrated engine horsepower • High oil level • Compressor locked up	• Allow compressor to bleed down before re-engagement • Bleed down air, restart compressor, and move air • Raise the engine speed • Check oil level, adjust the oil level to the middle of the sight window. • Repair/replace compressor
Compressor locked up	• High oil level (compressor is flooded) • Sump fire • Low oil level or no oil	• Check oil level, adjust level to half of the sight glass with vehicle parked on a level surface • Check system and repair

Trouble Shooting Chart

Symptom	Possible Cause	Corrective Action
Poor CAFS (wet or dry) or no CAFS (assuming air pressure to generator is OK)	• Using wetting agent and not foam concentrate • Foam proportioning rate turned too low • Foam proportioning control OFF or turned too low, foam tank empty • Discharge hose not matched to generator setting	• Use foam concentrate • Increase amount of concentrate delivered to manufacturer recommended amount • Make sure proportioner is turned on and proper rate setting on Tellurus screen, foam supply valve is open, foam tank has concentrate, wye strainer is clean, and supply line is connected to injector • Verify generator air injector and generator valve percentage settings. Hose size used must match generator settings. If generator is set up for 1-1/2 inch hose and a 2-1/2 inch hose is used, poor CAFS will result
Discharge hose shaking (slug flow)	• Using wetting agent and not foam concentrate • Foam proportioning rate turned too low • Foam proportioning control OFF or turned too low, foam tank empty	• Use foam concentrate • Increase amount of concentrate delivered to manufacturer recommended amount • Make sure proportioner is turned on and proper rate setting on Tellurus screen, foam supply valve is open, foam tank has concentrate, wye strainer is clean, and supply line is connected to injector
Foam in the water system (when proportioner turned off)	• Foam concentrate was poured into the on-board water tank • Foam manifold drain lines not isolated from water drain lines • Cooler line plumbed from manifold • Foam manifold check valve defective	• Flush tank and pump with clean water, refill • Isolate to separate drain valve • Relocate line to discharge side of pump • Rebuild/replace check valves
Safety pop off valve opening at low pressure	• Sump fire damaged pop off valve	• Check system for other damage and replace valve
Safety pop off valve repeatedly opening	• Trim valve or inlet completely open	• Trim valve should be set 3 turns open from closed position.

Contact Waterous for more information.

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Notes

WATEROUS

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