WATEROUS

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Eclipse™ Compressed Air System

Installation, Operation, and Maintenance

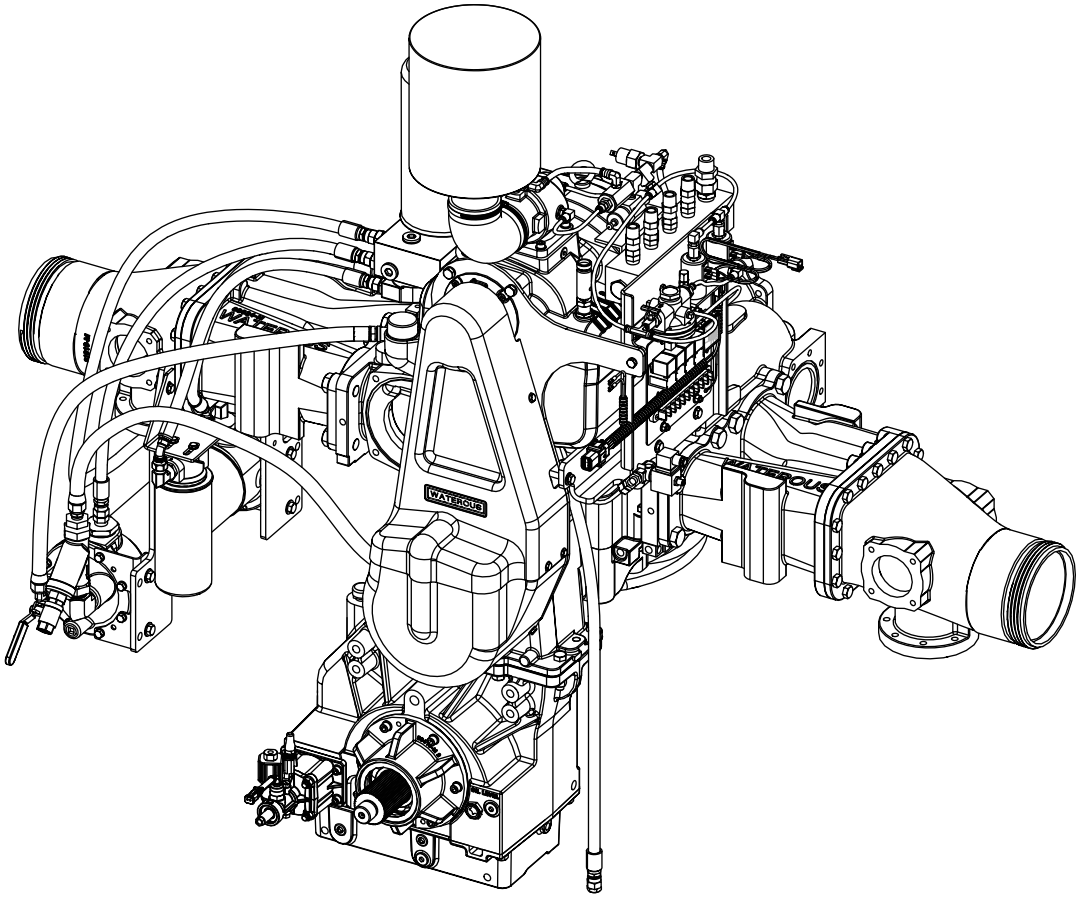

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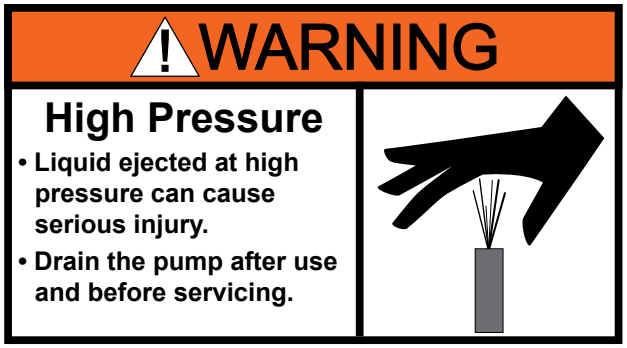
Table of Contents

Safety Precautions

- Read and understand all the associated documentation before you begin operating the product.
- Contact Waterous when you have questions about operating or maintaining the equipment.
- Read and understand all the notices and safety precautions.
- Do not operate the equipment when safety guards are removed.
- Do not modify the equipment.



Read and understand all instructions following this symbol.

NOTICE

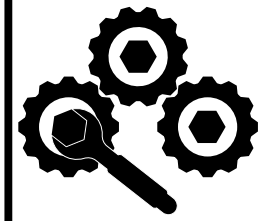
Before Operation

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

NOTICE

Modification

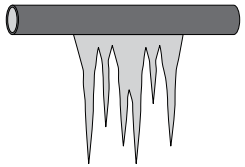
- Modifying the equipment can damage components and void your warranty.
- Do not modify the system or any of its components.



NOTICE

Freeze Damage

- Do not allow fluid in the lines to freeze.
- Remove all freezable fluid from the lines before storing the apparatus.



NOTICE

High Current

- High current from welding or plasma cutting can damage components.
- Disconnect all ground wire connections before applying high current.

Read and understand all instructions following this symbol.

Use this document to install and operate your Waterous equipment. Understand the following conditions before proceeding:

- The instructions may refer to options or equipment that you may not have purchased with your system.
- The illustrations in this document are intended to convey concepts. Do not use the illustrations to determine physical attributes, placement, or proportion.
- Understand that your application may require additional steps that are not described in the illustrations or instructions to perform the installation.
- 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.
- The information in this document is subject to change without notice.

This document is divided into the following sections:

SAFETY
This section describes precautions and alert symbols that are in the document.

INTRODUCTION
This section is an overview of the document.

OVERVIEW
This section describes the components that make up the system and the various system configurations.

INSTALLATION
This section describes the installation and initial setup procedures.

OPERATION
This section describes equipment operation.

MAINTENANCE
This section describes required maintenance.

TROUBLESHOOTING
This section describes how to troubleshoot any issues with the equipment.

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 designed to be printed on both sides and in color.
- Use a 3-ring binder to store the document.

Additional Documentation

Additional documentation is available through the MyWaterous login at waterousco.com. Use your serial number to gain access to the service parts list (SPL) associated with your system. Dimensional drawings are available through the Waterous service department.

Symbols

Symbols are used to illustrate additional tools or operations that are required to complete the instructions.


Discard—This symbol tells you to discard or recycle the part in accordance with local regulations.

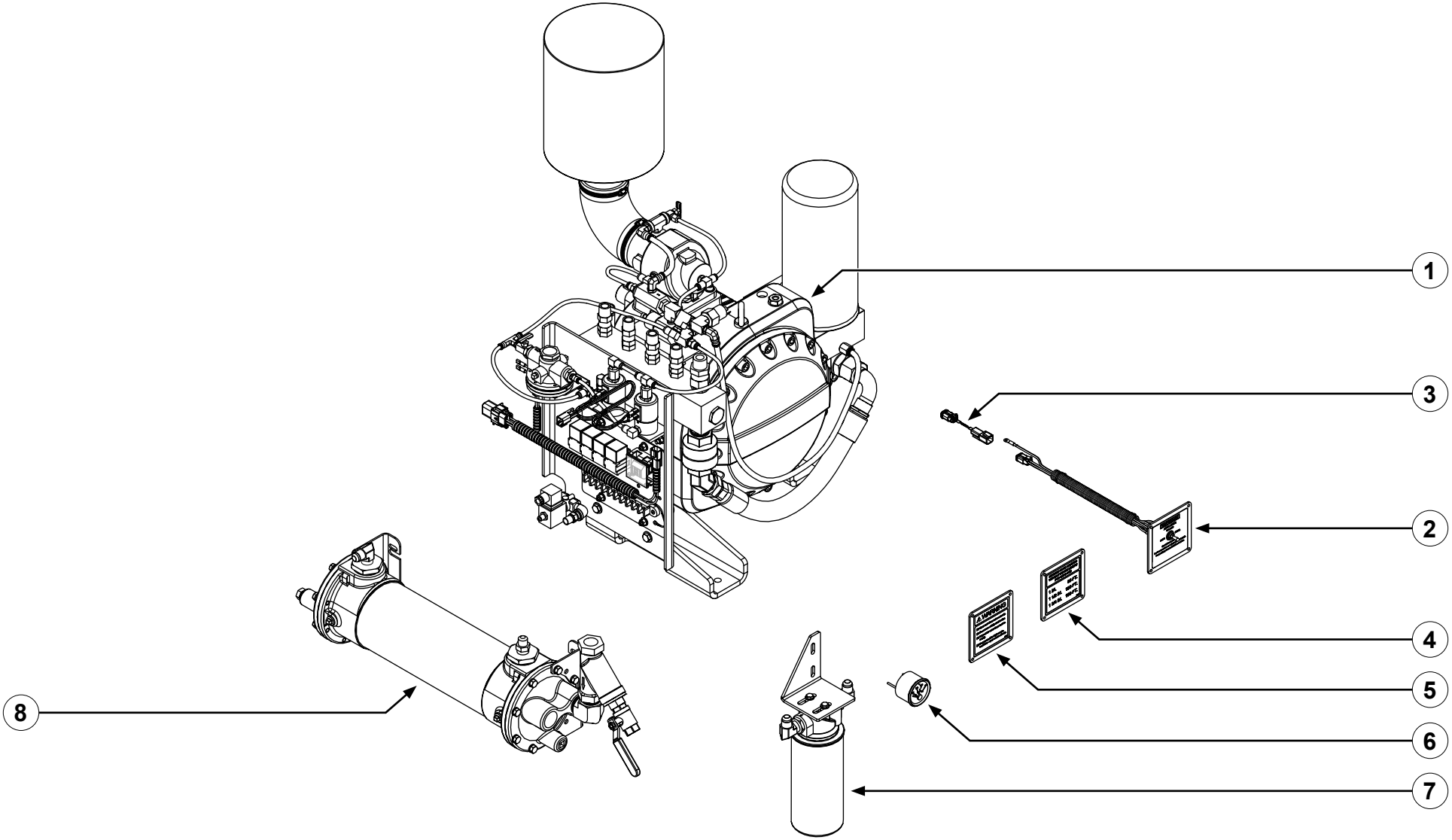

Drill—This symbol tells you to drill holes in the apparatus.


Jig saw—This symbol tells you to make a cutout in the apparatus.


Torque to specification—This symbol tells you to torque the hardware to the specified value.

System Components

The Eclipse™ CAFSystem includes the illustrated components. The system is available in 12 V or 24 V. Some components are assembled at the factory, while other components are shipped loose and require installation. The components that require installation depend on the configuration of your system. Additional components such as wire, bulbs, and connectors are sourced by the installer. Contact Waterous for information about available installation kits.

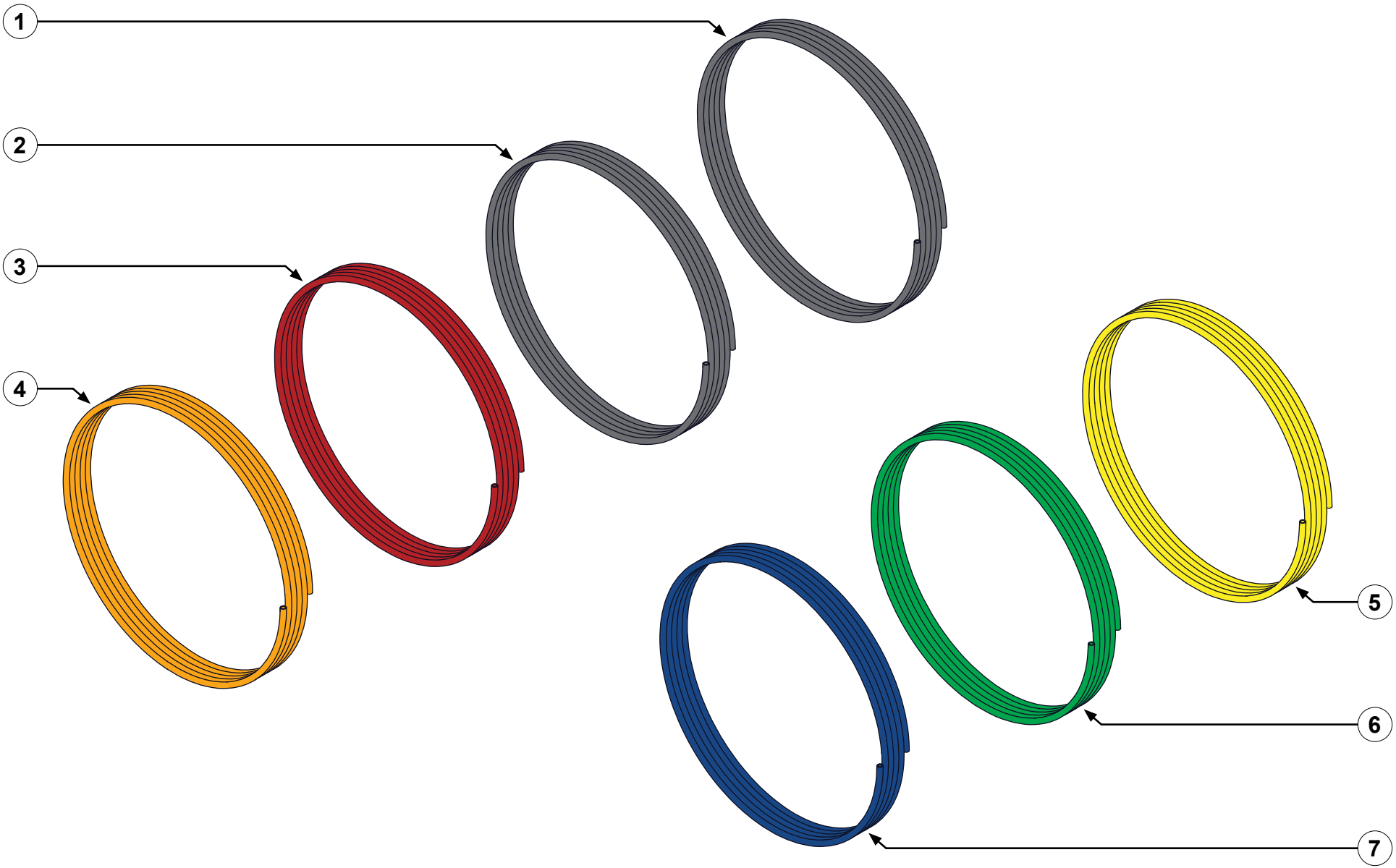


System Components

	Feature	Description
1	Compressor	This creates the compressed air for the system.
2	Auto-sync switch	This selects the mode of operation.
3	Auto-sync extension harness	This is an extension for the auto-sync switch wire harness.
4	Hose length plate	This details the recommended minimum hose length for a given diameter.
5	Compressed air warning plate	This details warnings associated with operating the system.
6	Oil temperature gauge	This displays the sump oil temperature.
7	Oil filter	This filters the oil before it enters the oil cooler.
8	Oil cooler	This cools the compressor oil.

System Components

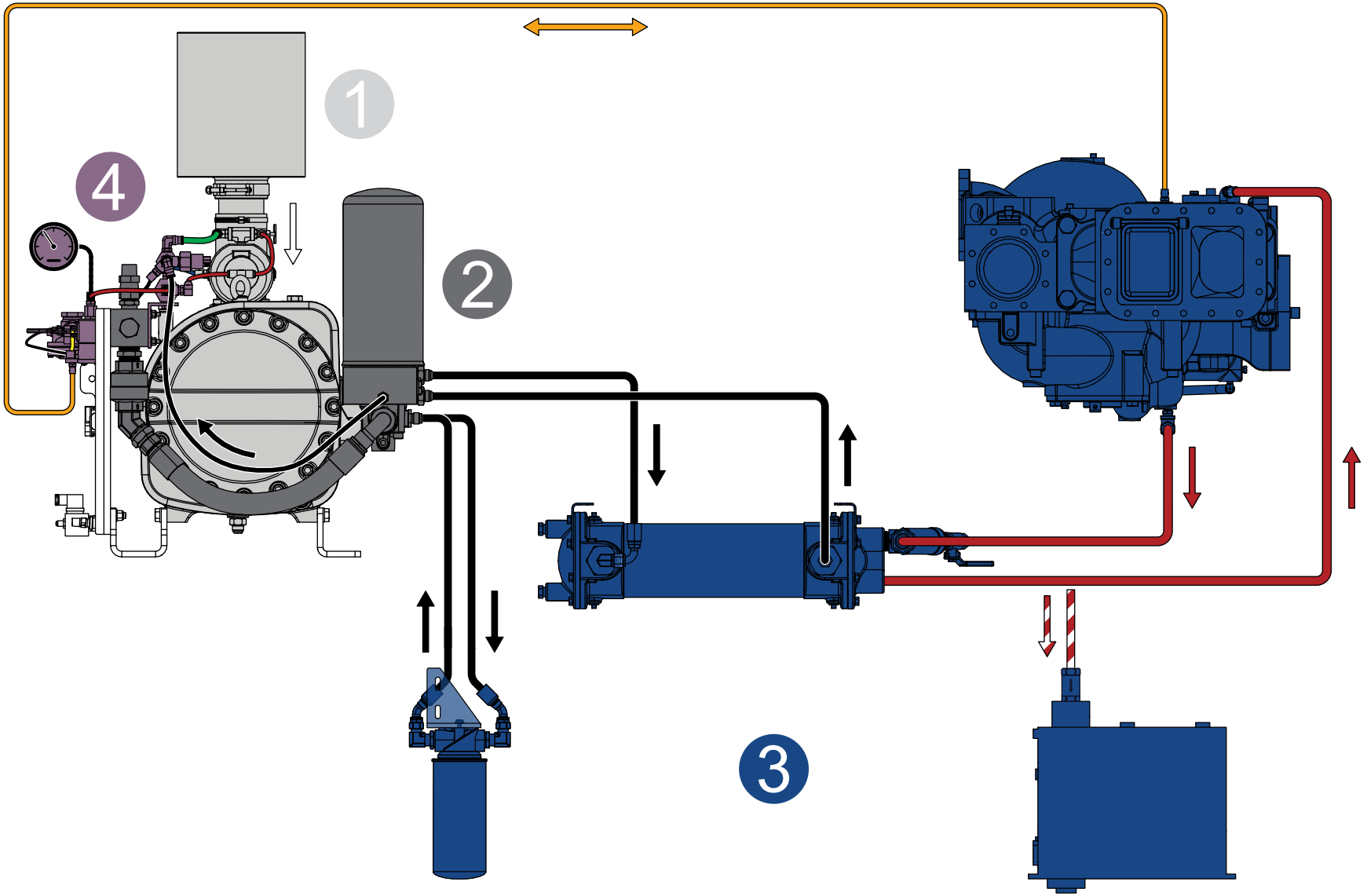
The CAFSystem™ includes the additional illustrated components. The components are color-coded for troubleshooting purposes.



System Components

	Feature	Description
1	Black tubing	This 1/4-inch tube connects various components in the system.
2	Black tubing	This 3/8-inch tube connects various components in the system.
3	Red tubing	This 1/4-inch tube connects various components in the system.
4	Orange tubing	This 1/4-inch tube connects various components in the system.
5	Yellow tubing	This 1/4-inch tube connects various components in the system.
6	Green tubing	This 3/8-inch tube connects various components in the system.
7	Blue tubing	This 1/4-inch tube connects various components in the system.

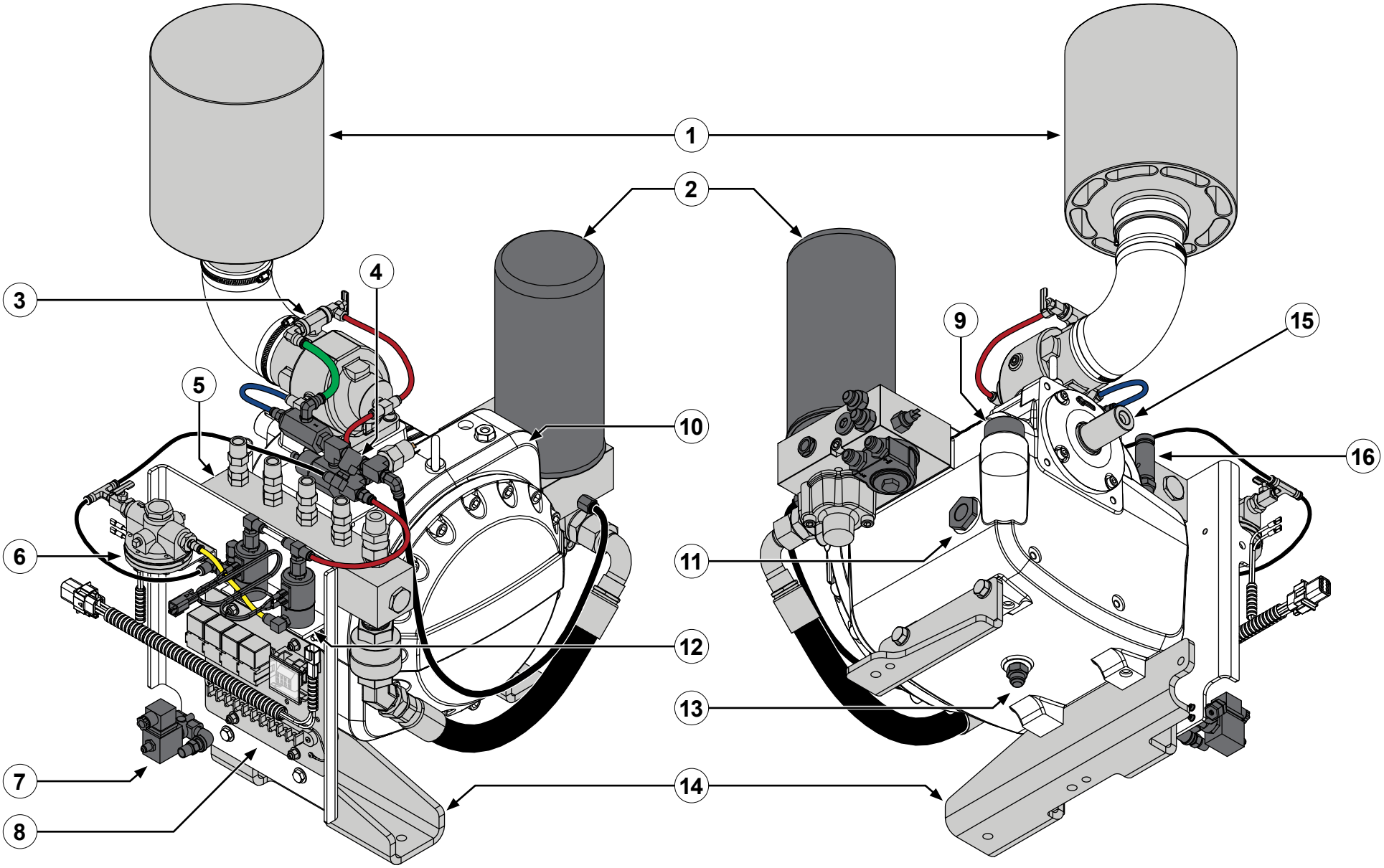
Operation Overview



Operation Overview

	Feature	Description
1	Compressor	The compressor portion of the system includes the compressor and the components driving the compressor, such as the transmission. Air enters the compressor through the air filter. The air is then entrained, or mixed into the oil, and moved to the compressor's internal sump.
2	Compressed air	The compressed air portion of the system includes the sump, separator filter, and supporting hoses. The air/oil mixture moves to the sump and separates. After leaving the sump, the air passes through the air/oil diverter, which connects multiple components that move air/oil through the system, and enters the separator filter. The separator filter collects any oil remaining in the mixture and sends it back to the compressor. The compressed air is then moved to the air distribution manifold. A port on the separator filter 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, oil filter, supporting hoses, fire pump, and water source. After leaving the sump, the oil passes through the air/oil diverter and enters the cooler. Flowing water circulated by the fire pump removes heat from the oil as it flows through the cooler. Typical applications use an external water source to cool the oil. Alternatively, an internal water source, such as an on-board water tank, can be used to cool the oil. However, an internal water source can retain heat and become less effective, so the oil temperature must be closely monitored. Depending on your application, an additional fan-style cooler may be available to enhance the cooling capability of the system. After being cooled, the oil is returned to the air/oil diverter and sent to the oil filter. The oil is then filtered and moves back to the compressor through the air/oil diverter.
4	Balance	The balance portion of the system includes the balance valve, auto-sync solenoid assembly, PMC assembly, and supporting hoses. When operating in auto mode, the balance valve synchronizes the air pressure produced by the compressor to the water pressure. The balance portion of the system also purges the air from the system when operation is complete.

Compressor Components

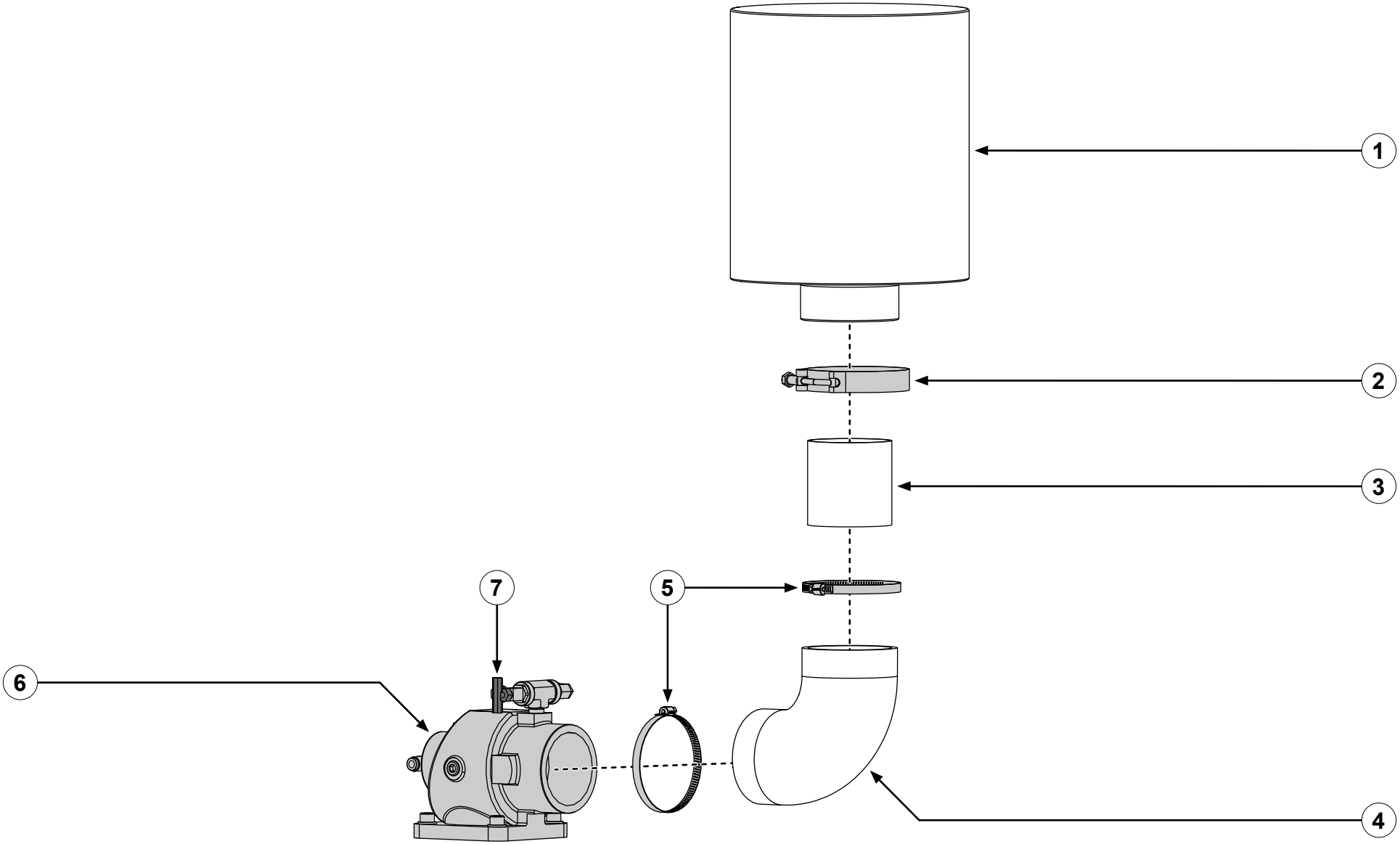


Compressor Components

	Feature	Description
1	Air filter assembly	This filters the incoming air supply to the compressor.
2	Air/oil separation components	This includes the separator filter, air/oil diverter, and other components connected to the air/oil diverter that filter the air/oil and move it through the system.
3	Air inlet assembly	This controls the air flow to the compressor.
4	Pressure modulation control (PMC) assembly	This part of the air control circuit sets the fixed pressure during operation and bleed-off during shutdown.
5	Air distribution manifold	This distributes the compressed air across the system's multiple air injection points. ***Note:*** *The type and number of air injection points depends on your application.*
6	Balance valve	This regulates the air circuit when the system is in auto mode.
7	3-way solenoid valve	This controls the air flow to the air clutch.
8	Relay panel assembly	This houses the system's electronic components.
9	Oil fill cap	This is where oil is added to the compressor.
10	Compressor	This pumps the compressed air and oil mixture.
11	Oil level sight plug	This allows you to view the amount of oil in the compressor.
12	Auto-sync solenoid assembly	This opens and closes the solenoids to switch between system operating modes.
13	Drain port	The compressed air/oil mixture exits the compressor at this port.
14	Mounting brackets	These are used to mount the compressor assembly on the pump.
15	Input shaft	This transfers power from the transmission to drive the compressor.
16	Pressure relief valve	This automatically releases pressure from the system when the operating limit is met—approximately 210 psi (14 bar).

Air Filtration Components

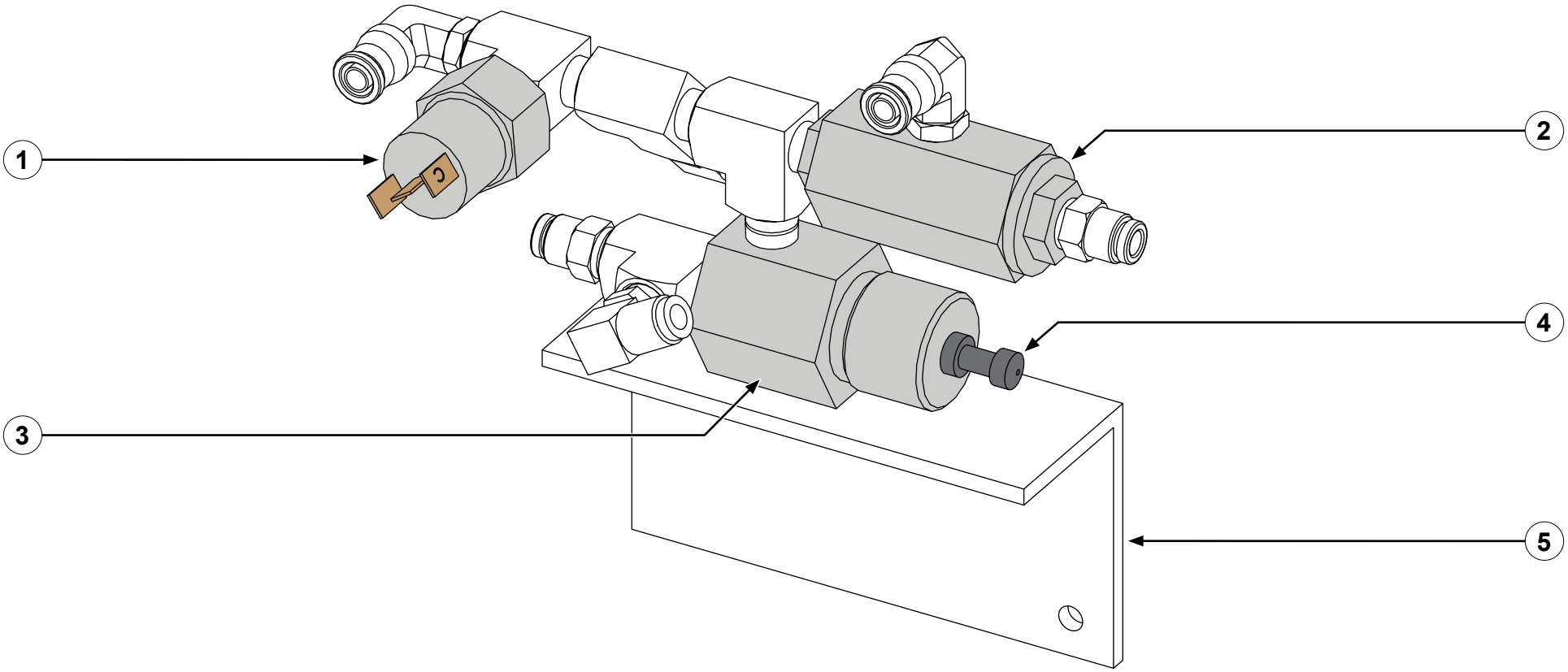
Note: *Make sure to install the filter so that it is easy to access. There must be adequate clearance to allow for filter maintenance and removal.*



Air Filtration Components

	Feature	Description
1	Air filter	This filters the incoming air.
2	T-bolt clamp	This secures the air filter to the air inlet tube.
3	Air inlet tube	This routes filtered air to the compressor. ***Note**: If the air filter is unstable after installation, provide additional support at the air inlet tube.*
4	90° rubber elbow	This routes filtered air to the compressor.
5	Hose clamps	These secure the air filter components together.
6	Air inlet assembly	This controls the air flow to the compressor.
7	Air inlet trim valve (AITV)	This calibrates the auto-sync air balance system.

Pressure Modulation Control (PMC) Assembly

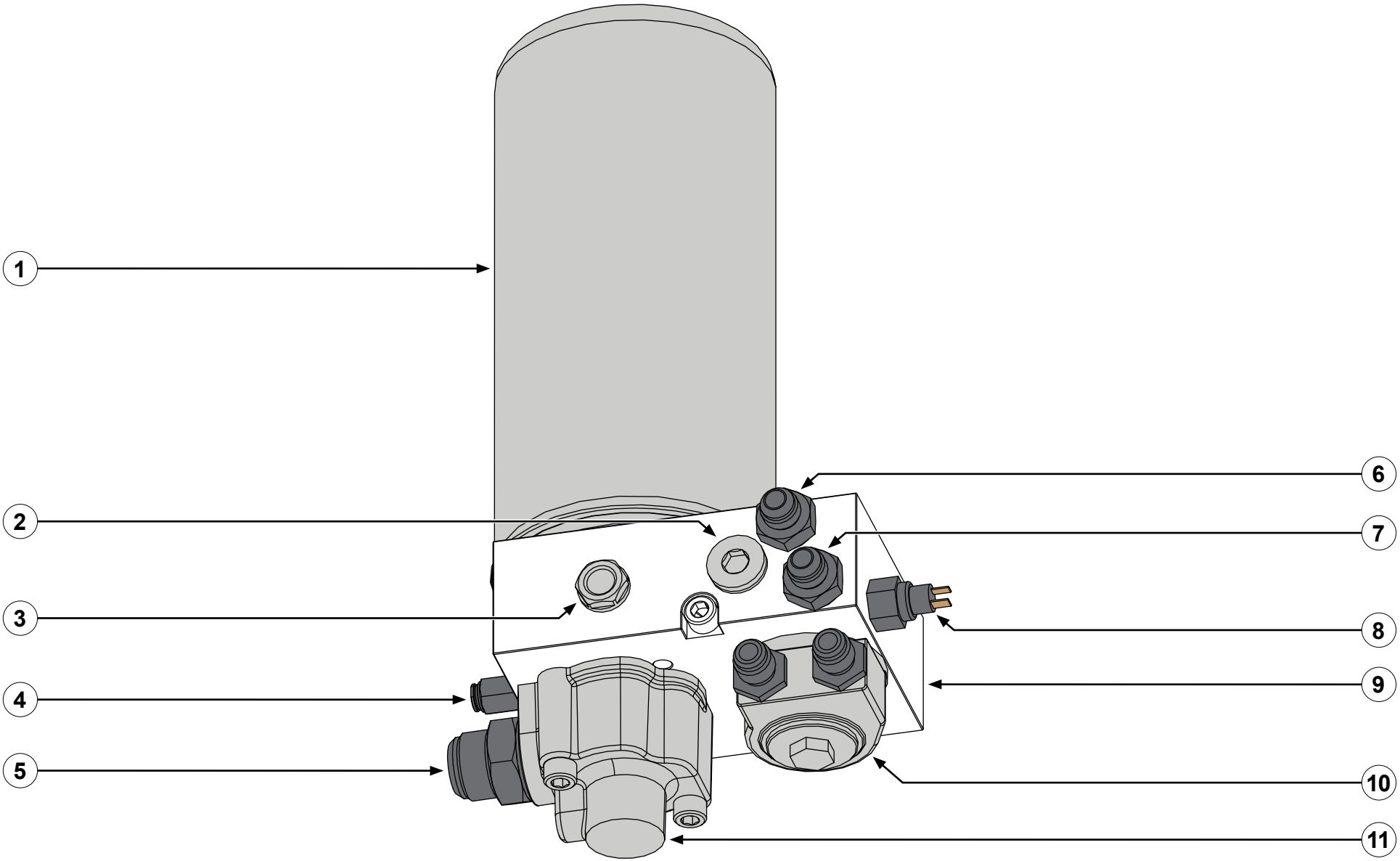


Pressure Modulation Control (PMC) Assembly

	Feature	Description
1	Pressure sensor	This activates the pressure switch when the PMC reaches a predetermined pressure.
2	Blowdown valve	This bleeds off any remaining air in the system when it shuts down.
3	Pressure regulator	This regulates the air circuit in fixed mode and limits the system's maximum pressure in auto mode.
4	Manual adjustment screw	This calibrates the air pressure in fixed mode.
5	Mounting bracket	This is used to mount the PMC on the compressor assembly.

Air/Oil Separation Components

Note: *Make sure to install the separator filter so that it is easy to access. There must be adequate clearance to allow for filter maintenance and removal.*

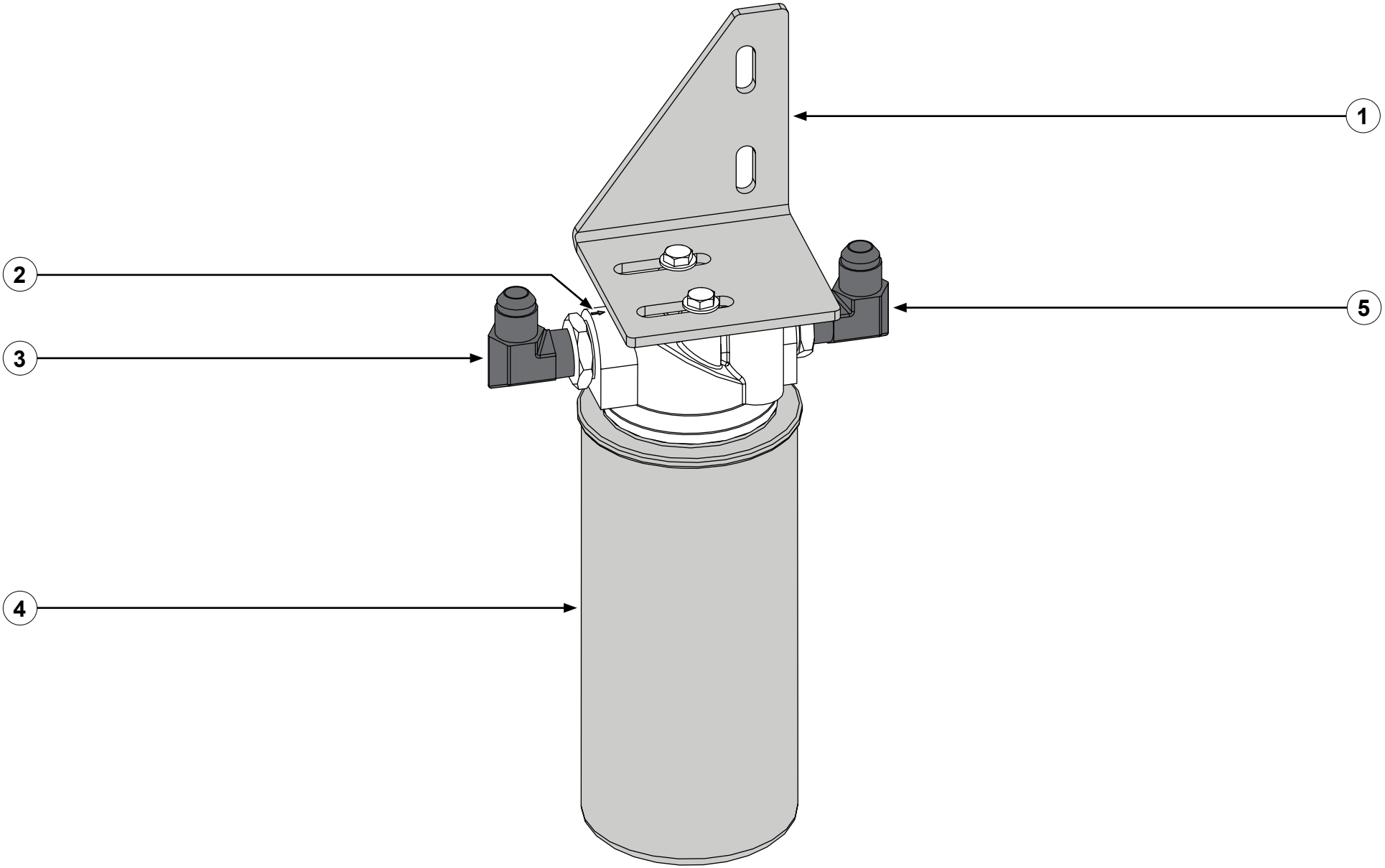


Air/Oil Separation Components

	Feature	Description
1	Separator filter	This removes the remaining oil from the air/oil mixture during the final stage of air/oil separation.
2	Oil thermostat	This regulates the oil temperature by diverting the oil to the cooler when it reaches a predetermined temperature.
3	Oil return sight plug	This displays the oil level in the oil return.
4	Compressed air outlet	This connects to the PMC.
5	Compressed air outlet	This connects to the air discharge manifold.
6	Oil cooler inlet	This connects to the oil cooler.
7	Oil cooler outlet	This connects to the oil cooler.
8	Temperature sender	This measures the oil temperature and automatically disengages the air clutch if the temperature exceeds 250°F (121°C).
9	Air/oil diverter	This connects multiple components that move air/oil through the system.
10	Remote oil filter adapter	This provides a remote connection to the oil filter through the oil filter inlet (left) and oil filter outlet (right).
11	Minimum pressure valve	This sets the minimum pressure allowed to pass through the valve—approximately 40 psi (2.8 bar).

Oil Filter

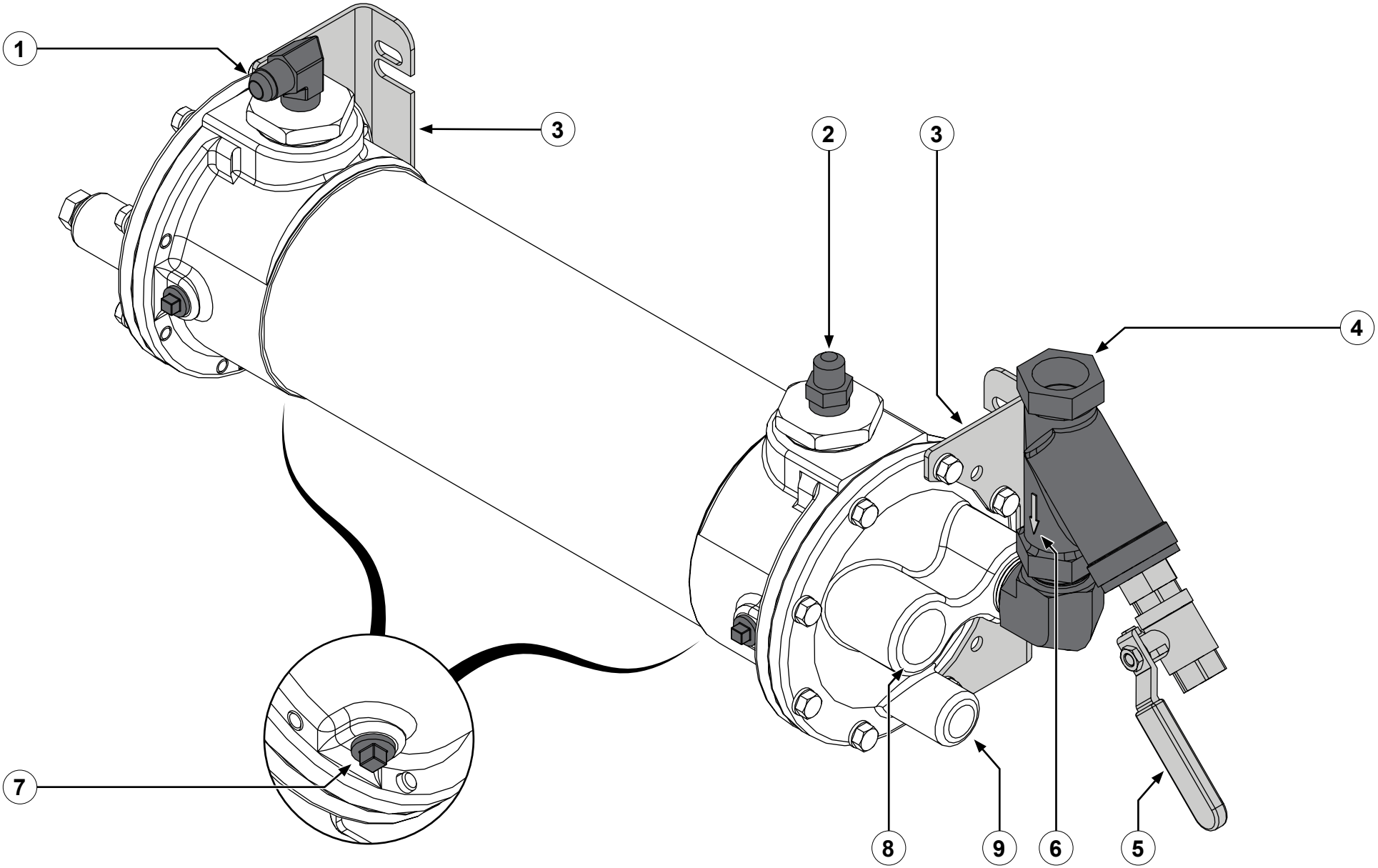
Note: *Make sure to install the oil filter so that it is easy to access. There must be adequate clearance to allow for filter maintenance and removal.*



Oil Filter

	Feature	Description
1	Mounting bracket	This is used to mount the oil filter on the apparatus.
2	Direction of flow indicator	This indicates the direction of flow through the oil filter.
3	Oil inlet	This is the inlet for the unfiltered oil.
4	Oil filter	This filters the oil.
5	Oil outlet	This is the outlet for the filtered oil.

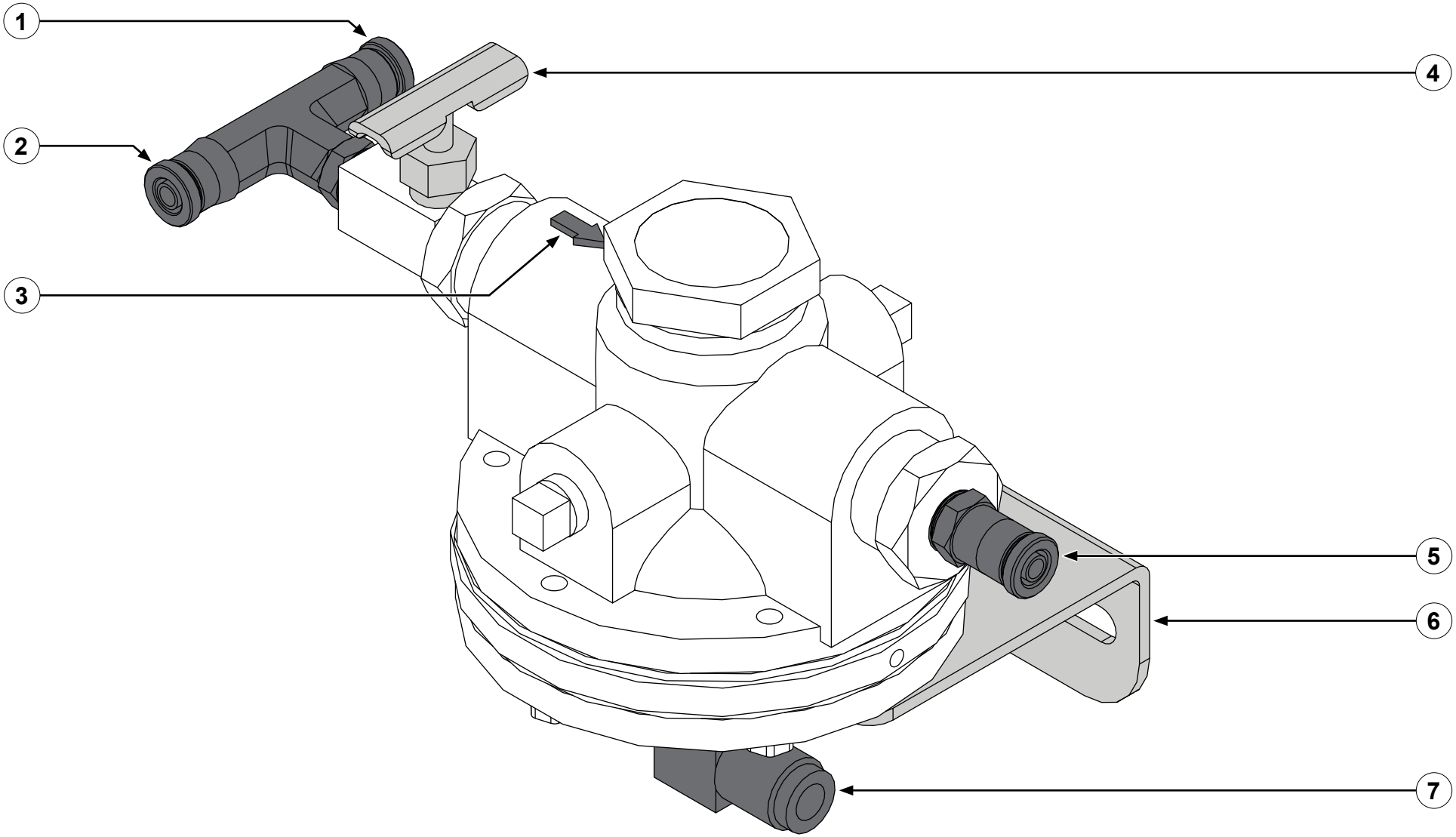
Oil Cooler



Oil Cooler

	Feature	Description
1	Oil inlet	This is the inlet for the heated oil.
2	Oil outlet	This is the outlet for the cooled oil.
3	Mounting bracket	These are used to mount the oil cooler on the apparatus.
4	Water inlet	This is the inlet for the water that cools the oil.
5	Wye strainer clean-out valve	This allows you to quickly remove accumulated debris from the wye strainer.
6	Direction of flow indicator	This indicates the direction of water flowing through the oil cooler. Water must flow through the wye strainer before entering the oil cooler.
7	Oil drain	These allow you to drain the oil.
8	Water outlet	This is the outlet for the water that cools the oil.
9	Water drain	This allows you to drain the water from the cooler to prevent freezing. The drain components are application-specific and supplied by the installer.

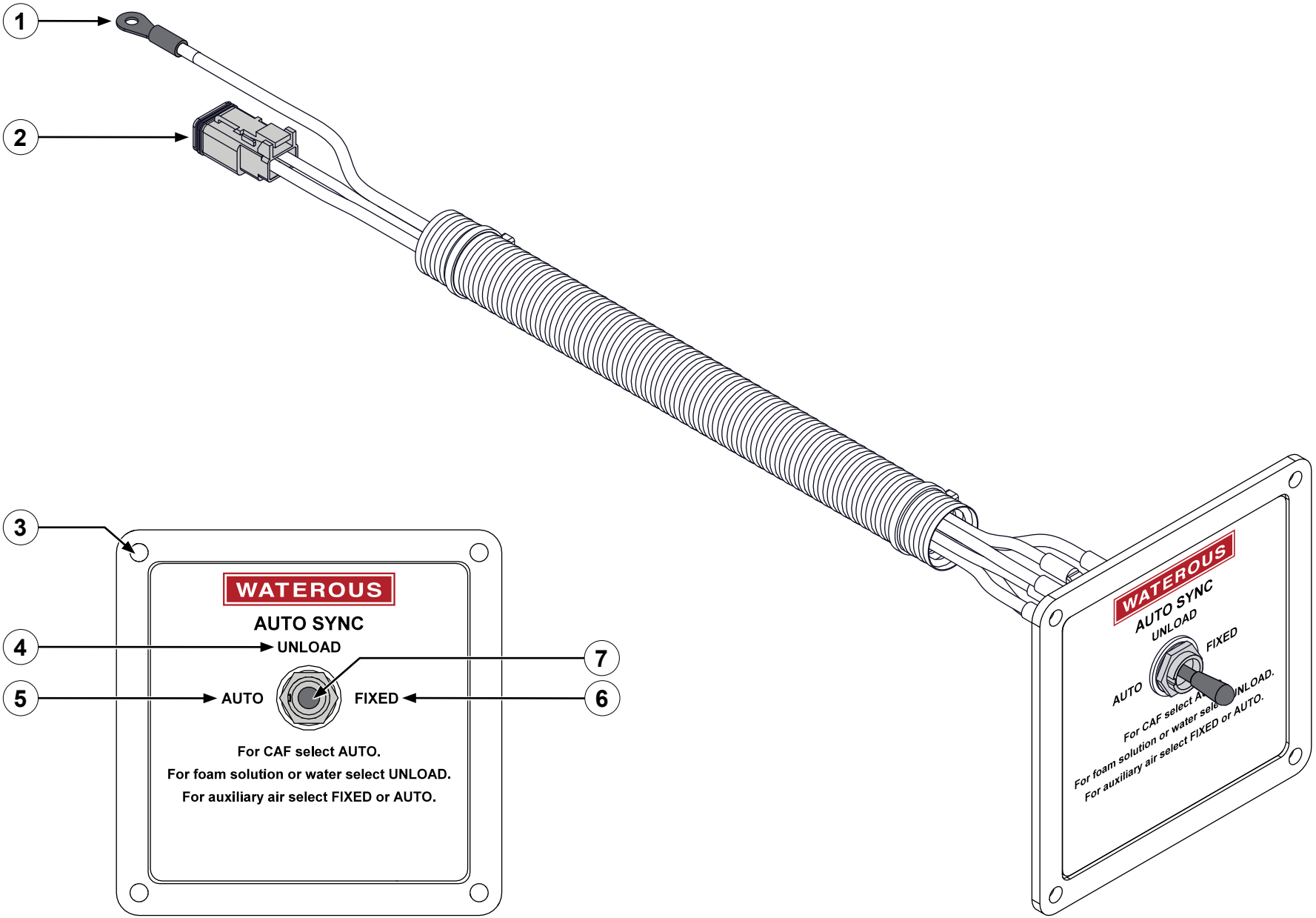
Balance Valve



Balance Valve

	Feature	Description
1	Pressure port	This connects to the pressure control circuit.
2	Auto-sync output	This connects to the black solenoid on the auto-sync assembly.
3	Direction of flow indicator	This indicates the direction the air flows through the balance valve.
4	Balance trim valve	This calibrates the air in auto mode.
5	Auto-sync output	This connects to the yellow solenoid on the auto-sync assembly.
6	Mounting bracket	This mounts the balance valve on the compressor assembly.
7	Pump input	This connects to the pump discharge.

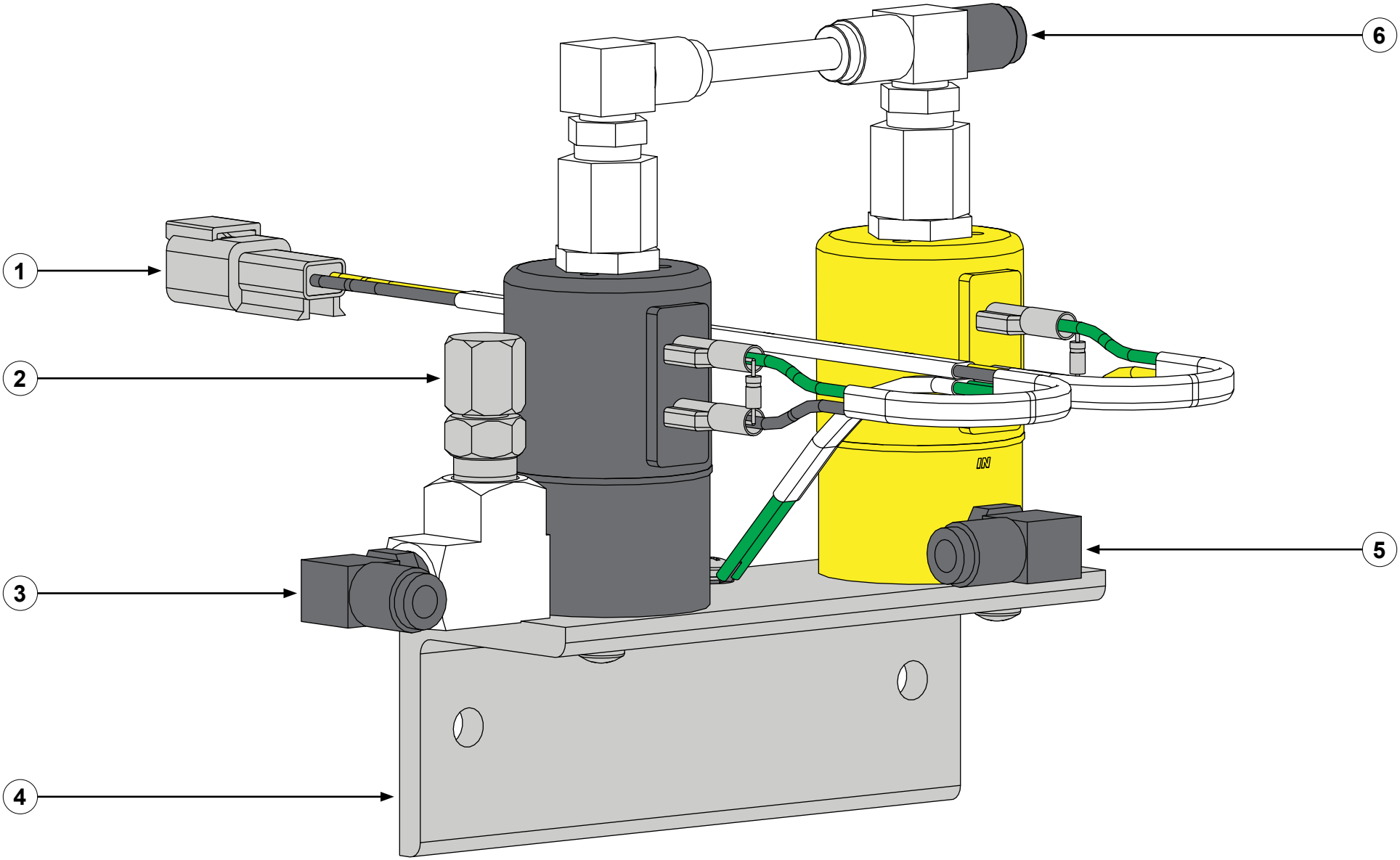
Auto-Sync Mode Switch



Auto-Sync Mode Switch

	Feature	Description
1	Power wire	This connects to apparatus power.
2	Wire harness connector	This connects to the wire harness on the auto-sync assembly.
3	Mounting holes	These secure the plate to the apparatus.
4	Unload mode	This mode operates the compressor at approximately 40 psi (2.8 bar). The compressor generates a minimum pressure of 40 psi to circulate the compressor oil and cool the system. Always start the compressor in this mode or auto mode.
5	Auto mode	This mode operates the compressor at 50 to 150 psi (3.4 to 10.3 bar). The system automatically adjusts the air pressure as you raise and lower the water pressure. Always start the compressor in this mode or unload mode.
6	Fixed mode	This mode operates the compressor at 150 psi (10.3 bar) regardless of water pressure.
7	3-way switch	This toggles between the 3 operation modes.

Auto-Sync Solenoid Assembly

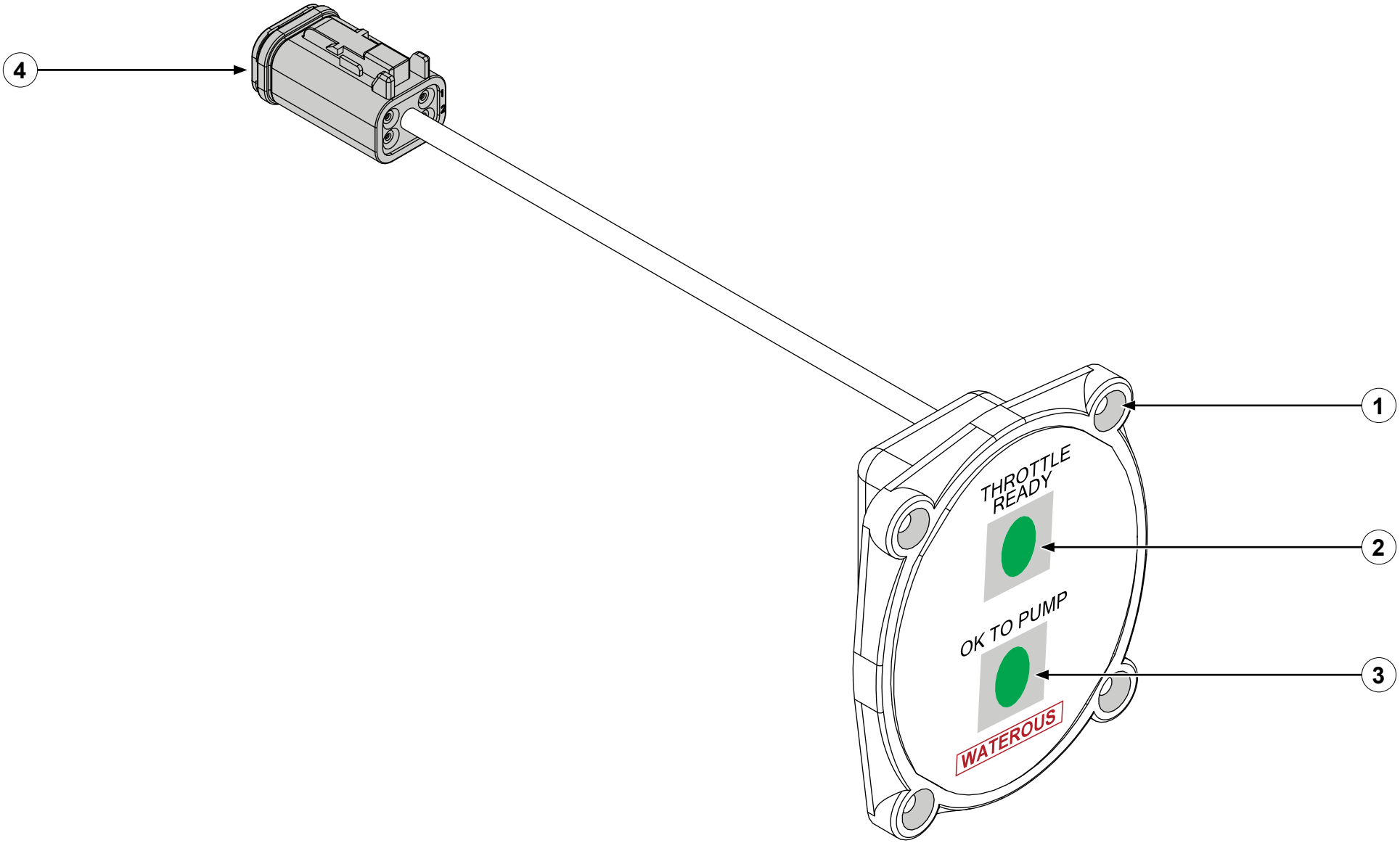


Auto-Sync Solenoid Assembly

Note: *The solenoids are color-coded for ease of identification in the illustrations. On the compressor assembly, the solenoids can be identified by the black or yellow tubing that feeds into them.*

	Feature	Description
1	Wire harness	This connects to the auto-sync switch.
2	Pressure gauge adapter	This connects to the supplier-installed pressure gauge.
2	Balance valve input	This connects to the balance valve.
3	Mounting bracket	This secures the auto-sync to the compressor assembly.
4	Balance valve input	This connects to the balance valve.
5	PMC input	This connects to the PMC.

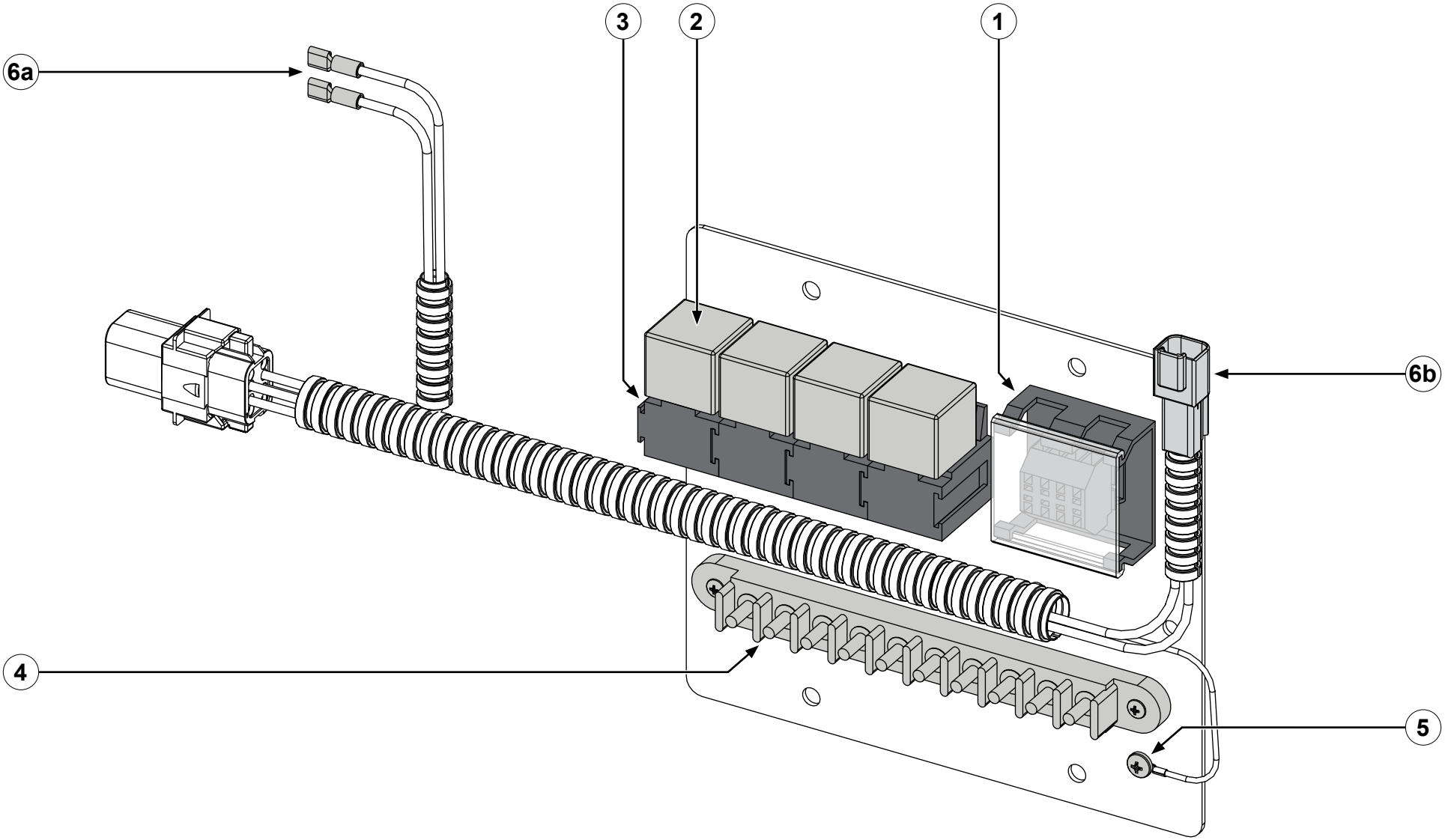
Throttle Ready Panel



Throttle Ready Panel

	Feature	Description
1	Mounting holes	These secure the panel to the apparatus.
2	*THROTTLE READY* LED	This illuminates when the throttle ready interlock is engaged.
3	*OK TO PUMP* LED	This illuminates when the OK to pump interlock is engaged.
4	Connector	This connects to the relay panel to create the throttle ready interlock loop.

Relay Panel Assembly



Relay Panel Assembly

	Feature	Description
1	Terminal strip	This provides a way to connect various system components to the relay panel.
2	Relay	These are switches that control various system components.
3	Relay connector	These provide a way to connect the system wiring to the relays.
4	Terminal block	This provides a way to connect various system components to the relay panel.
5	Grounding screw	This provides the ground connection for system components connected to the relay panel.
6	Wire harness	This provides a way to connect various system components to the grounding screw. a. These connect to the oil temperature sender. b. This connects to the pressure switch on the PMC.

Installation Overview

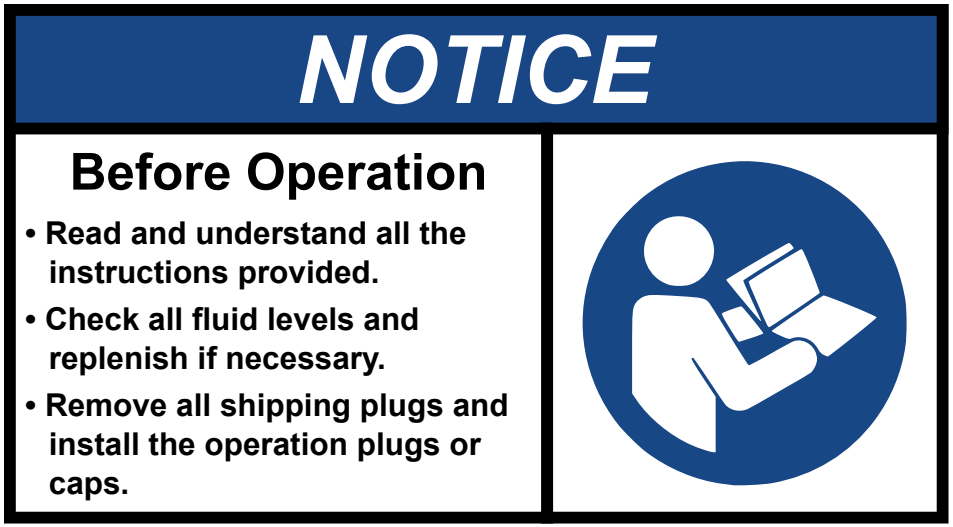
This equipment is intended to be installed by a person or persons with the basic knowledge of installing similar equipment. Contact Waterous with questions about installing the equipment. The installation may require the following tasks and abilities:

- Locating, drilling, and cutting features into the apparatus.
- Welding.
- Installing the hoses and fittings.
- Routing and securing the hoses.
- Routing and securing the wiring.
- Calibrating the output.
- Calibration and final testing.

Preparing for the Installation

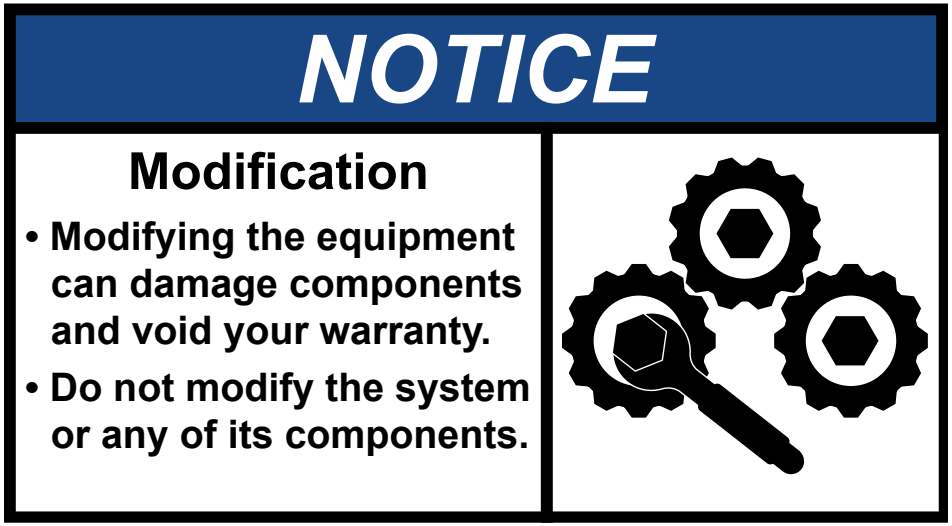
Use the following guidelines before, during, and after the installation.

- Read and understand all the installation instructions before installing the equipment.
- Prepare a suitable, well-lit area and gather all the necessary tools before you begin the installation.
- Make sure that you remove any shipping plugs or caps before installing components.
- Make sure that you bring all fluids to operating levels before using the equipment.



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 of its components. Doing so will void your warranty.

Optional Equipment

Be aware that the installation instruction may include optional equipment not included in your application.

Determining Panel and Plate Locations

Use the following guidelines to determine a location to mount the control panel and instruction plate:

- Consider the wire harness and hose routing.
- Consider accessibility during operation and maintenance.
- Install instruction plates near their applicable operator panels.

Determining Hose Routing

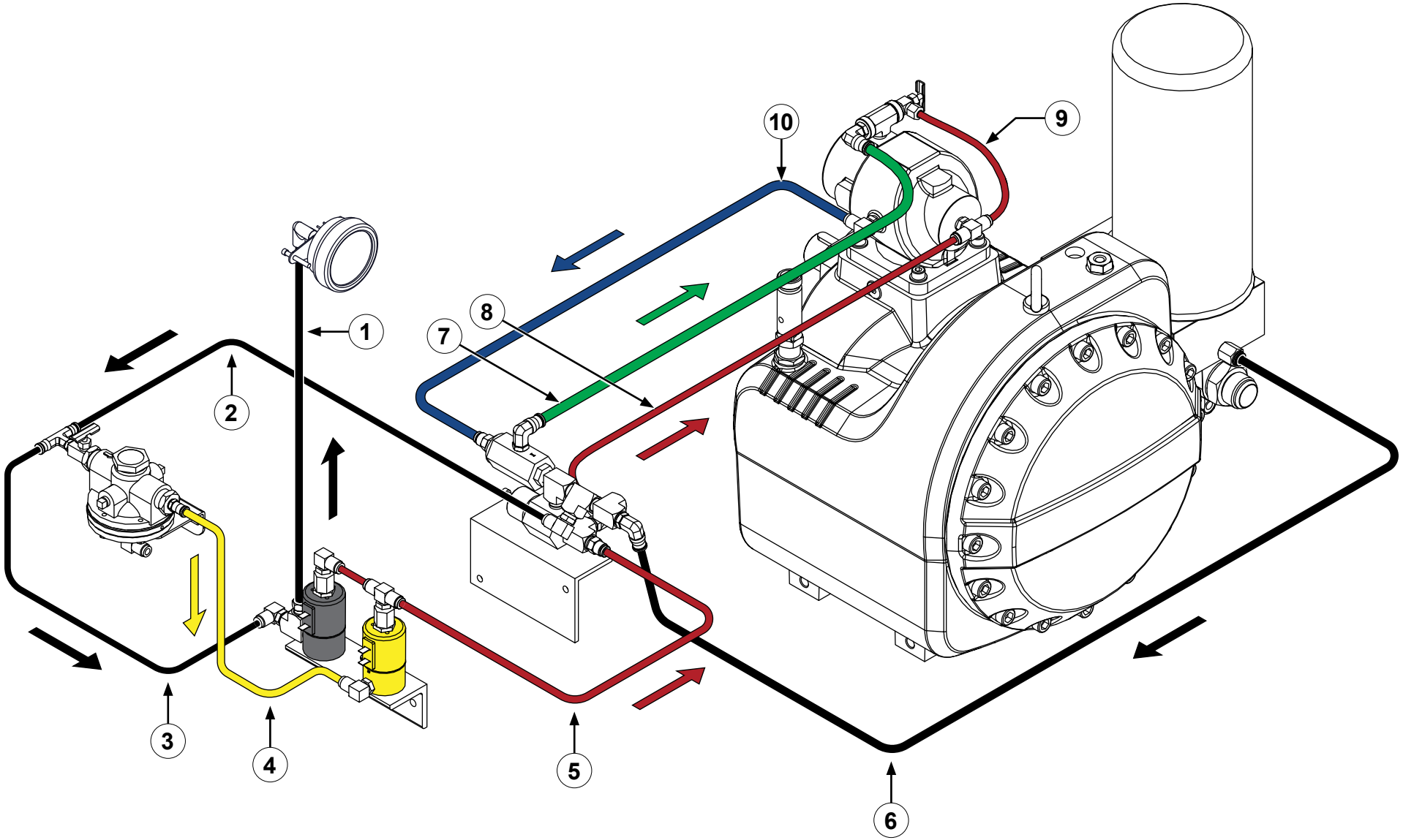
Use the following guidelines when routing the hoses:

- Route hoses in a straight line whenever possible.
- Do not pinch or kink hoses.
- Do not secure hoses to moving parts.
- Do not secure hoses near excessive heat.
- Do not secure hoses near sharp edges.

Determining Cable and Wire Routing

Use the *Wiring Best Practices* document, available at waterousco.com, as a guide to select and route wiring for your application.

Pneumatic Connections Overview

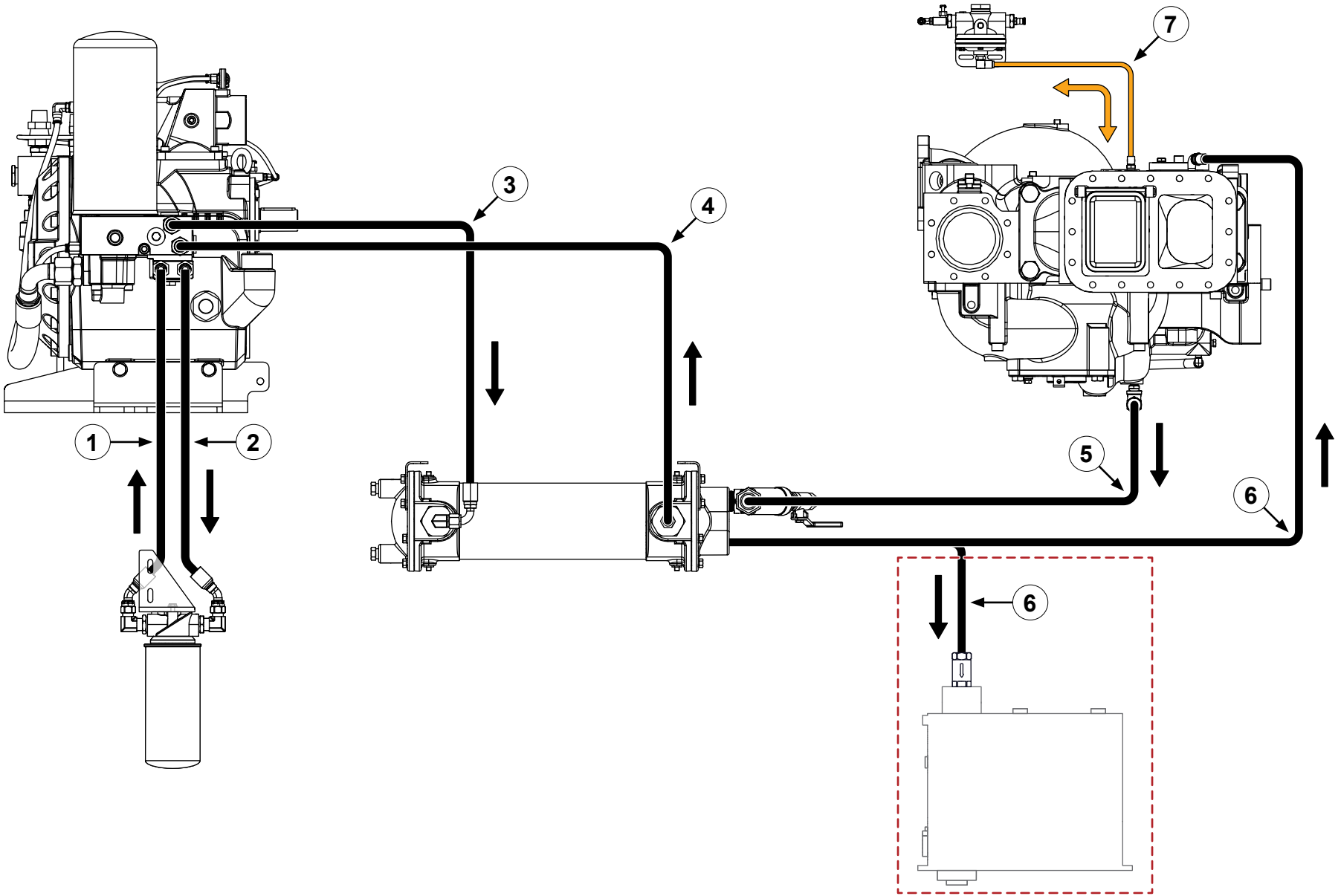


Pneumatic Connections Overview

	Feature	Description
1	Compressed air line	This is a black tube that routes compressed air from the auto-sync solenoid assembly to the pressure gauge.
2	Compressed air line	This is a black tube that routes compressed air from the PMC to the balance valve.
3	Compressed air line	This is a black tube that routes compressed air from the balance valve to the auto-sync solenoid assembly.
4	Balanced air line	This is a yellow tube that routes balanced air from the balance valve to the auto-sync solenoid assembly.
5	Regulated air line	This is a red tube that routes regulated air from the auto-sync solenoid assembly to the PMC.
6	Compressed air line	This is a black tube that routes compressed air from the separator filter to the PMC.
7	Bleed-off line	This is a green tube that routes air from the PMC to the air inlet assembly.
8	Regulated air line	This is a red tube that routes regulated air from the PMC to the air inlet assembly.
9	Regulated air line	This is a red tube that routes regulated air from the PMC to the AITV.
10	Blowdown line	This is a blue tube that routes compressed air from the PMC to the air inlet assembly.

Hose Connections Overview

Use the illustration to plan the hose routing for the apparatus. Contact Waterous for more information about available hose and fitting kits.



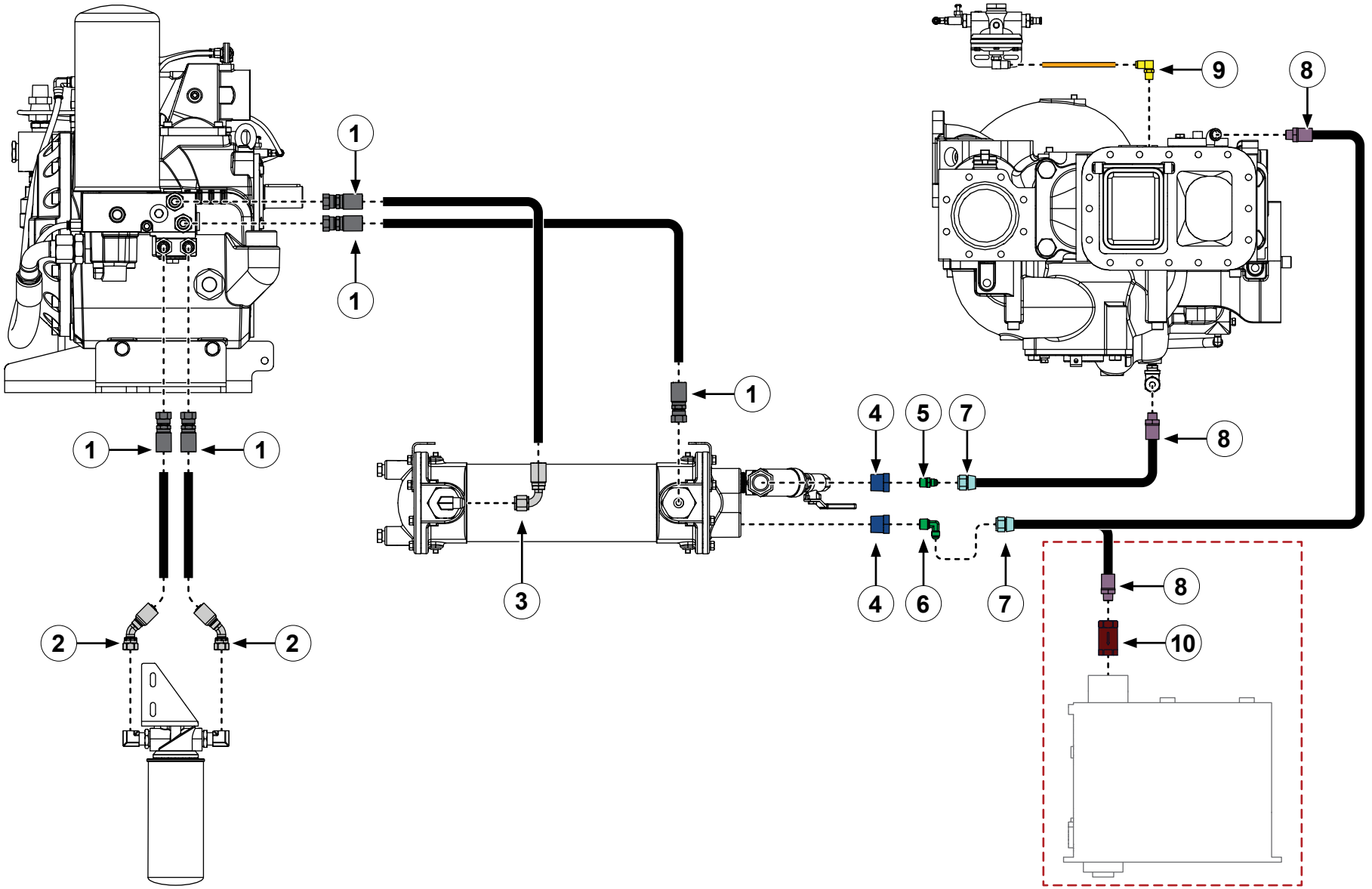
Hose Connections Overview

Note: *The oil cooler and the oil filter cannot be connected in series.*

	Feature	Description
1	Oil filter hose	This routes oil from the oil filter to the compressor—1/2-inch hydraulic hose.
2	Oil filter hose	This routes oil from the compressor to the oil filter—1/2-inch hydraulic hose.
3	Oil cooler hose	This routes oil from the compressor to the oil cooler—1/2-inch hydraulic hose.
4	Oil cooler hose	This routes oil from the oil cooler to the compressor—1/2-inch hydraulic hose.
5	Cooler supply hose	This routes water from the pump to the oil cooler—3/8-inch hydraulic hose.
6	Cooler return hose	This routes water from the oil cooler to the pump inlet or water tank—3/8-inch hydraulic hose.
7	Balance valve hose	This routes water between the pump discharge and the balance valve—1/4-inch orange tubing.

Fittings Overview

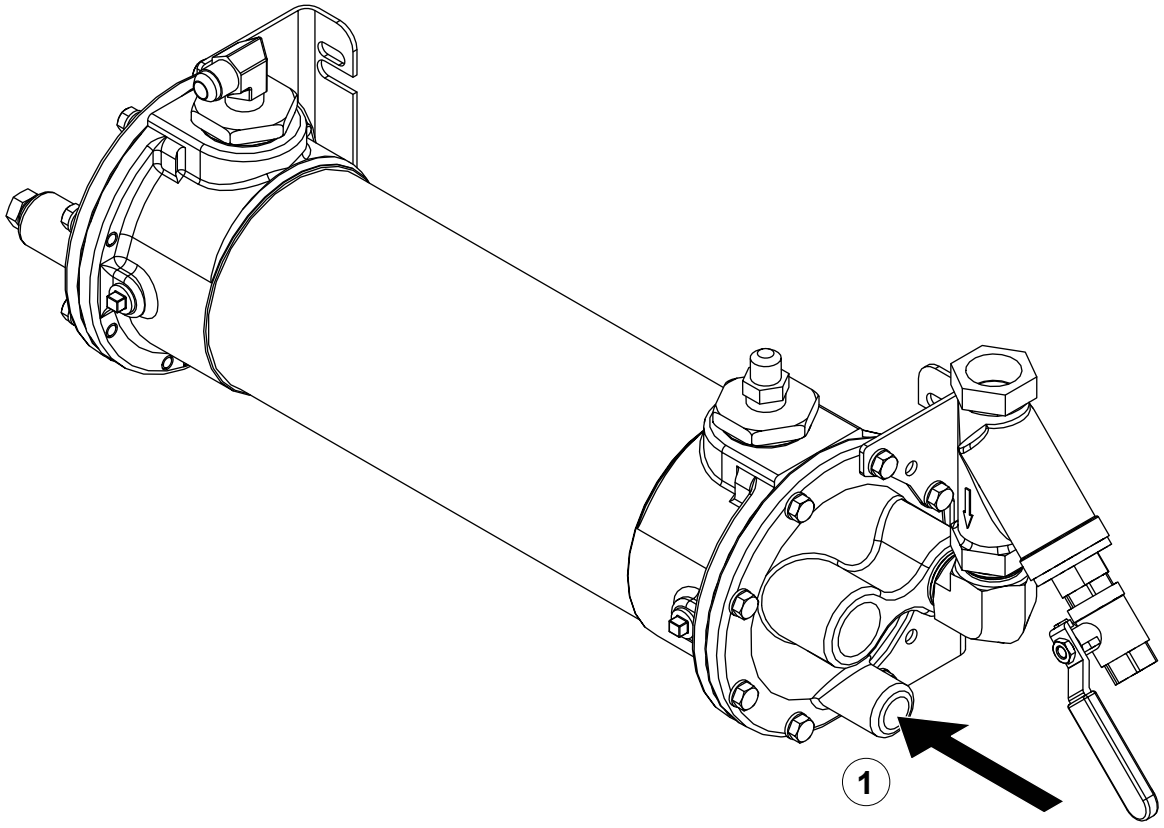
Use the illustration to plan the hose routing for the apparatus. Contact Waterous for more information about available hose and fitting kits.



Fittings Overview

	Feature	Description
1	Hose fitting	This is for a 1/2-inch hose—#8 FJIC.
2	45° hose fitting	This is for a 1/2-inch hose—#8 FJIC.
3	90° hose fitting	This is for a 1/2-inch hose—#8 FJIC.
4	Reducing bushing	This is a 1 MNPT x 1/2 FNPT.
5	Straight adapter	This is a 6 MSAE x 1/2 MNPT.
6	90° elbow adapter	This is a 6 MSAE x 1/2 MNPT.
7	Swivel hose fitting	This is for a 3/8-inch hose—6 MSAE x 3/8 MNPT.
8	Hose fitting	This is for a 3/8-inch hose—6 MSAE x 3/8 MNPT.
9	90° elbow fitting	This is a 1/4 MNPT x 1/4 AB.
10	Check valve	This prevents water from flowing backwards through the system—the check valve is installer-supplied and its size is dependent on your application.

Installing the Oil Cooler Drain Line



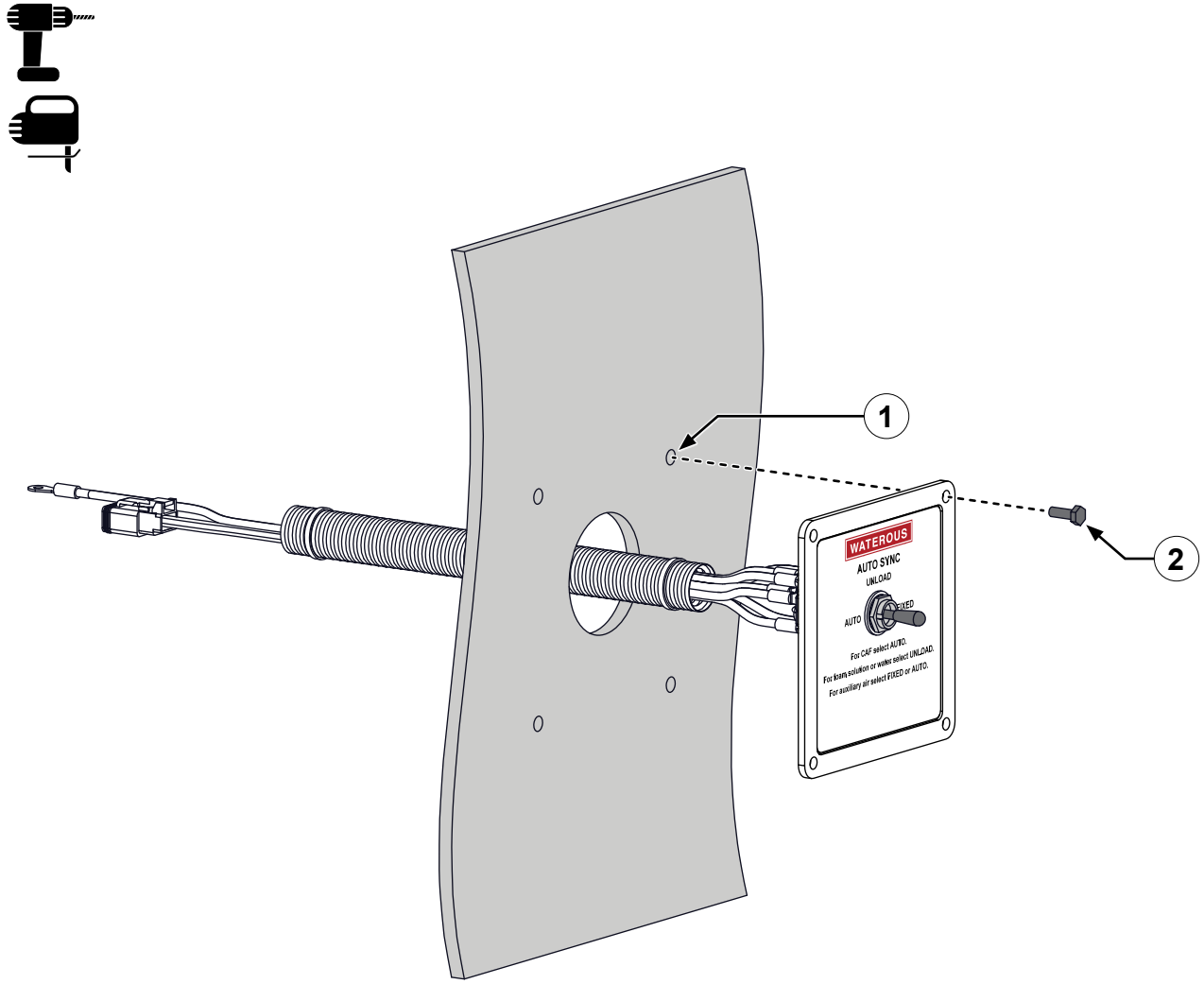
Use the illustration and instructions to install the oil cooler drain line. Fluid that is susceptible to freezing must be drained from the cooler to prevent damage.

Freezing fluid: *May cause system damage. If the equipment is exposed to freezing temperatures, drain all fluid from the cooler.*

1. Locate the drain port on the side of the cooler.
2. Install the appropriate fittings and hoses to drain the cooler as required.

Notes

Mounting the Auto-Sync Switch

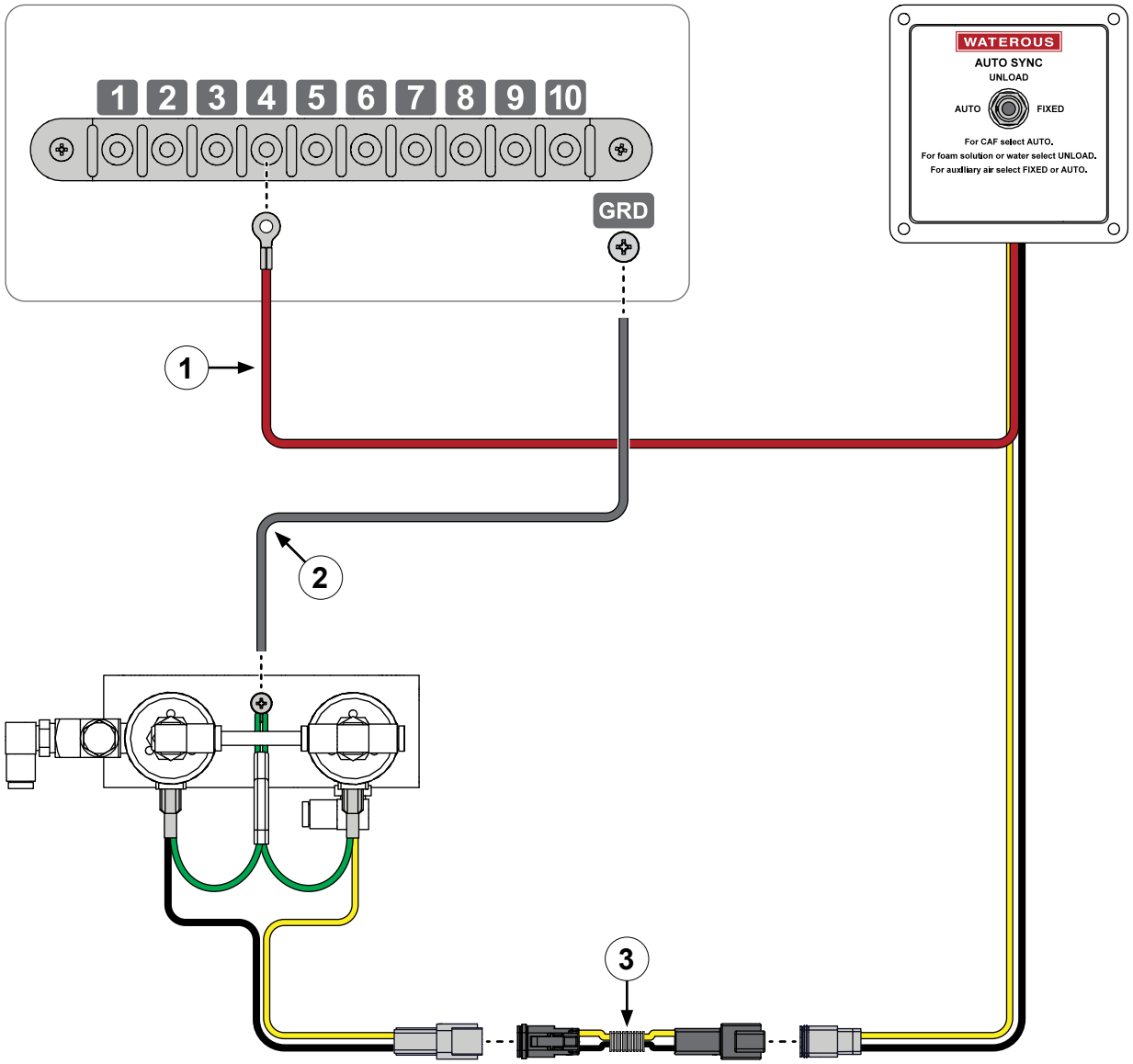


Use the illustration and instructions to mount the auto-sync switch on the operator panel.

Note: *Make sure to install the auto-sync switch so that it is easy to access.*

1. Create the cutout and drill the mounting holes for the auto-sync switch.
2. Use locally sourced hardware to secure the auto-sync switch to the operator panel.

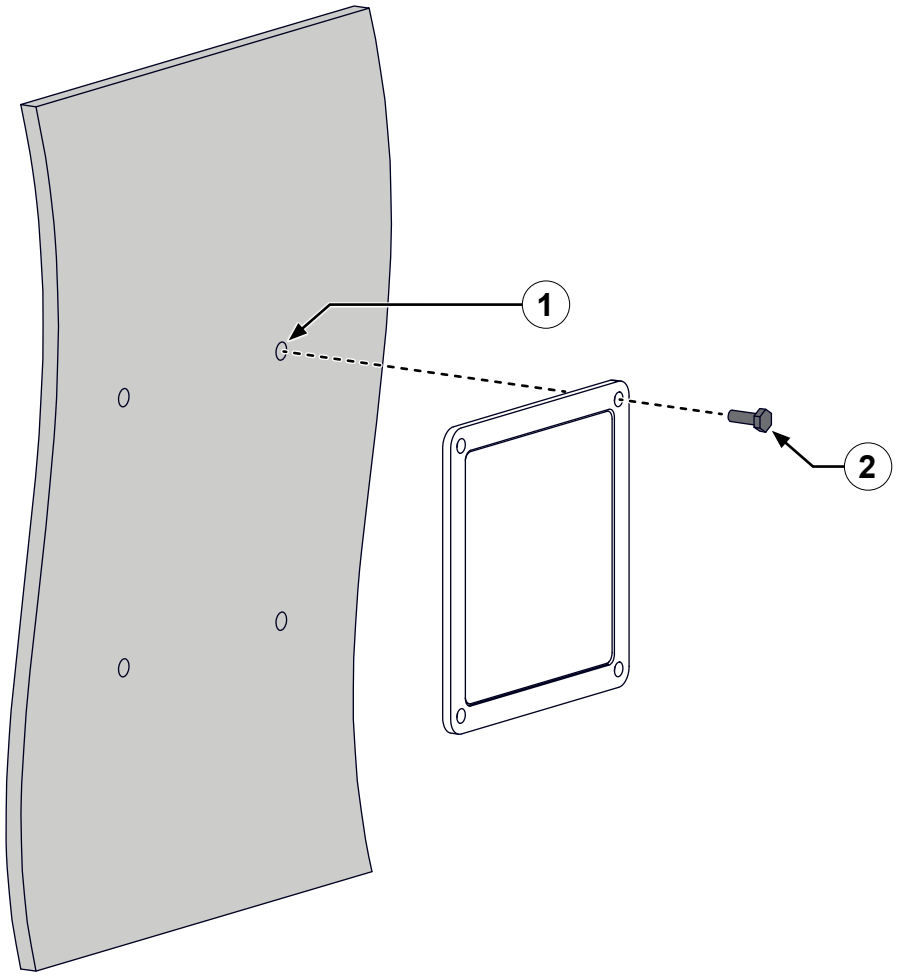
Connecting the Auto-Sync System



Use the illustration and instructions to connect the auto-sync switch wires and components.

1. Secure the power wire from the auto-sync switch to terminal 4 on the relay panel.
2. Secure the ground wire to the grounding screws on the auto-sync mounting bracket and the relay panel.
3. Connect the auto-sync switch connector and solenoid wire harness connector to the wire harness extension.

Mounting the Warning or Instruction Plate

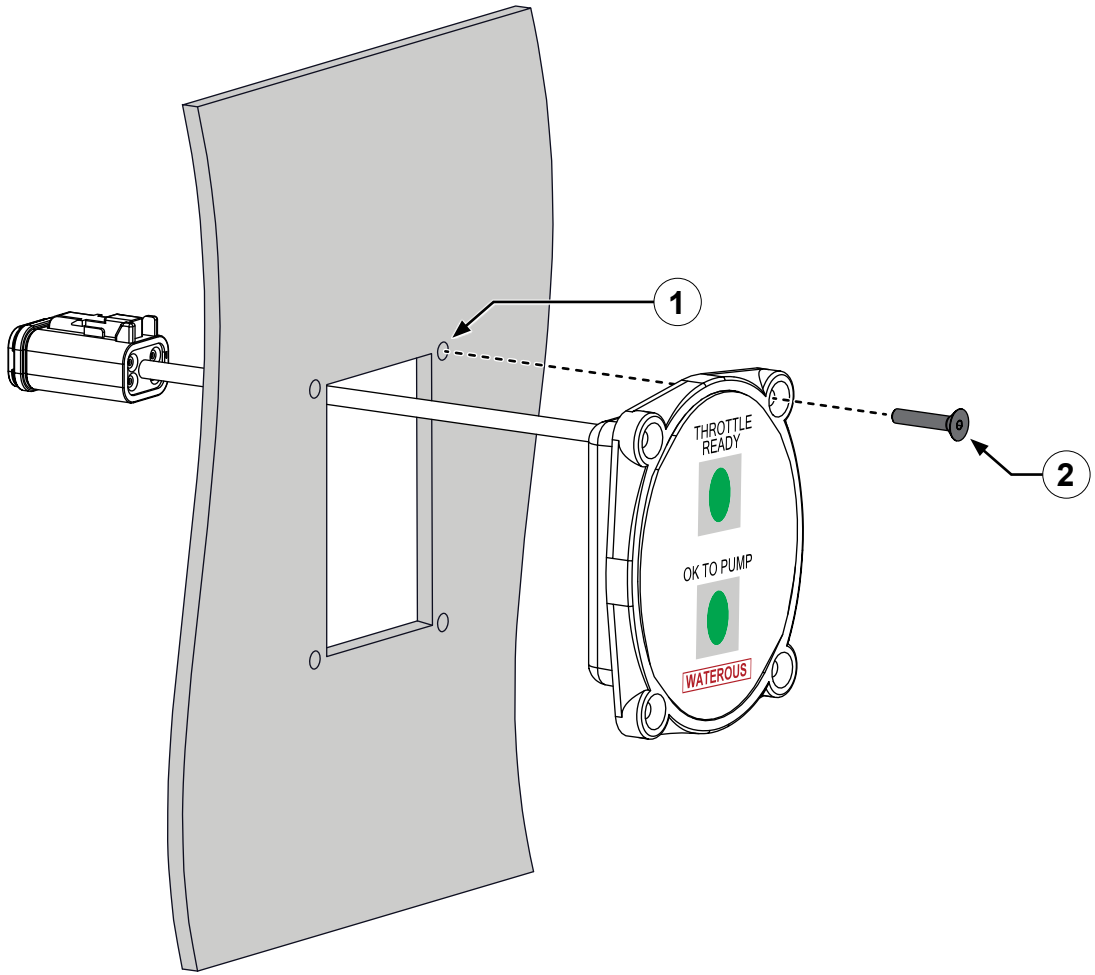


Use the illustration and instructions to mount the warning and instruction plates on the apparatus.

Note: *Make sure to install the plates near the auto-sync switch.*

1. Drill the mounting holes for the warning and instruction plates on the apparatus.
2. Use locally sourced hardware to secure the plates to the apparatus.

Mounting the Throttle Ready Panel

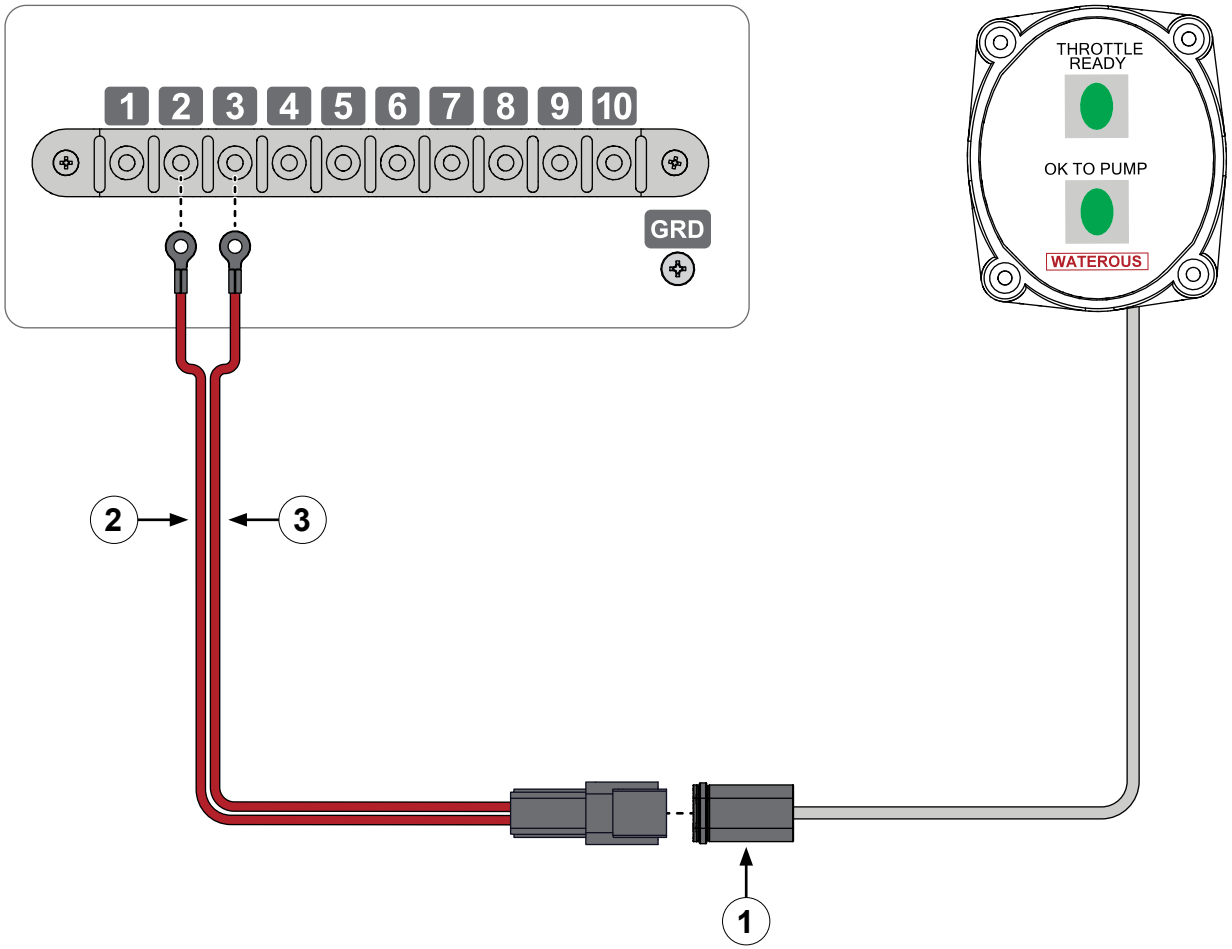


Use the illustration and instructions to mount the throttle ready panel on the apparatus.

Note: *Make sure to install the panel so that the LEDs are easily visible.*

1. Drill the mounting holes for the throttle ready panel.
2. Use the provided hardware to secure the panel to the apparatus.

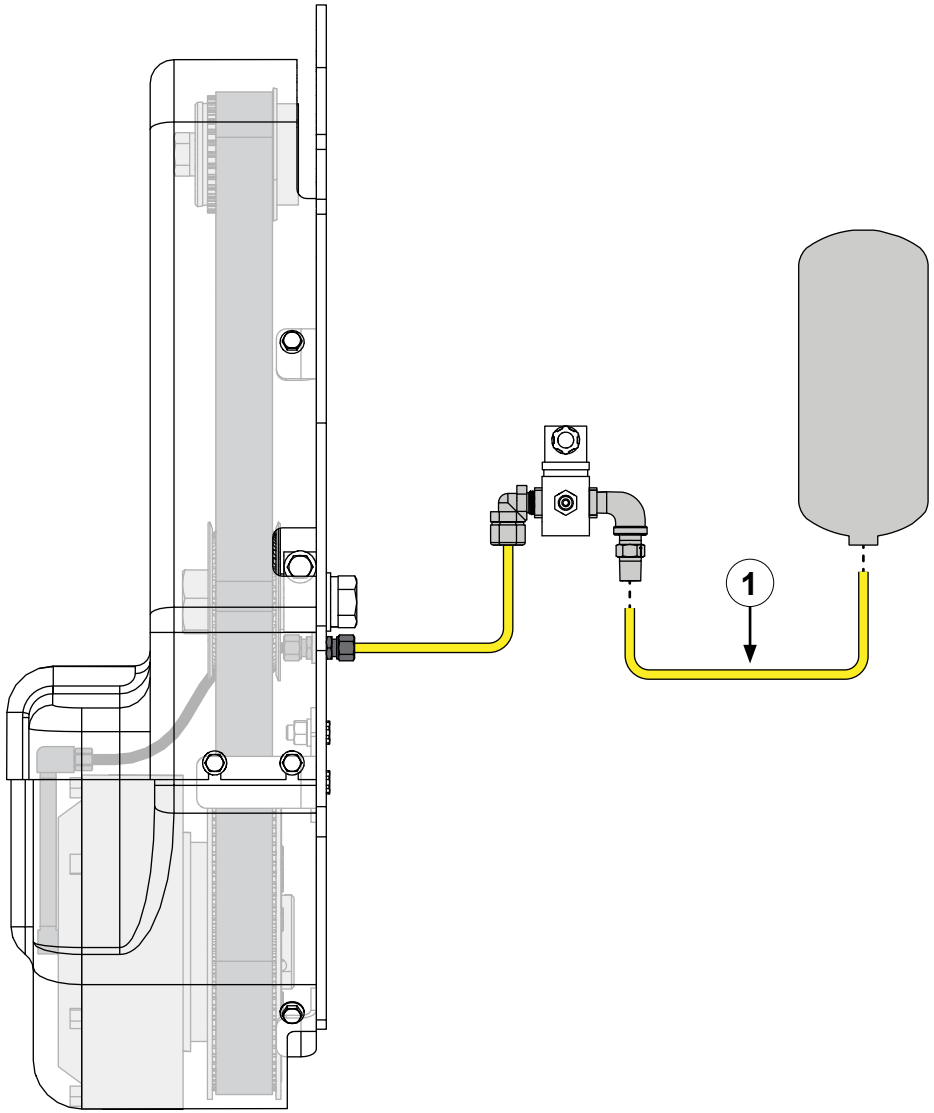
Connecting the Throttle Ready Panel and Interlock



Use the illustration and instructions to connect the throttle ready panel wires and components.

1. Connect the panel connector to the interlock connector.
2. Secure one of the interlock connector wires to terminal 2 on the relay panel.
3. Secure the remaining interlock connector wire to terminal 3 on the relay panel.

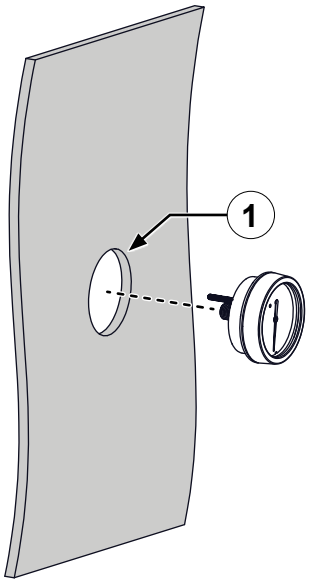
Installing the Air Clutch Hose

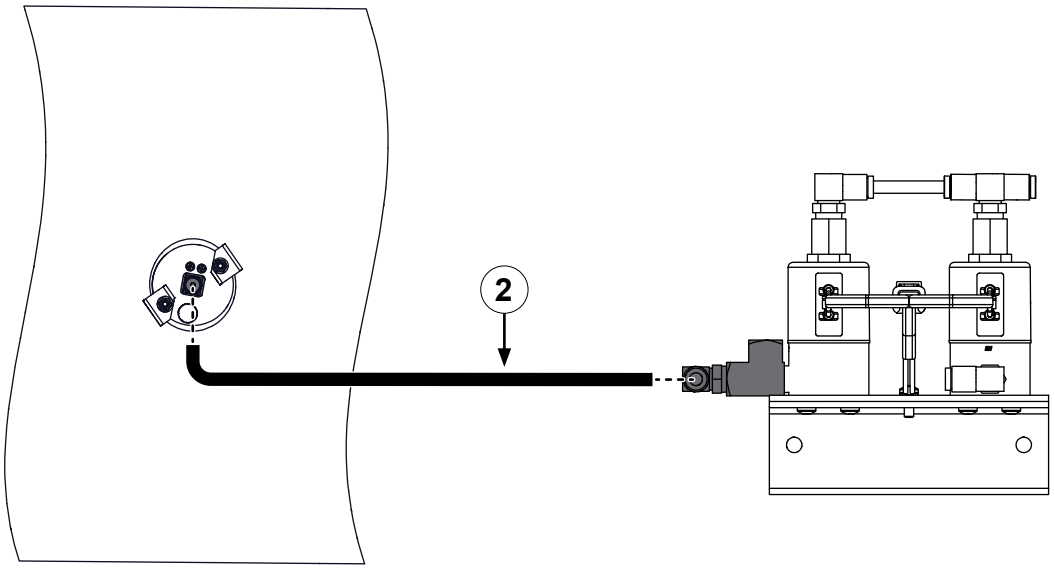


Use the illustration and instructions to install the air clutch hose.

1. Use a portion of the yellow tubing to connect the vehicle air supply and the 3-way solenoid valve.

Installing the Pressure Gauge

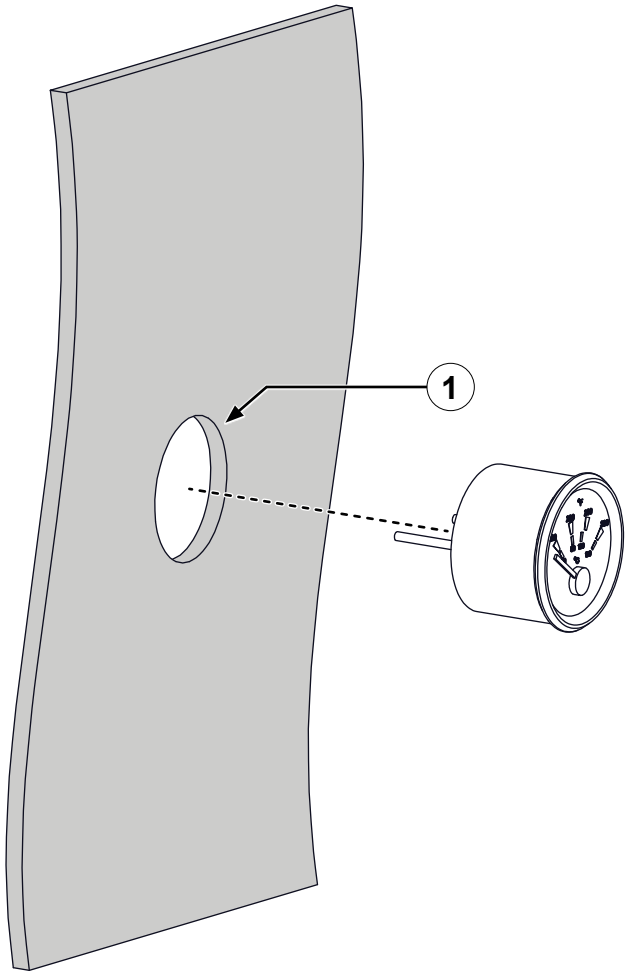




Use the illustrations and instructions to install the pressure gauge on the control panel. The pressure gauge is required by NFPA standards and must be locally sourced by the installer.

1. Create the cutout for the pressure gauge. For dimensions, refer to the specifications provided by the manufacturer.
2. Use a portion of the black tubing to connect the pressure gauge and the auto-sync solenoid assembly.

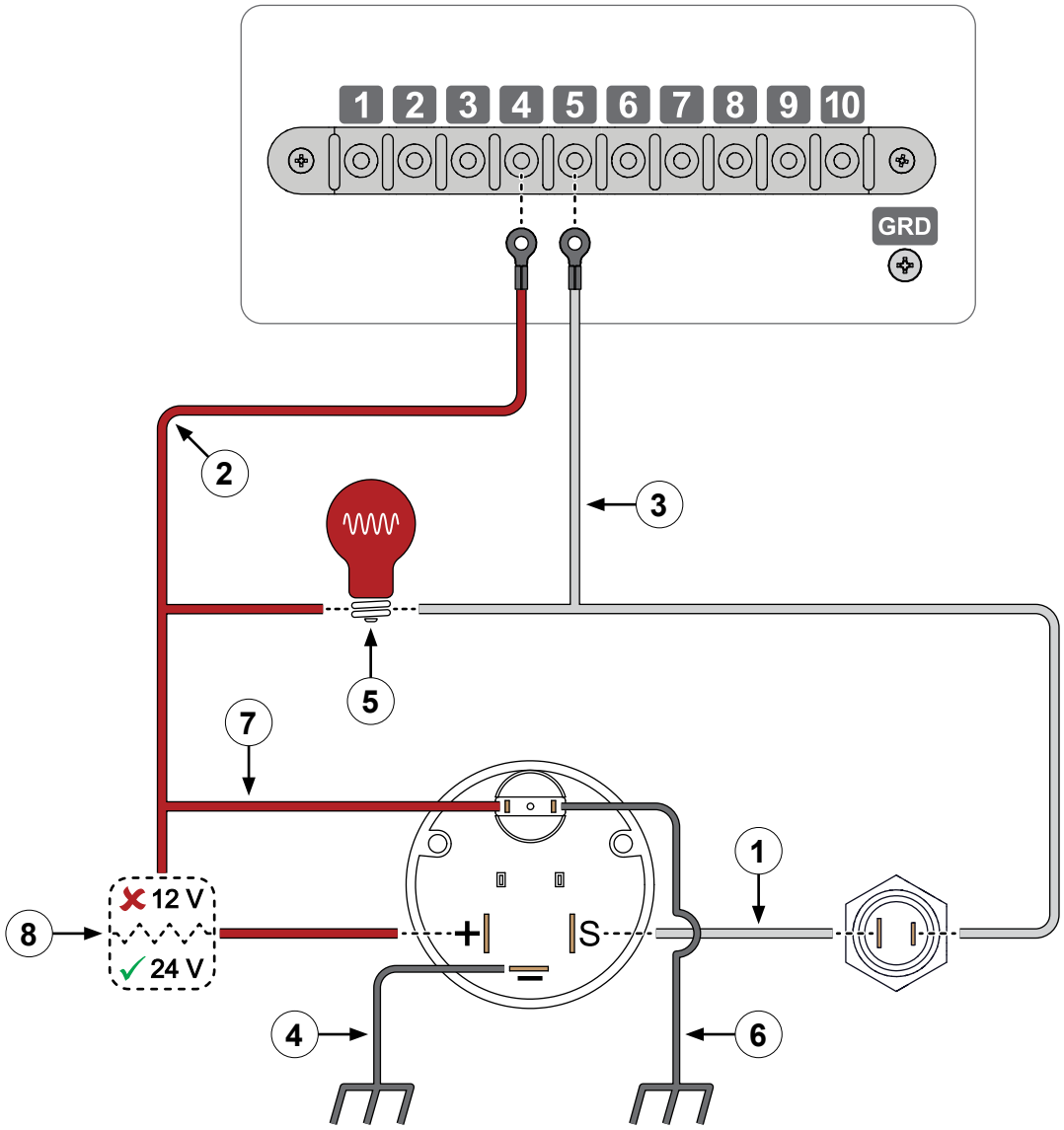
Installing the Temperature Gauge



Use the illustration and instructions to install the temperature gauge on the control panel.

1 Create the cutout for the temperature gauge, then use the provided hardware to secure the gauge to the apparatus.

Connecting the Temperature Gauge

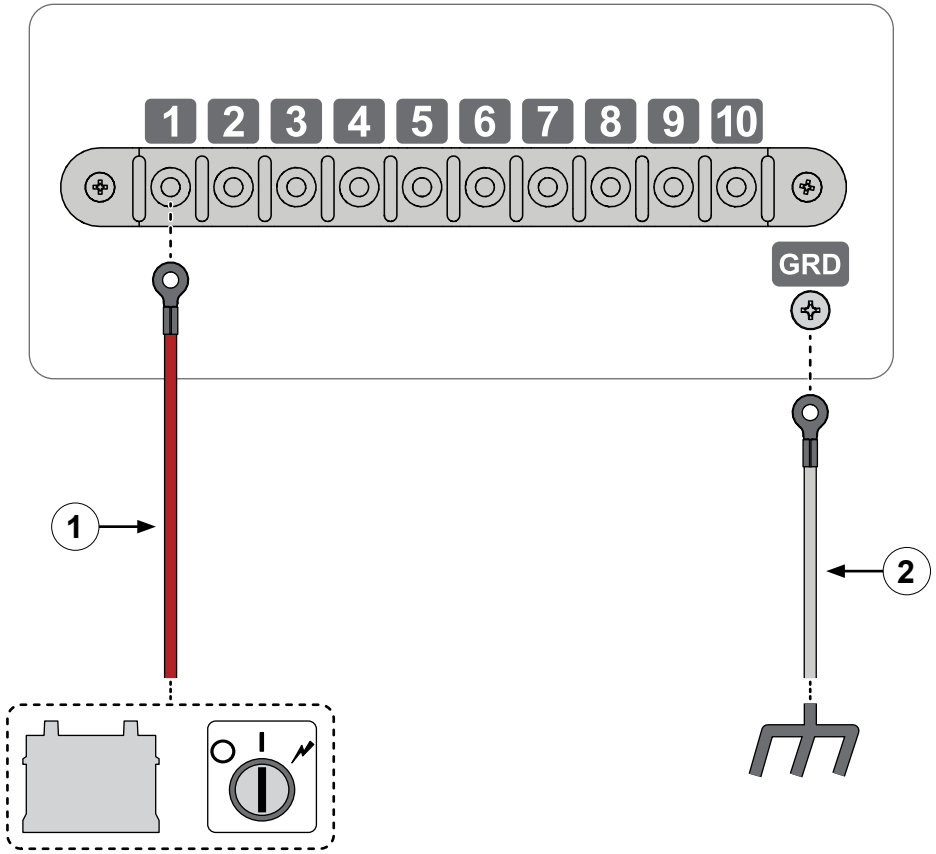


Use the illustration and instructions to connect the temperature gauge wires and components.

Note: *The wire is supplied by the installer.*

1	Secure the neutral wire between the signal terminal on the gauge and the larger spade on the temperature sender.
2	Secure the power wire between the positive terminal on the gauge and terminal 4 on the relay panel.
3	Secure the neutral wire between the smaller spade on the temperature sender and terminal 5 on the relay panel.
4	Secure the ground wire to the negative terminal on the gauge.
5	Wire the warning light into the circuit.
6	Secure the ground wire to one of the gauge light terminals.
7	Secure the power wire to the other gauge light terminal.
8	If you are installing a 24 V system, wire the resistor into the circuit.

Connecting to the Relay Panel



Connecting to Power

Use the illustration and instructions to connect the power source and ignition to the relay panel.

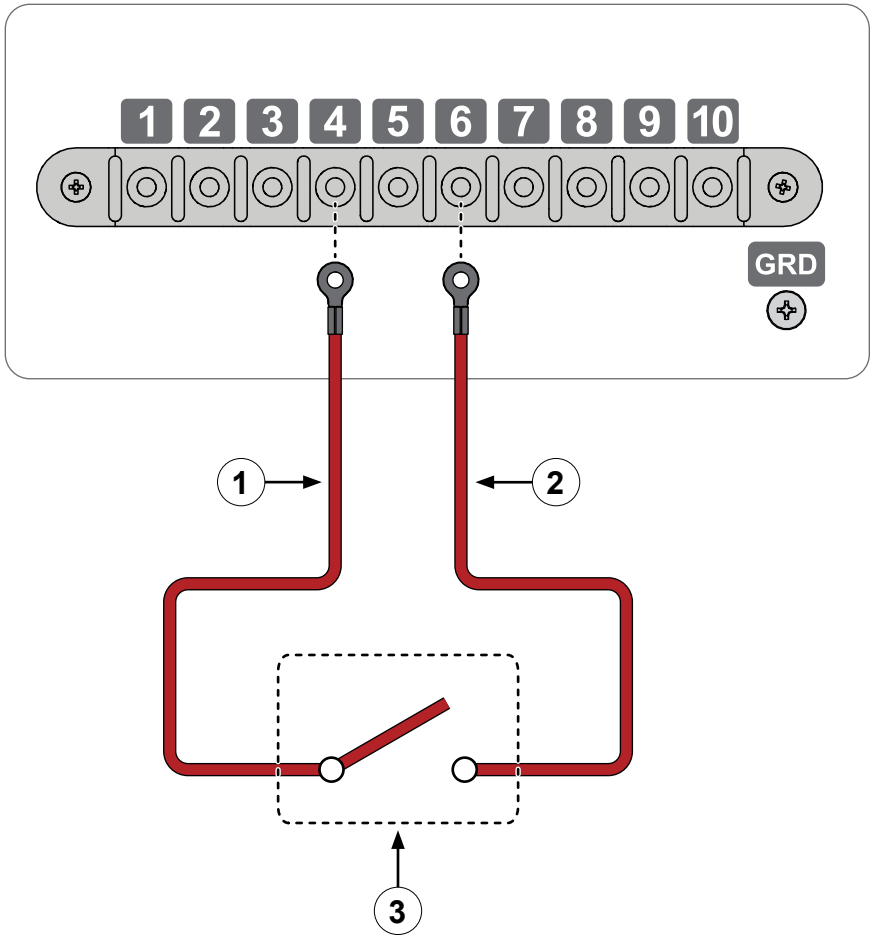
Note: *The wire is supplied by the installer.*

1. Secure the power wire to terminal 1 on the relay panel.

   Note: *A 20 amp fuse is required between the power source and terminal.*

2. Secure the ground wire to the grounding screw on the relay panel.

Connecting to the Relay Panel



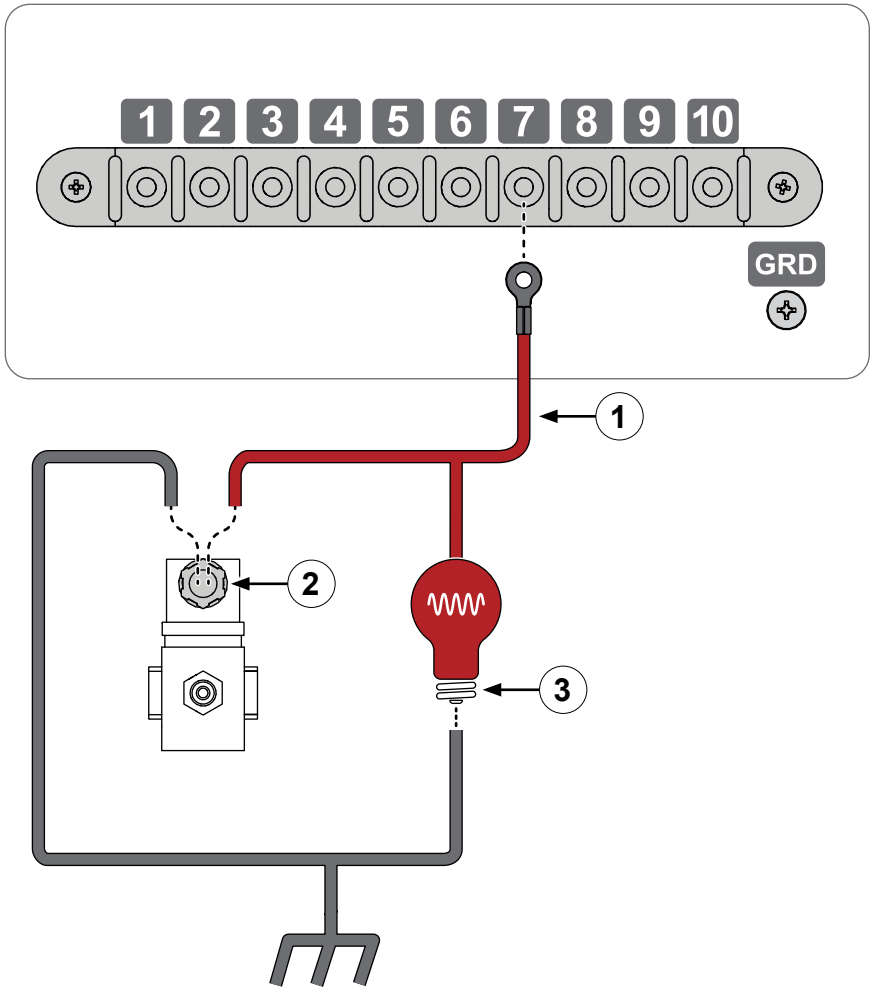
Connecting the Air Clutch Switch

Use the illustration and instructions to connect the air clutch switch to the relay panel.

Note: *The switch and wire are supplied by the installer.*

1	Secure the wire to terminal 4 on the relay panel.
2	Secure the wire to terminal 6 on the relay panel.
3	Connect the wires to the air clutch switch.

Connecting to the Relay Panel



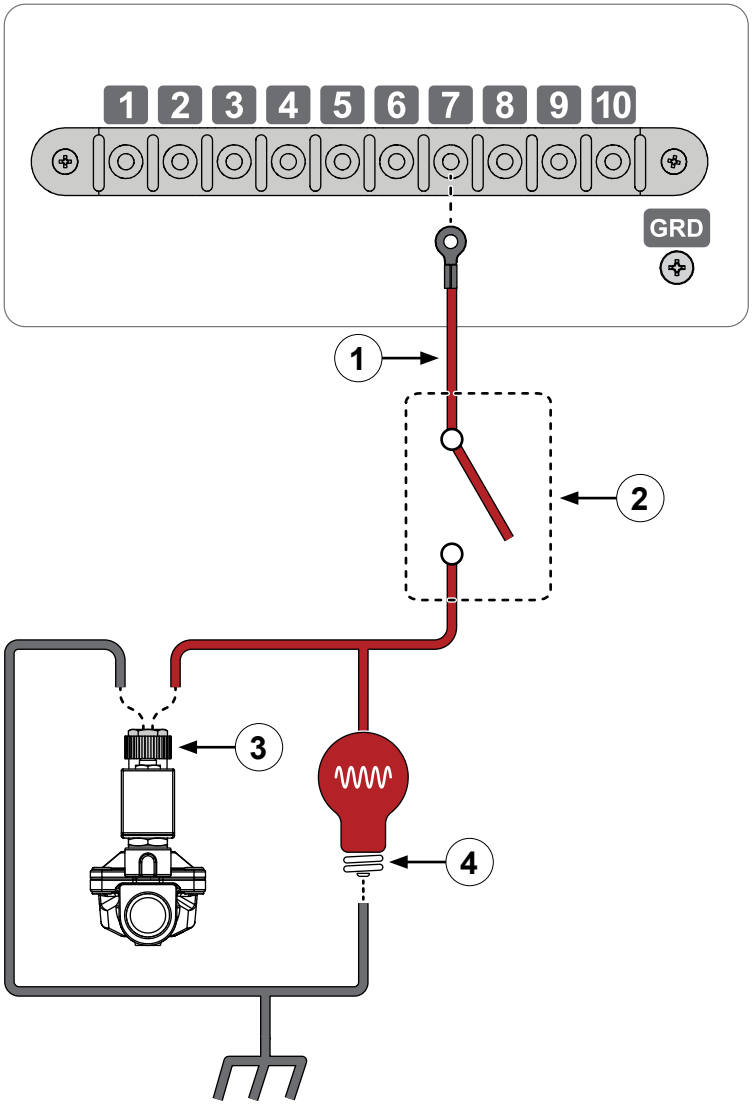
Connecting the Air Clutch

Use the illustration and instructions to connect the air clutch solenoid to the relay panel.

Note: *The indicator light and wire are supplied by the installer.*

1	Secure the wire to terminal 7 on the relay panel.
2	Secure the wire to the cable gland on the 3-way solenoid.
3	Wire the *CLUTCH ENGAGED* indicator light into the circuit.

Connecting to the Relay Panel



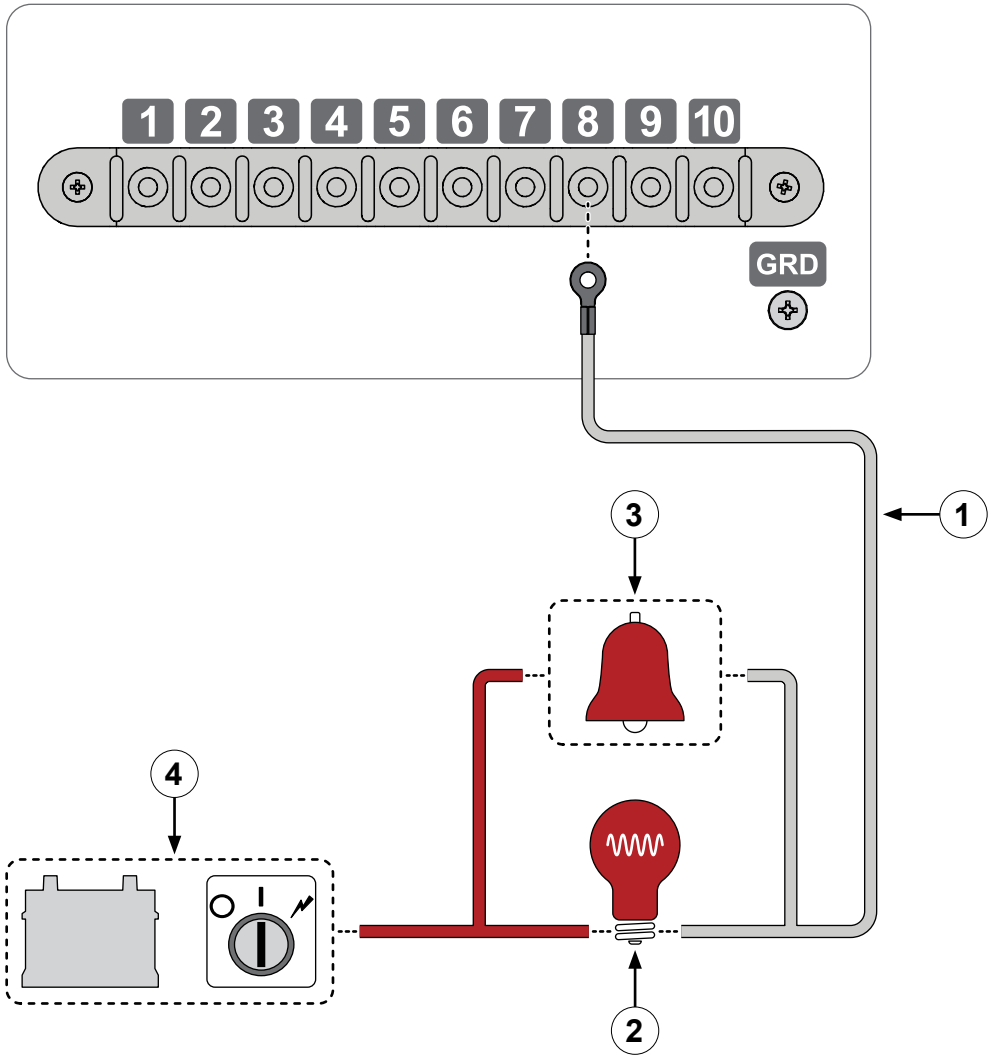
Connecting the Air Discharges

Use the illustration and instructions to connect the air discharge solenoids to the relay panel.

Note: *The indicator light and wire are supplied by the installer.*

1	Secure the wire to terminal 7 on the relay panel.
2	Install a switch between the relay panel and the air discharge solenoid.
3	Secure the wire to the cable gland on the solenoid.
4	Wire the deck gun indicator light into the circuit.
5	Repeat the process to connect the rest of the air discharge solenoids.

Connecting to the Relay Panel



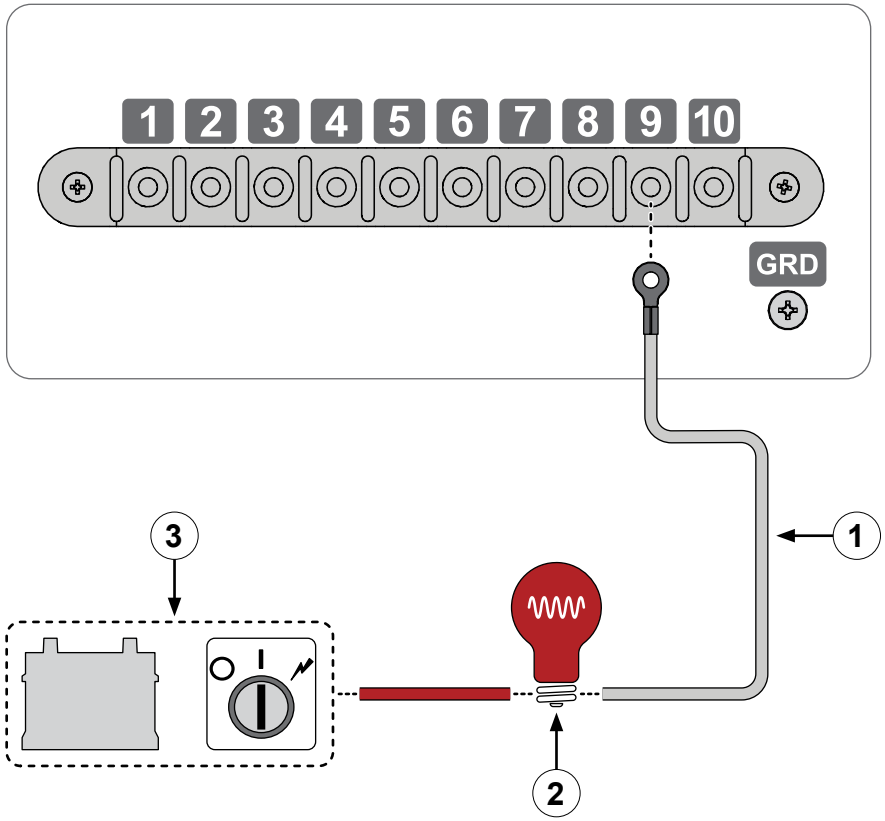
Connecting the Overheat Light and Audible Alarm

Use the illustration and instructions to connect the overheat indicator light and optional audible alarm to the relay panel.

Note: *The indicator light, audible alarm, and wire are supplied by the installer.*

1	Secure the wire to terminal 8 on the relay panel.
2	Wire the overheat indicator light into the circuit.
3	If desired, wire the optional audible alarm into the circuit.
4	Secure the wire to the *RUN* terminal on the ignition.

Connecting to the Relay Panel



Connecting the Pressure Light

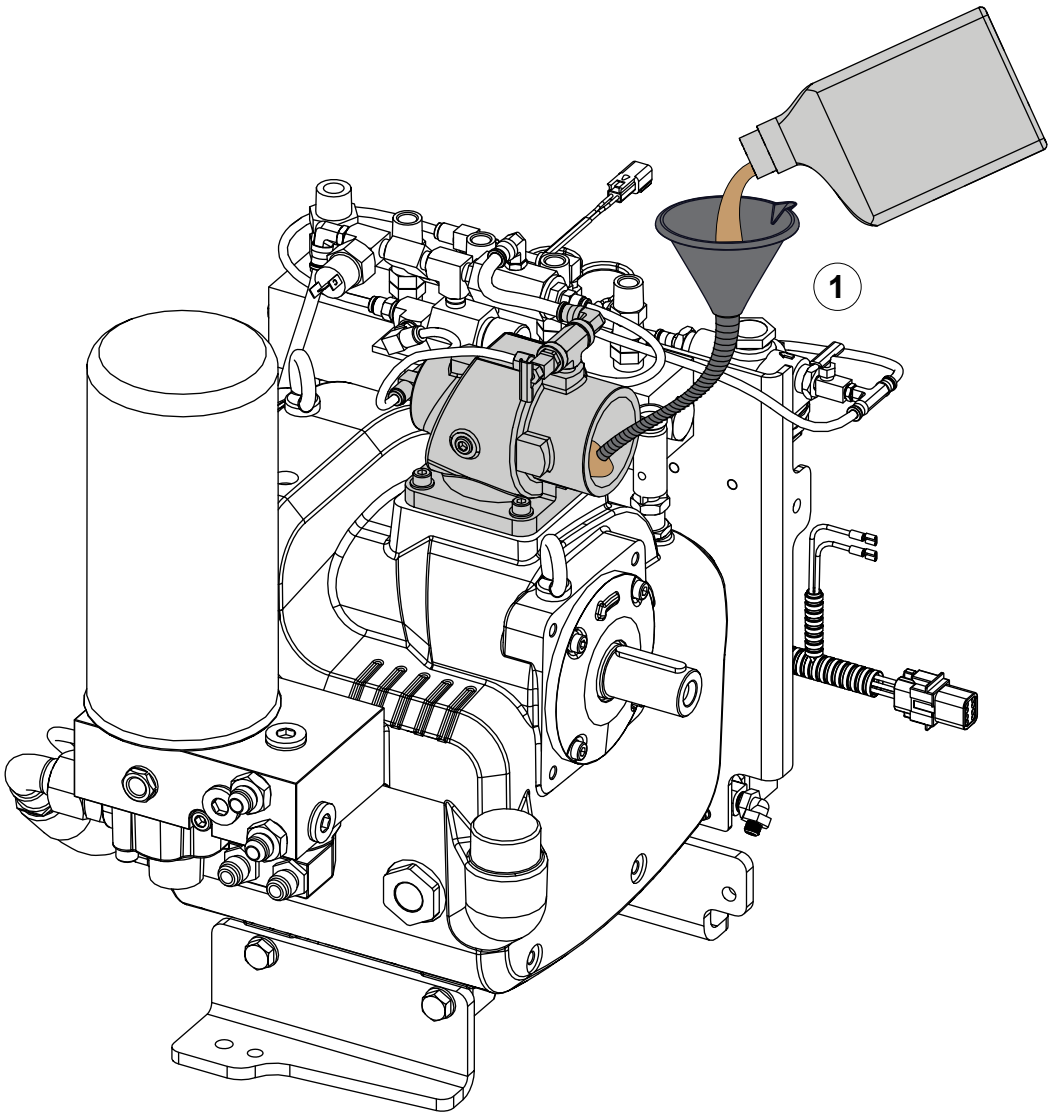
Use the illustration and instructions to connect the optional pressure light to the relay panel.

Note: *The indicator light and wire are supplied by the installer.*

1. Secure the wire to terminal 9 on the relay panel.
2. Wire the pressure indicator light into the circuit.
3. Secure the wire to the *RUN* terminal on the ignition.

Notes

Preparing for Operation



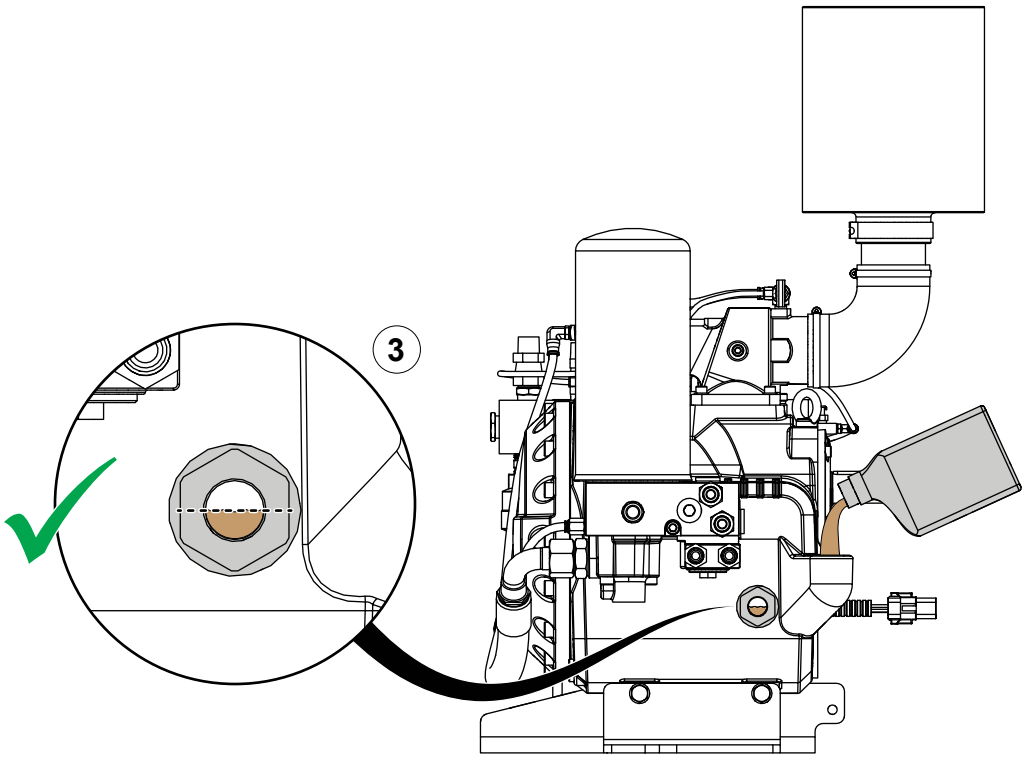
Use the illustrations and instructions to prepare the system for operation. This procedure distributes the oil in the compressor to the hoses, oil cooler, and other system components.

Before you begin the procedure:

- Make sure that tools have been removed from the apparatus and the equipment is clear of debris.
- Make sure that all hardware and connections are properly tightened.
- Make sure that the drain valves are closed.
- Make sure to flow water through the oil cooler.
- Make sure that all associated equipment is operating properly.

1 Remove the air filter, then pour 8 to 16 oz (267 to 474 ml) of ISO 68 low-foaming or anti-foam hydraulic oil into the air inlet. Install the air filter.

Preparing for Operation



Use the illustrations and instructions to prepare the system for operation.

2 Toggle the auto-sync switch to the *UNLOAD* position, then engage the compressor for up to 10 seconds.

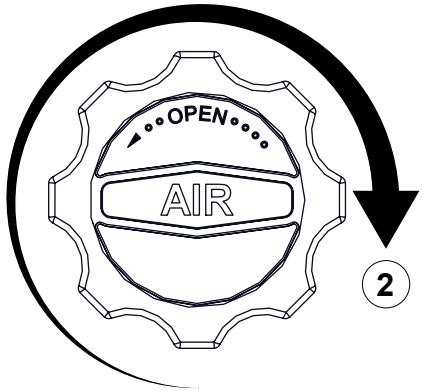
Note: *Do not operate the compressor for more than 10 seconds during this procedure. Doing so will damage the compressor and void your warranty.*

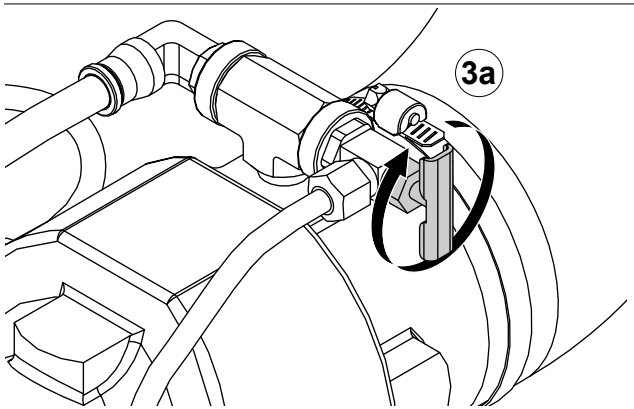
Pressure: *May cause personal injury. Allow time for the pressure to be completely purged from the system.*

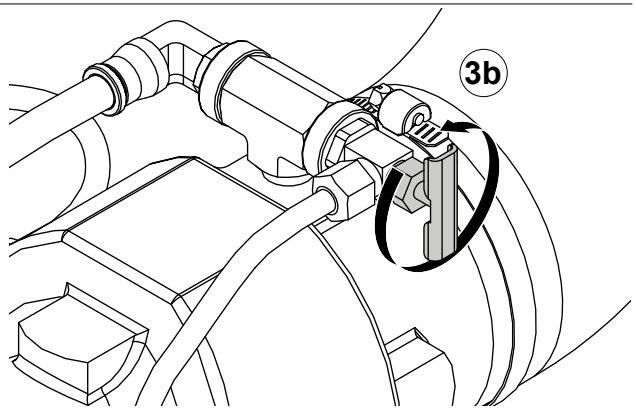
3 Replenish the oil that moved into the system. Refer to: **"Adding the Compressor Oil" on page 79.**

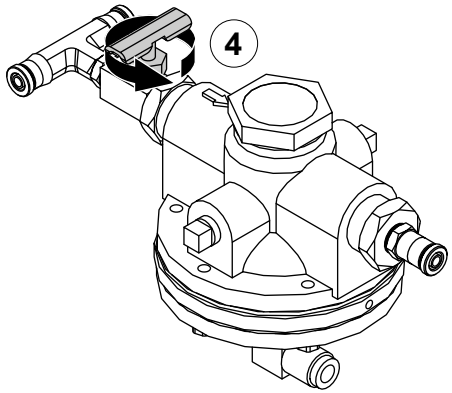
4 Repeat the procedure until the oil level remains stable.

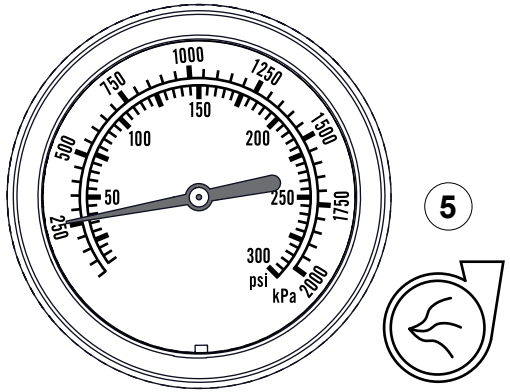
Calibrating the System—Unload Mode











Use the illustrations and instructions to calibrate the system for unload mode.

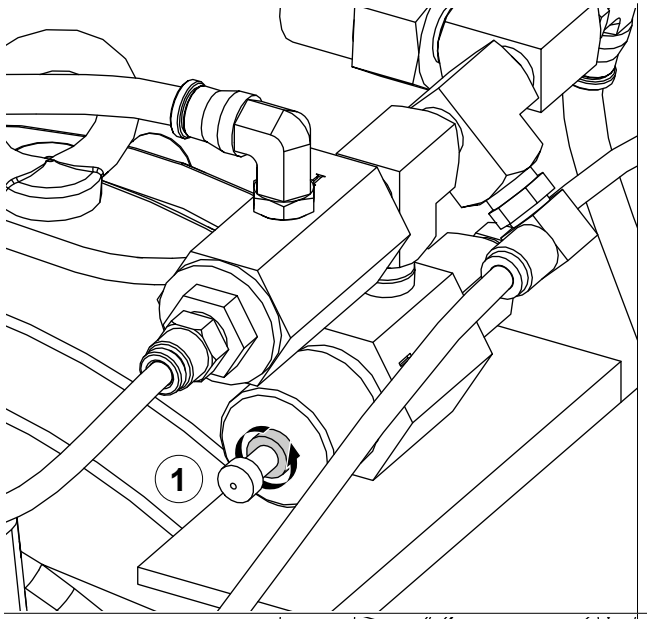
When operating the system:

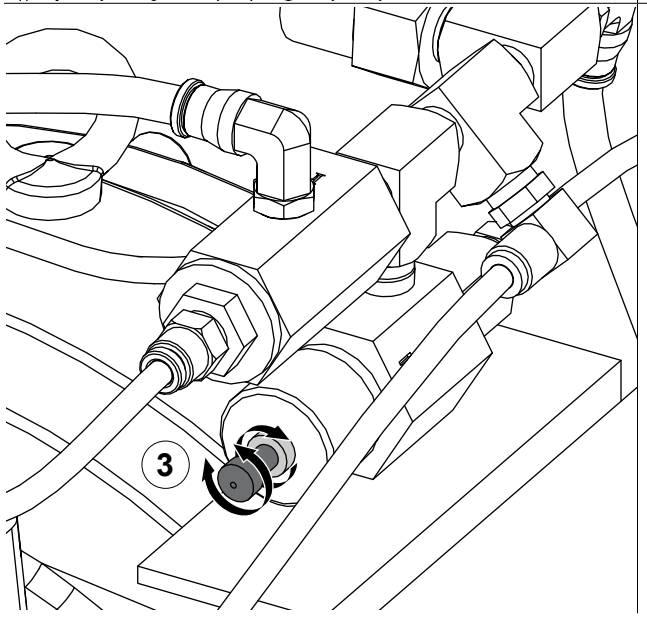
- Always start the system in auto or unload mode.
- Always circulate enough cool water to regulate the compressor oil temperature during operation.
- Never operate the system with the compressor oil temperature above 250°F (121°C).

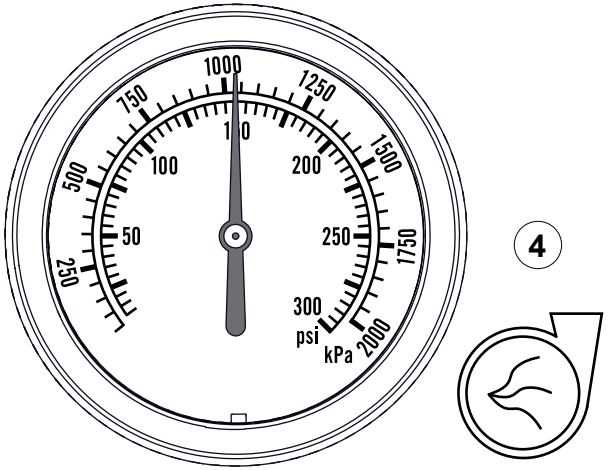
1. Toggle the auto-sync switch to the *UNLOAD* position.
2. Close all air discharges before calibration.
3. a. Locate the AITV, then turn it clockwise until fully closed.
   b. From the closed position, turn it 3 full turns counterclockwise.
4. Locate the balance trim valve, then turn it counterclockwise until fully open.
5. Idle the engine and flow water through the pump, then engage the air clutch. The air pressure gauge should read approximately 40 psi (2.8 bar).

   Note: *Do not engage the clutch when the engine speed is above 1,000 rpm.*

Calibrating the System—Fixed Mode







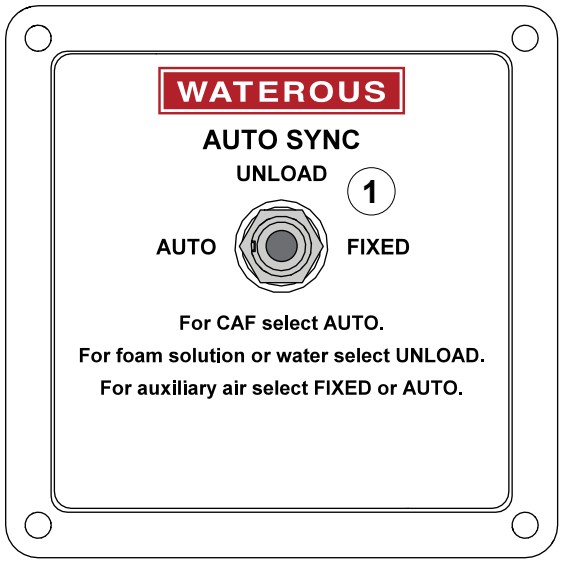
Use the illustrations and instructions to calibrate the system for fixed mode.

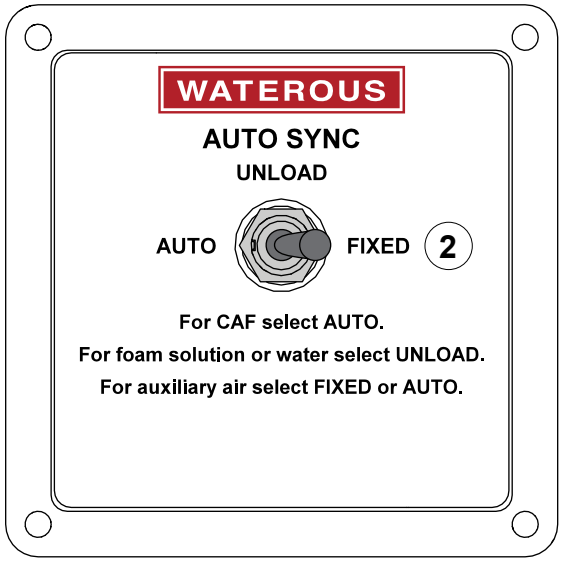
When operating the system:

- Always start the system in auto or unload mode.
- Always circulate enough cool water to regulate the compressor oil temperature during operation.
- Never operate the system with the compressor oil temperature above 250°F (121°C).

1. Loosen the locknut on the PMC manual adjustment screw.
2. Toggle the auto-sync switch to the *FIXED* position.
3. To adjust the air pressure, do the following:
   - Turn the screw clockwise to increase pressure.
   - Turn the screw counterclockwise to decrease pressure.
4. Allow time for the adjustment to take effect, then use the gauge to verify the change. Secure the setting with the locknut.

Calibrating the System—Fixed Mode





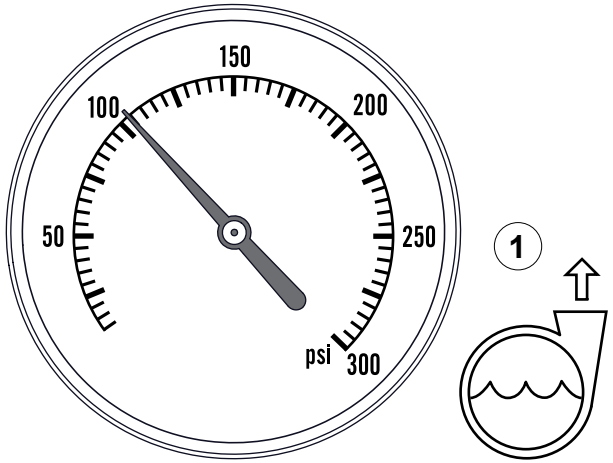
Use the illustrations and instructions to verify that the system is calibrated for fixed mode.

When operating the system:

- Always start the system in auto or unload mode.
- Always circulate enough cool water to regulate the compressor oil temperature during operation.
- Never operate the system with the compressor oil temperature above 250°F (121°C).

1. Toggle the auto-sync switch to the *UNLOAD* position to make sure that the air pressure decreases to the unload mode value—typically 40 psi (2.8 bar).
2. Toggle the auto-sync switch to the *FIXED* position to make sure that the air pressure increases to the fixed mode value—typically 145 to 150 psi (10 bar).
3. Verify that the system operates as expected in both modes when you vary the engine speed.

Calibrating the System—Auto Mode



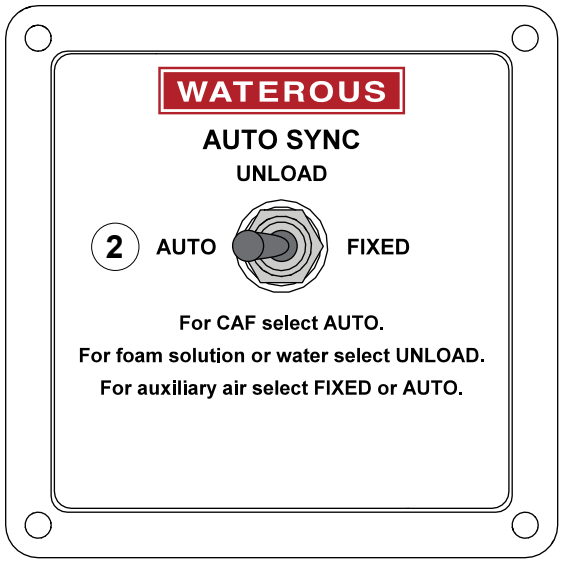
Use the illustrations and instructions to adjust the system in auto mode.

When operating the system:

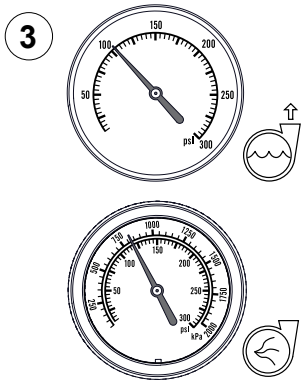
- Always start the system in auto or unload mode.
- Always circulate enough cool water to regulate the compressor oil temperature during operation.
- Never operate the system with the compressor oil temperature above 250°F (121°C).

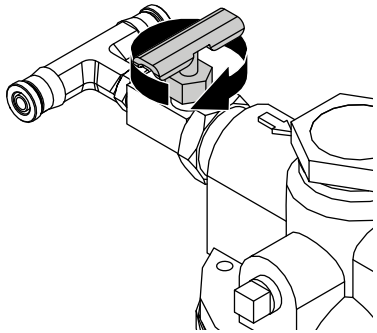
1 Make sure that the pump has 100 psi (10.3 bar) at the main discharge with minimal flow.

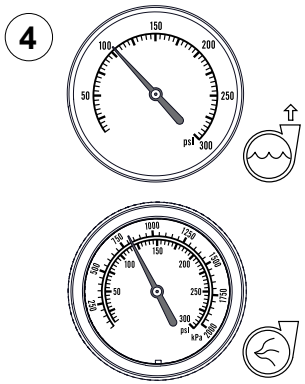
2 Toggle the auto-sync switch to the *AUTO* position.

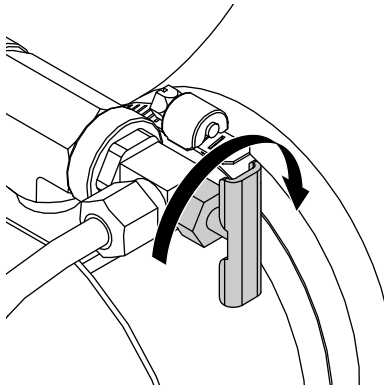


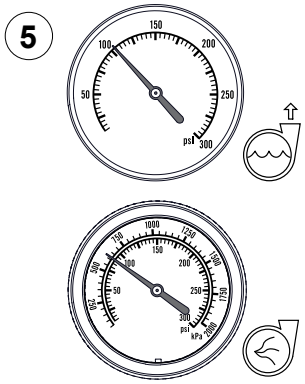
Calibrating the System—Auto Mode

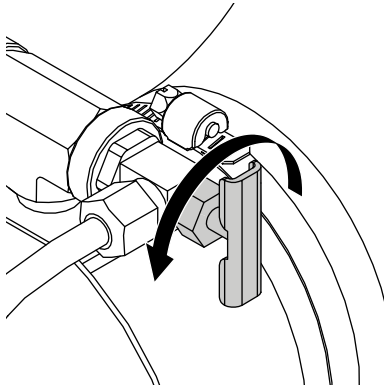












Use the illustrations and instructions to adjust the system in auto mode.

When operating the system:

- Always start the system in auto or unload mode.
- Always circulate enough cool water to regulate the compressor oil temperature during operation.
- Never operate the system with the compressor oil temperature above 250°F (121°C).

3 Turn the balance trim valve clockwise until the air pressure is 5 to 10% higher than the water pressure.

4 If the air pressure remains 10% higher than the water pressure and the balance trim valve is fully open, turn the AITV 1/2 turn clockwise. After the adjustment takes effect, compare the air and water pressure.

If the air pressure is still too high, turn the AITV an additional 1/2 turn clockwise.

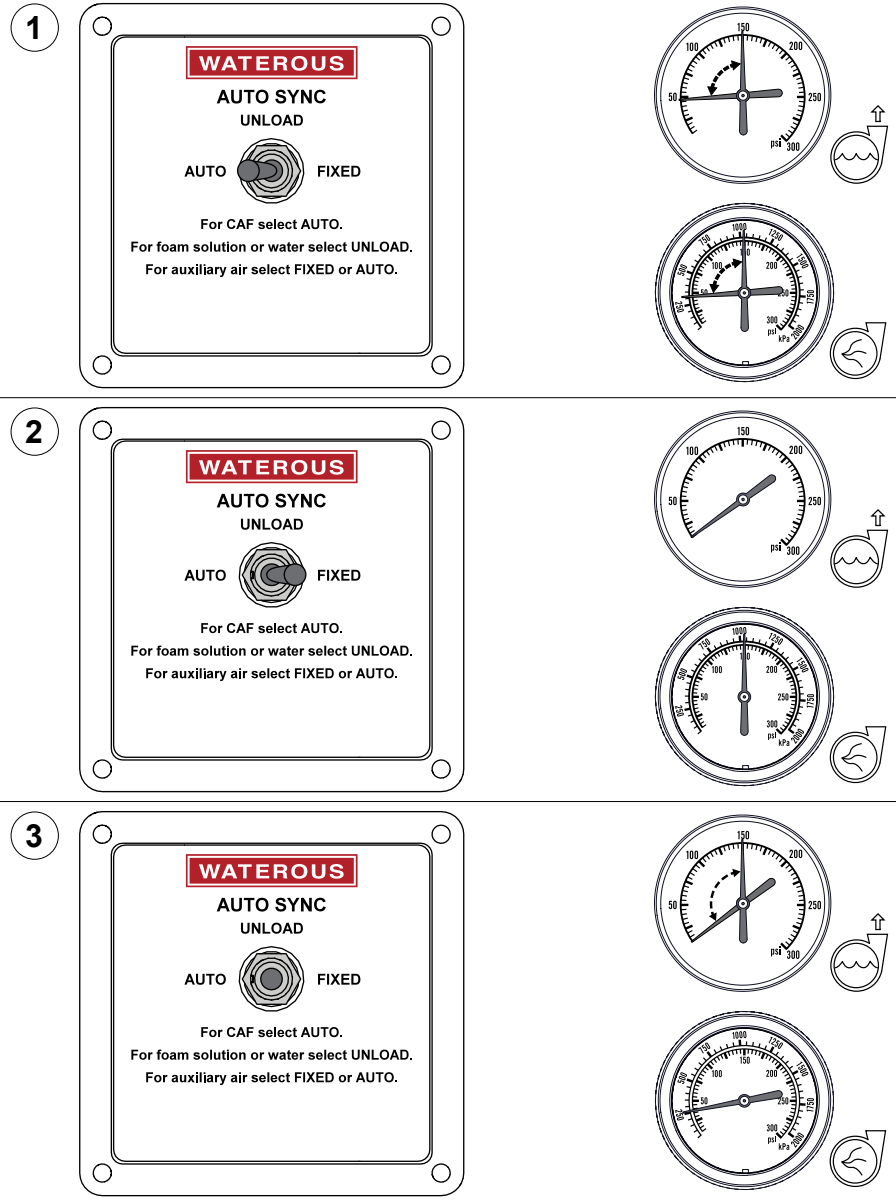
Note: *Do not turn the AITV more than one full turn clockwise.*

5 If the air pressure remains lower than the water pressure and the balance valve is fully closed, turn the balance trim valve counterclockwise until it is fully open. After the adjustment takes effect, compare the air and water pressure.

Repeat this step until the air pressure is equal to, or 5% higher than, the water pressure.

Note: *Do not turn the AITV more than one full turn counterclockwise.*

Operating the System



The system operates in 3 modes. Each mode is engaged with the toggle switch on the auto-sync controller.

When operating the system:

- Always start the system in auto or unload mode.
- Always circulate enough cool water to regulate the compressor oil temperature during operation.
- Never operate the system with the compressor oil temperature above 250°F (121°C).

1 To operate in auto mode, toggle the auto-sync switch to the *AUTO* position. In this mode, the system synchronizes the air pressure with the water pressure.

The air pressure rises and falls automatically as you raise and lower the static water pressure. Auto mode operates between approximately 50 to 150 psi.

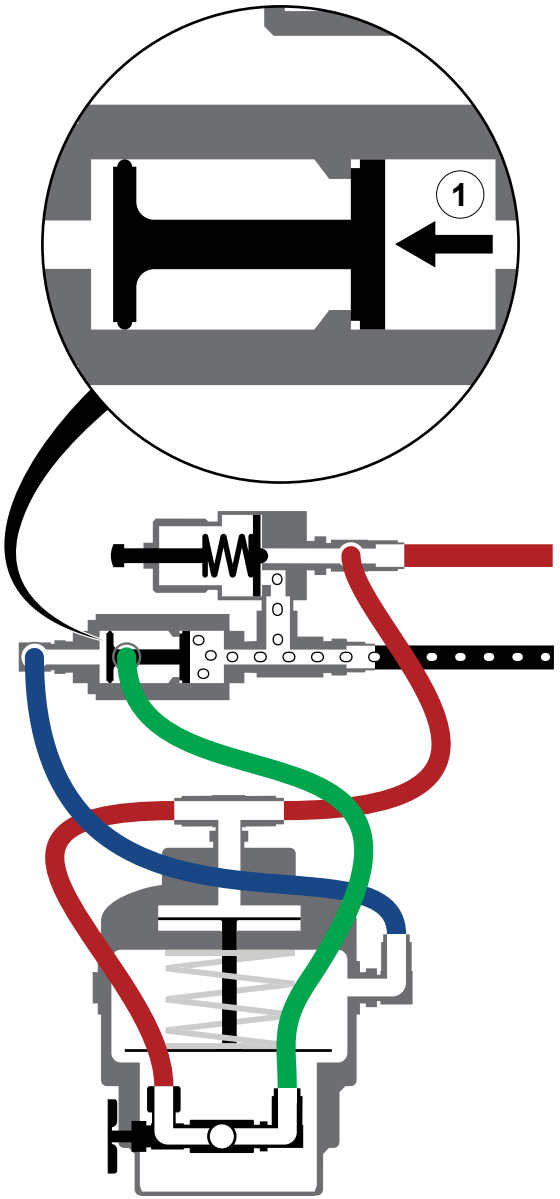
2 To operate in fixed mode, toggle the auto-sync switch to the *FIXED* position. In this mode, the system sets the air pressure to approximately 150 psi.

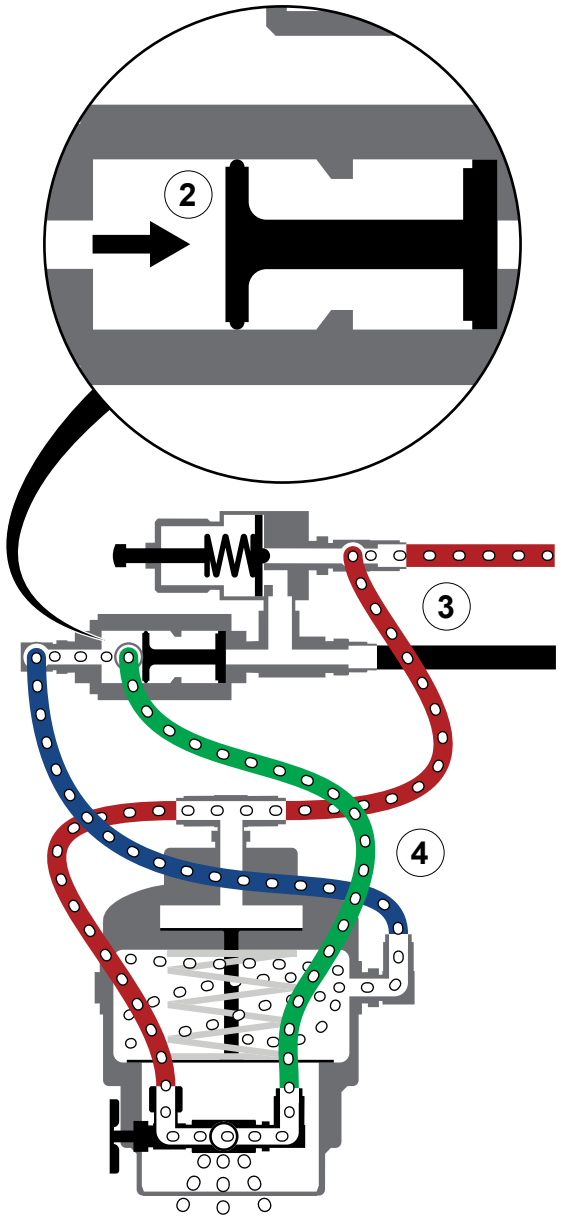
Fixed mode is used to operate air tools, rescue bags, etc. Operate the compressor in fixed mode once a week for 15 minutes per the maintenance schedule.

3 To operate in unload mode, toggle the switch to the *UNLOAD* position. In this mode, the system operates the compressor in standby.

Approximately 40 psi is produced to circulate the oil and cool the compressor. In unload mode, the air pressure and water pressure work independently.

Understanding the Shuttle Valve Operation



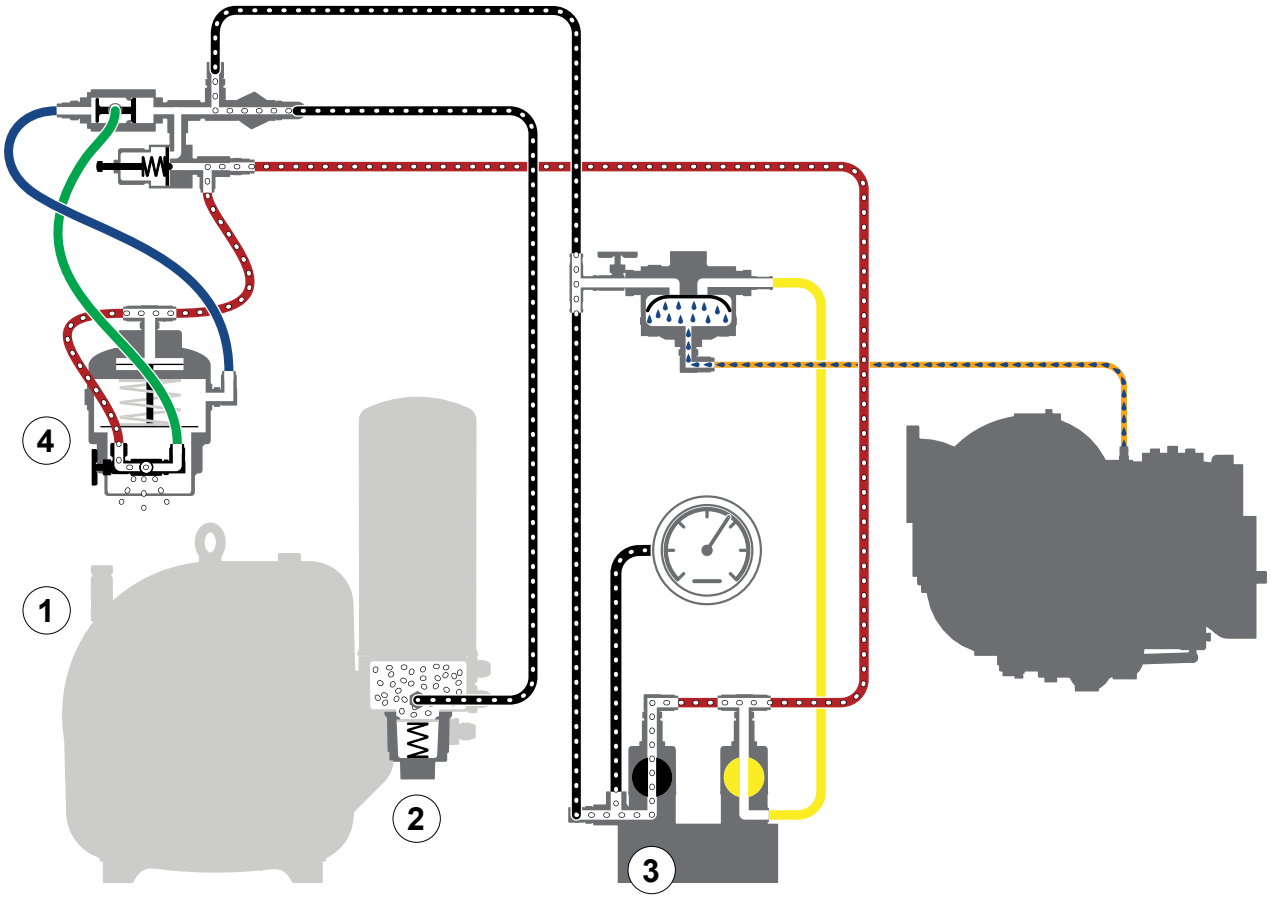


The shuttle valve engages as the air pressure in the system rises. It prevents air from escaping during CAFS operation. When the system shuts down and the air pressure leaves the valve, the shuttle returns to its resting position and bleeds off any remaining air in the system to atmosphere.

Note: *The white dots illustrate the main air pressure route described in the instructions.*

1	The rising pressure in the system moves the shuttle into the operating position.
2	When the compressor shuts down, the lack of air pressure moves the shuttle into the resting position.
3	Air in the lines migrates to atmosphere through the red tubing.
4	Air in the compressor migrates to atmosphere through the green tubing.

Operating in Unload Mode

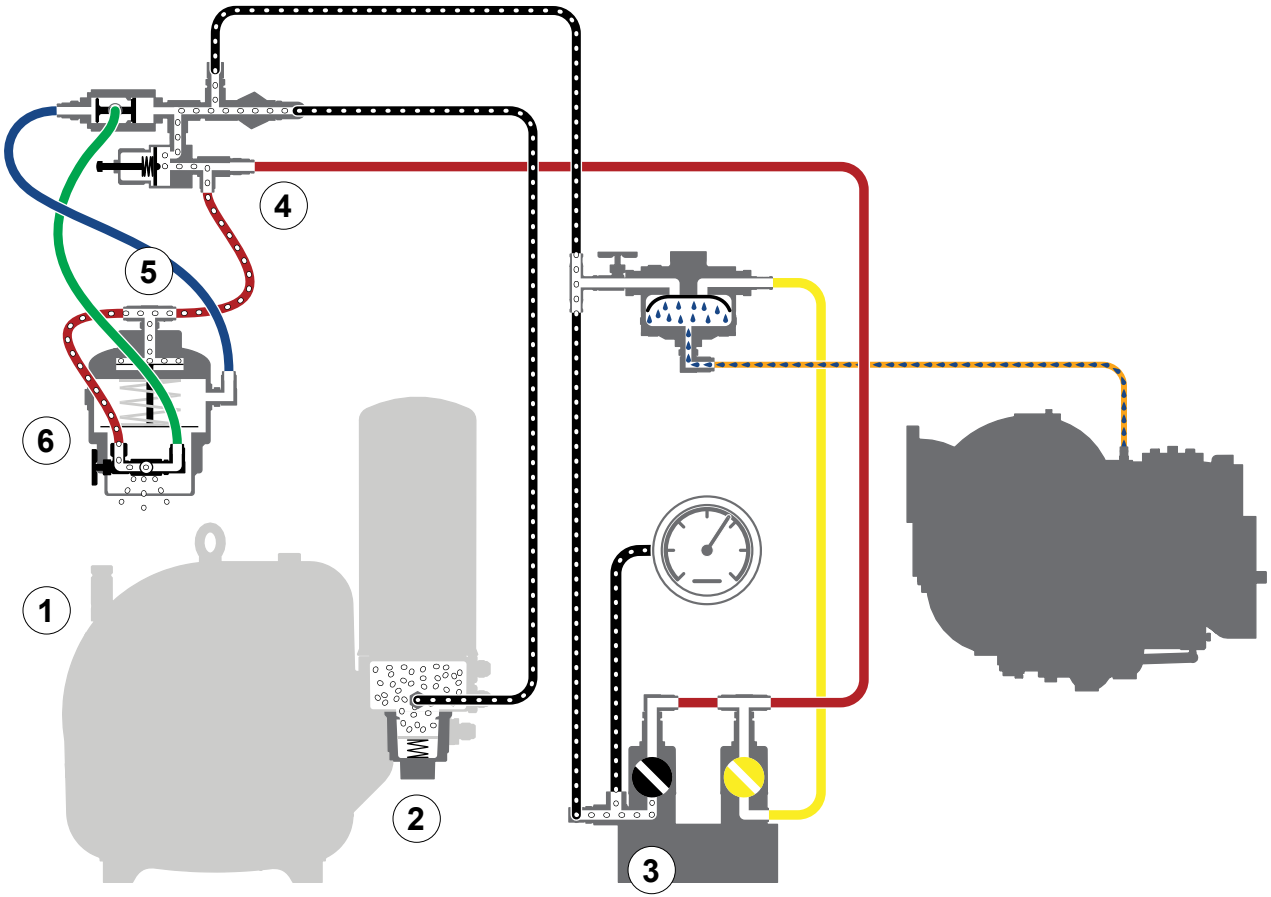


Unload mode operates the compressor in standby. The compressor generates a minimum pressure of 40 psi (2.8 bar) to circulate the compressor oil and cool the system.

Note: *The white dots illustrate the main air pressure route described in the instructions.*

1	The compressor builds the air pressure in the system to 40 psi (2.8 bar). To adjust the set point, refer to: **"Calibrating the System—Unload Mode" on page 64.**
2	The minimum pressure valve prevents air pressure below 40 psi (2.8 bar) from entering the manifold. ***Note:*** *The pressure gauge should read 0 psi in unload mode.*
3	The open black solenoid allows air to pass through to the PMC.
4	The air (pressure) modulates the air inlet to maintain the 40 psi (2.8 bar) air pressure.

Operating in Fixed Mode

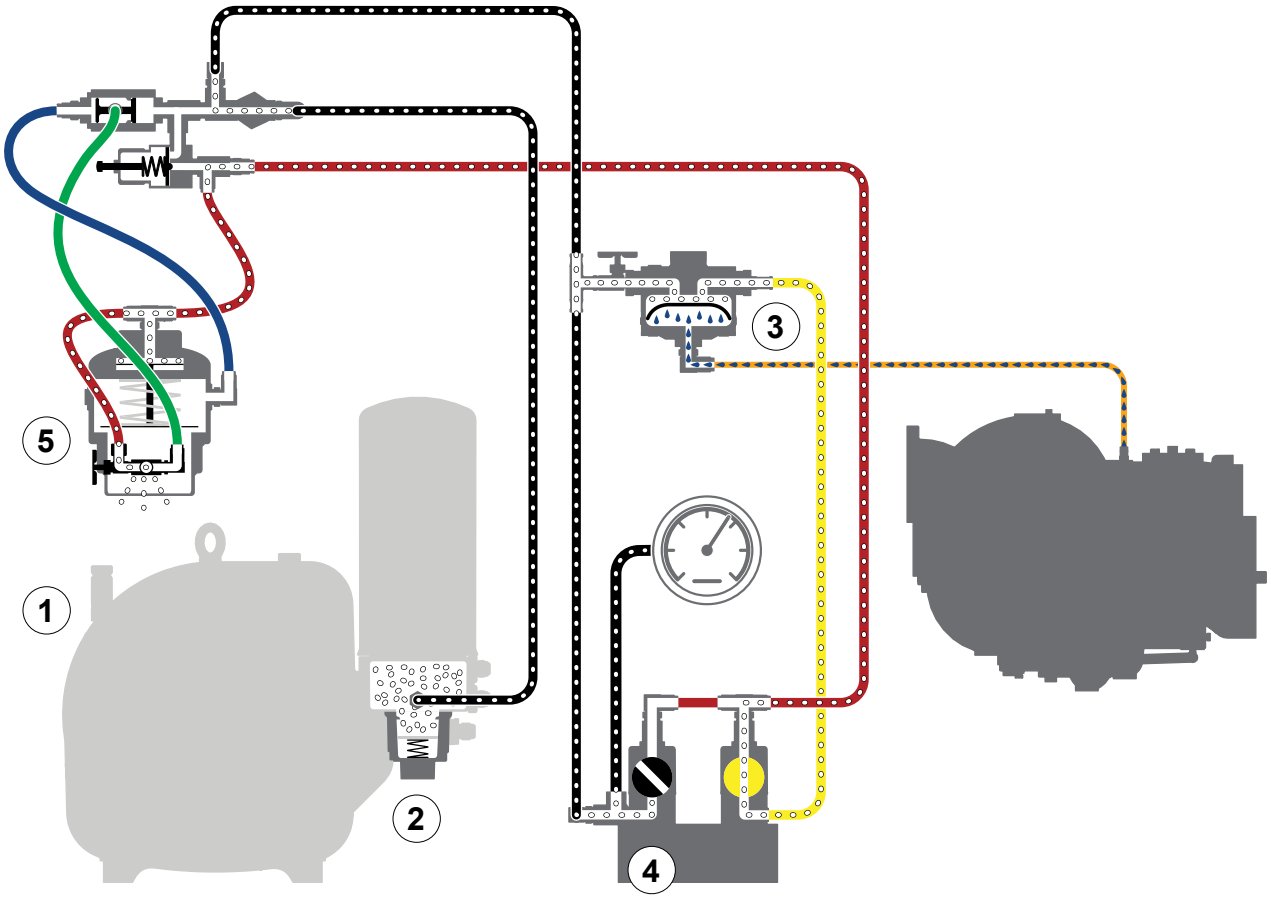


Fixed mode sets the air pressure at a fixed point. The fixed point for typical applications is 150 psi (10.3 bar).

Note: *The white dots illustrate the main air pressure route described in the instructions.*

1	The compressor builds the air pressure in the system.
2	Air moves through the system and interacts with the regulator components.
3	Both solenoids are closed, which allows the air pressure to operate independently from the water pressure.
4	Pressure builds until it reaches the set point when the fixed pressure regulator opens and allows excess air (pressure) to purge to atmosphere. To adjust this setting, refer to: **"Calibrating the System—Fixed Mode" on page 66.**
5	As the air (pressure) is purged to atmosphere, it closes the valve in the air inlet.
6	As the air (pressure) drops, the fixed pressure regulator closes, the compressor air inlet opens, the system pressure builds, and the cycle repeats.

Operating in Auto Mode

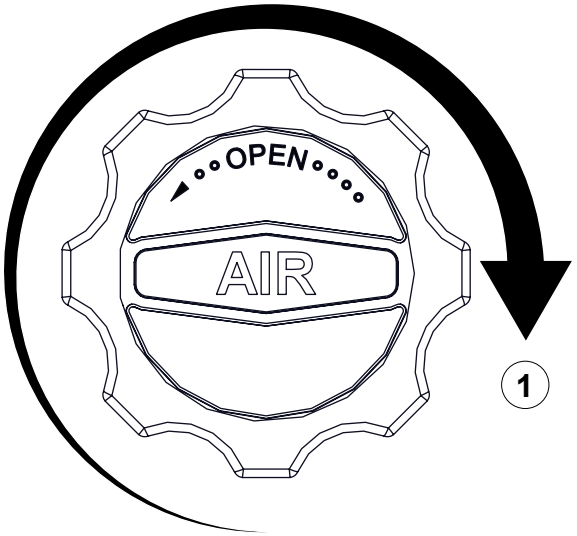


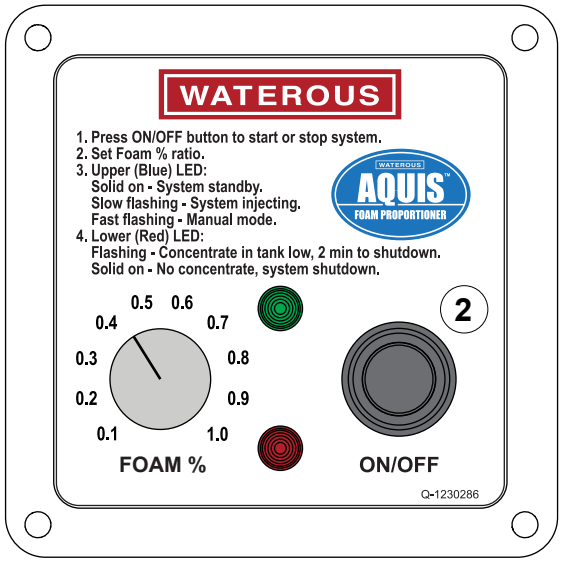
Auto mode synchronizes the air pressure with the water pressure. The air pressure rises and falls automatically as you raise and lower the water pressure. Auto mode operates between 50 to 150 psi (3.4 to 10.3 bar).

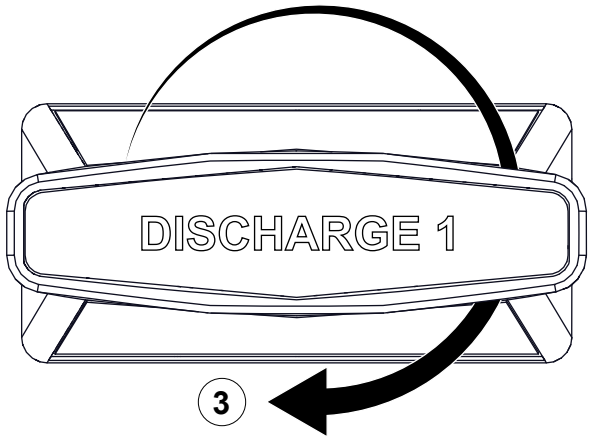
Note: *The white dots illustrate the main air pressure route described in the instructions.*

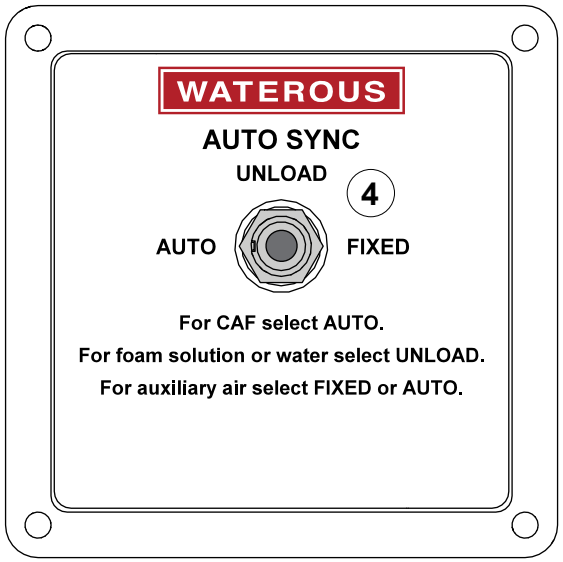
1. The compressor builds the air pressure to match the water pressure. When the water pressure is below 40 psi (2.8 bar), the system operates as if it is in unload mode.
2. As the air pressure surpasses 40 psi (2.8 bar), the minimum pressure valve opens, allowing air to move into the manifold.
3. Inside the balance valve:
   - The water side of the balance valve closes the path for air to move to the yellow solenoid, forcing air pressure to build.
   - As the air pressure builds, it overtakes the water pressure on the other side of the diaphragm and allows the air to move though the yellow solenoid to the PMC.
4. Inside the PMC:
   - Air pressure builds in the PMC until it closes the air intake, which starves the compressor of air and causes the pressure to drop.
   - As the air pressure drops, the water pressure closes the diaphragm and stops the air from moving through the yellow solenoid.
5. Air (pressure) in the PMC escapes though the trim valve, opening the air inlet and allowing the pressure to increase.

Shutting Down the System









Use the illustrations and instructions to create a shutdown procedure for your application.

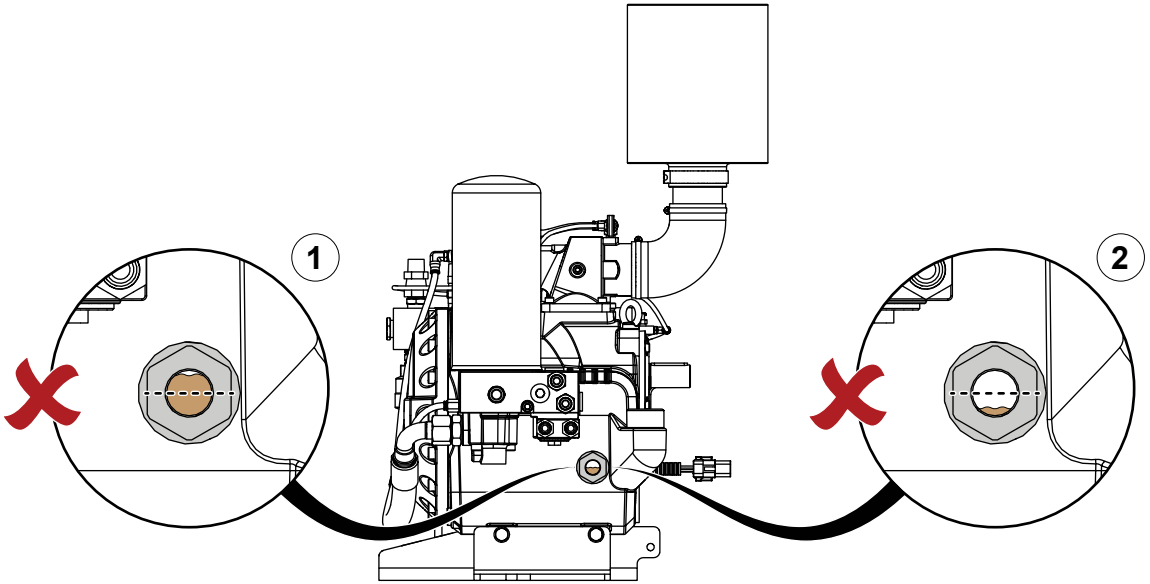
1. Close the air valves if they are open.
2. Disengage the foam proportioner, then flow water though the discharge hoses to clean them.
3. Close the discharge valves.
4. Toggle the auto-sync switch to the *UNLOAD* position.
5. Drain all freezable fluids before storing the apparatus in cold weather.

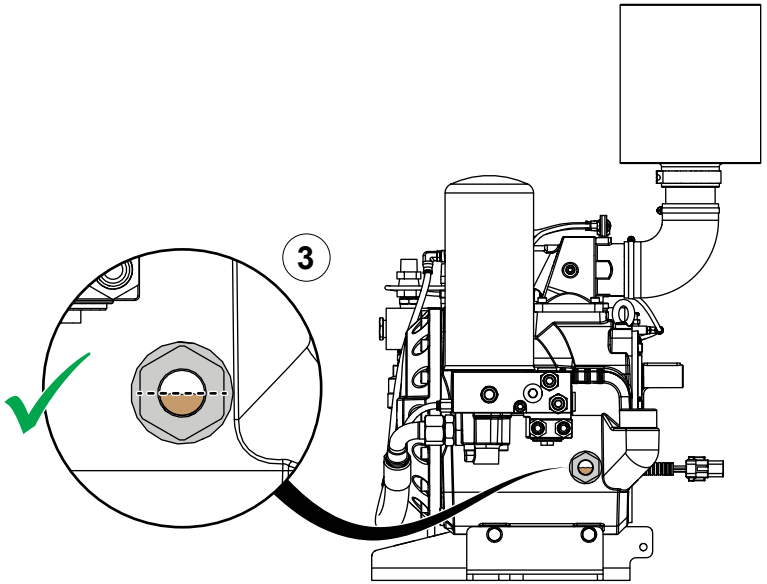
Maintenance Schedule

Perform the following procedures at the recommended intervals at a minimum. Environmental conditions affect the maintenance requirements. Inspect the components frequently and create a maintenance schedule suitable to your application and environment. Replace wear components with equivalent components. Use your serial number to gain access to the SPL associated with your system through the MyWaterous login at waterousco.com.

Operation	Before Operation	Daily	Weekly	12 Months	24 Months	Comment
Check the oil level.	X	X				Note that the oil level drops temporarily during system operation.
Inspect the hoses and fittings.	X	X				
Service operation.			X			Operate the system in air only mode once a week for 15 minutes.
Clean the wye strainer.			X			Clean the wye strainer after each use. This is dependent on water quality.
Change the oil.				X		Replace the oil after first 30 hours of operation, then yearly after that. Use ISO 68 low-foaming or anti-foam hydraulic oil.
Change the oil filter.				X		Replace the oil filter when you replace the oil.
Change the air filter.				X		Replace the air filter more often in dusty or dirty environments.
Inspect the air clutch and belt drive.				X		Inspect the equipment during routine maintenance.
Inspect the mounting hardware.				X		
Change the separator filter.					X	Replace the separator filter after a sudden increase in oil consumption.

Checking the Compressor Oil Level





Use the illustrations and instructions to check the compressor oil level. Check the oil level daily when the system is not in use and replenish the oil as needed.

1 The oil level is too high when it is higher than halfway up the sight glass. Drain the appropriate amount of oil. Refer to: **"Draining the Compressor Oil" on page 77.**

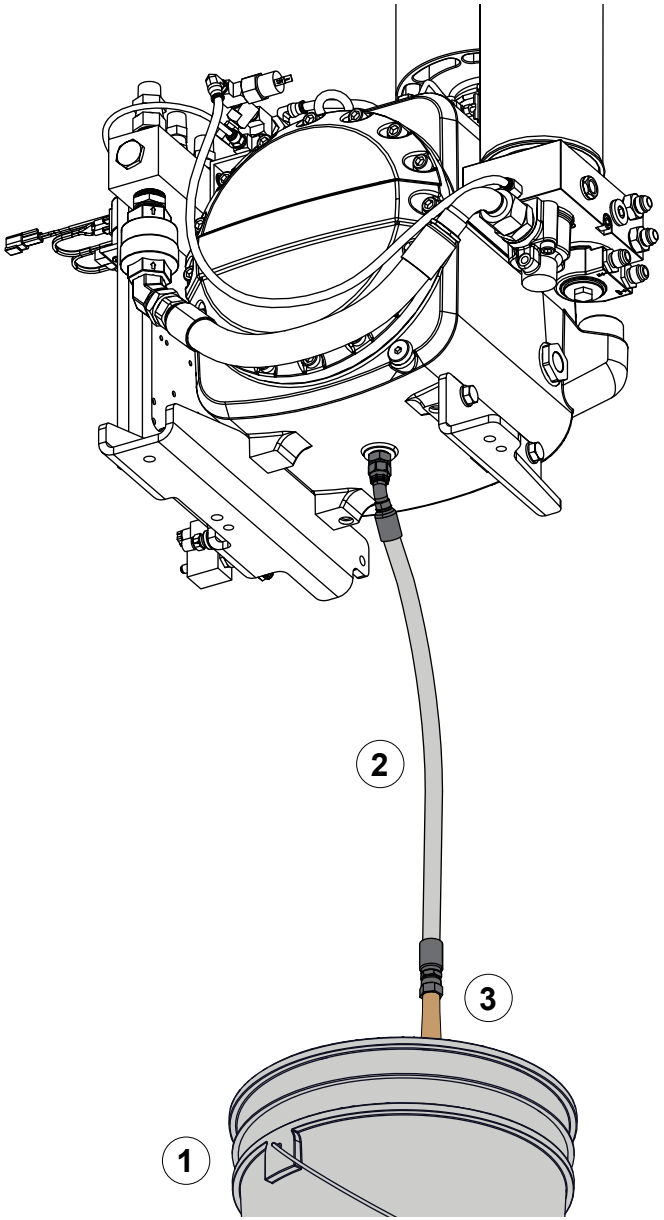
Note: *If the oil level is too high, it is important to determine the cause. Check for water entering the compressor from the pump, then repair or replace any components allowing water through.*

2 The oil level is too low when it is lower than halfway up the sight glass. Add the appropriate amount of oil. Refer to: **"Adding the Compressor Oil" on page 79.**

Note: *If the oil level is too low, it is important to determine the cause. Check the compressor for leaks and repair as needed.*

3 The appropriate oil level is halfway up the sight glass.

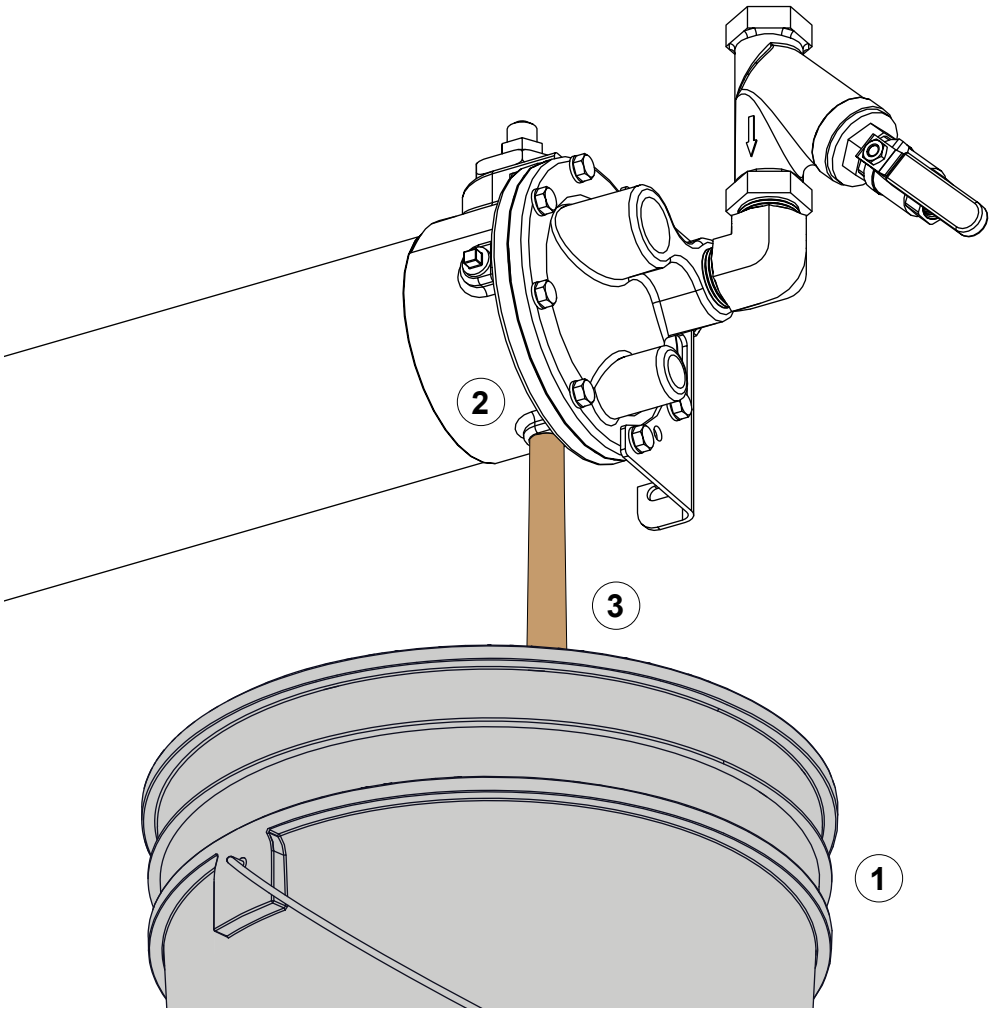
Draining the Compressor Oil



Use the illustration and instructions to drain the oil in the compressor.

⚠	***Pressure:*** *May cause personal injury. Purge the pressure from the system before draining the oil.*
1	Place a suitable container under the compressor to collect the drained oil.
2	Uncoil the oil drain hose and remove the cap.
3	Allow the oil to drain.
4	Cap the oil drain hose and stow it when not in use.
5	To add oil to the compressor, refer to: **"Adding the Compressor Oil" on page 79.**
6	Properly recycle or dispose of the oil per local regulations.

Draining the Oil Cooler

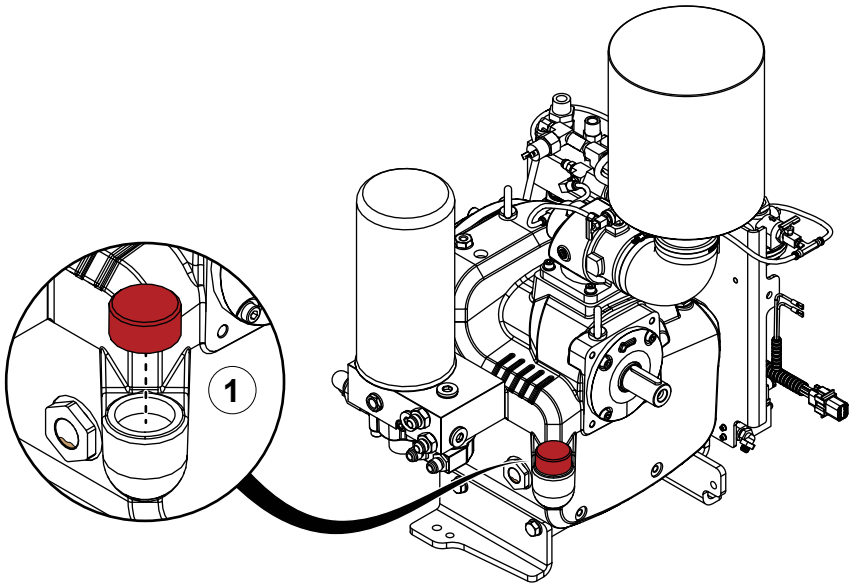


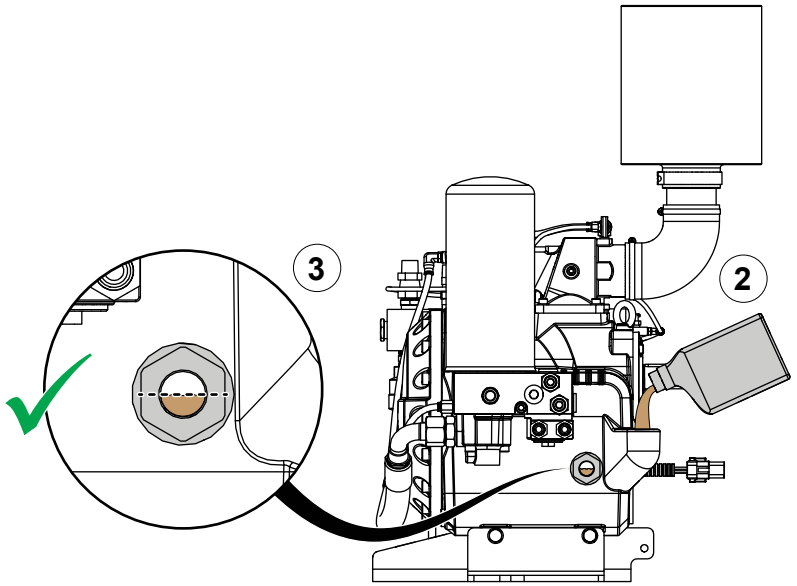
Use the illustration and instructions to drain the oil in the cooler.

Pressure: *May cause personal injury. Purge the pressure from the system before draining the oil.*

1. Place a suitable container under the cooler to collect the drained oil.
2. Select the best port for your application, then remove the drain plug.
3. Allow the oil to drain.
4. Install the drain plug.
5. Properly recycle or dispose of the oil per local regulations.

Adding the Compressor Oil





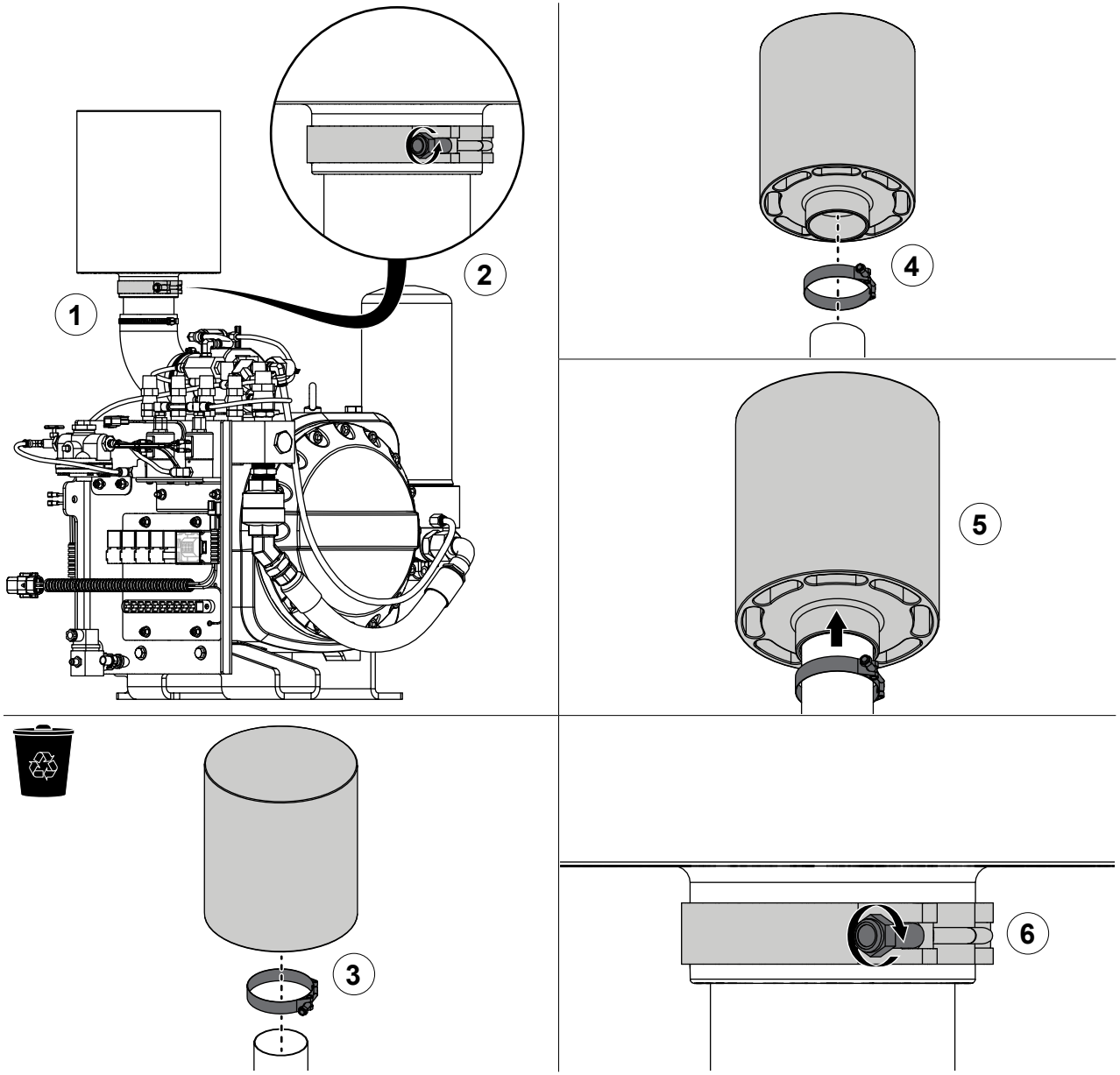
Use the illustrations and instructions to add oil to the sump. Use ISO 68 low-foaming or anti-foam hydraulic oil.

Pressure: *May cause personal injury. Purge the pressure from the system before adding the oil.*

1. When all pressure has been purged from the system, remove the oil fill cap.
2. Add oil to the compressor, then run the compressor for 10 seconds to circulate the oil through the system.

   Note: *After pouring some oil into the compressor, allow it to settle before adding more to avoid over-filling.*
3. Add oil until it reaches halfway up the sight glass.
4. Install the oil fill cap.

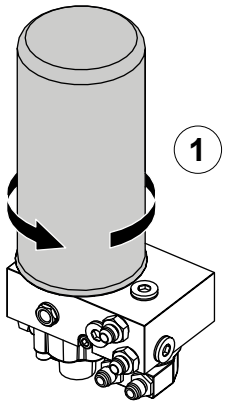
Changing the Air Filter

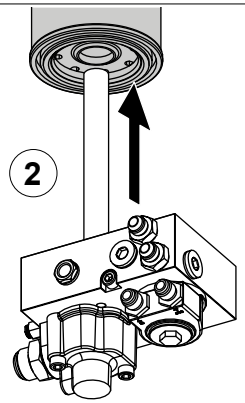


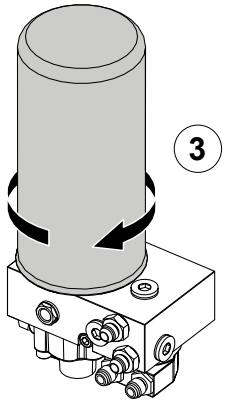
Use the illustrations and instructions to change the air filter.

1. Locate the T-bolt clamp that secures the air filter to the air tube.
2. Loosen the T-bolt clamp.
3. Remove and discard the air filter.
4. Position the new air filter over the air tube.
5. Install the air filter onto the tube, then position the T-bolt clamp over the air filter.
6. Tighten the T-bolt clamp to secure the air filter to the air tube.

Changing the Separator Filter





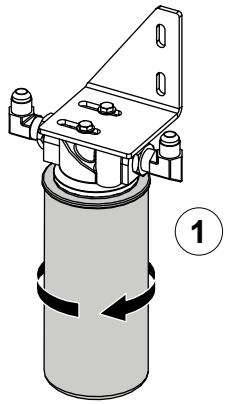


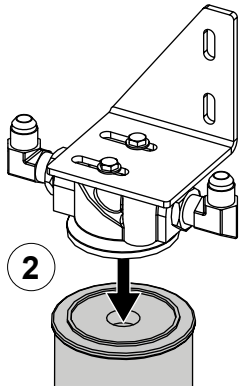
Use the illustrations and instructions to change the separator filter.

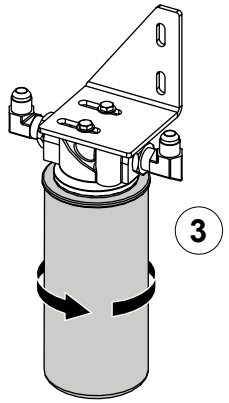
Pressure: *May cause personal injury. Purge the pressure from the system before changing the separator filter.*

1. Remove the separator filter from the air/oil diverter.
2. Discard the filter.
3. Install the replacement filter onto the air/oil diverter.

Changing the Oil Filter





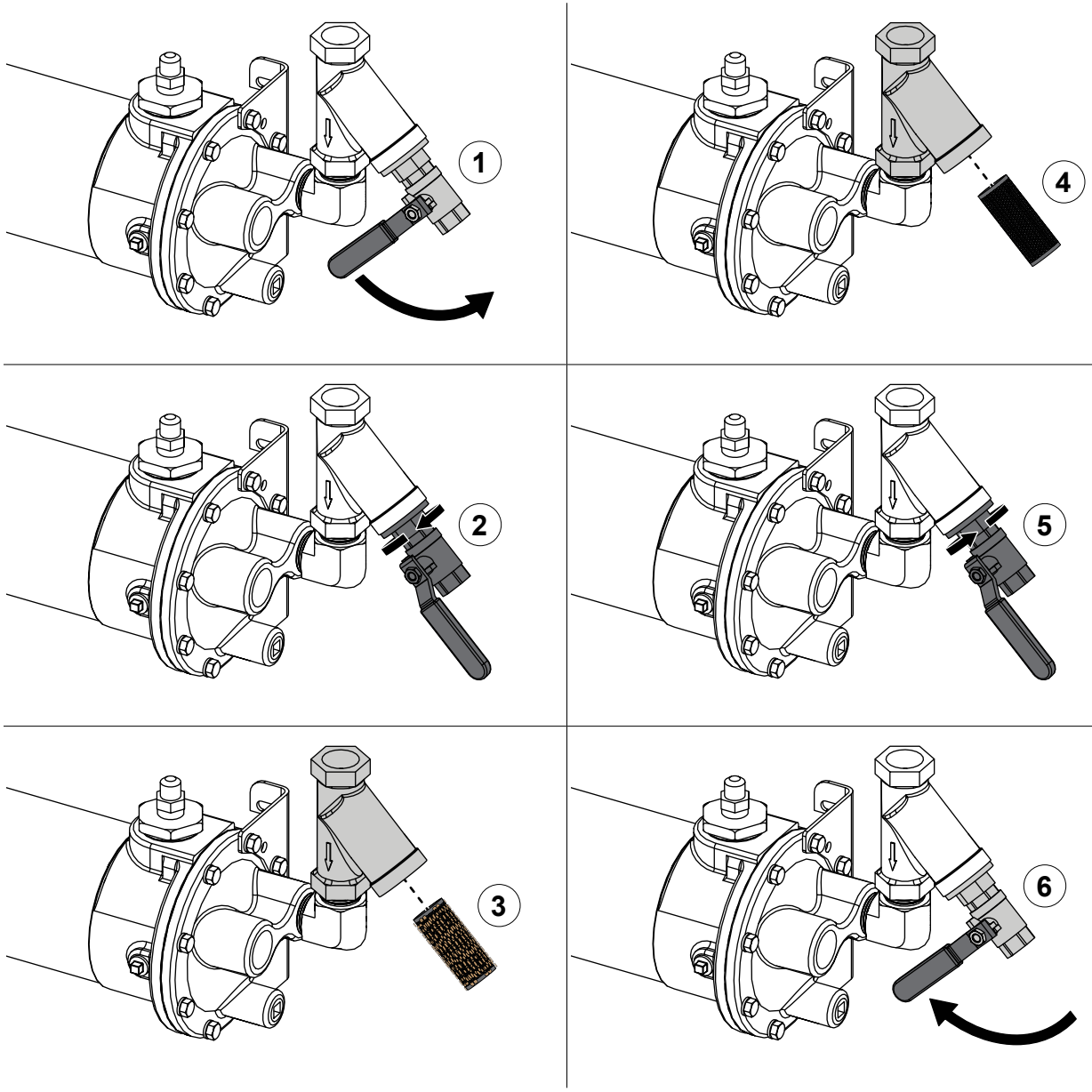


Use the illustrations and instructions to change the oil filter.

Pressure: *May cause personal injury. Purge the pressure from the system before changing the oil filter.*

1. Remove the filter from the assembly.
2. Discard the filter.
3. Install the replacement filter onto the assembly.

Cleaning the Wye Strainer



Use the illustrations and instructions to clean the wye strainer.

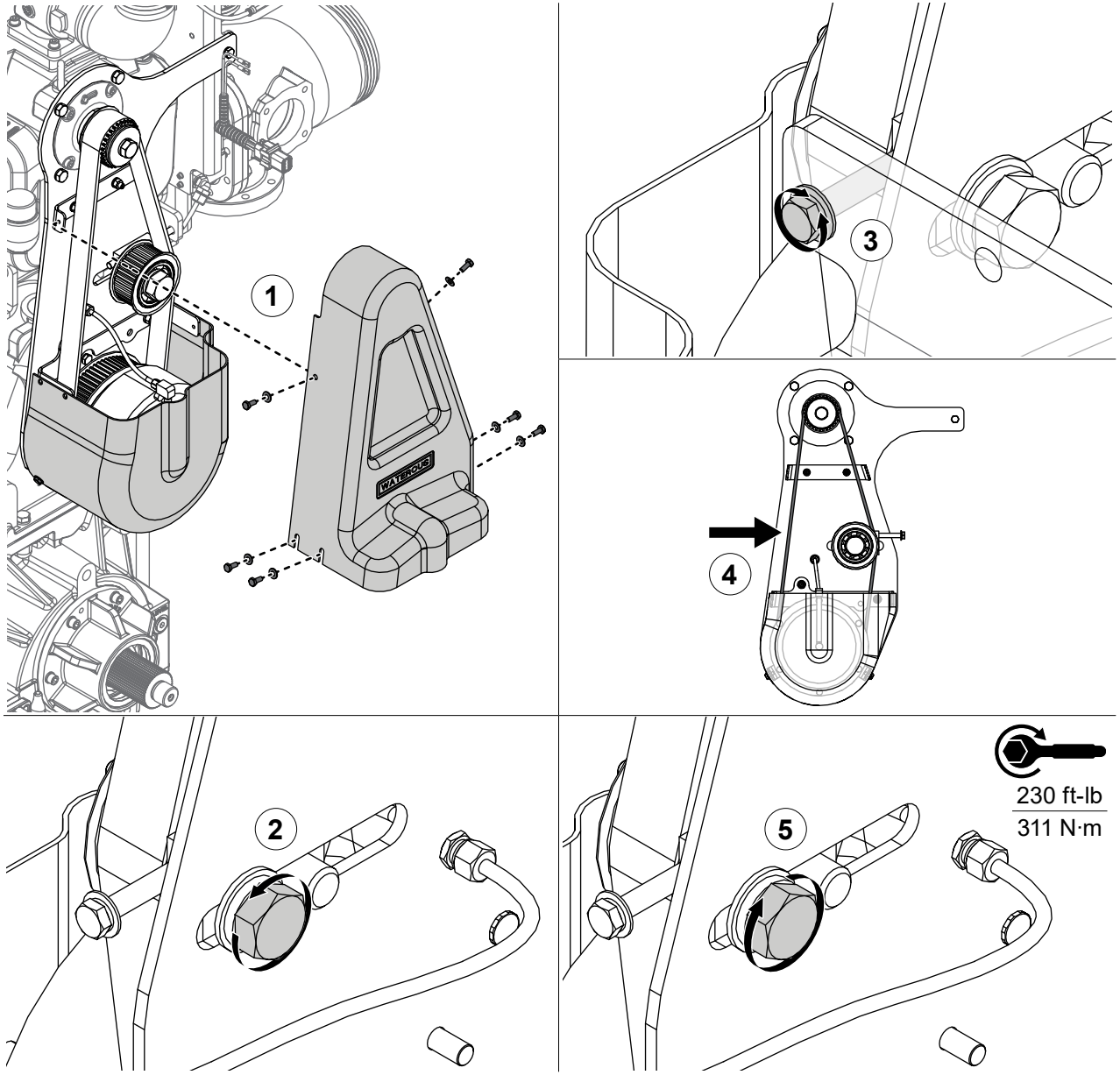
Pressure: *May cause personal injury. Purge the pressure from the system before changing the wye strainer.*

1. Open the clean-out valve and allow the system drain.
2. Remove the clean-out valve and adapting components.

   Note: *Replace any worn or deteriorated washers or O-rings.*
3. Remove the strainer from the assembly, then clean or replace it.
4. Install the strainer into the wye fitting.

   Note: *Operating the cooler without the strainer allows debris from the water supply to damage the system.*
5. Install the clean-out valve into the wye fitting.
6. Close the clean-out valve.

Adjusting the Belt Tension



Use the illustrations and instructions to adjust the air clutch belt tension. Adjustment is only needed if the belt is loosened or removed to service other system components.

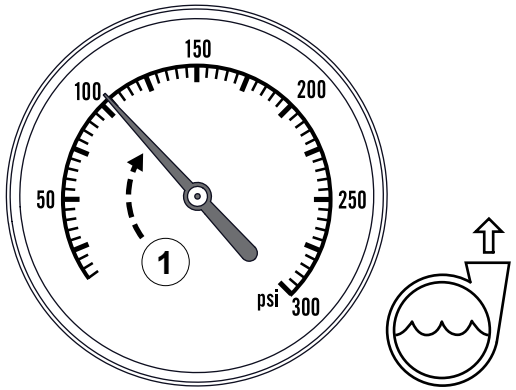
Note: *Certain components have been removed from the illustrations to provide a clear view of the equipment.*

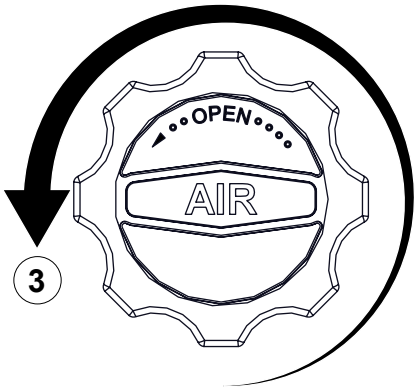
Moving parts: *May cause personal injury or death. when equipment is operating.*

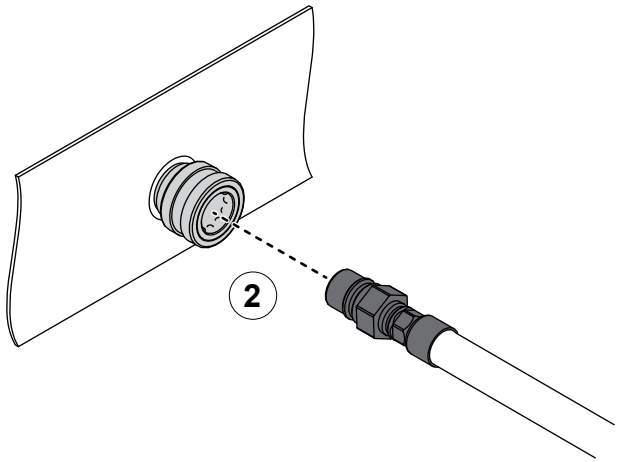
1. Remove the top half of the belt guard.
2. Loosen the screw on the back of the idler plate.
3. Turn the adjustment screw clockwise to increase the belt tension or counterclockwise to decrease the belt tension.
4. Set the belt tension to allow for 1/4 to 5/16 inch deflection when 10 to 12 lbf are applied to the longest span.

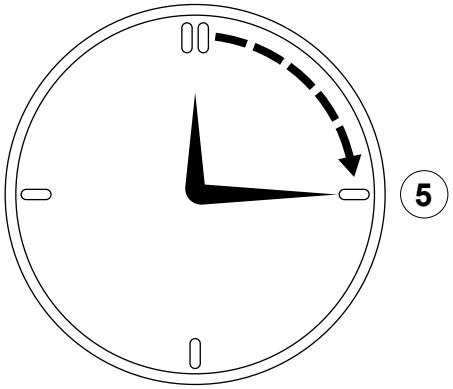
   Note: *Do not over-tighten the belt. Extremely high tension can reduce belt life and damage other drive components.*
5. Tighten the idler plate screw to hold the adjustment block in position.
6. Install the top half of the belt guard.

Performing the Weekly Compressor Maintenance









Use the illustrations and instructions to perform the weekly compressor maintenance. Operating the compressor in fixed mode with the air discharge open lubricates and exercises the system.

Note: *In humid environments, steam can form and escape during this procedure.*

When performing this procedure:

- Always start the system in auto or unload mode.
- Always circulate enough cool water to regulate the compressor oil temperature during operation
- Never operate the system with the compressor oil temperature above 250°F (121°C).

1	Engage the water pump, then make sure that the pressure is rising.
2	Connect a hose to the auxiliary air outlet.
3	Open the auxiliary air outlet.
4	Engage the compressor, then toggle the auto-sync switch to the *FIXED* position.
5	Operate the system for 15 minutes.
6	After completing the procedure, shut down the system. Refer to: **"Shutting Down the System" on page 74.**

Troubleshooting Guide

Symptom	Possible Cause	Solution
The compressor is working, but no air is supplied to the discharges.	The auto-sync switch is not in the correct position.	• Make sure that the air pressure produced in unload mode is between 25 to 40 psi. • Make sure that the air pressure produced in auto mode is 50 psi or more and changes with water pressure. • Make sure that the air pressure produced in fixed mode is between 145 to 150 psi.
	The air discharge solenoid is not working.	Verify that the air discharge solenoid has power and is operational—repair or replace the solenoid.
	There is a leak in the air solenoid or in the tubing between the solenoid and discharge.	Repair or replace the leaking components.
	The air check valve is defective or mounted backwards.	Replace the air check valve or mount it correctly.
	The trim valve is out of adjustment.	Adjust the trim valve.
	The air lines were plumbed prior to the discharge valve seal.	Relocate air lines to the discharge side of discharge valve.
	The compressor speed (rpm) is too low.	Increase the compressor speed (rpm).
The air supply is insufficient.	The air lines are the wrong size.	Replace the lines with the correct size.
	The throttle valve is closed (if the system uses a throttle valve to control air flow).	Make sure that the throttle valve is open and properly adjusted.
The system is functional, but the pressure gauge is not indicating the correct pressure.	• The gauge is malfunctioning. • The air line has detached or is leaking. • The air line is restricted.	• Check the components for air leaks. • Reattach, repair, or replace the malfunctioning components. • Make sure that the air line is not kinked or obstructed—clear any obstructions.
Air pressure is produced in fixed mode, but no pressure is produced in auto mode.	• The balance valve is malfunctioning. • Water is not being supplied to the balance valve.	• Make sure that the balance valve tubing is installed properly. • Make sure that the balance valve tubing is not leaking, kinked, or obstructed—clear any obstructions.
	The balance trim valve is closed.	Make sure that the trim valve is open and properly adjusted.
Air pressure is produced in auto mode, but it remains at the fixed pressure.	The balance valve is malfunctioning.	• Make sure that the balance valve tubing is installed properly. • Make sure that the balance valve tubing is not leaking, kinked, or obstructed—clear any obstructions.
	The balance trim valve is closed.	• Make sure that the trim valve is open and properly adjusted. • If the trim valve is already open, make sure that it is not obstructed—clear any obstructions.
The air discharge pressure is too high.	The red auto-sync tube has detached or is leaking.	Reattach, repair, or replace the tubing.
	The trim valve is out of adjustment—the air inlet trim valve is too far open, the balance trim valve is closed.	Adjust the trim valve.
	The PMC valve is out of adjustment.	Adjust the system to approximately 150 psi in fixed mode.

Symptom	Possible Cause	Solution
The system is overheating (water cooling).	Water is not flowing through the cooler.	• Make sure that water is flowing through the pump. • Make sure that the lines are not kinked or obstructed—clear any obstructions.
The system is overheating with adequate flow to the cooler (liquid shell/tube cooling).	The compressor oil level is too low.	• Add the appropriate amount of oil—the proper oil level is halfway up the sight window when the apparatus is on level ground. • Make sure that the lines are not kinked or obstructed—clear any obstructions. • Replace the oil filter.
	The temperature sending unit and/or temperature gauge is malfunctioning.	• Check the wire connections at the sending unit. • Make sure that the wiring is not damaged or corroded—repair or replace any damaged or corroded wiring. • Make sure that the components are not malfunctioning or corroded—repair or replace worn or corroded components.
	The water being recirculated through the system has become saturated with heat.	Introduce cool water to the tank or stop operation until the system is no longer overheating.
	The cooler is partially restricted.	Check the cooler for debris—clear any debris hindering the flow and determine where debris entered the cooler.
	The wye strainer or panel strainer is plugged with debris.	Clean the wye strainer or panel strainer.
	There is a hole in the wye strainer.	Replace the wye strainer.
	There is a buildup of material in the cooling tubes.	Clean the cooler as needed and clear any obstructions in the tubing.
The oil consumption is high.	The compressor oil level is too high.	Remove the appropriate amount of oil—the proper oil level is halfway up the sight window when the apparatus is on level ground.
	The compressor oil is not suitable for your system.	Switch to low- or non-foaming compressor oil.
	The separator filter is damaged.	Replace the separator filter.
	There is water in the separator filter.	Remove the water or replace the separator filter.
	An incompatible separator filter is being used.	Replace the separator filter with another separator filter from the factory-recommended brand.
	Air flow exceeds the system's cfm.	• Check the maximum cfm of the system and test again. • Lower the engine speed and flow CAFS to relieve pressure. • Replace the separator filter.
	There is an oil leak in the system.	Repair or replace the leaking components.

Symptom	Possible Cause	Solution
The engine stalls when the compressor is engaged.	The compressor was engaged while under load.	Allow the air (pressure) in the compressor to bleed off before engaging the compressor.
	The compressor is flooded with oil.	Allow the air (pressure) in the compressor to bleed off, then start the compressor and flow air.
	The engine horsepower was underrated.	Increase the engine speed (rpm) before engaging the compressor—do not engage the compressor when the engine speed is over 1,000 rpm.
	The auto-sync system is in fixed mode.	Engage the compressor in auto or unload mode, then switch to fixed mode.
	The compressor oil level is too low.	Add the appropriate amount of oil—the proper oil level is halfway up the sight window when the apparatus is on level ground.
	The compressor oil level is too high.	Remove the appropriate amount of oil—the proper oil level is halfway up the sight window when the apparatus is on level ground.
	The compressor is locked up.	Replace the compressor.
	There is a dome on the compressor discharge hose.	Reroute the hose per the requirements of your application.
The compressor is locked up.	The oil level is too high and the compressor is flooded.	Remove the appropriate amount of oil—the proper oil level is halfway up the sight window when the apparatus is on level ground.
	There was a sump fire.	Check the system and repair the damaged components. Contact Waterous for more information.
	The oil level is low or there is no oil.	• Add the appropriate amount of oil—the proper oil level is halfway up the sight window when the apparatus is on level ground. • Check the system and repair the damaged components. Contact Waterous for more information.
The air pressure is appropriate but the system produces poor quality foam.	The foam system has not been calibrated or is out of calibration.	Make sure that the foam system has been calibrated—recalibrate the system.
	You are using a wetting agent, not foam concentrate.	Use foam concentrate rated for CAFS.
	The foam proportioning control is too low.	Increase the amount of concentrate to the manufacturer's recommended percentage.
	The air supply is restricted.	Make sure that the lines are not kinked or obstructed—remove any obstructions.
	The air/water volume was not adjusted properly.	Adjust the air/water volume to achieve the proper mixture for foam.
	The air/water pressure is not balanced.	Adjust the trim valve.
	The foam proportioning control is too low or disabled, or the foam tank is empty.	Make sure that the proportioner is turned on, the foam supply valve is open, the foam tank has concentrate, the wye strainer is clear, and the supply line is connected to the injector.

Symptom	Possible Cause	Solution
The foam pump is disabled and there is foam in the water system.	Foam concentrate was poured into the on-board water tank.	Flush the tank and pump with clean water, then refill.
	The foam manifold drain line is not isolated from the water drain lines.	Isolate to a separate drain valve.
	The cooler line is plumbed from the foam manifold.	Relocate the cooler line to the discharge side of the fire pump.
	The foam concentrate inject check valve is defective.	Repair or replace the check valve.
	There is a leak between the water and foam tanks.	Repair or replace the tanks.
	The dry vacuum test forces foam concentrate into the foam manifold.	Set the proportioner to flush during the test.
Water is in the compressor oil/air.	The air check valves are malfunctioning.	Repair or replace the check valves.
	Check valves were not installed on the discharges.	Install check valves on the discharges.
	Condensation has built up in the oil/air mixture.	Flow air once per week at a minimum, more often if operating in high humidity.
	The system was exposed to cold temperatures without the oil cooler being drained.	Test the oil cooler for internal leaks from the water side to the oil side—replace the cooler.
The safety pop-off valve is opening at a low pressure or opening repeatedly.	The auto-sync system is out of balance.	Adjust the auto-sync system—make sure to not open the compressor trim valve more than 3 turns.
	A sump fire damaged the pop-off valve.	Check the system for other damaged components, then replace the pop-off valve.
	The trim valve or inlet is completely open.	Adjust the trim valve.
	The red tube circuit has detached or is leaking.	Reattach, repair, or replace the red tubing.
	The black tube circuit is restricted.	Make sure that the black tubing is not kinked or obstructed—clear any obstructions.
	Operating in high humidity has trapped water vapor in the compressor oil.	Operating the system at the boiling point of water allows the water vapor to escape as steam.
The bleed-down time seems too long during system operation.	The bleed-down time varies between systems.	If the auto-sync system is working properly and the compressor output is within spec, the bleed-down time is normal.
	The trim valve or inlet is too far closed.	Adjust the trim valve.
	The air inlet trim valve is restricted.	Clear any debris hindering the trim valve operation.

Symptom	Possible Cause	Solution
The bleed-down time seems too long during system shutdown.	The bleed-down time varies between systems.	If the auto-sync system is working properly and the compressor output is within spec, the bleed-down time is normal.
	There is a plugged restrictor jet at the air inlet trim valve tee.	Remove and discard the restrictor jet at the tee fitting.
	The green/gray air-brake tube is restricted.	Make sure that the green/gray tubing is not kinked or obstructed—clear any obstructions.
	The shuttle valve is stuck.	Disassemble and clean the shuttle valve, then install it back into the PMC. ***Note:*** *Because it is easy to reverse the shuttle valve connections, make sure to note how the shuttle valve is connected during disassembly.*
The air clutch is smoking.	The auto-sync system is engaged in the wrong mode.	Engage the system in auto or unload mode.
	The clutch solenoid has an air leak.	Repair the air leak or replace the solenoid.
	The clutch disc is contaminated.	Clean or replace the clutch disc.
	The clutch is engaged at a high engine speed.	Only engage the clutch at a lower engine speed.
	The clutch is engaging the system when the compressor has not had adequate bleed-down time.	Allow the air (pressure) in the compressor to bleed off before engaging the compressor.
	The air supply for the clutch does not have an isolated air line.	Plumb an air line exclusively for clutch operation.
The discharge hose is shaking (slug flow).	The foam proportioner is on, the setting is correct, and the tank has concentrate, but it is not providing foam solution.	Refer to foam proportioner instructions for detailed calibration and troubleshooting instructions.
	Foam concentrate is not being injected into the foam manifold.	Make sure that the foam system is turned on.
	The discharge has low water flow and the foam concentrate is not being injected into the foam manifold.	• Increase water flow. • Raise the foam percentage. • Make sure that the flow meter is the correct size. • Make sure that the foam system has been calibrated—recalibrate the system.
	Poor quality foam concentrate is being used.	• Make sure that the foam system is calibrated correctly. • Raise the foam percentage until slug flow stops.
	The wye strainer is plugged with debris.	Clean the foam tank and wye strainer, then open the foam concentrate shut-off valve.
	The foam concentrate shut-off valve is closed.	Open the shut-off valve.
	The foam concentrate inject check valve is in the bypass position.	Move the check valve to the inject position.

Symptom	Possible Cause	Solution
The compressor is producing no air pressure.	The clutch is not engaging.	• Make sure that the clutch is operating properly—check air clutch systems for leaks. • Make sure that the *OK TO PUMP* LED is illuminated. • Check the wire connections at the clutch. • Make sure that the wiring is not damaged or corroded—repair or replace any damaged or corroded wiring.
	The auto-sync system is not engaged in fixed mode.	• Make sure that the air pressure produced in unload mode is between 25 to 40 psi. • Make sure that the air pressure produced in auto mode is 50 psi or more and changes with the water pressure. • Make sure that the pressure produced in fixed mode is between 145 to 150 psi.
The compressor is producing low air pressure.	The clutch is not engaging.	• Make sure that the clutch is operating properly—check air clutch systems for leaks. • Make sure that the *OK TO PUMP* LED is illuminated. • Check the wire connections at the clutch. • Make sure that the wiring is not damaged or corroded—repair or replace any damaged or corroded wiring.
	The auto-sync system is not engaged in fixed mode.	• Make sure that the air pressure produced in unload mode is between 25 to 40 psi. • Make sure that the air pressure produced in auto mode is 50 psi or more and changes with the water pressure. • Make sure that the pressure produced in fixed mode is between 145 to 150 psi.

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