WATEROUS

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AQUIS ULTRAFLOW—Discharge Line Assemblies and Valves

Installation and Operation

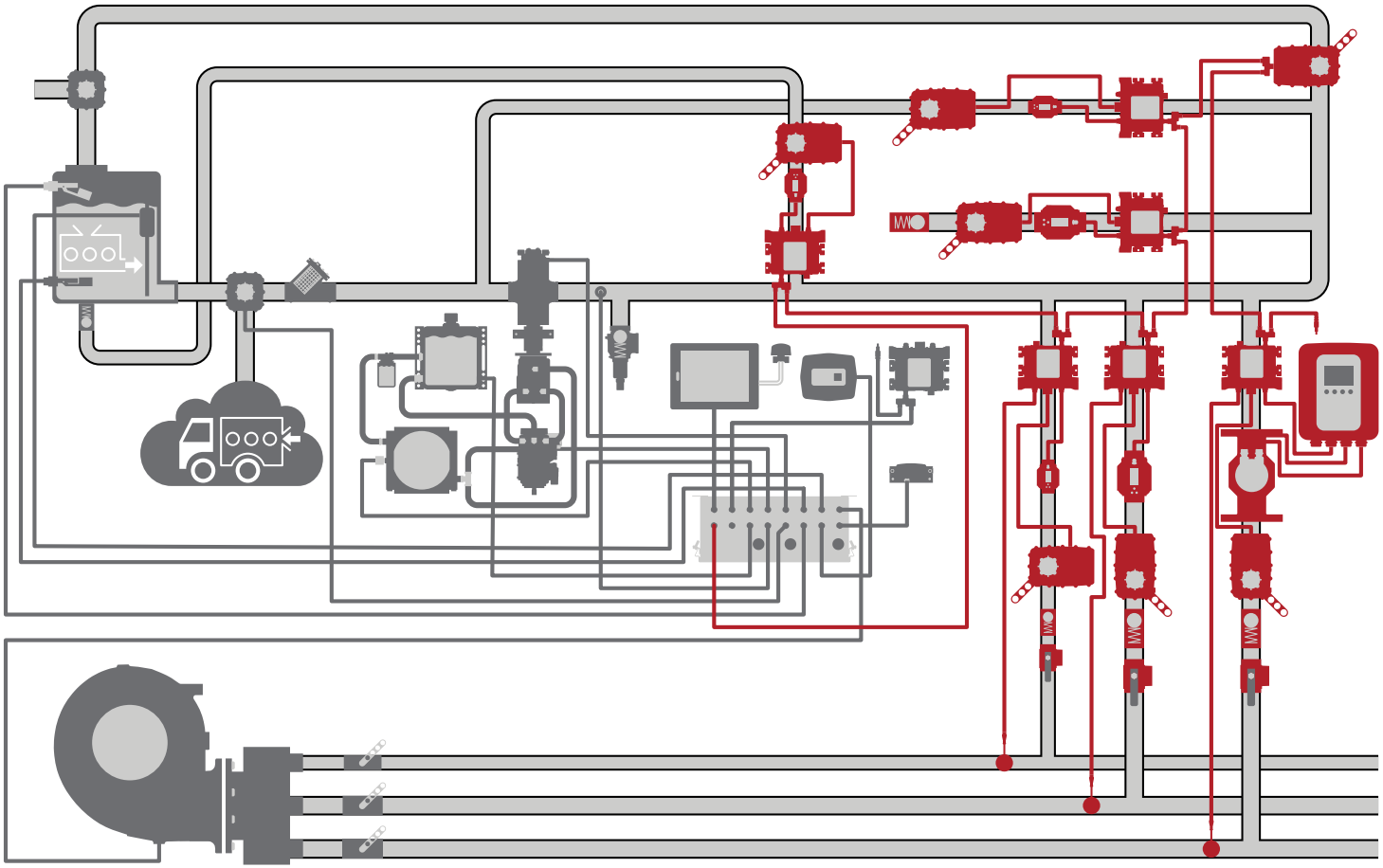

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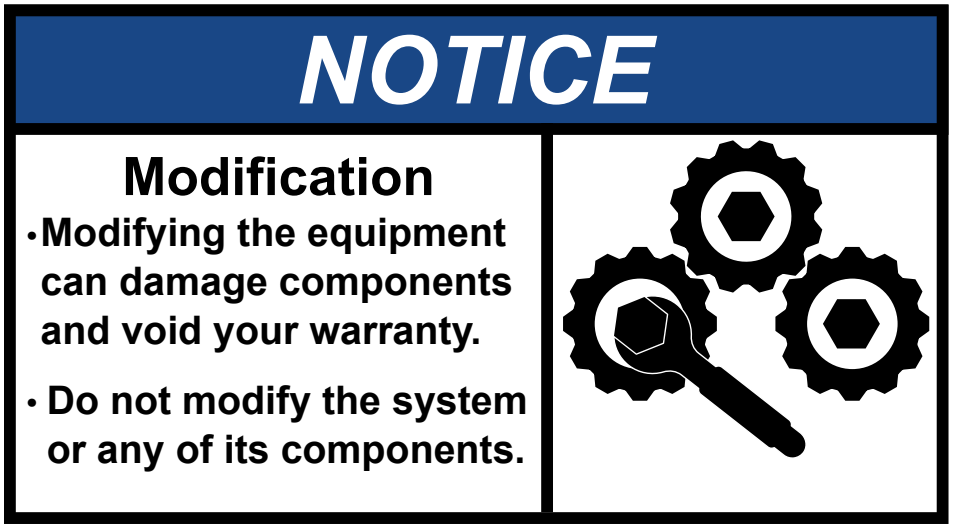
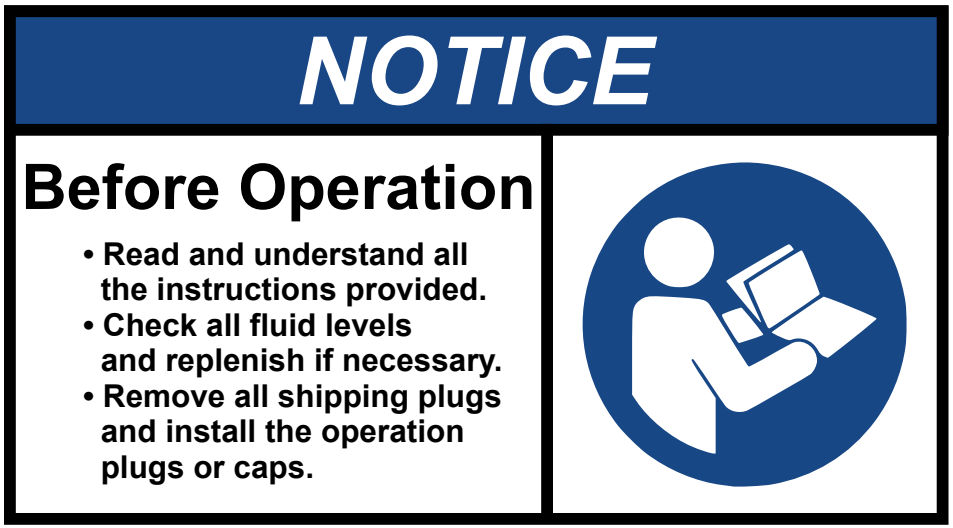
Table of Contents

Safety Precautions

- Read and understand all the associated documentation 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, operating, or maintaining the equipment.
- Do not install the equipment if you are not familiar with the tools and skills needed to safely perform the 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 and worn or deteriorated parts.



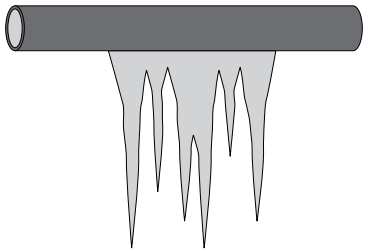


Safety Precautions

NOTICE

Freeze Damage

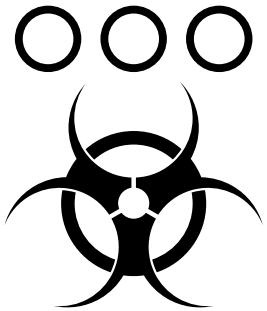
- Do not allow fluid in the lines to freeze.
- Remove all freezable fluid from the lines before storing the apparatus.



NOTICE

Concentrate Supply Contamination

- Priming with water can contaminate the on-board concentrate supply.
- Divert water to prevent concentrate contamination.



Use this document to install and operate your Waterous equipment. 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 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 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 installation and initial setup procedures.

OPERATION
This section describes the equipment operation.

MAINTENANCE
This section describes any required maintenance.

Using this Document

Use the guidelines below when viewing this document.

Viewing the Document Electronically

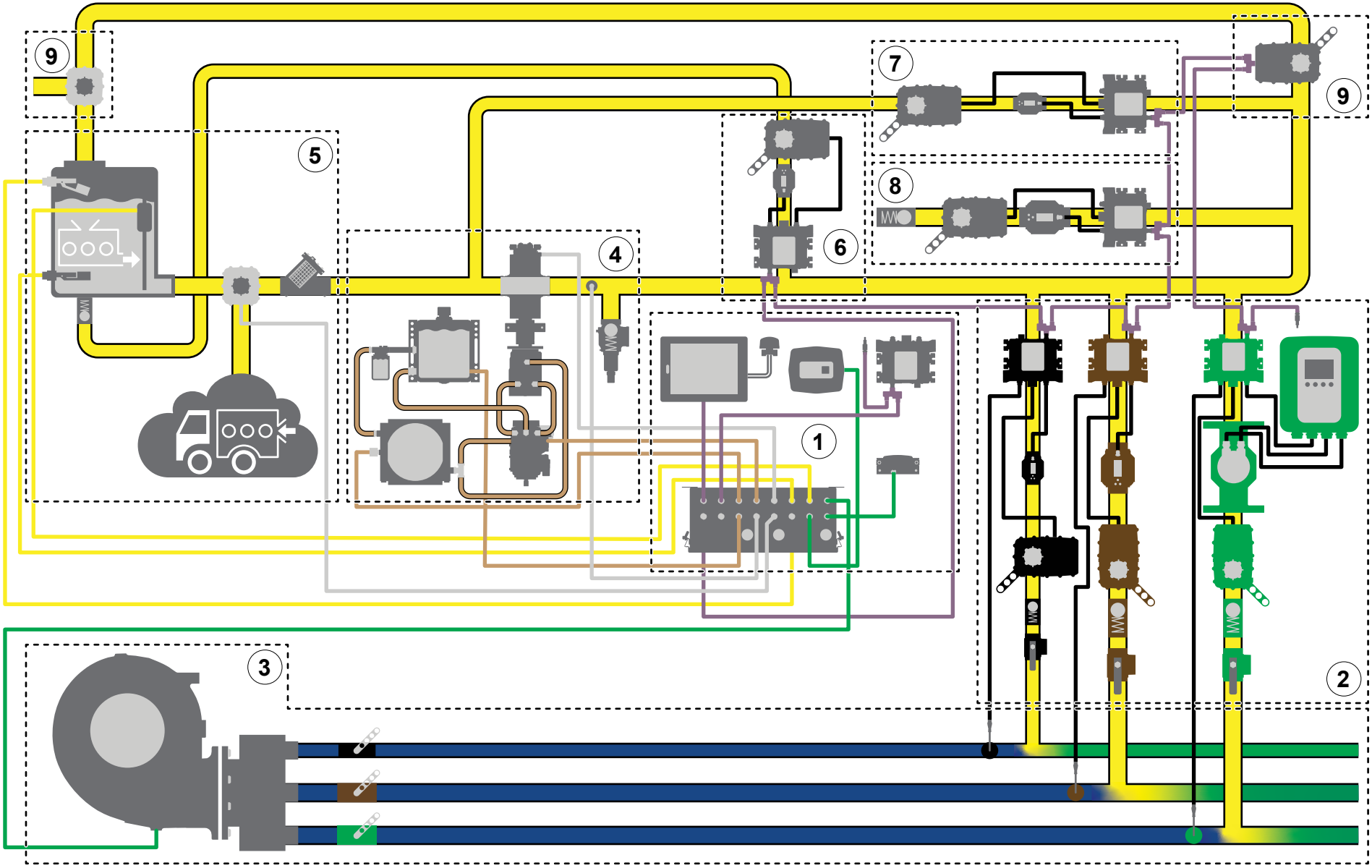
- View this document in landscape orientation.
- Use the table of contents to navigate directly to that section.
- Text **with this appearance** is linked to a reference.

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.

Notes

AQUIS ULTRAFLOW Industrial Foam Proportioner System



AQUIS ULTRAFLOW Industrial Foam Proportioner System

The AQUIS ULTRAFLOW industrial foam proportioner system supplies concentrate into a solution-capable discharge line. A Tellurus™ touchscreen display, or human machine interface (HMI), shows system activity, and provides control over the system using a CANbus protocol. Foam concentrate is sourced from an on-board supply tank or an auxiliary source. The concentrate pump distributes concentrate though the discharge line assembly (DLA) using hydraulic components, where it is measured, controlled, and introduced into the solution-capable discharge line to produce foam solution. Understand that your application will include all or portions of the components described.

	Subsystem	Description
1	Control system	This monitors and controls the foam proportioning system. The components in this subsystem include: • Tellurus display (HMI)—this displays system operation and provides control of the system. • Control box—this connects to various components in the system and contains the programmable logic controllers (PLC). • Manual override switch—this disables the automatic control of the concentrate control valves. • Power disconnect relay—this power relay enables and disables power to the DLA. • Remote I/O—this adds a node controller to the system for additional options required in your application. • Various cables—these provide communication and power to system components.
2	Discharge line assembly	This manages the concentrate injected into the solution-capable discharge. The system can control up to 19 DLAs. The components in this subsystem include: • Node controller—this connects to, and controls, the concentrate control valve, reads the flowmeters and the discharge pressure transducer. • Split CANbus cable—this connects the node controllers to one another and the control box. • DLA terminating resistor—this terminates the CANbus connection on the last node controller or valve in the CANbus chain. • Concentrate control valve—this controls the concentrate flow. • Magnetic flowmeter—this measures the concentrate flow. • Check valve—this prevents contamination of concentrate by preventing reverse fluid flow in the line. • Cal/Inject valve—this allows you to divert and collect water or concentrate when calibrating the your system.
3	Solution-capable discharge	This includes the installer-supplied water pump, distribution manifold, plumbing, and additional components that produce water flow. Additional components in this subsystem include: • Paddlewheel flowmeter—this measures the amount of water flowing in the discharge. ***Note:*** *You can install the paddlewheel flowmeter upstream or downstream of where the concentrate is injected into the waterway.* • Water pump pressure transducer—this measures the pressure at the pump discharge. ***Note:*** *Some applications prohibit measuring discharge pressure at the pump, in those applications alternative measurement methods are used.* • Solution discharge pressure transducer—this measures the pressure at the solution capable discharge.

AQUIS ULTRAFLOW Industrial Foam Proportioner System

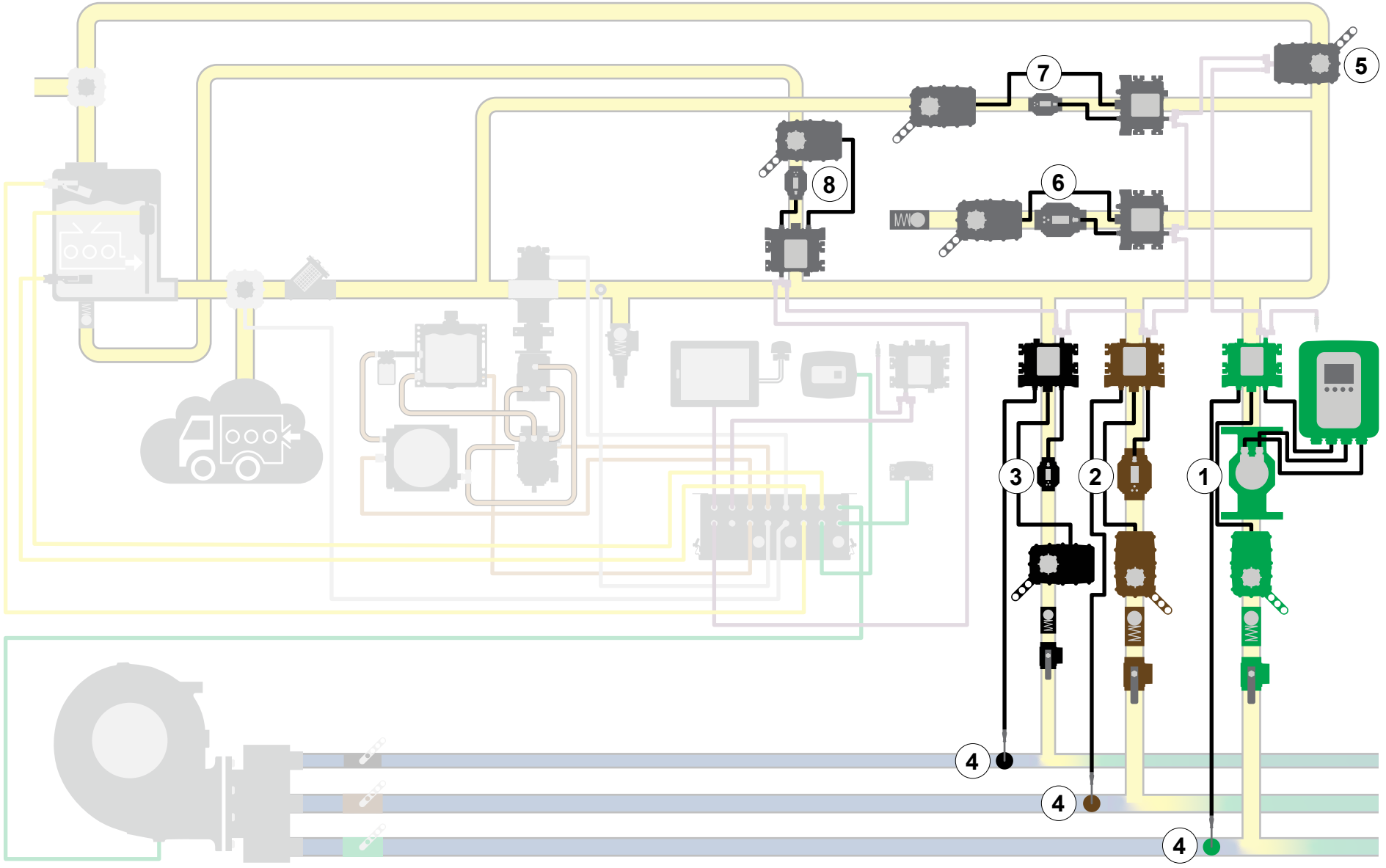
	Subsystem	Description
4	Concentrate pump	These components support, control, and power the concentrate pump. The components in this subsystem include: • Concentrate pump—this circulates the foam concentrate through the system. • Hydraulic motor—this drives the concentrate pump. • Hydraulic pump—this drives the hydraulic motor. • Hydraulic fluid reservoir—this contains the hydraulic fluid supply. • Hydraulic fluid filter—this filters the hydraulic fluid. • Hydraulic fluid heat exchanger—this cools the hydraulic fluid. • Hydraulic fluid temperature sensor—this measures the hydraulic fluid temperature. • Hydraulic fluid level sensor—this monitors the hydraulic fluid level in the reservoir. • Pressure transducer—this measures the pressure in the concentrate discharge line. • Pressure relief valve—this limits the pressure in the concentrate discharge manifold by opening when the pressure reaches a predetermined level.
5	Concentrate supply	This contains components that contain or supply foam concentrate for the system. The components in this subsystem include: • Concentrate supply tank—this contains the on-board foam concentrate supply. • Tank-full sensor—this indicates a tank full condition to the system. • Tank-low sensor—this indicates a tank low condition to the system. • Tank level sensor—this is an installer supplied sensor and display that indicates the supply level in the tank. • Concentrate pump intake select valve—this is an installer supplied, 2 position valve, and additional components that sources concentrate from an on-board tank or an auxiliary supply. A signal is provided to the system to ignore the on-board tank sensors when sourcing concentrate from an auxiliary supply. • Concentrate strainer—this collects debris that would otherwise flow through the system and could damage the concentrate pump.
6	Concentrate supply refill line	This allows you to fill the on-board tank from an external source. The components in this subsystem include: • Node controller—this connects to the fill valve and flowmeters. • Fill line control valve—this controls the flow of concentrate. • Magnetic flowmeter—this measures the flow of concentrate. • Split CANbus cable—this connects the node controllers to one another and the control box. • Check valve—this prevents reverse fluid flow in the line.

AQUIS ULTRAFLOW Industrial Foam Proportioner System

	Subsystem	Description
7	Low-flow bypass line	This returns a portion of the pumped concentrate in the supply line back to the pump inlet when the desired concentrate output requires the pump to operate at an RPM that is lower than possible by the pump. The components in this subsystem include: • Node controller—this connects to the low-flow control valve, flowmeters. • Low-flow valve—this controls the concentrate return flow. • Magnetic flowmeter—this measures the flow of concentrate. • Split CANbus cable—this connects the node controllers to one another.
8	Transfer line	This allows you to transfer or relay concentrate from the apparatus to another location. The components in this subsystem include: • Node controller—this connects to and controls the concentrate control valve, flowmeters. • Split CANbus cable—this connects the node controllers to one another and the control box. • Concentrate control valve—this controls the concentrate flow. • Magnetic flowmeter—this measures the concentrate flow. • Check valve—this prevents reverse fluid flow in the line.
9	Priming line	This evacuates air from the concentrate pump inlet as the system primes before operation. The components in this subsystem include: • Priming valve—this opens to allow air to evacuate the line before operation. • Split CANbus cable—this connects the node controllers to one another and the control box. • Prime bypass line—this is an installer-supplied valve that prevents contaminating the concentrate during training. When water is substituted for concentrate during training or testing, and you have concentrate in the supply tank, this bypass valve prevents water from contaminating the concentrate supply. ***Note:*** *You must drain any remaining water in the line before priming the system with concentrate to prevent contamination.*

Discharge Line Assemblies and Valves

A variety of DLAs are available for your application. Refer to the illustration and the table to learn how DLAs are integrated within a complete ULTRAFLOW system and their function.

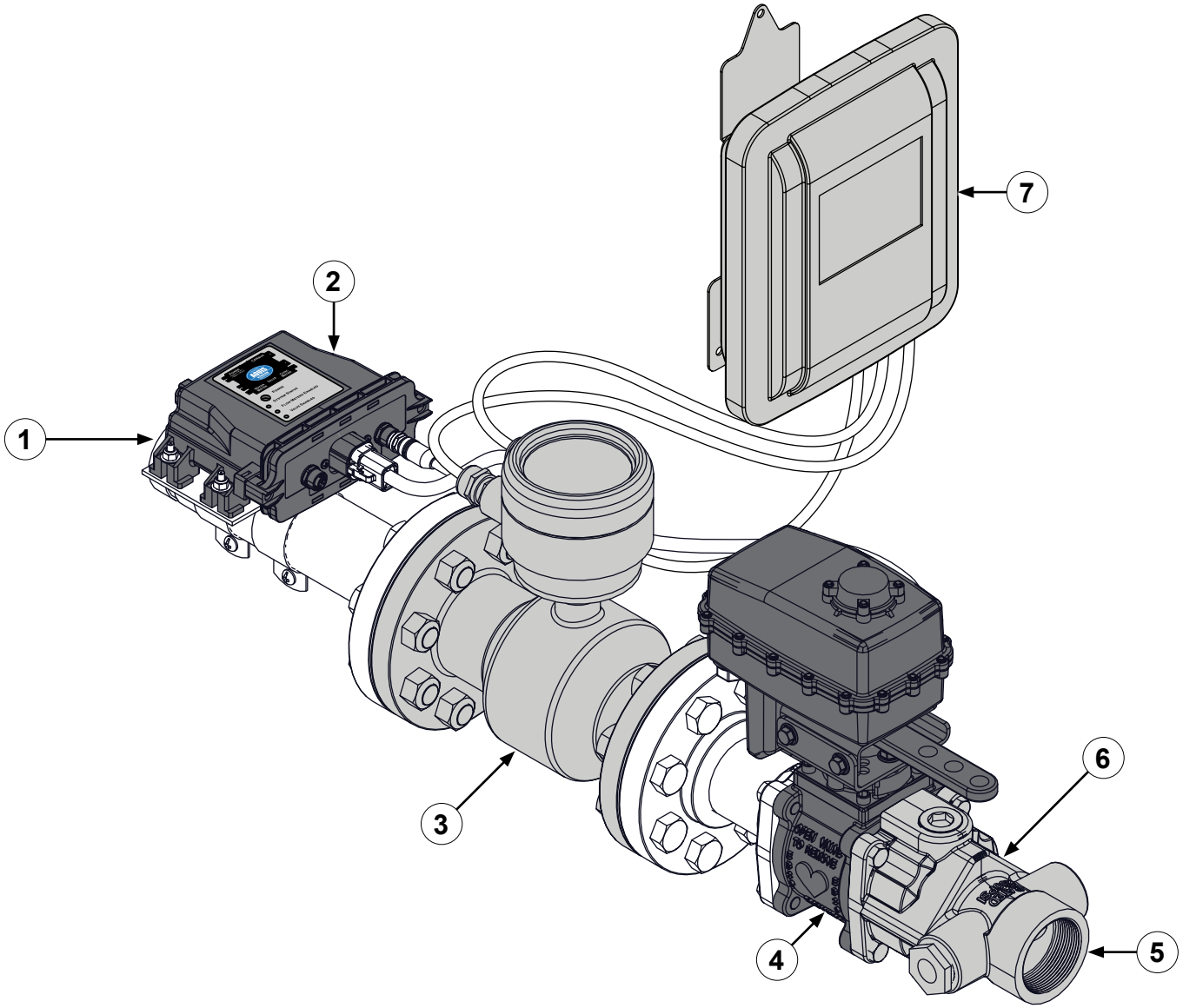


Discharge Line Assemblies and Valves

	Subsystem	Description
1	2-inch high-flow magnetic flowmeter DLA	This manages the concentrate injected into the solution-capable discharge and is capable of high-flow—373 gpm maximum flow rate.
2	2-inch magnetic flowmeter DLA	This manages the concentrate injected into the solution-capable discharge—238 gpm maximum flow rate.
3	1-inch magnetic flowmeter DLA	This manages the concentrate injected into the solution-capable discharge—26 gpm maximum flow rate.
4	Paddlewheel flowmeter	The paddlewheel flowmeter measures the flow in the solution-capable discharge.
5	Priming valve	This evacuates air from the concentrate pump inlet as the system primes before operation.
6	Transfer or relay DLA	This allows you to transfer or relay concentrate from the apparatus to another location.
7	Low-flow bypass line assembly	This returns a portion of the pumped concentrate in the supply line back to the pump inlet when the desired concentrate output requires the pump to operate at an RPM that is lower than possible by the pump. It is available in a 1-inch or 2-inch configuration. Choose the 1-inch low-flow bypass line assembly for concentrate pumps rated at less than 300 gpm, and the 2-inch low-flow bypass line assembly for concentrate pumps rated at more than 300 gpm.
8	Supply tank fill line	This allows you to fill the on-board tank from an auxiliary source.

2-Inch High-Flow DLA and Transmitter

The 2-inch high-flow DLA manages the concentrate injected into a solution-capable discharge.

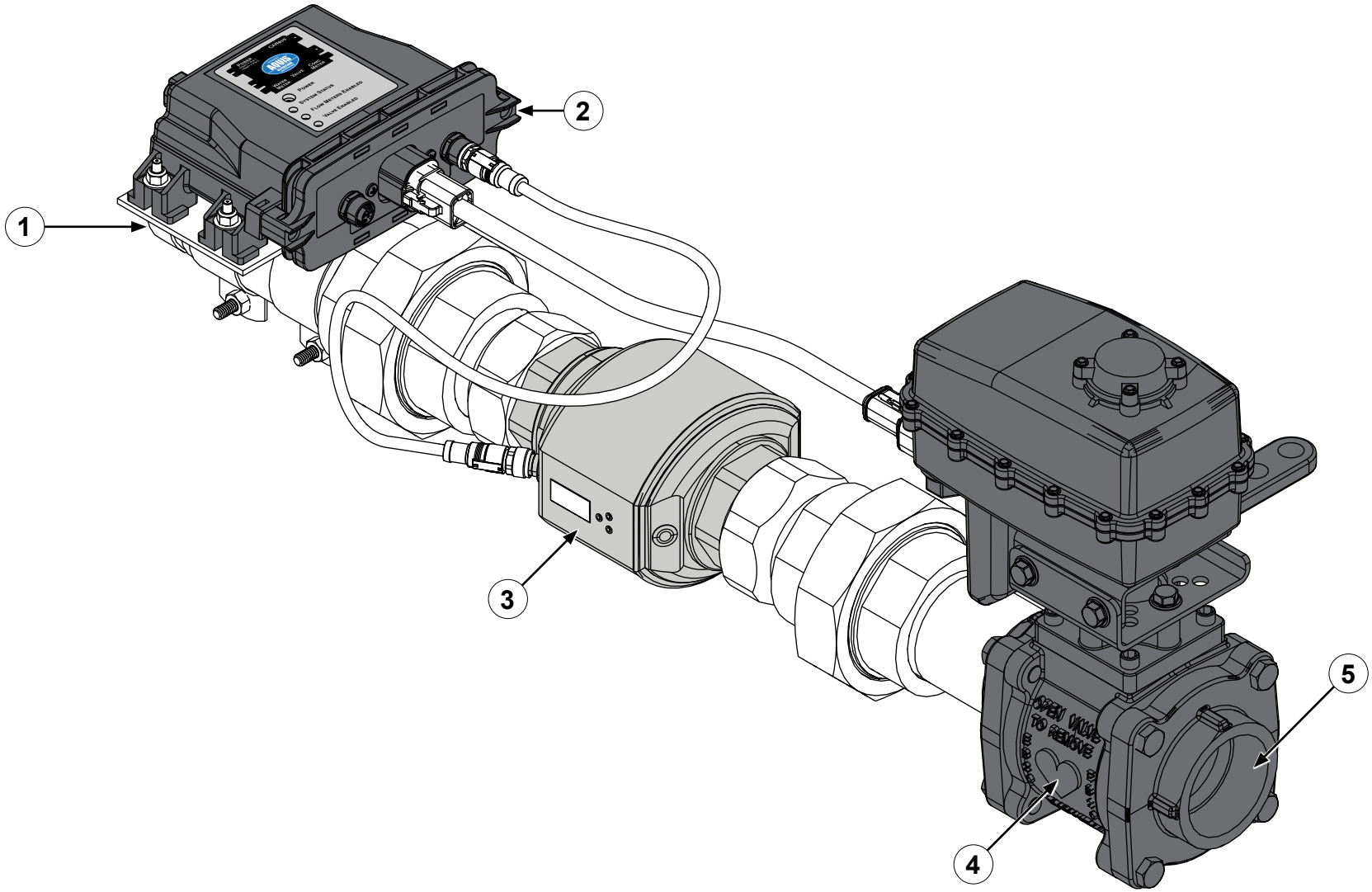


2-Inch High-Flow DLA and Transmitter

	Feature	Description
1	Concentrate inlet	This is where the concentrate enters the valve assembly—2-inch victaulic/2-inch NPT.
2	Node controller	This monitors and controls the valve assembly.
3	Magnetic flowmeter—high flow	This measures concentrate flow and sends the measurement to the transmitter—373 gpm maximum flow rate.
4	Electric valve	This controls the concentrate flow into the discharge line.
5	Concentrate outlet	This is where the concentrate exits the valve assembly—2-inch NPT.
6	Check valve	This prevents improper fluid flow in the line.
7	Transmitter	This processes the magnetic flowmeter measurement and sends it to the node controller.

2-Inch DLA Assembly

The DLA manages the concentrate injected into a solution-capable discharge.

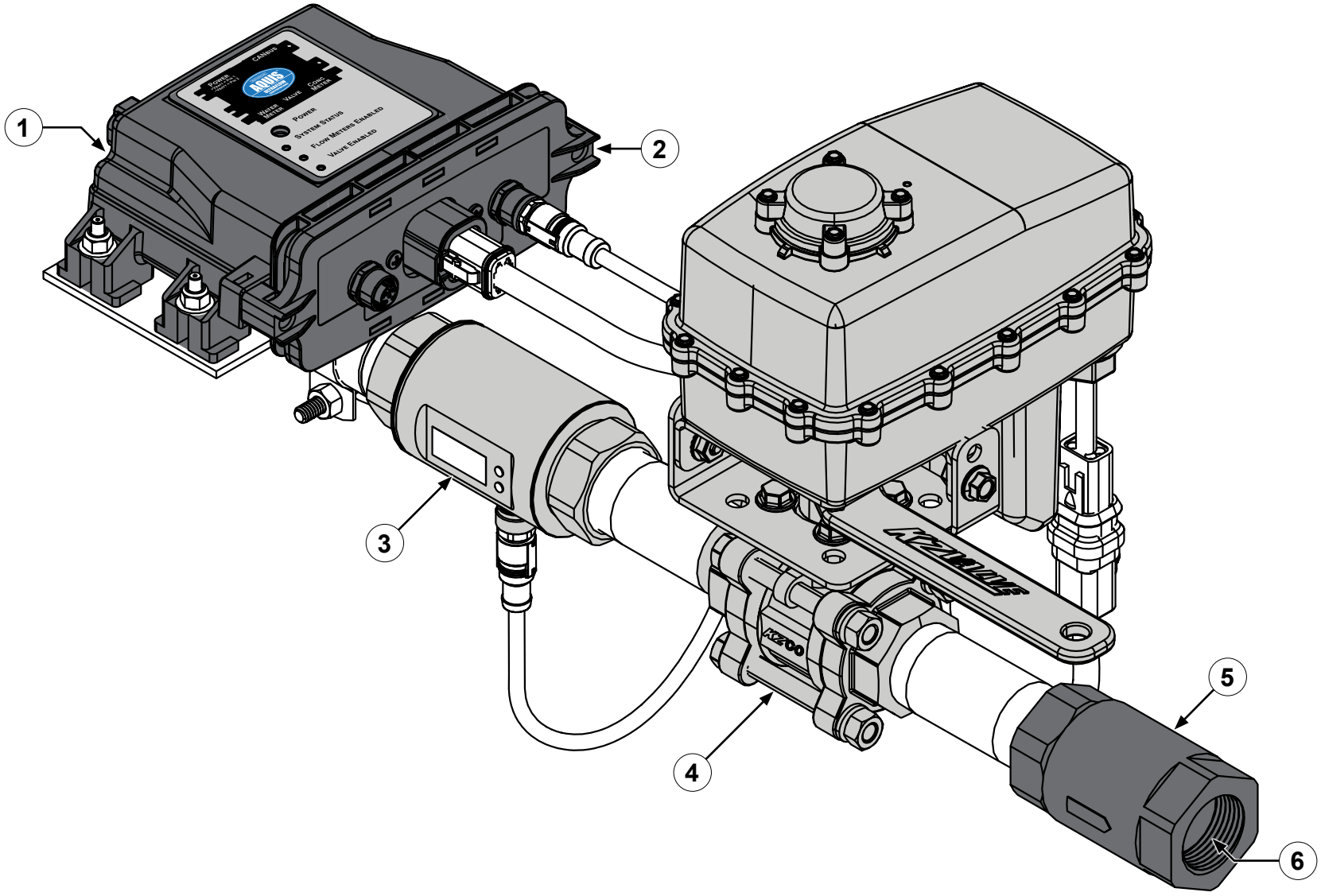


2-Inch DLA Assembly

	Feature	Description
1	Concentrate inlet	This is where the concentrate enters the valve assembly—2-inch victaulic.
2	Node controller	This monitors and controls the valve assembly.
3	Magnetic flowmeter—2-inch	This measures concentrate flow—238 gpm maximum flow rate.
4	Electric valve	This controls the concentrate flow into the discharge line.
5	Concentrate outlet	This is where the concentrate exits the valve assembly—2-inch NPT.

1-Inch DLA Assembly

The DLA manages the concentrate injected the solution-capable discharge.

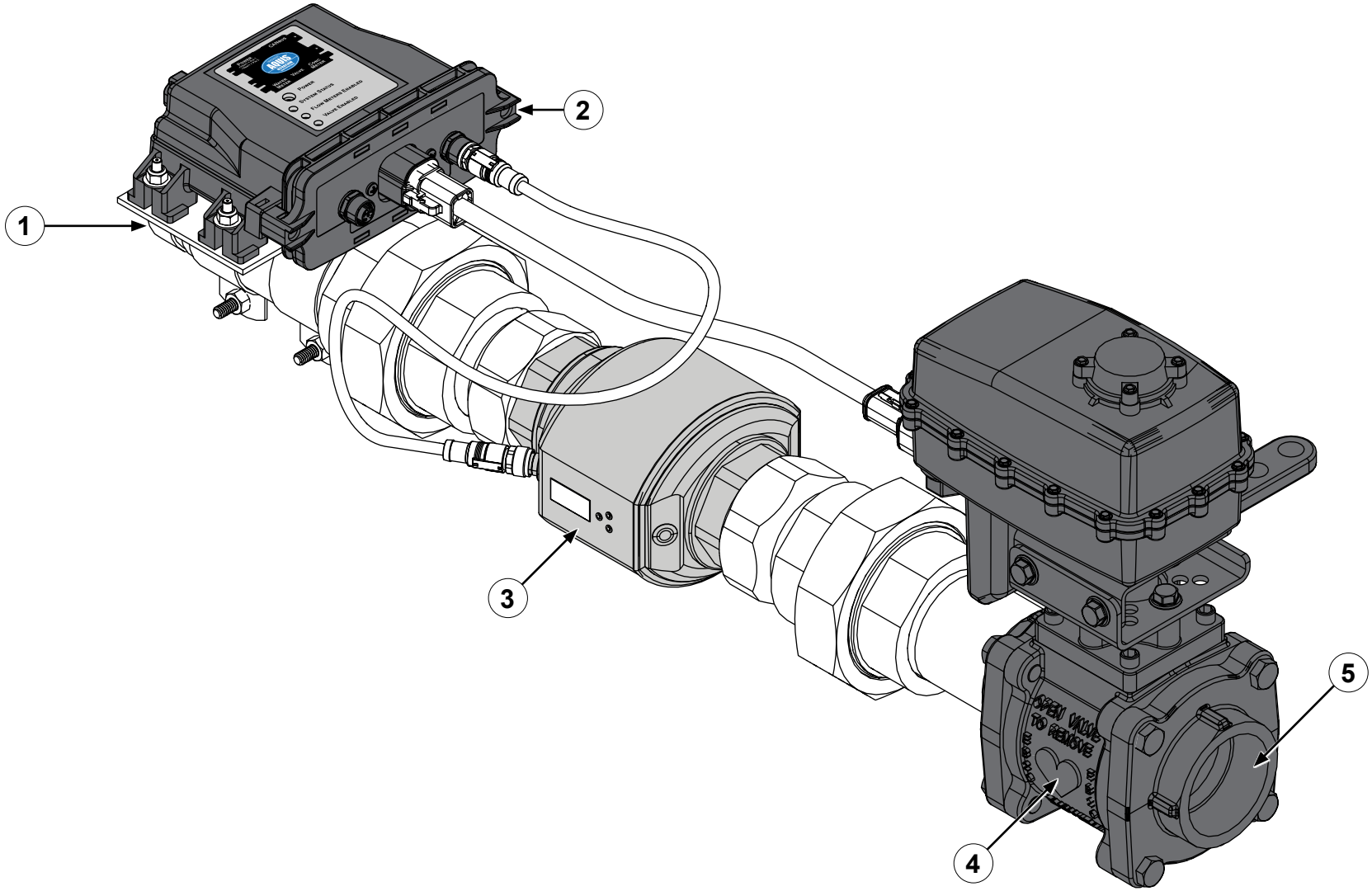


1-Inch DLA Assembly

	Feature	Description
1	Concentrate inlet	This is where the concentrate enters the valve assembly—1-inch victaulic.
2	Node controller	This monitors and controls the valve assembly.
3	Magnetic flowmeter—1-inch	This measures concentrate flow—26 gpm maximum flow rate.
4	Electric valve	This controls the concentrate flow into the discharge line.
5	Check valve	This prevents reverse fluid flow in the line.
6	Concentrate outlet	This is where the concentrate exits the valve assembly—1-inch NPT.

2-Inch Low-Flow Bypass Line Assembly

This returns a portion of the pumped concentrate in the supply line back to the pump inlet when the desired concentrate output requires the pump to operate at an RPM that is lower than possible by the pump.

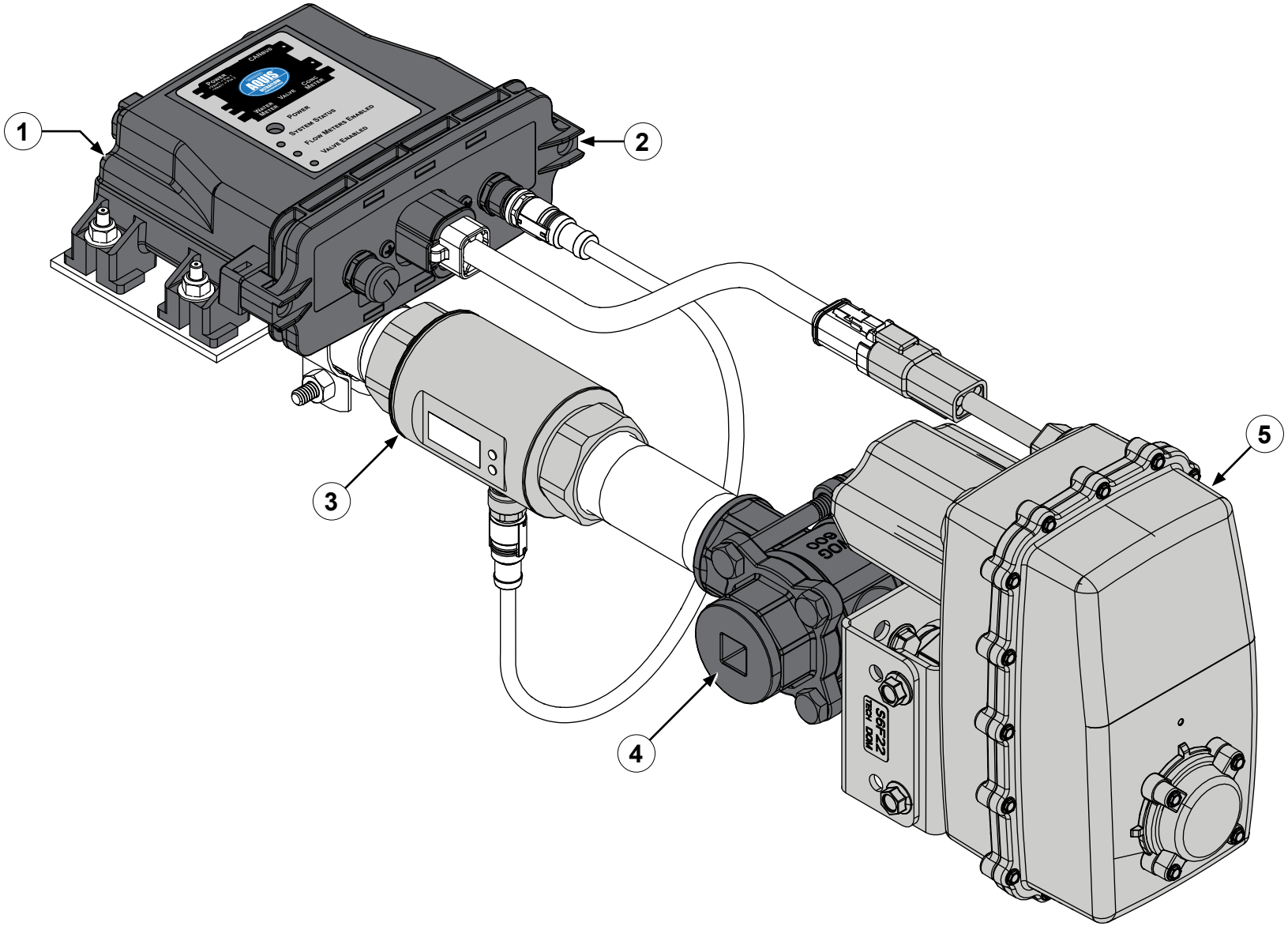


2-Inch Low-Flow Bypass Line Assembly

	Feature	Description
1	Concentrate inlet	This is where the concentrate enters the valve assembly—2-inch victaulic.
2	Node controller	This monitors and controls the valve assembly.
3	Magnetic flowmeter—2-inch	This measures concentrate flow—238 gpm maximum flow rate.
4	Electric valve	This controls the concentrate flow into the low-flow bypass line.
5	Concentrate outlet	This is where the concentrate exits the valve assembly—2-inch NPT.

1-Inch Low-Flow Bypass Line Assembly

This returns a portion of the pumped concentrate in the supply line back to the pump inlet when the desired concentrate output requires the pump to operate at an RPM that is lower than possible by the pump.

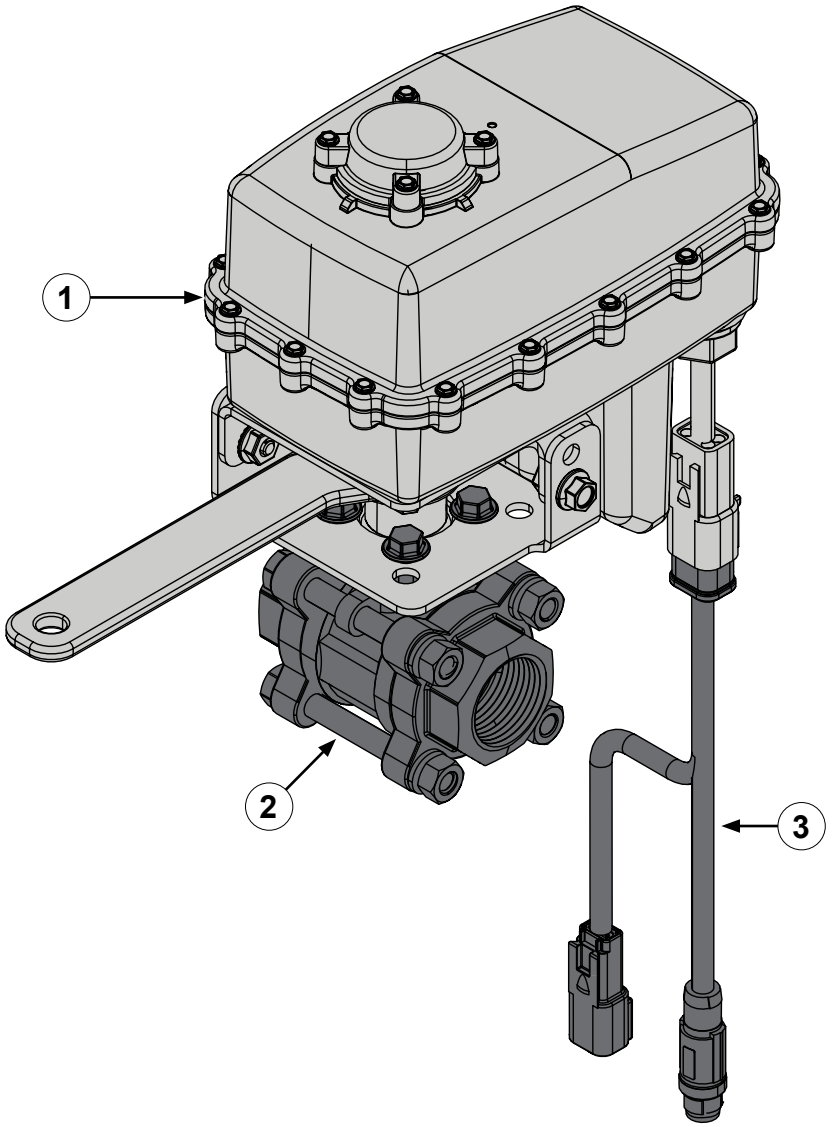


1-Inch Low-Flow Bypass Line Assembly

	Feature	Description
1	Concentrate inlet	This is where the concentrate enters the valve assembly—1-inch victaulic.
2	Node controller	This monitors and controls the valve assembly.
3	Magnetic flowmeter—1-inch	This measures concentrate flow—26 gpm maximum flow rate.
4	Valve	This opens and closes during low-flow operation—1-inch NPT.
5	Electric valve	This controls the concentrate flow into the low-flow bypass line.

Priming Valve Assembly

This evacuates air from the concentrate line as the system primes before operation.

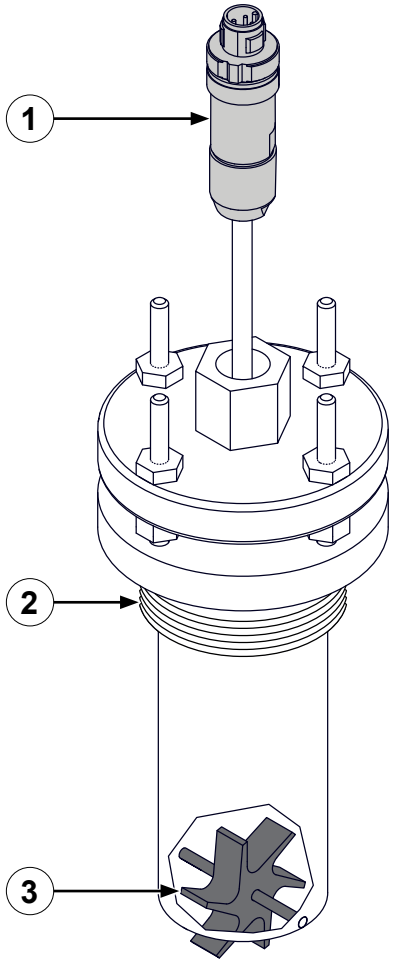


Priming Valve Assembly

	Feature	Description
1	Electric valve	This controls the concentrate valve.
2	Valve	This opens and closes during priming—1-inch NPT.
3	Cable	This connects to apparatus power and the CANbus system.

Paddlewheel Flowmeter

The paddlewheel flowmeter measures the flow in the solution-capable discharge. ***Note:*** *Accurate measurement is dependent on proper installation in the waterway. Refer to the OEM installation instructions for the paddlewheel to properly install it in your application.*

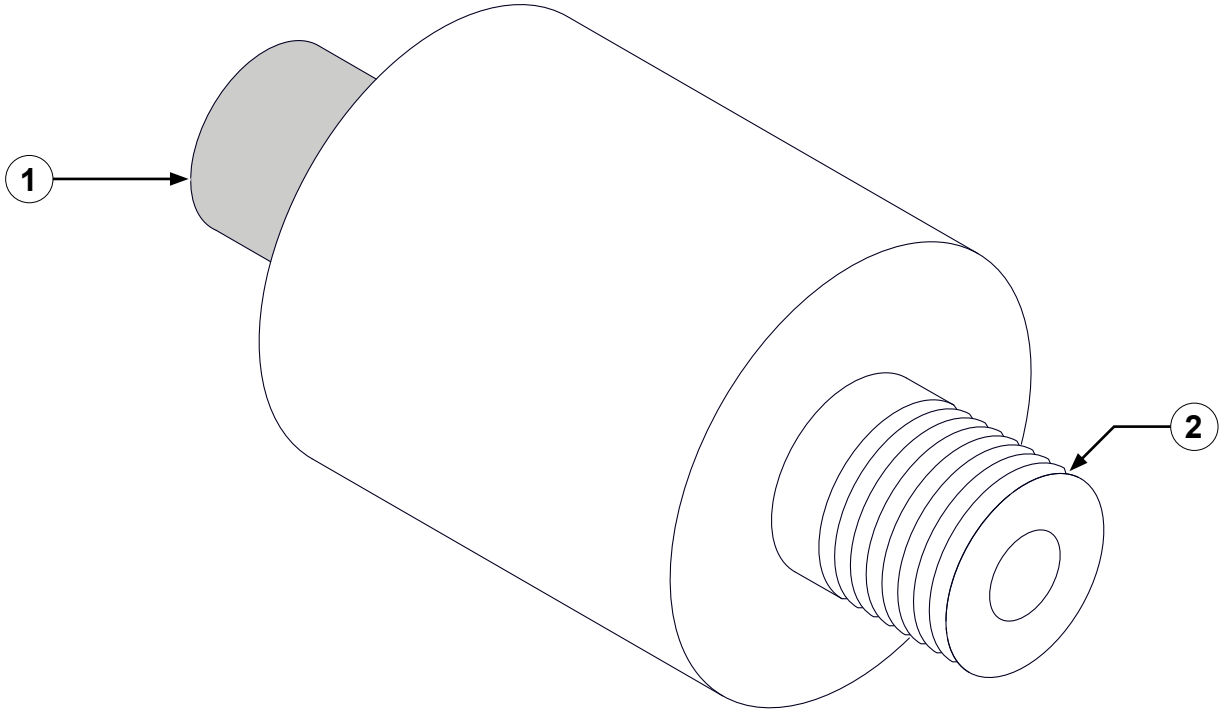


Paddlewheel Flowmeter

	Feature	Description
1	Flowmeter cable	This connects to the cable from the associated DLA node controller.
2	Body	This installs into the discharge line—2-inch NPT.
3	Paddlewheel	This measures the water flow in the solution-capable discharge.

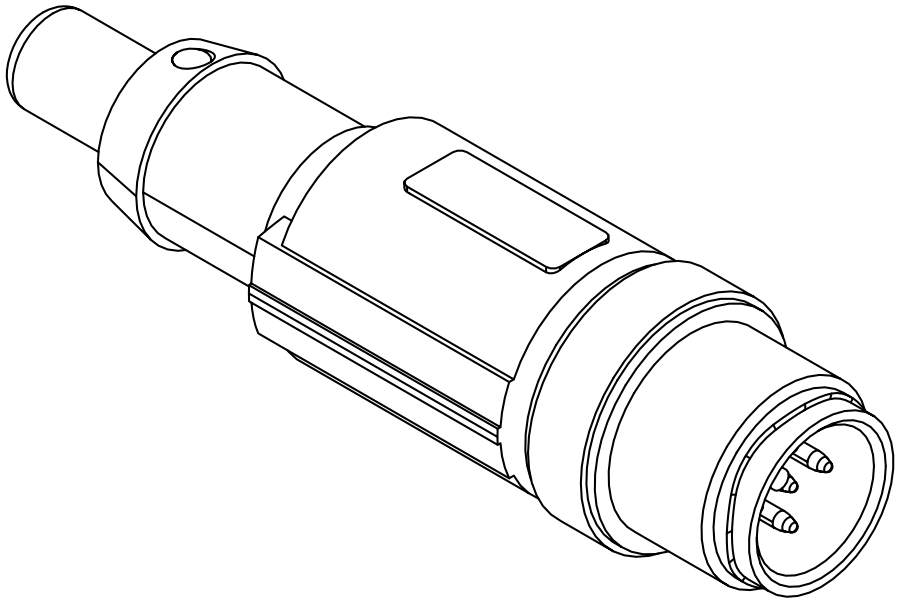
Line Pressure Transducer

The pressure transducer measures the concentrate and discharge line pressure, respectively.



	Feature	Description
1	Connector	This connects to the cable from the control box, or through the Y-splitter when the water pump discharge pressure is not supplied to the system.
2	Pressure sensor	This measures pressure at the discharge of the water pump—1/4 NPT, 0–500 psi.

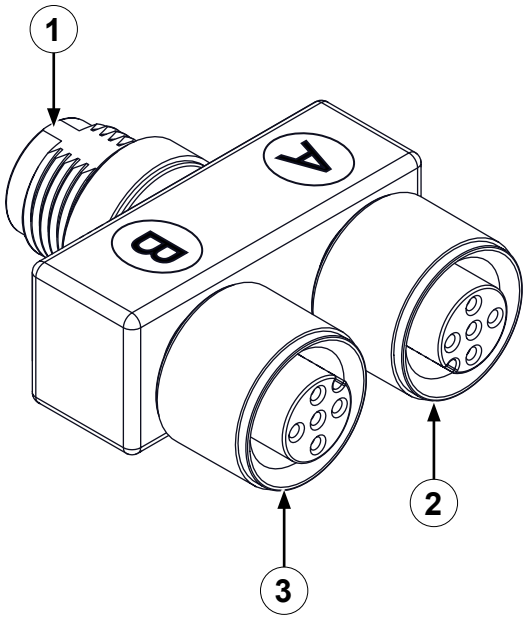
Terminating Resistor



	Feature	Description
1	Terminating resistor	This connects to the split CANbus cable female socket connector on the last DLA in the system.

Y-Splitter

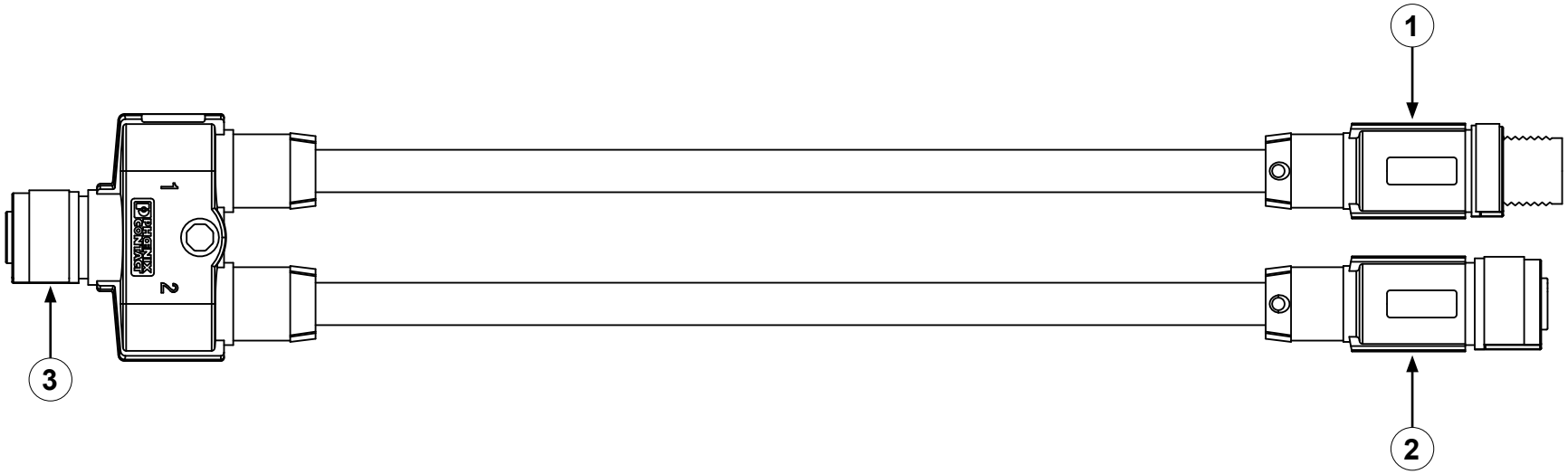
This splits the M12 cable to allow flowmeter communication on pin 4 and pressure sensor communication on pin 2 when the water pump discharge pressure is not supplied to the system.



	Feature	Description
1	Node connector	This connects to the node controller—female socket.
2	A-connector	This connects to the paddlewheel flowmeter.
3	B-connector	This connects to the pressure sensor.

Split CANbus Cable

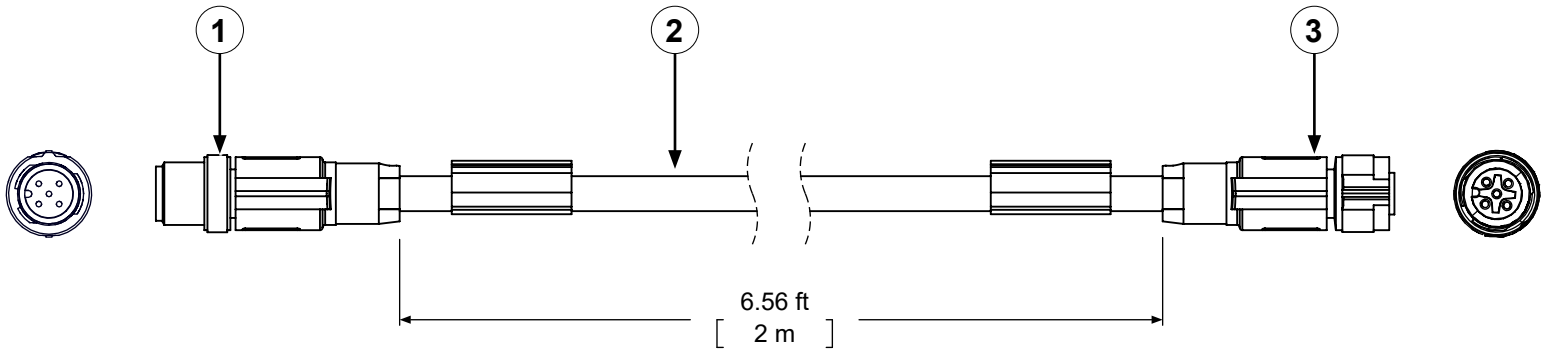
The split CANbus cable communicates data between the CANbus connections. It is typically a violet color.



	Feature	Description
1	CANbus output	This connects to the next node in the chain or the terminating resistor—female plug.
2	CANbus input	This connects to the previous node in the chain or the control box discharge CANbus—male socket.
3	Node connector	This connects to the node controller—female socket.

2.0 Meter CANbus Extension Cable

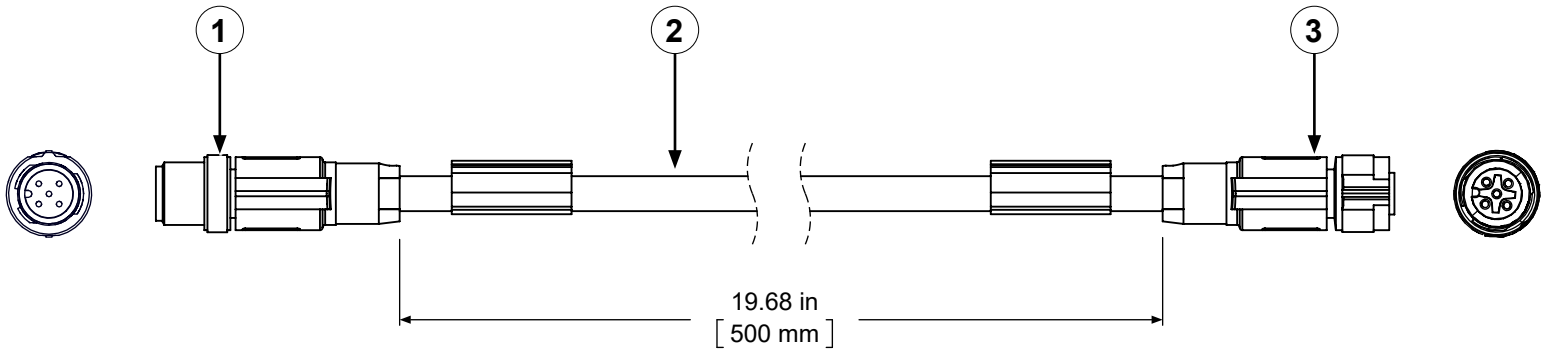
The CANbus extension cable communicates data between the CANbus connections. It is typically a violet color. The CANbus extension cable is not interchangeable with the sensor extension cable. ***Note:*** *You can connect 2 or more cables together to achieve a desired length.*



	Feature	Description
1	M12 connector	This is a male connector.
2	Cable	This is typically a violet cable jacket.
3	M12 connector	This is a female connector.

0.5 Meter CANbus Extension Cable

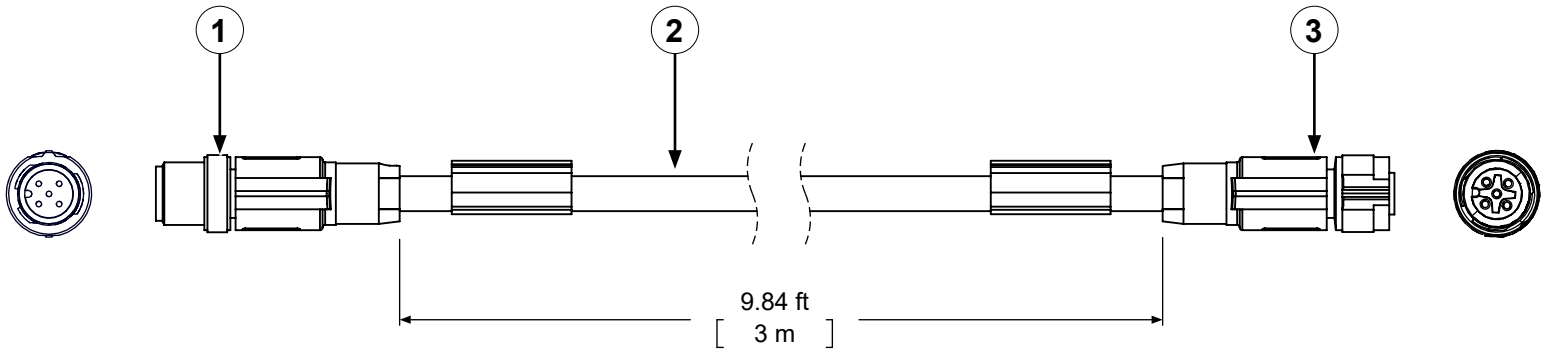
The CANbus extension cable communicates data between the CANbus connections. It is typically a violet color. The CANbus extension cable is not interchangeable with the sensor extension cable. ***Note:*** *You can connect 2 or more cables together to achieve a desired length.*



	Feature	Description
1	M12 connector	This is a male connector.
2	Cable	This is typically a violet cable jacket.
3	M12 connector	This is a female connector.

3.0 Meter Sensor Cable

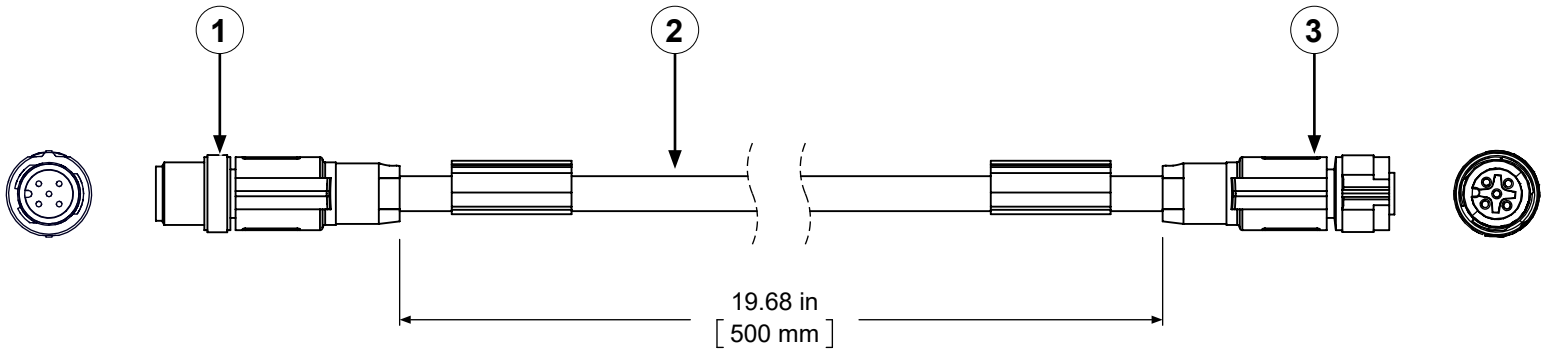
The sensor cable communicates data between the various connections. It is typically a yellow, gray, or black color. The sensor cable is not interchangeable with the CANbus extension cable. ***Note:*** *You can connect 2 or more cables together to achieve a desired length.*



	Feature	Description
1	M12 connector	This is a male connector.
2	Cable	This is typically a yellow, gray, or black cable jacket.
3	M12 connector	This is a female connector.

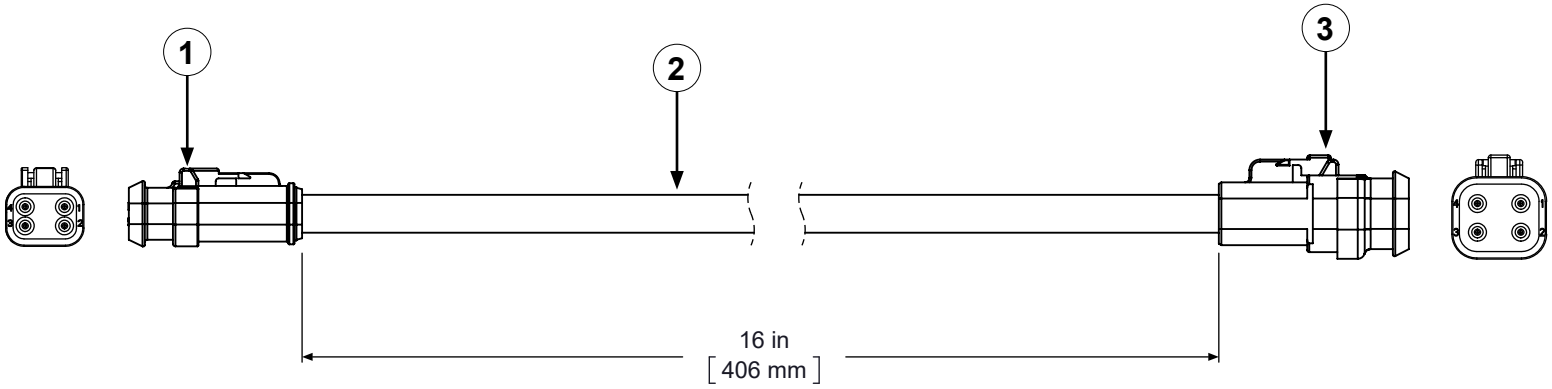
0.5 Meter Sensor Cable

The sensor cable communicates data between the various connections. It is typically a yellow, gray, or black color. The sensor cable is not interchangeable with the CANbus extension cable. ***Note:*** *You can connect 2 or more cables together to achieve a desired length.*



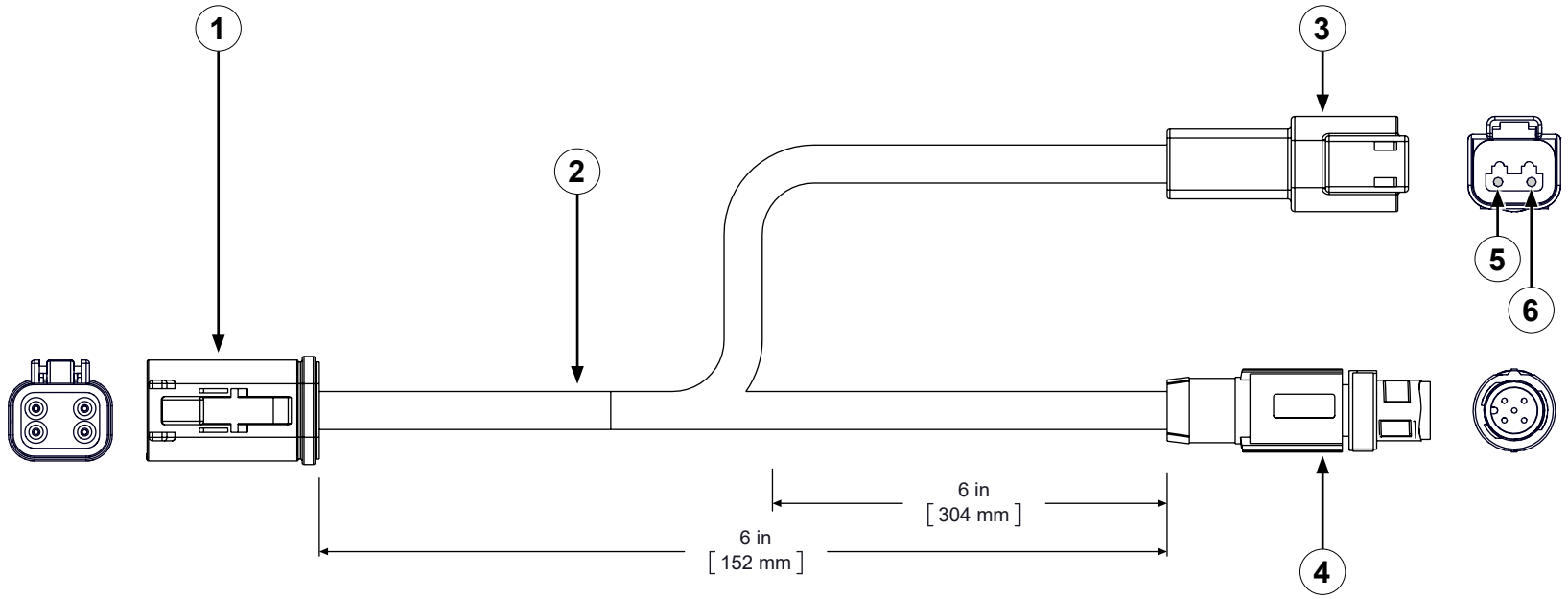
	Feature	Description
1	M12 connector	This is a male connector.
2	Cable	This is typically a yellow, gray, or black cable jacket.
3	M12 connector	This is a female connector.

CANbus Valve Motor Cable



	Feature	Description
1	Deutsch connector	This connects to the DLA control valve.
2	Cable	This is a braided loom jacket.
3	Deutsch connector	This connects to the DLA node controller.

Priming Valve Motor Cable



	Feature	Description
1	Deutsch connector	This connects to the priming valve.
2	Cable	This is a braided loom cable jacket.
3	Deutsch connector	This connects to apparatus power.
4	M12 connector	This connects to the discharge CANbus.
5	Pin 1	Power +12V, red.
6	Pin 2	Ground, black

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 the component.
- Make sure that you bring all fluids to operating levels before using the equipment.

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.**

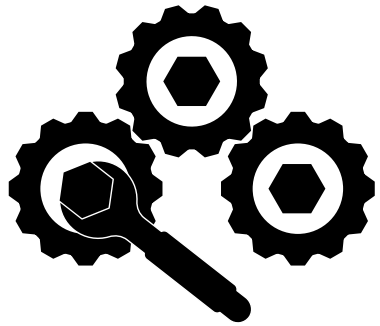
Modifying the Equipment

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. Contact Waterous for more information.

NOTICE

Modification

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



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

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 associated with your system. Dimensional drawings are available through the Waterous Service department.

Optional Equipment

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

Determining DLA and Valve Locations

Use the following guidelines to determine DLA and valve locations:

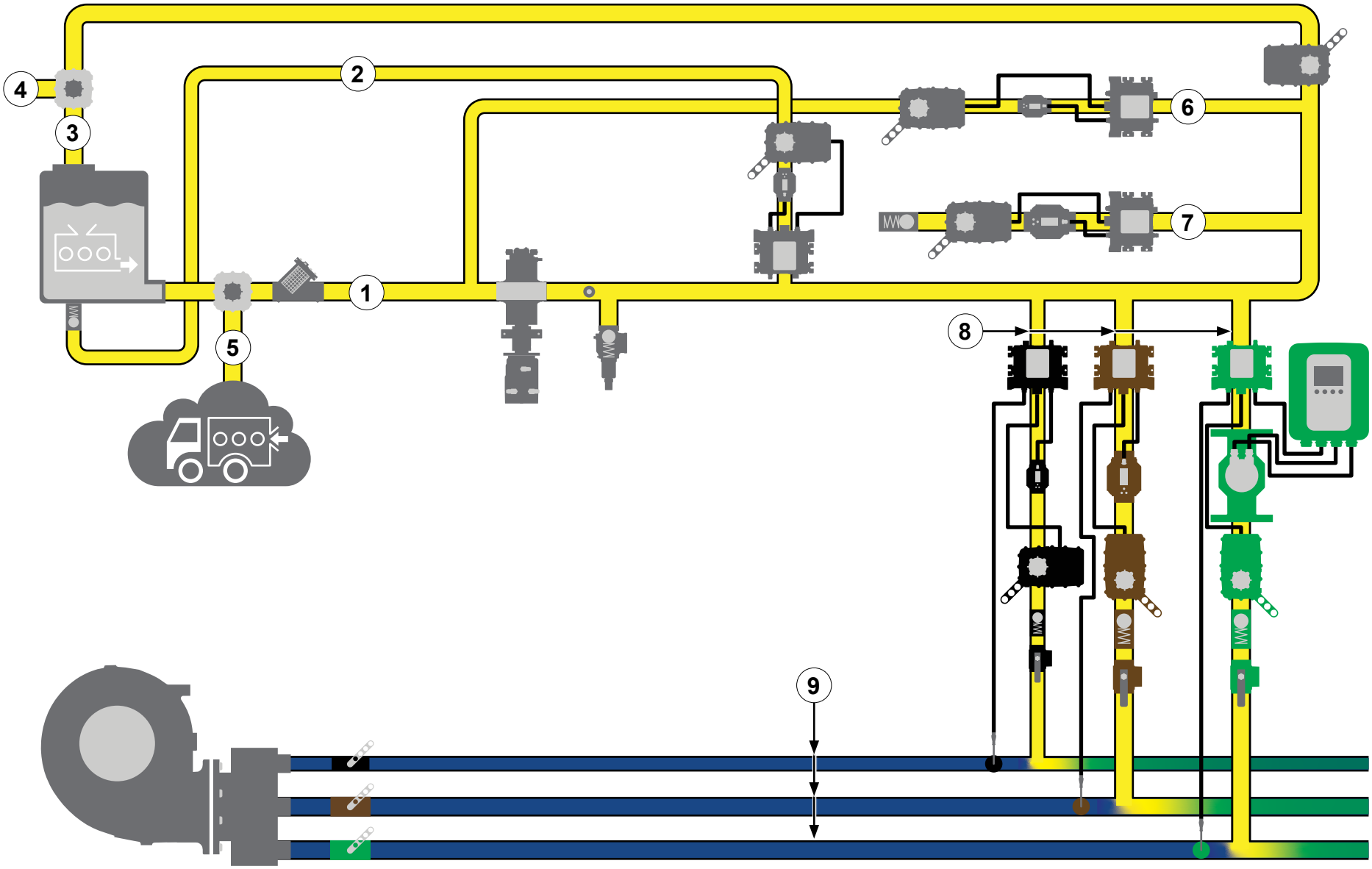
- Consider the cable routing and plumbing.
- Consider accessibility during operation and maintenance.

Determining Cable and Wire Routing

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

Plumbing Layout

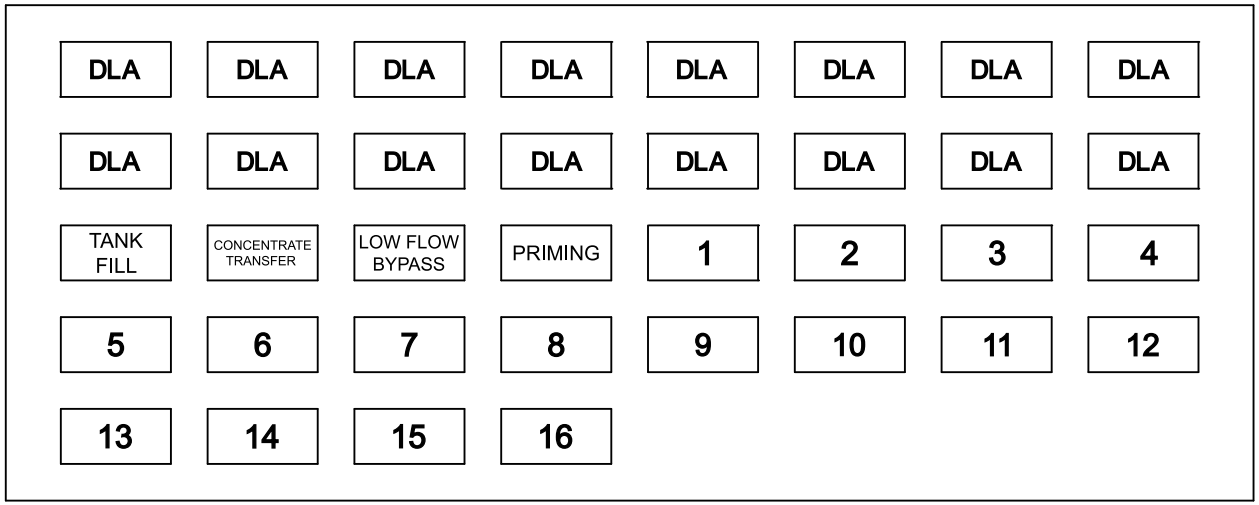
Use the illustration as a guide to lay out the plumbing connections in your application.



Plumbing Layout

	Description
1	Concentrate supply line—this transports concentrate around the system.
2	Concentrate supply refill line—this allows you to fill the on-board tank from an auxiliary source.
3	Priming line—this evacuates air from the concentrate pump inlet as the system primes before operation.
4	Priming bypass line—this prevents contaminating the concentrate during testing and training. When water is substituted for concentrate during training or testing, and you have concentrate in the supply tank, this bypass valve diverts water from the supply tank to prevent concentrate contamination. It is also very important to make sure that you drain any remaining water in the line before priming the system with concentrate.
5	Auxiliary concentrate supply line—this allows you to source concentrate from an external source.
6	Low-flow bypass line—this returns a portion of the pumped concentrate in the supply line back to the pump inlet when the desired concentrate output requires the pump to operate at an RPM that is lower than possible by the pump.
7	Transfer line—this line allows you to transfer or relay concentrate to another location.
8	Discharge line assembly—this manages the concentrate injected into the solution-capable discharge.
9	Solution-capable discharge—this transports clear water and is capable of creating a foam solution.

Installing the DLA Identification Labels



Use the labels provided with the install kit to identify the DLAs.

Apply the appropriate label to the DLA as you install it. In the future, use the label to identify the DLA during setup, service, and maintenance. Use the table below to match the DLA with the discharge name on the apparatus.

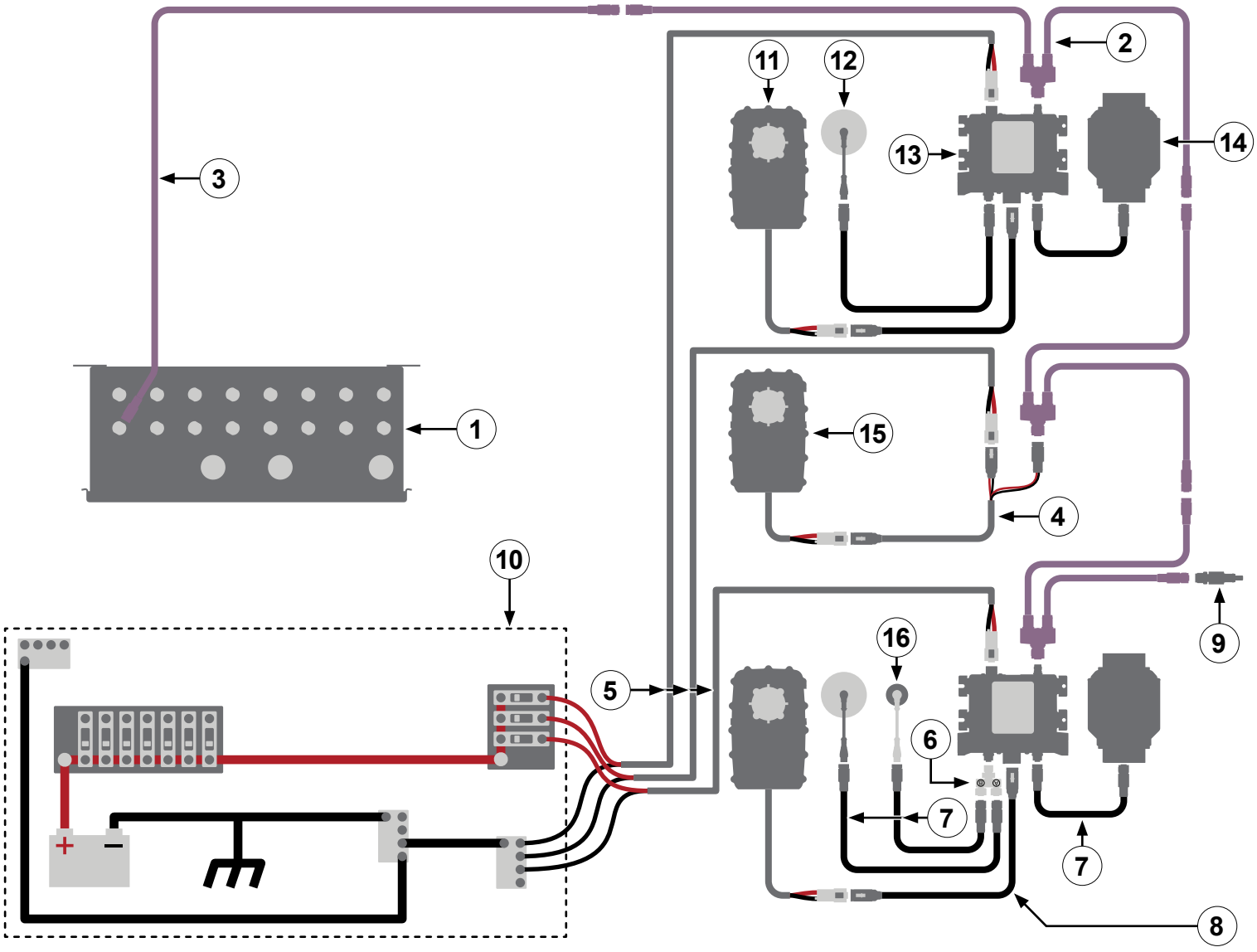
Note: *It is important to properly number each DLA as this information will be used to commission and name the discharges in the ULTRAFLOW software. To facilitate setup, labeling both the DLA and its associated circuit breaker is recommended.*

DLA	HMI Display Name	Notes
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		

Notes

DLA Components and Connections

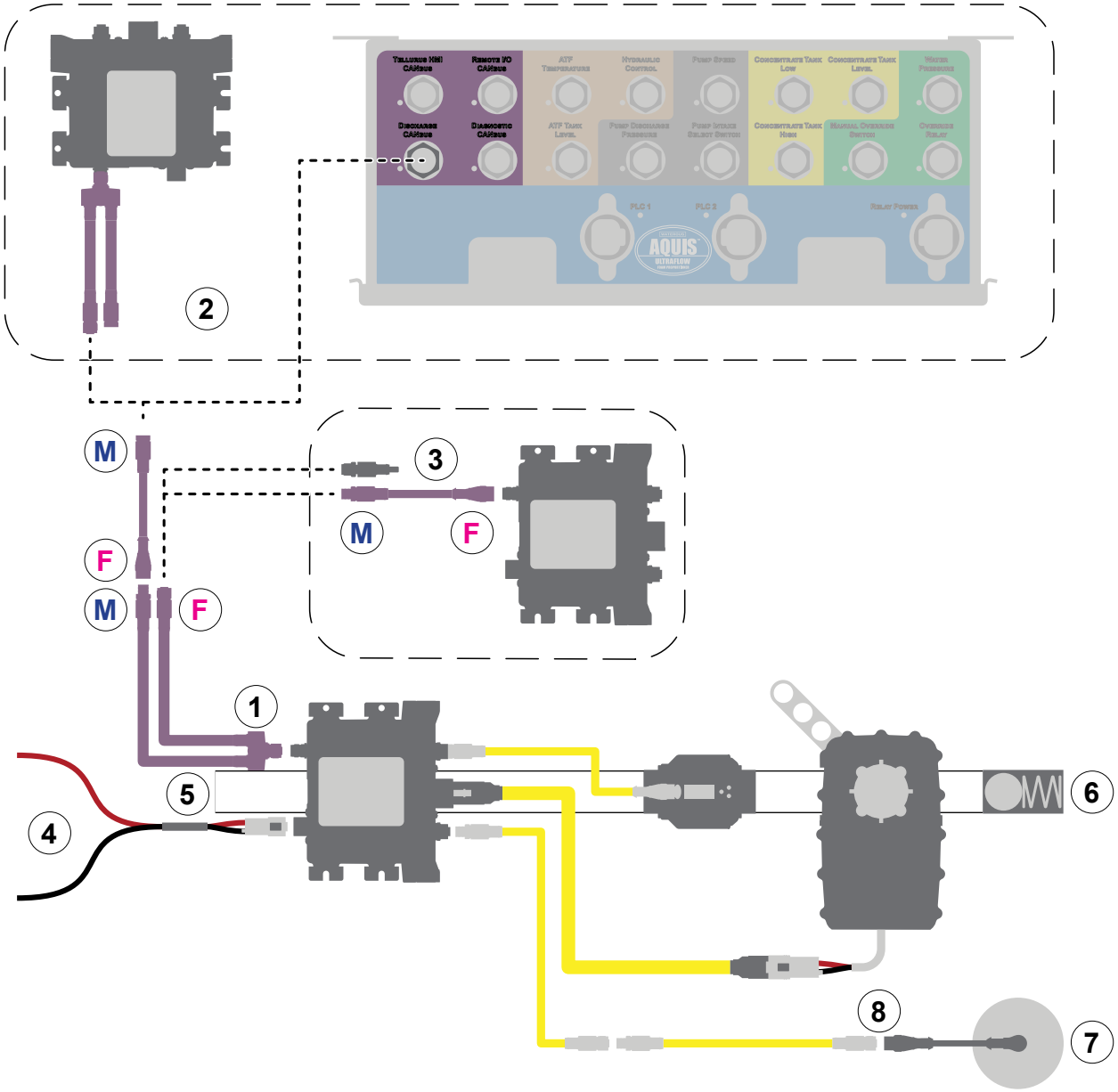
Use the illustration and table to understand the various cable connections to the DLAs and system power.



CANbus Cables and Connections

	Feature	Description
1	Control box	This connects to various components in the system and contains the programmable logic controllers (PLC).
2	Split CANbus Cable	This passes CANbus bus commands to the next node controller in the chain.
3	CANbus extension	This connects the node controllers to one another and the control box.
4	Priming valve cable	This connects the priming valve to power and CANbus control.
5	DLA cable	This supplies power to the DLA and requires a 10 amp circuit breaker per DLA. This is installer-supplied.
6	Y-Splitter—M12	This splits the M12 cable to allow flowmeter communication on pin 4 and pump discharge pressure transducer communication on pin 2. ***Note:*** *Use this when the water pump discharge pressure is not supplied to the system.*
7	M12 cable	This connects the M12 equipped components—0.5 meter or 2.0 meter.
8	Control valve cable extension	This connects the DLA control valve to the node controller.
9	Terminating resistor	This terminates the CANbus signal.
10	System power	This is the system power.
11	Concentrate control valve	This controls the flow of concentrate.
12	Flowmeter—paddlewheel	This measures the flow at the discharge—water and solution.
13	Node controller	This connects to the concentrate control valve, flowmeters, and additional discharge line assemblies (DLA).
14	Flowmeter—magnetic	This measures the flow of concentrate.
15	Priming valve	This allows air to evacuate when priming the concentrate pump.
16	Pressure transducer	This measures the line pressure.

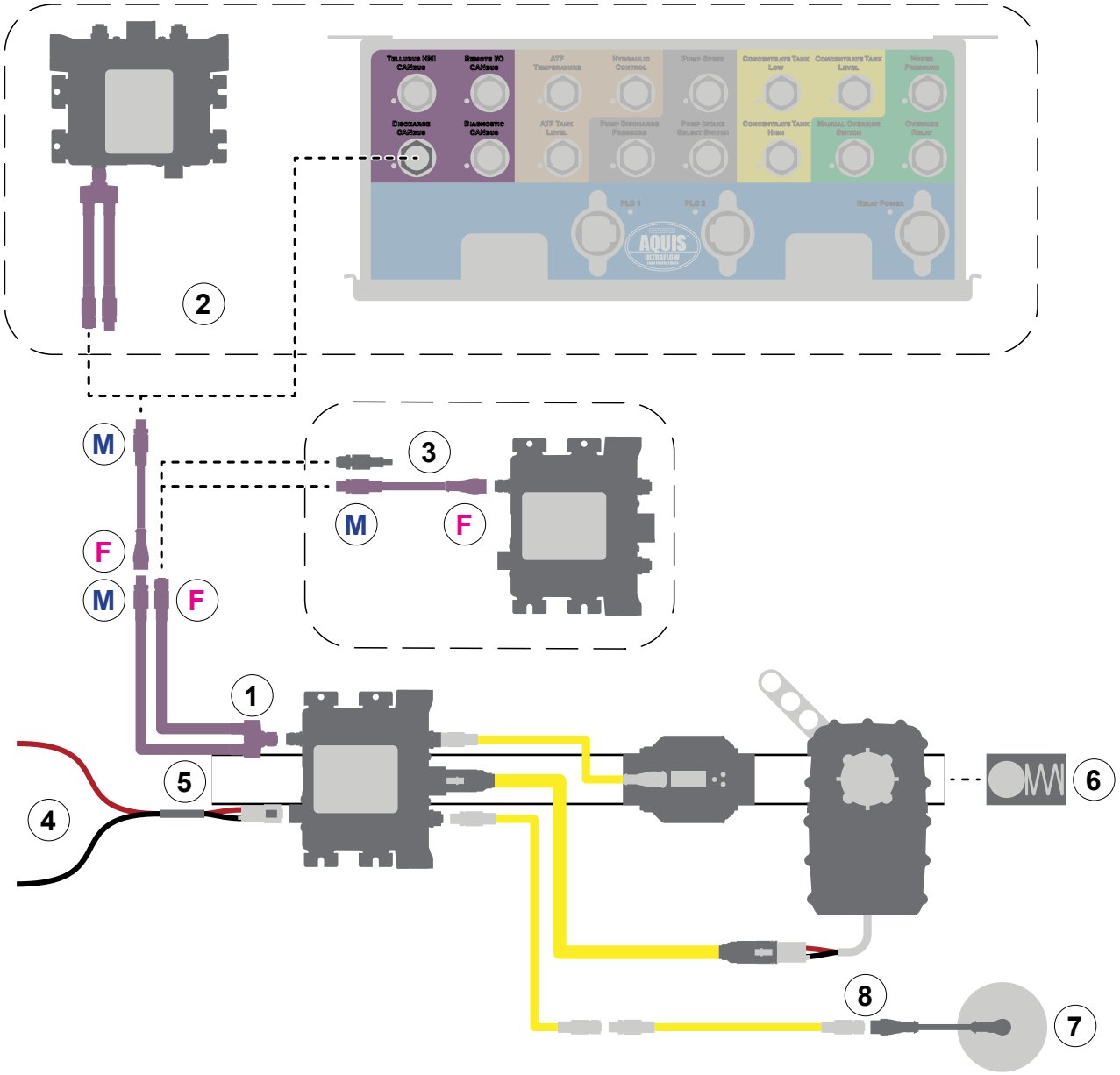
Connecting the 1-Inch DLA



Use the illustration and instructions to install the 1-inch DLA. To connect to the apparatus plumbing, refer to: **"Plumbing Layout" on page 40**.

1. Connect the split CANbus cable to the CANbus connector on the node controller.
2. Connect the male end on the split CANbus cable to an upstream node controller, or to the control box—the discharge CANbus connection.
   Note: *Use a CANbus extension cable if necessary.*
3. Connect the female end on the CANbus splitter cable to the next, downstream node controller, or to a terminating resister if this is the last downstream node controller in the system.
   Note: *Use a CANbus extension cable if necessary.*
4. Locally source a Deutsch DT06-2S connector and an appropriate cable to connect apparatus power to the node controller. Power the node controller through a 10 A circuit breaker.
5. Connect the DLA inlet to the concentrate supply.
6. Connect the DLA outlet to the discharge.
7. Install the paddlewheel flowmeter into the associated discharge, upstream of the DLA outlet connection.
   Note: *You must install the flowmeter away from any turbulent flow and follow the OEM installation instructions to achieve accurate measurements.*
8. Use an M12 cable extension to connect the node controller to the paddlewheel flowmeter.
   Note: *Use additional M12 cable extensions if necessary.*

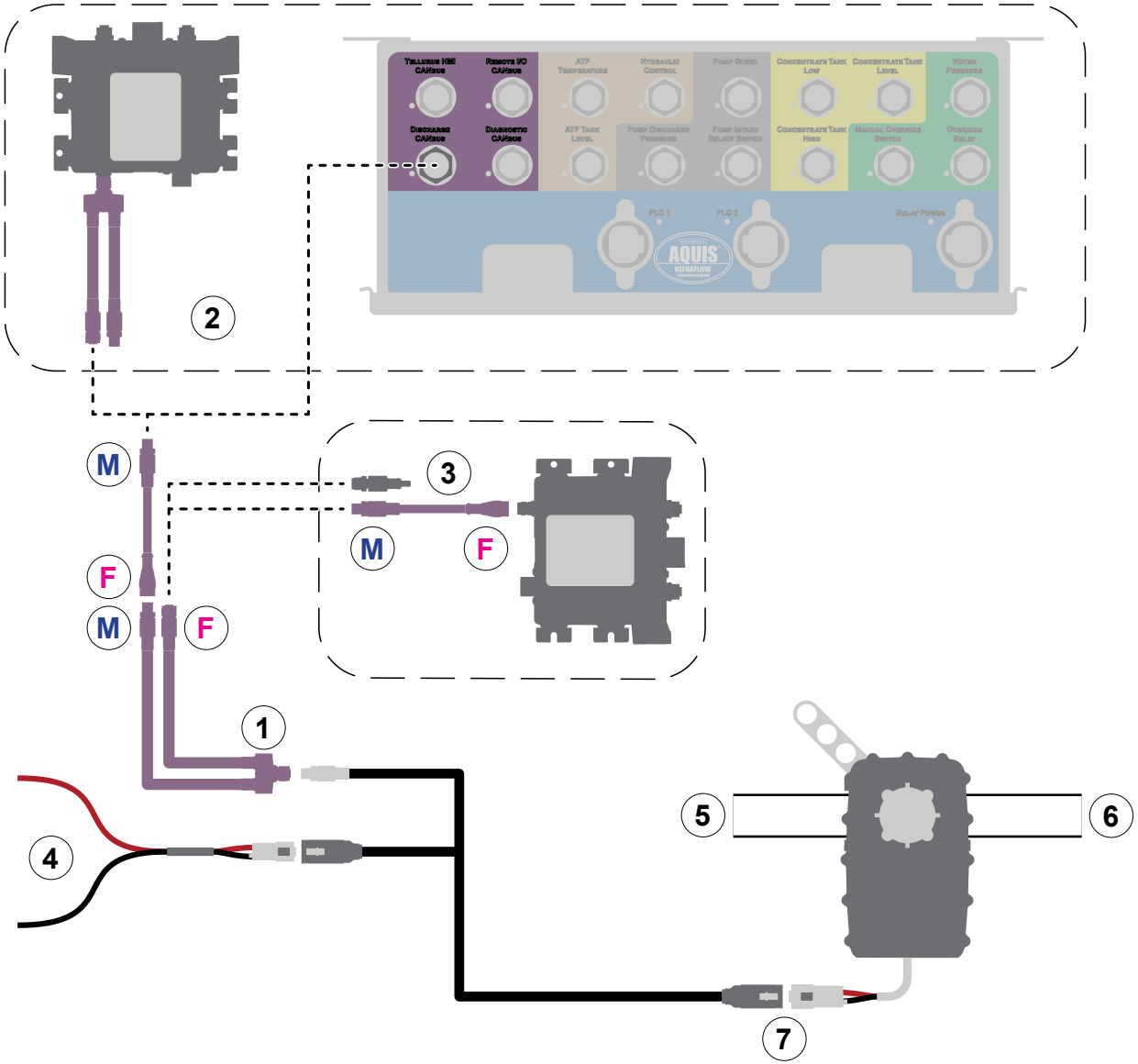
Connecting the 2-Inch DLA



Use the illustration and instructions to install the 2-inch DLA. To connect to the apparatus plumbing, refer to: **"Plumbing Layout" on page 40**.

1. Connect the split CANbus cable to the CANbus connector on the node controller.
2. Connect the male end on the split CANbus cable to an upstream node controller, or to the control box—the discharge CANbus connection.
   Note: *Use a CANbus extension cable if necessary.*
3. Connect the female end on the CANbus splitter cable to the next, downstream node controller, or to a terminating resistor if this is the last downstream node controller in the system.
   Note: *Use a CANbus extension cable if necessary.*
4. Locally source a Deutsch DT06-2S connector and an appropriate cable to connect apparatus power to the node controller. Power the node controller through a 10 A circuit breaker.
5. Connect the DLA inlet to the concentrate supply.
6. Install the check valve to the DLA, then connect the DLA outlet to the discharge.
7. Install the paddlewheel flowmeter into the associated discharge, upstream of the DLA outlet connection.
   Note: *Refer to the OEM installation instructions to properly install the paddlewheel in your application.*
8. Use an M12 cable extension to connect the node controller to the paddlewheel flowmeter.
   Note: *Use additional M12 cable extensions if necessary.*

Connecting the Priming Valve



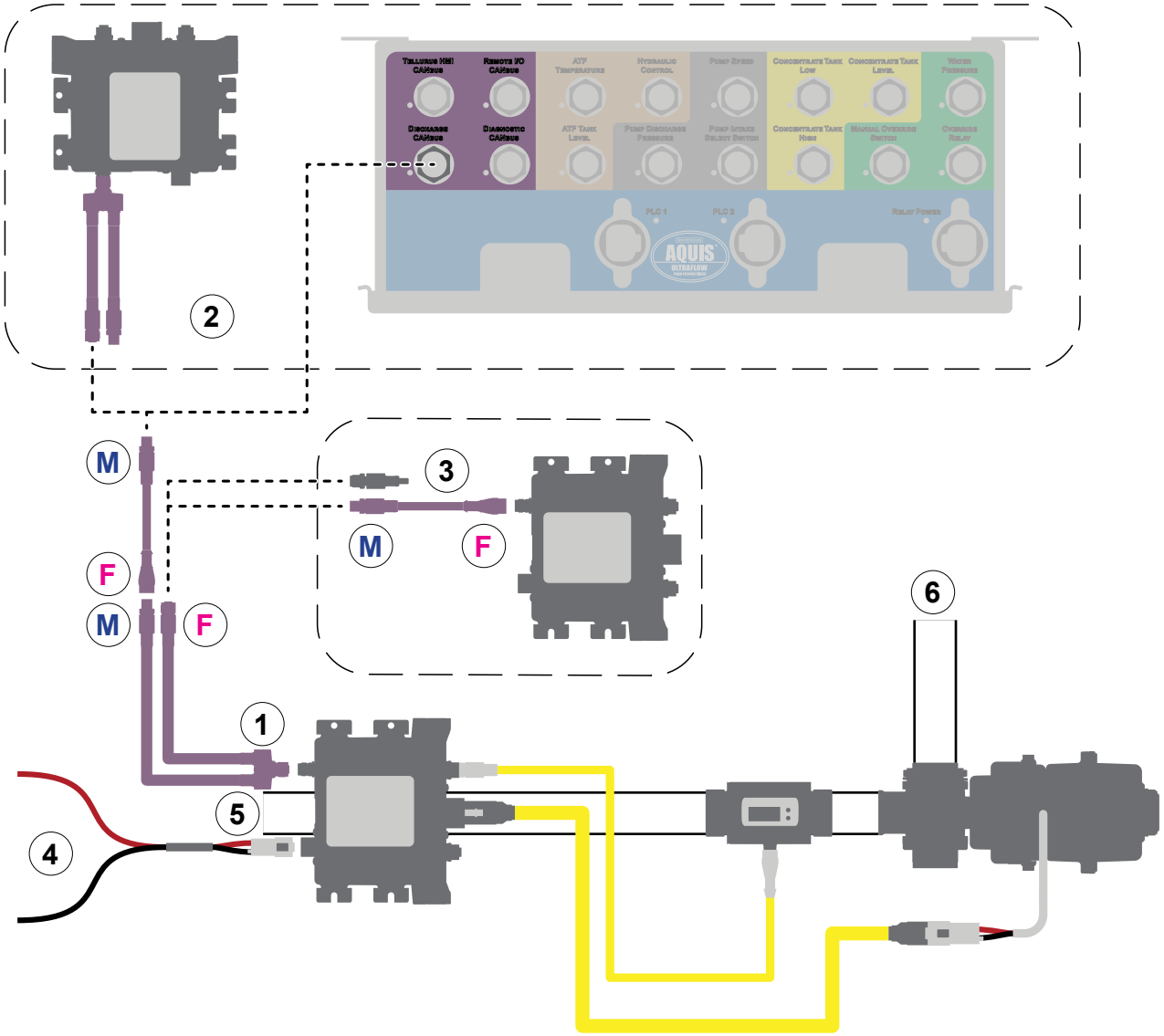
Use the illustration and instructions to install the priming valve. To connect to the apparatus plumbing, refer to: **"Plumbing Layout" on page 41**.

1. Connect the split CANbus cable to the CANbus connector on the priming valve motor cable.
2. Connect the male end on the split CANbus cable to an upstream node controller, or to the control box—the discharge CANbus connection.

   Note: *Use a CANbus extension cable if necessary.*
3. Connect the female end on the CANbus splitter cable to next downstream node controller, or to a terminating resistor if this is the last downstream node controller in the system.

   Note: *Use a CANbus extension cable if necessary.*
4. Locally source a Deutsch DT06-2S connector and an appropriate cable to connect apparatus power to the priming valve motor cable. Power the priming valve motor through a 10 A circuit breaker.
5. Connect the priming valve inlet to the discharge side of the concentrate pump.
6. Connect the priming valve outlet to the concentrate supply tank, through the installer-supplied prime-bypass valve.
7. Connect the priming valve motor cable to the priming valve.

Connecting the Low-Flow Bypass Line



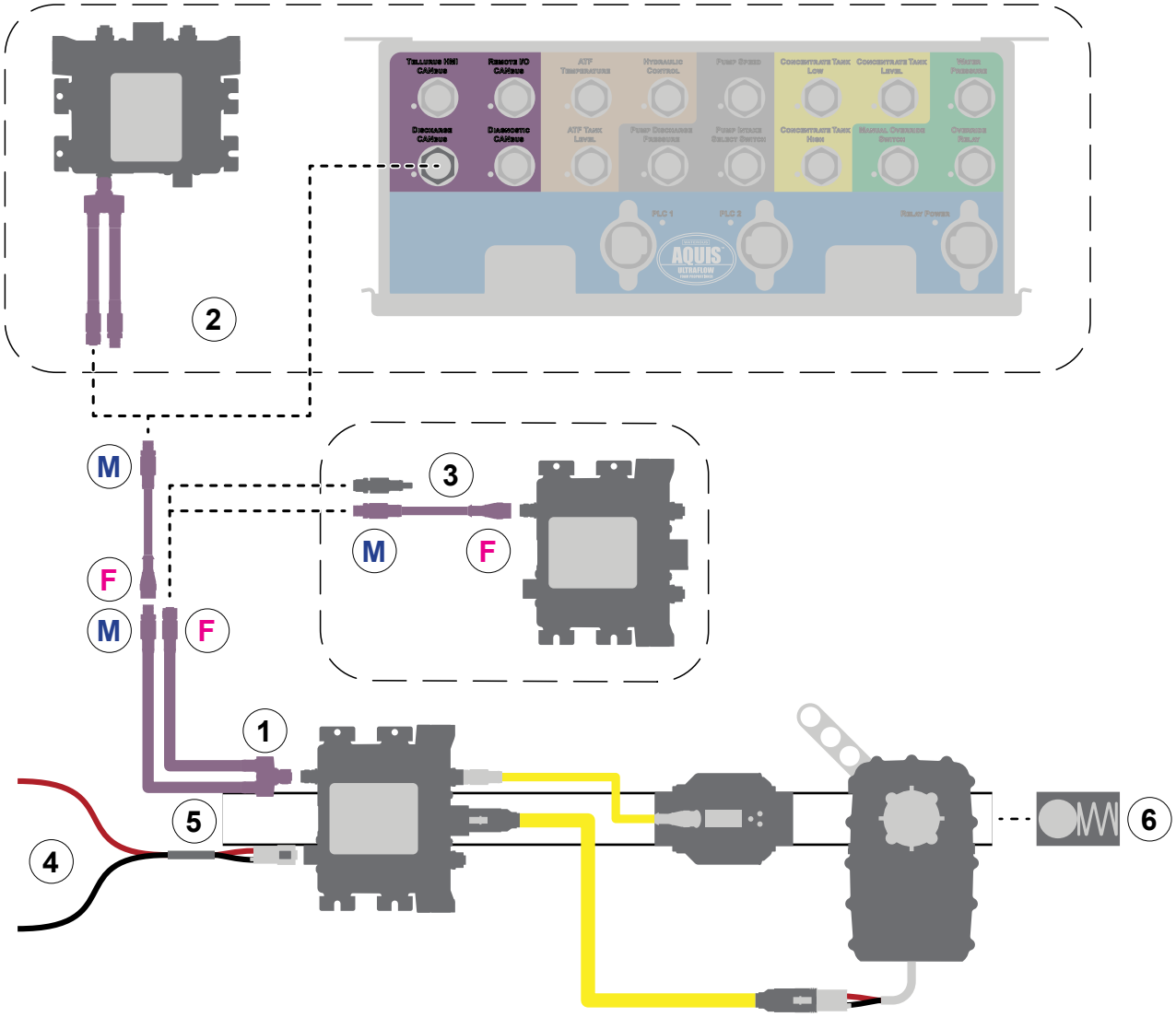
Use the illustration and instructions to install the low-flow bypass line. To connect to the apparatus plumbing, refer to: **"Plumbing Layout" on page 40**.

1. Connect the split CANbus cable to the CANbus connector on the node controller.
2. Connect the male end on the split CANbus cable to an upstream node controller, or to the control box—the discharge CANbus connection.

   Note: *Use a CANbus extension cable if necessary.*
3. Connect the female end on the CANbus splitter cable to next downstream node controller, or to a terminating resister if this is the last downstream node controller in the system.

   Note: *Use a CANbus extension cable if necessary.*
4. Locally source a Deutsch DT06-2S connector and an appropriate cable to connect apparatus power to the node controller. Power the node controller through a 10 A circuit breaker.
5. Connect the low-flow bypass line inlet end to the discharge side of the concentrate pump.
6. Connect the low-flow bypass line outlet end to the inlet side of the concentrate pump.

Connecting the Supply Tank Fill Line



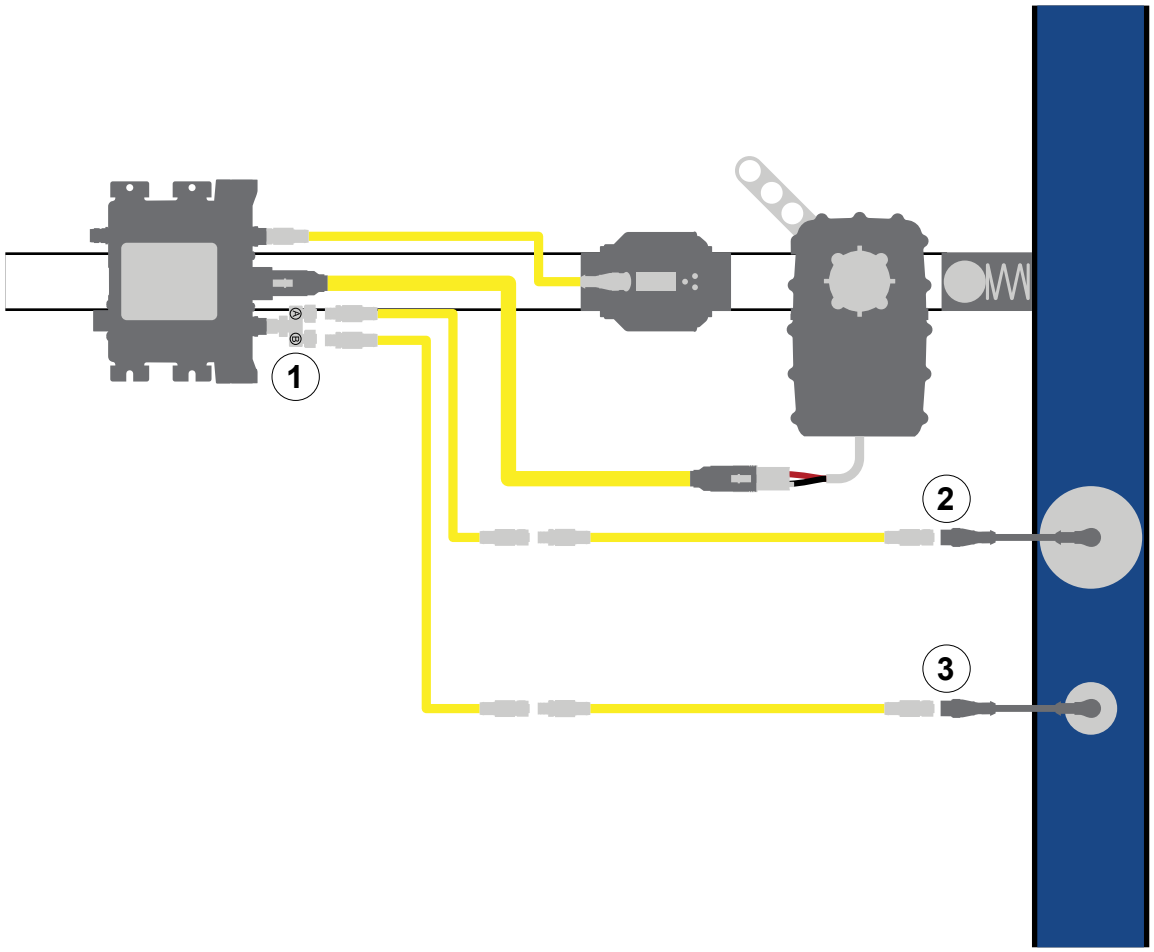
Use the illustration and instructions to install the supply tank fill line. To connect to the apparatus plumbing, refer to: **"Plumbing Layout" on page 40**.

1. Connect the split CANbus cable to the CANbus connector on the node controller.
2. Connect the male end on the split CANbus cable to an upstream node controller, or to the control box—the discharge CANbus connection.

   Note: *Use a CANbus extension cable if necessary.*
3. Connect the female end on the CANbus splitter cable to next downstream node controller, or to a terminating resistor if this is the last downstream node controller in the system.

   Note: *Use a CANbus extension cable if necessary.*
4. Locally source a Deutsch DT06-2S connector and an appropriate cable to connect apparatus power to the node controller. Power the node controller through a 10 A circuit breaker.
5. Connect the supply tank fill line to the concentrate supply.
6. Install the check valve, then connect the supply tank fill line to the apparatus plumbing.

Connecting the Y-Splitter—Alternate Discharge Pressure Measurement



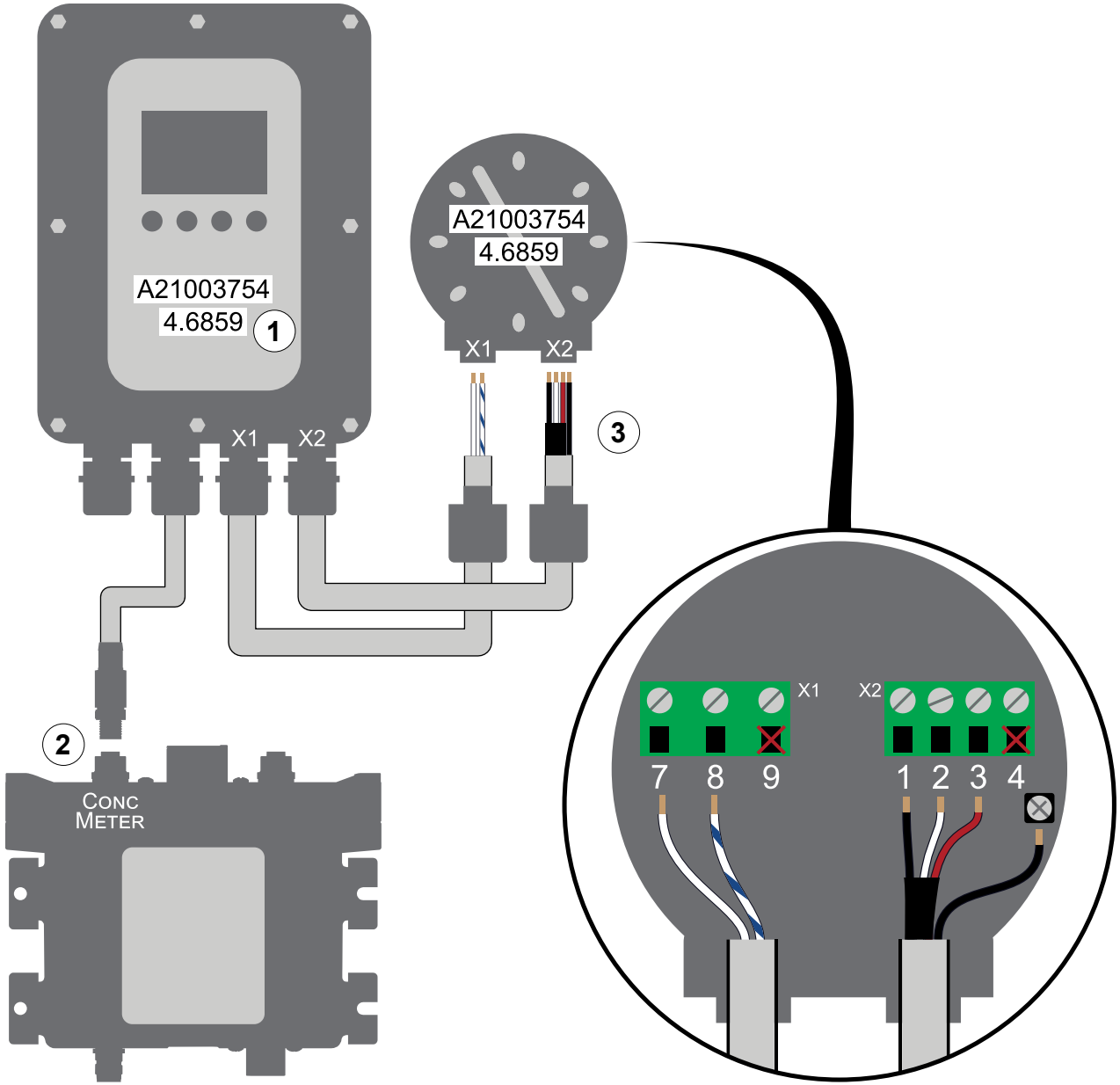
Use the illustration and instructions to install the Y-splitter when measuring discharge pressure at the pump is not possible.

1. Connect the Y-splitter to the node controller.
2. Connect the paddle flowmeter that is installed in the solution-capable discharge to the A-connection on the Y-splitter.

   Note: *Use an M12 extension cable if necessary.*
3. Connect the pressure transducer that is installed in the solution-capable discharge to the B-connection on the Y-splitter.

   Note: *Use an M12 extension cable if necessary.*

Installing the Transmitter and Flowmeter

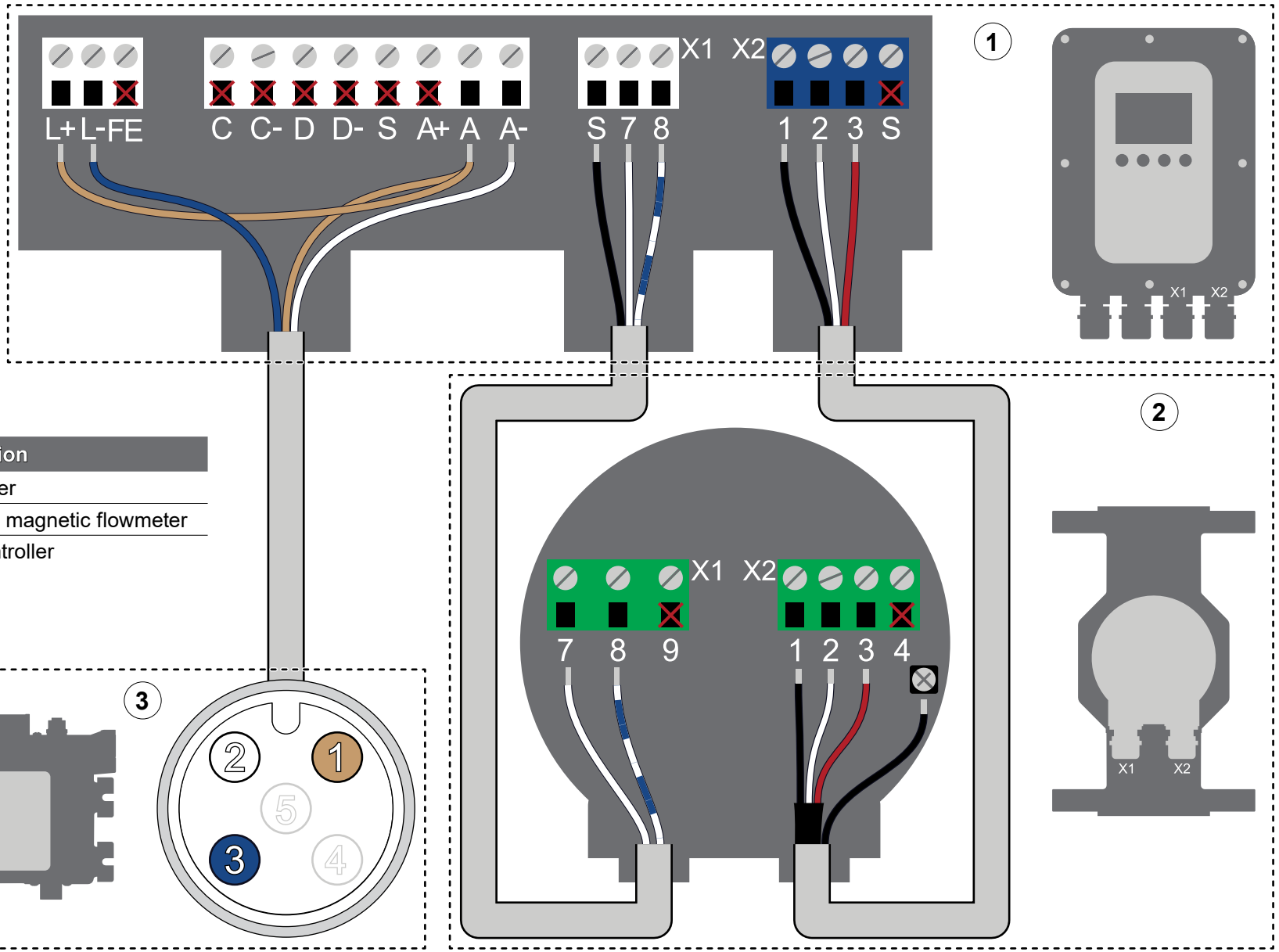


Use the illustration and instructions to install the transmitter and flowmeter. To connect the flowmeter to the apparatus plumbing, refer to: **"Plumbing Layout" on page 40**. Mount the transmitter close to the DLA. Make sure that there is access for setup and maintenance. The transmitter is wired at the factory and only requires installing the wire-leads to the flowmeter.

1. Make sure that the numbers on the transmitter and flowmeter match.
2. Connect the M-12 connector to the node controller—Conc Meter.
3. To wire the flowmeter, do the following:
   - Remove the top cover from the flowmeter and locate the cable-glands among the shipped-loose items.
   - Route the cables through the cable-glands and into the flowmeter.
   - Install the cable-glands to secure the cables, leave enough room to install the wire-leads.
   - Secure the wires-leads to the terminal blocks and ground screw.
   - Install the top cover.

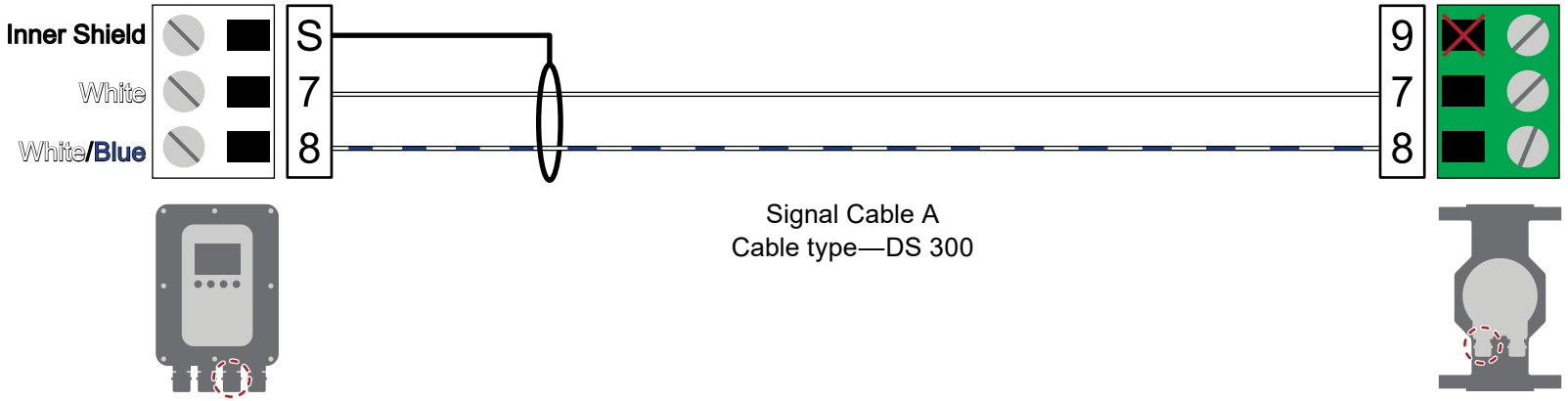
Wiring the Transmitter and Flowmeter—Custom Cable Length Application

Use the following information only if your application requires custom-length cables where cable extensions are not available.



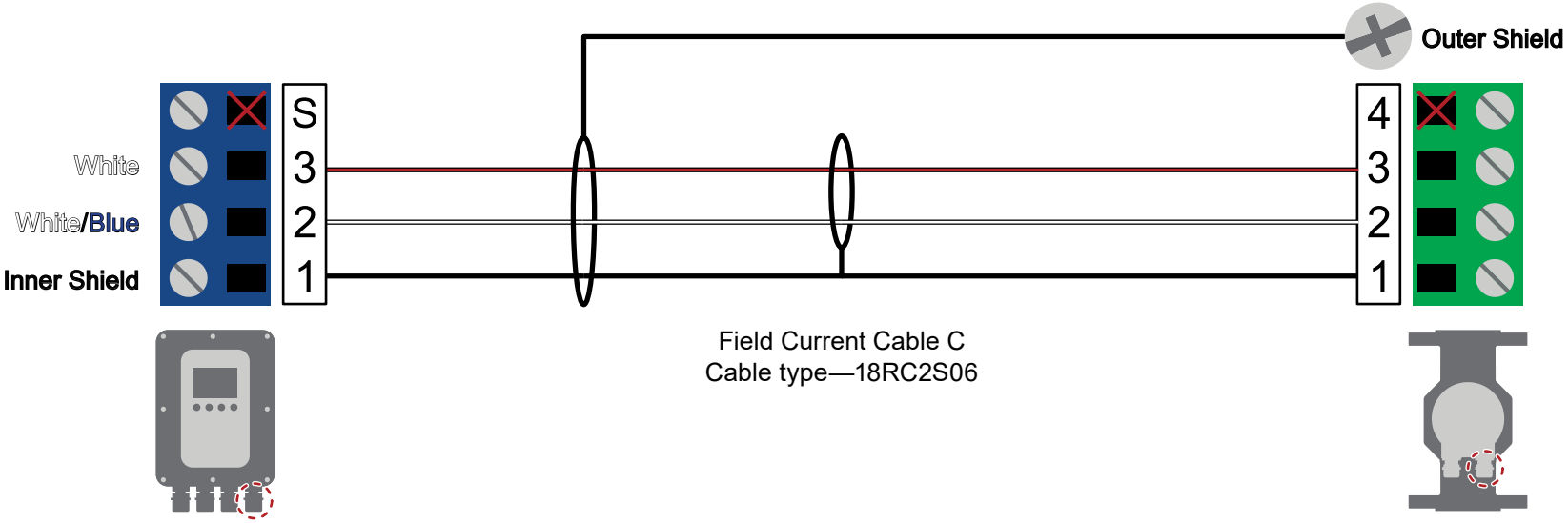
	Description
1	Transmitter
2	High-flow magnetic flowmeter
3	Node controller

X1 Cable Schematic—Custom Cable Length Application



Signal Cable A
Cable type—DS 300

X2 Cable Schematic—Custom Cable Length Application



Field Current Cable C
Cable type—18RC2S06

Operation Overview

This equipment is intended to be operated by a person or persons that have been trained in its operation.

Preparing for the Operation

Use the following guidelines before operation:

- Read and understand all the instructions before operating the system.
- Make sure that the system is tested and calibrated before operation.
- Make sure that you are train on the system before operation.

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.**

During Operation

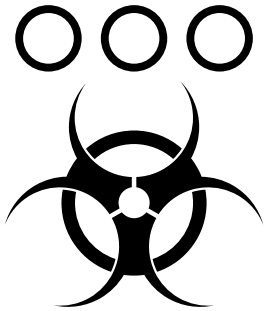
Use the following guidelines before operation:

- Use industry best practices when you operate the system.
- Only allow trained personnel to operate the system.
- When water is substituted for concentrate during training or testing, and you have concentrate in the supply tank, use the bypass valve to prevent water from contaminating the concentrate supply. ***Note:*** *You must drain any remaining water in the line before priming the system with concentrate to prevent contamination.*

NOTICE

Concentrate Supply Contamination

- **Priming with water can contaminate the on-board concentrate supply.**
- **Divert water to prevent concentrate contamination.**



After Operation

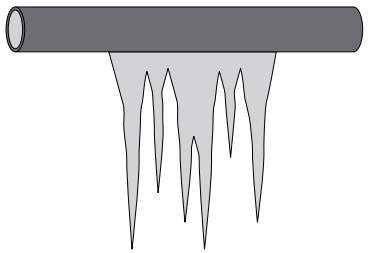
Use the following guidelines after operation:

- Flush any residual concentrate from the apparatus plumbing.
- Drain all lines when freezing can occur.

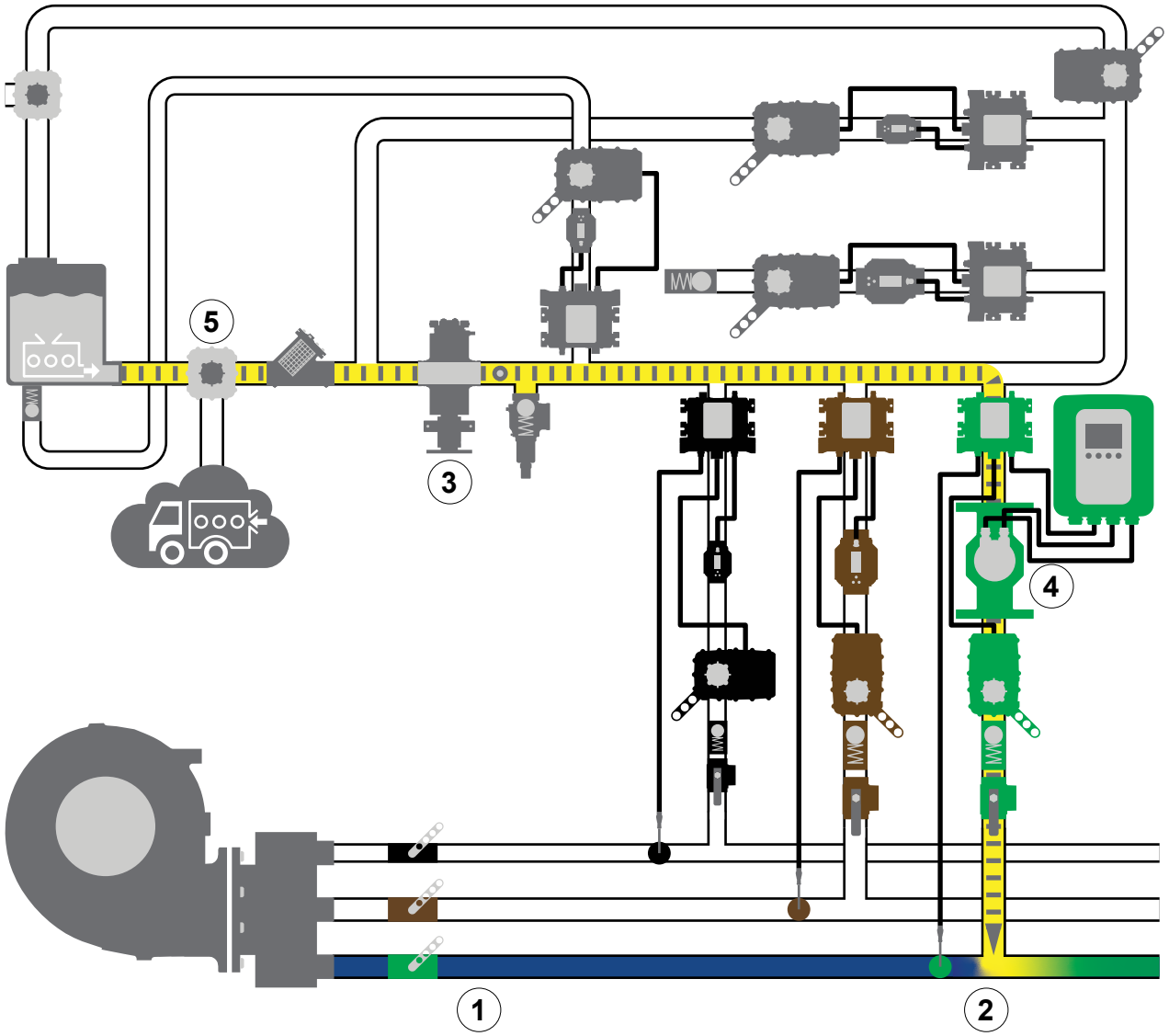
NOTICE

Freeze Damage

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



Enabling and Disabling a Discharge

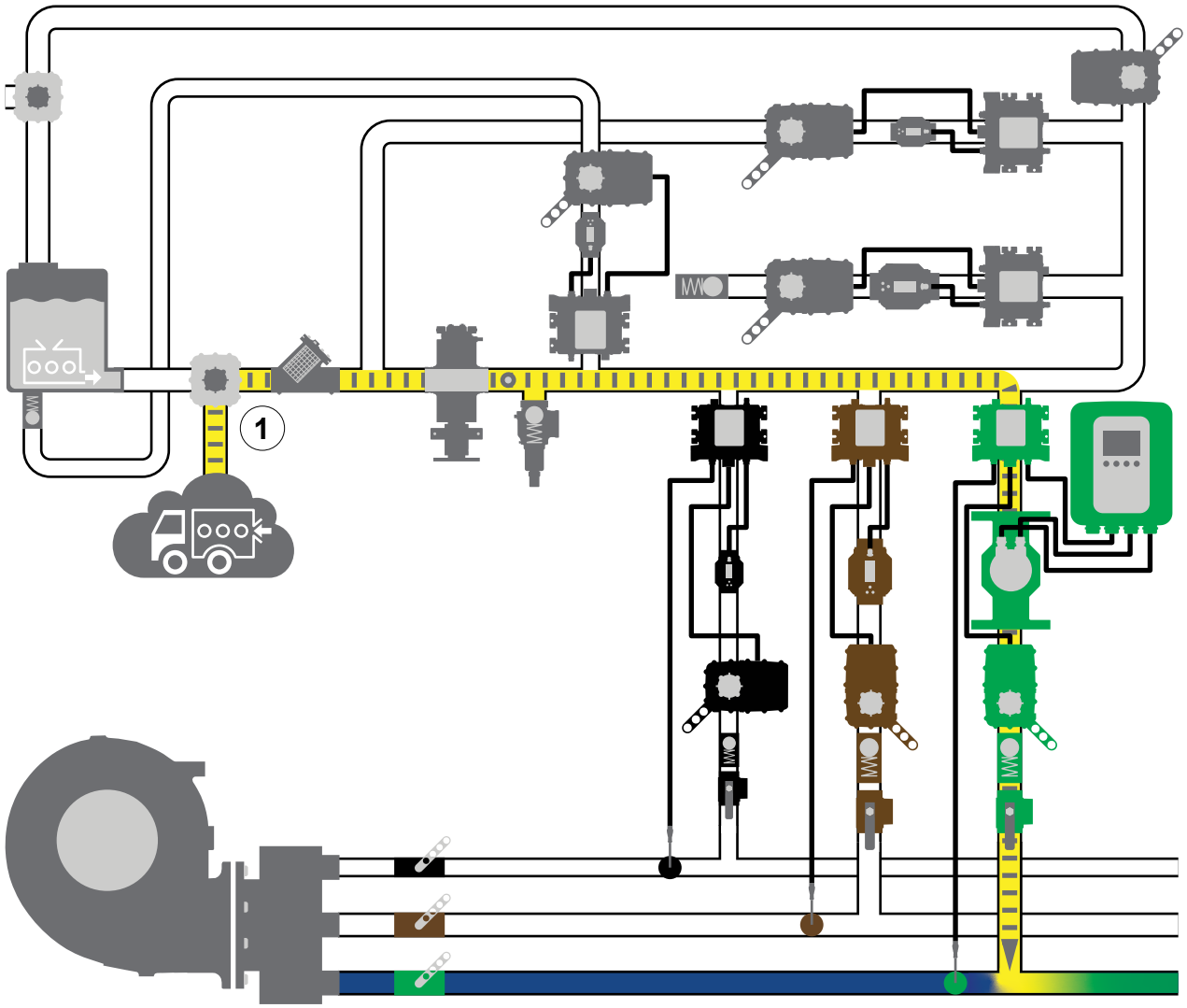


Use the illustration and instructions to understand the system activity when you enable a DLA. Keep in mind that an enabled DLA is only active when the associated line is flowing water.

Note: *For instructional purposes, this illustration only focuses on the specific activity in the system that best conveys the topic.*

1	The fire pump flows water into the discharge.
2	The enabled DLA measures the water flow in the discharge.
3	The concentrate pump activates.
4	The magnetic flowmeter measures the amount concentrate flowing in the DLA, while the valve meters the concentrate proportioned into the discharge to produce the selected solution.
5	The concentrate source is selected by the concentrate-source valve. The valve switches between an on-board or auxiliary concentrate source. The valve position is provided to the system—which allows or prohibits certain function.

Switching the Concentrate Source Mode—System View



Use the illustration and instructions to understand the system activity when you set it to an auxiliary concentrate source.

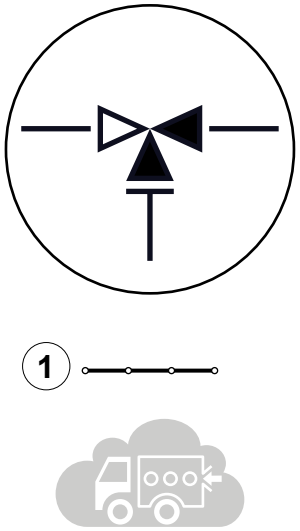
Note: *For instructional purposes, this illustration only focuses on the specific activity in the system that best conveys the topic.*

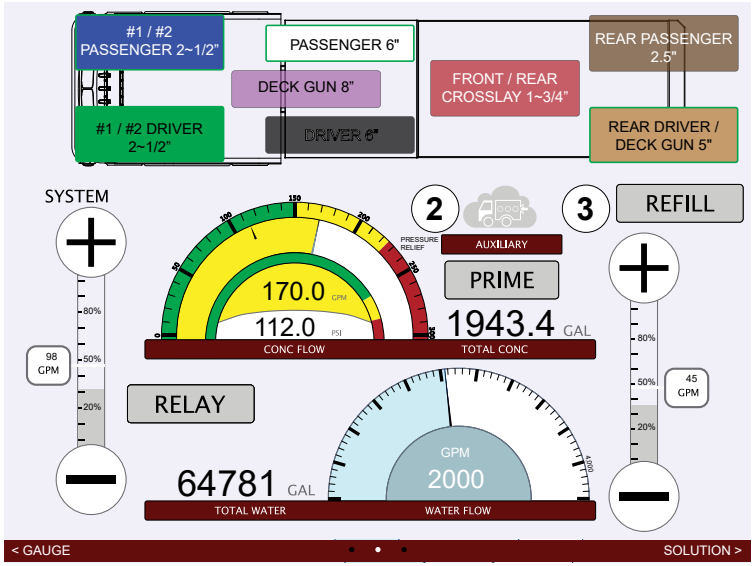
1 When set to auxiliary supply mode, a valve is used to change the concentrate source from the on-board supply tank to the auxiliary system. When sourcing concentrate from an auxiliary source, the system cannot measure the supply level—the concentrate supply must be managed by the operator.

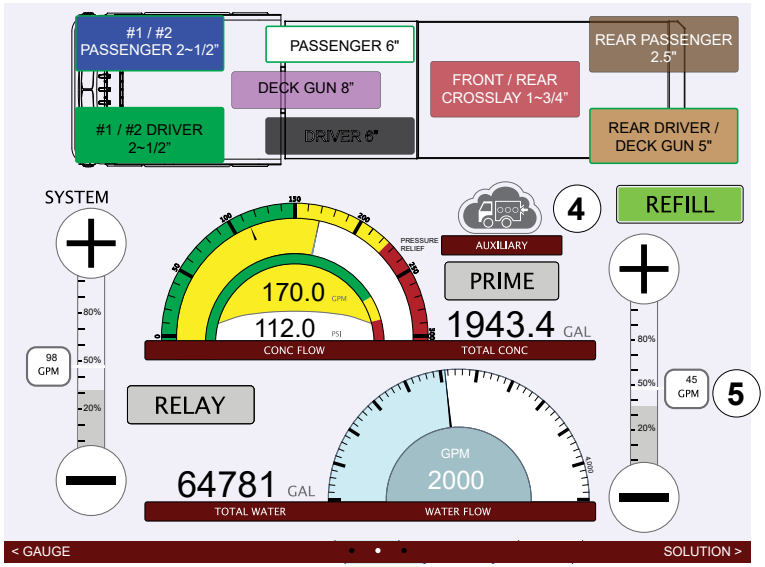
The auxiliary source valve and components required to integrate with the control box are installer-supplied.

Note: *Do not operate the equipment without providing concentrate or water to pump through the system.*

Refilling the On-Board Supply Tank—Screen View



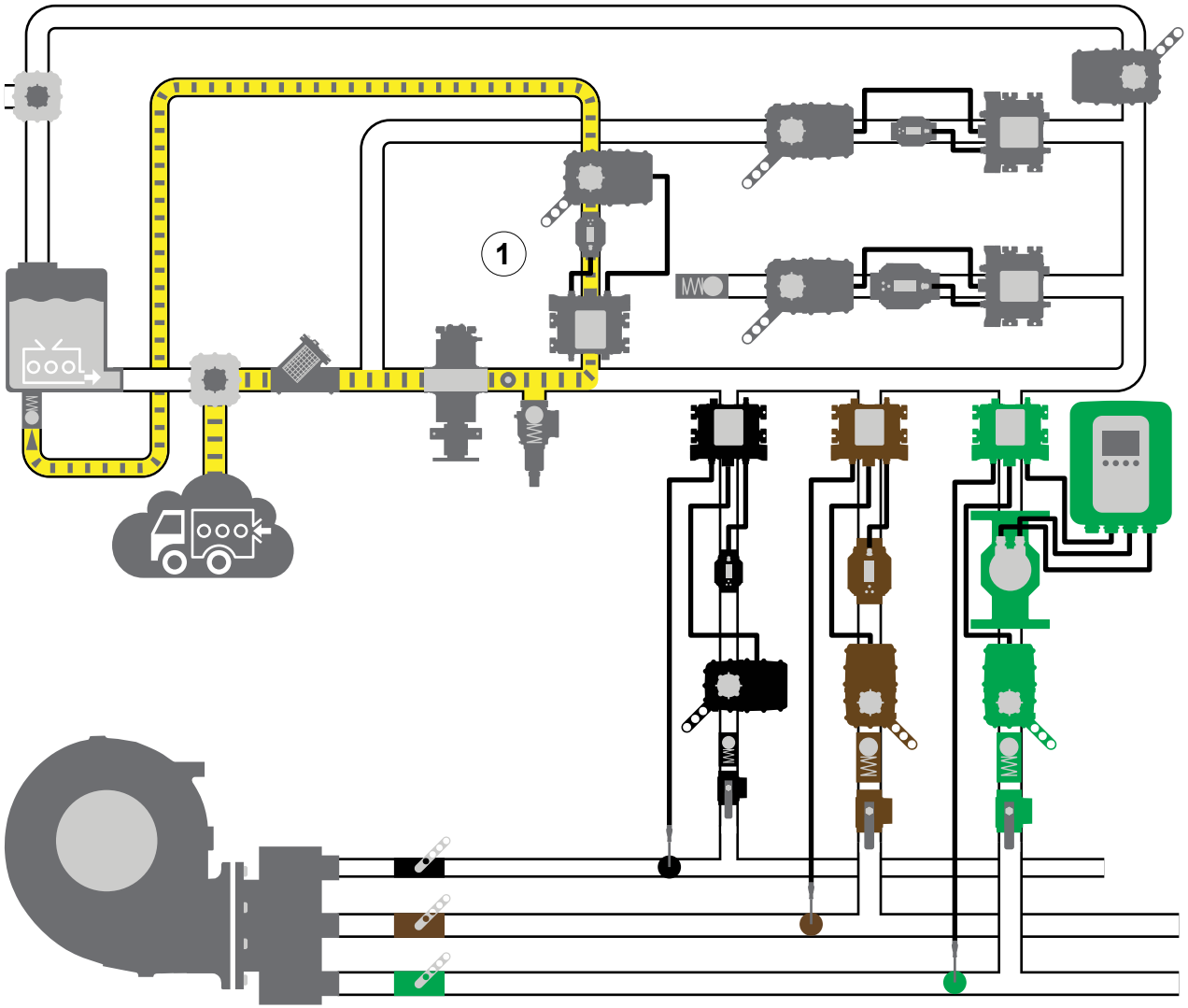




Use the illustration and instructions to refill the on-board concentrate-supply tank from an auxiliary source. This is useful when manually refilling the on-board supply tank is not practical. Refilling the on-board supply tank can take place concurrently with normal discharge operations.

1. Set the concentrate-supply source to auxiliary.
2. Verify that the concentrate-supply icon is showing that auxiliary supply is selected.
3. Press the *REFILL* button to start the process. The system stops when the concentrate-supply tank is full.
4. The *REFILL* button changes appearance and concentrate-supply icon begins to animate when the refill process is active.
5. Adjust the slider to the desired refill rate.

Refilling the On-Board Supply Tank—System View



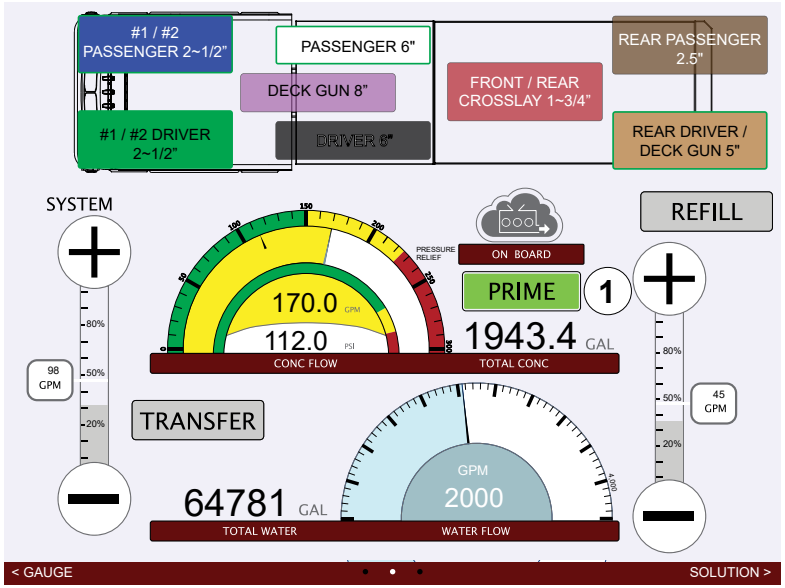
Use the illustration and instructions to understand the system activity when you refill the on-board concentrate-supply tank. You can operate the discharges while refilling the tank.

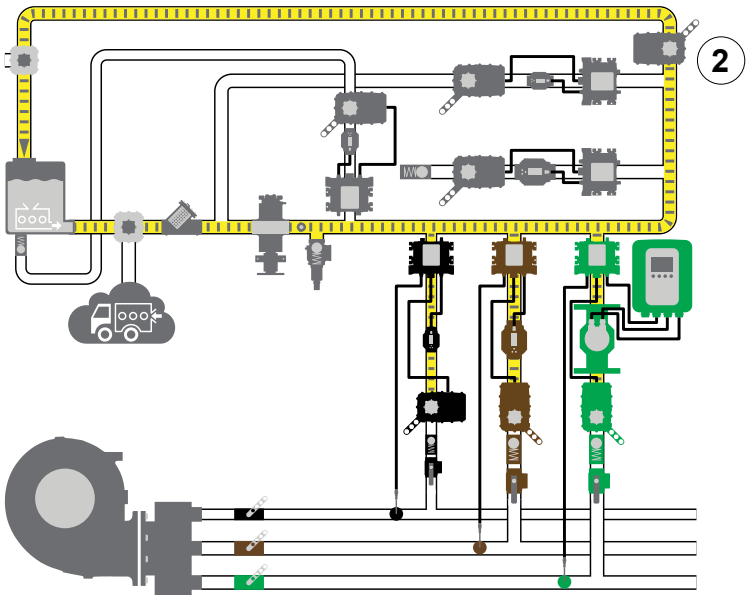
Note: *For instructional purposes, this illustration only focuses on the specific activity in the system that best conveys the topic.*

1 The system sources concentrate from the auxiliary concentrate supply. Concentrate is pumped into the on-board supply tank until the supply-level system determines the tank is full.

Note: *Make sure that you provide enough concentrate to fill the on-board supply tank, or manually stop the pump operation before the auxiliary concentrate supply runs out.*

Manually Priming the Concentrate Line—with Concentrate





Use the illustrations and instructions to manually prime the concentrate line. The system automatically primes before operation. You can also manually prime the system by pressing the prime button until the system is primed.

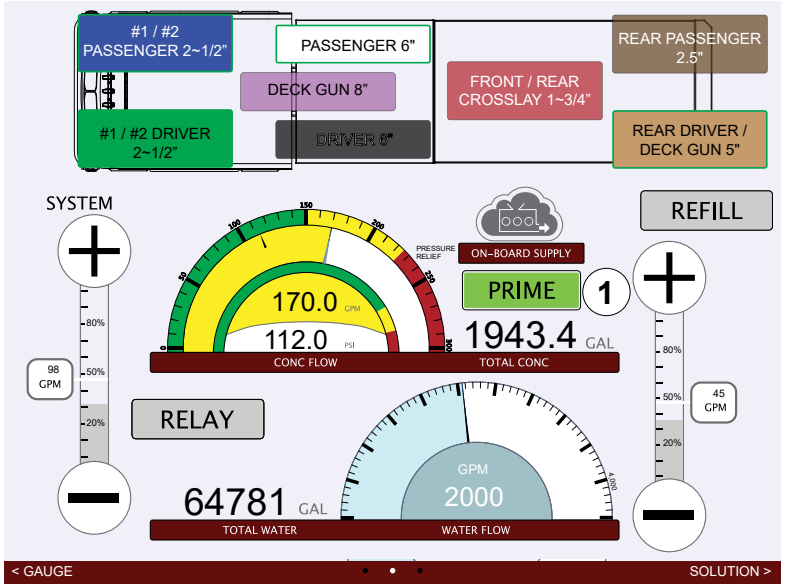
Note: *For instructional purposes, the system illustration only focuses on the specific activity in the system that best conveys the topic.*

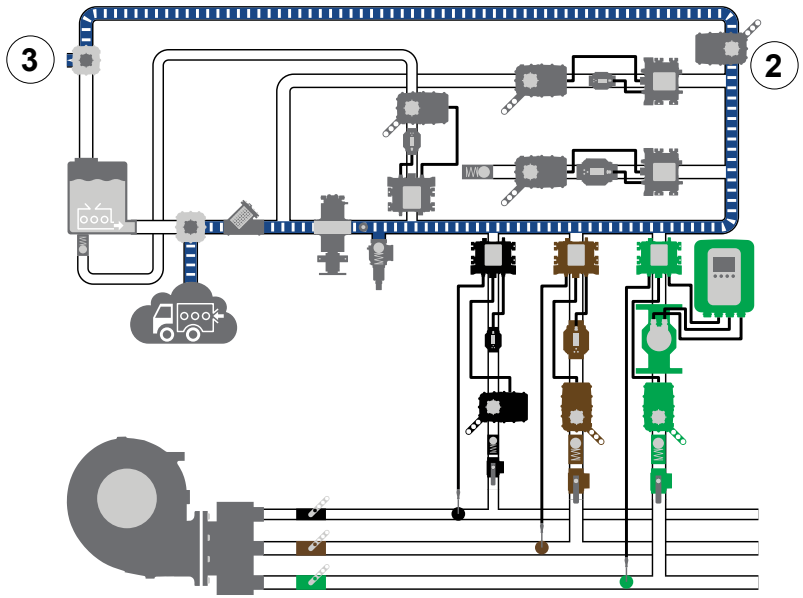
1 Press and hold the prime button until the system is primed.

2 The system evacuates the air in the lines to atmosphere as the concentrate fill the lines. During prime operation a small amount of concentrate will return to the on-board tank. Make sure that the tank capacity is sufficient to allow for normal priming operation.

You can also prime the system from an auxiliary concentrate source. However, extended priming from an auxiliary supply is not recommended as this may overflow the on-board tank.

Manually Priming the Concentrate Line—with Water





Use the illustrations and instructions to manually prime the concentrate line. The system automatically primes before operation. You can also manually prime the system by pressing the prime button until the system is primed.

Note: *For instructional purposes, the system illustration only focuses on the specific activity in the system that best conveys the topic.*

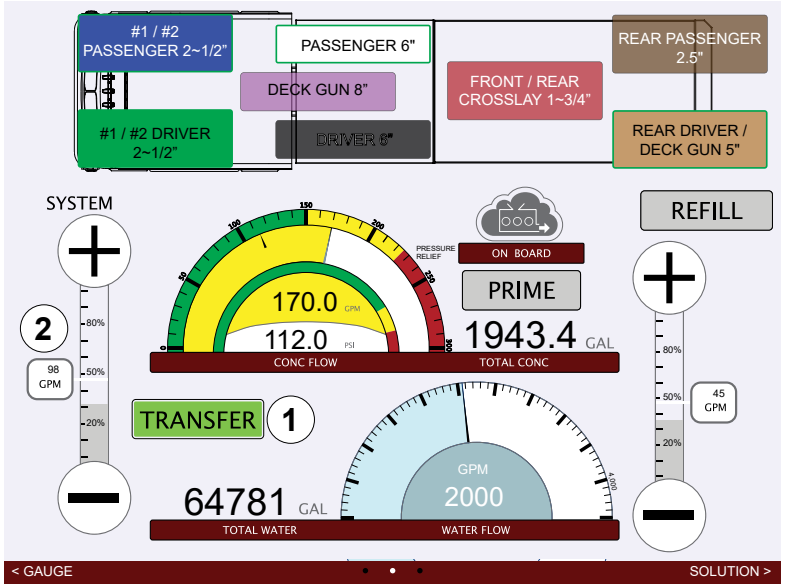
1. Press and hold the prime button until the system is primed.
2. The system evacuates the air in the lines to atmosphere as the concentrate fill the lines.
3. Be aware that certain training and test conditions could contaminate the on-board concentrate supply. If you substitute the foam concentrate with water from the auxiliary source, and have the priming line plumbed to evacuate into a supply tank containing concentrate, the concentrate will be contaminated. To avoid contamination, install a bypass line to divert the water. Also, make sure that you drain any remaining water in the line before priming the system with concentrate.

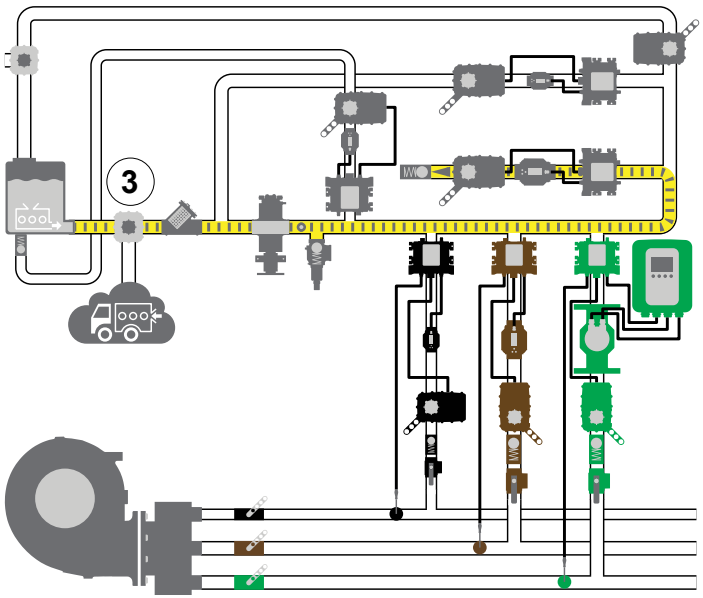
NOTICE

Concentrate Supply Contamination

- **Priming with water can contaminate the on-board concentrate supply.**
- **Divert water to prevent concentrate contamination.**

Transferring Concentrate



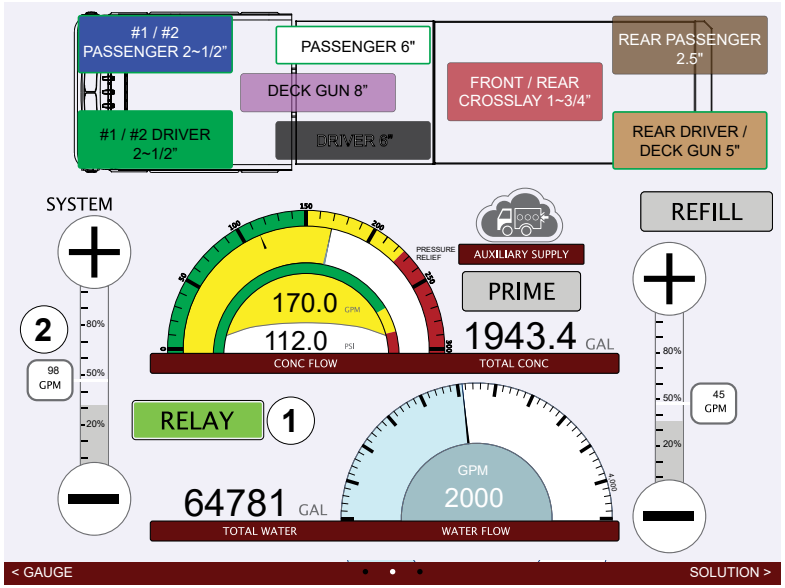


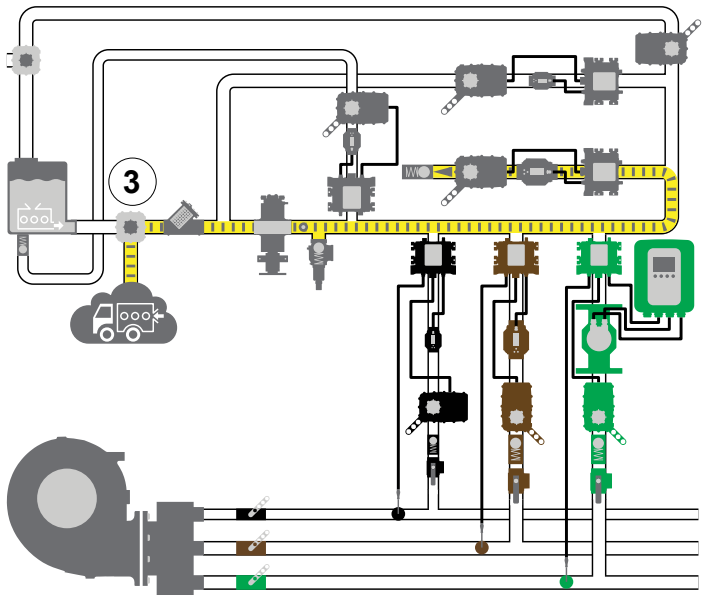
Use the illustrations and instructions to transfer concentrate to another location. If included in your application, you can use the transfer line to move the concentrate from the on-board tank, or external source, to another location. You can operate the discharges while transferring concentrate.

Note: *For instructional purposes, the system illustration only focuses on the specific activity in the system that best conveys the topic.*

1. Press the *TRANSFER* button to begin the transfer process.
2. Adjust the slide to the desired transfer rate.
3. The system transfers the concentrate from the selected source to the transfer line.

Relaying Concentrate



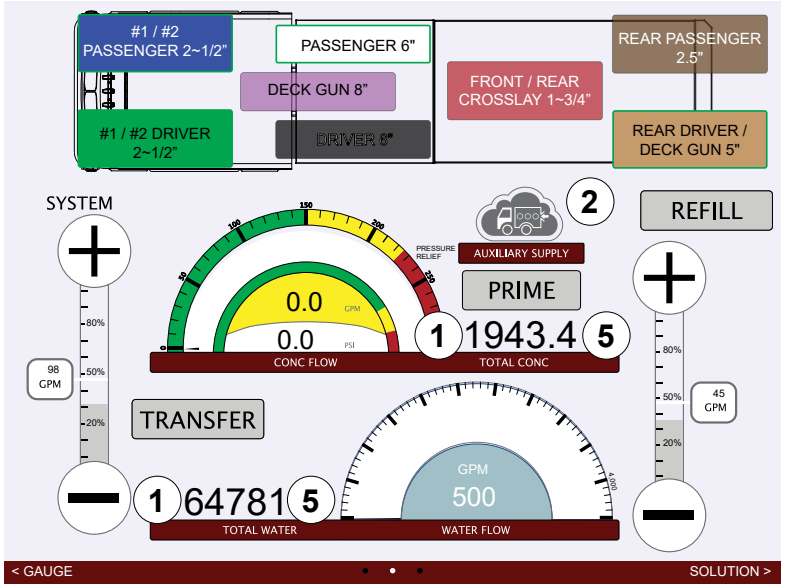


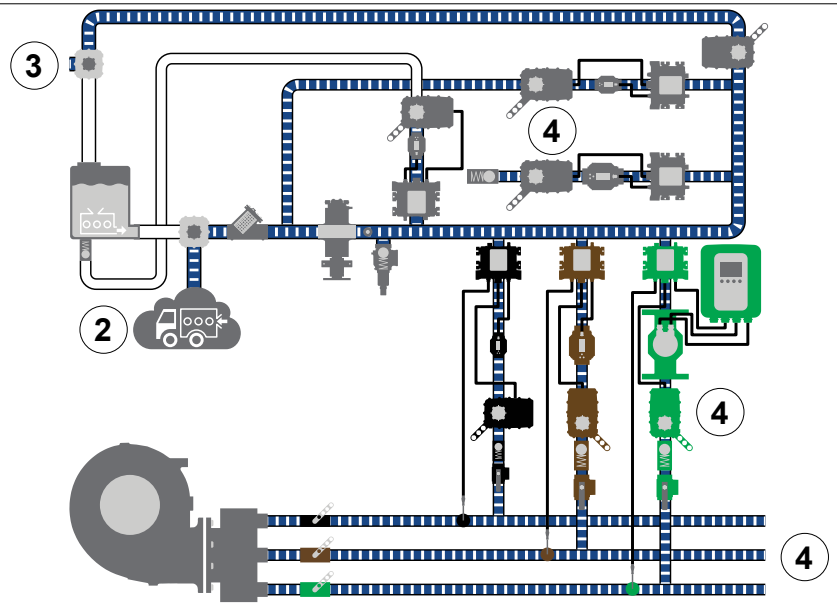
Use the illustrations and instructions to transfer concentrate to another location. If included in your application, you can use the transfer line to move the concentrate from the on-board tank, or external source, to another location. You can operate the discharges while transferring concentrate.

Note: *For instructional purposes, the system illustration only focuses on the specific activity in the system that best conveys the topic.*

1. Press the *RELAY* button to begin the relay process.
2. Adjust the slide to the desired relay rate.
3. The system relays the concentrate from an auxiliary source to the transfer line.

Flushing the Apparatus Plumbing





Use the illustrations and instructions to develop an after-operation flush procedure that removes any residual concentrate left in the plumbing.

Concentrate left in the plumbing after operation could degrade future performance. Therefore, it is strongly recommended that you completely flush any plumbing that may contain residual concentrate, including the DLA, prime, bypass, transfer, auxiliary, and drain lines with clear water until any residual concentrate is removed from the plumbing.

1. Before you flush the plumbing, record the TOTAL CONC and the TOTAL WATER values. Otherwise, any values accrued during the flush procedure will be added to the totals—making them inaccurate.
2. Connect a clean water source to the auxiliary intake.
3. Make sure that you set the prime bypass valve to divert the water away from the concentrate supply tank to avoid contaminating concentrate.

NOTICE

Concentrate Supply Contamination

- **Priming with water can contaminate the on-board concentrate supply.**
- **Divert water to prevent concentrate contamination.**

4. Flush any plumbing exposed to concentrate and drain the lines to prevent future contamination.
5. Recording the values after flushing the system, press and hold the value for the TOTAL CONC, and TOTAL WATER to reset it to zero.

Maintenance Schedule

No scheduled maintenance is required for the discharge line assemblies. However, it is recommended that you periodically inspect the system to reveal excessive debris buildup, worn components, or any developing leaks. Consider environmental conditions, hours of operation, and other factors specific to your application to develop a suitable inspection schedule.

WATEROUS

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