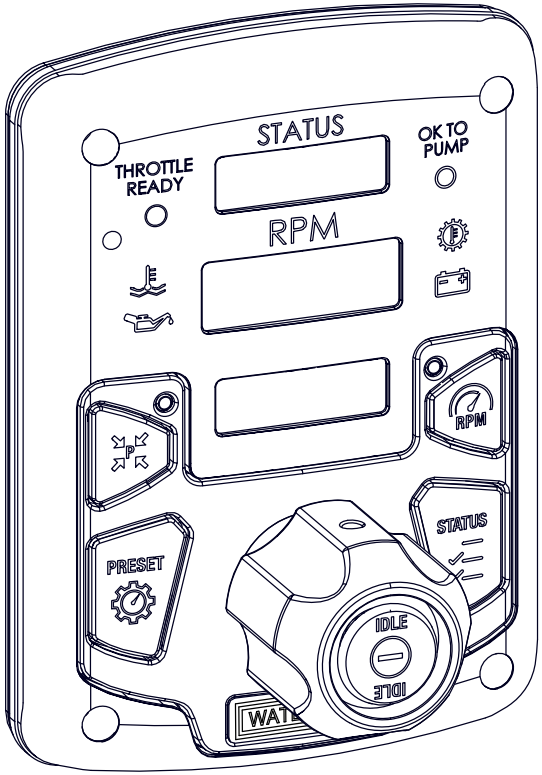
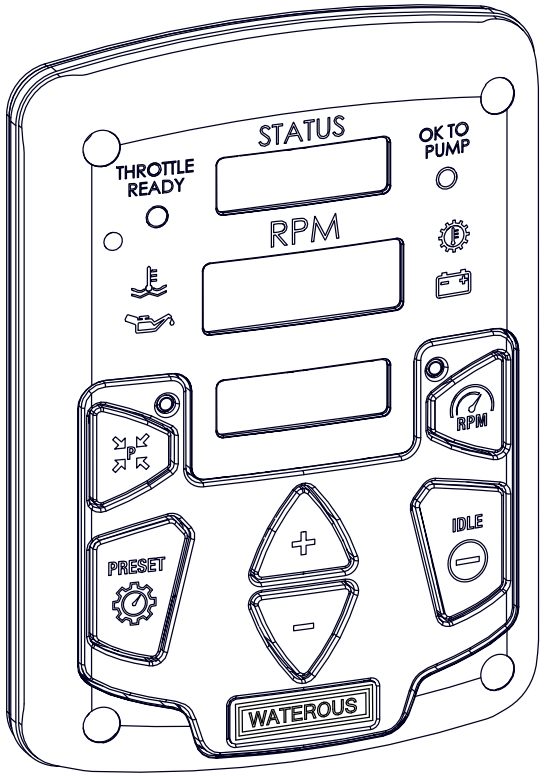
WATEROUS

Form Number: F2837
Issue Date: Aug 12, 2020
Revision Date: Aug 17, 2021

Pressure Governor System

Installation and Operation





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www.waterousco.com

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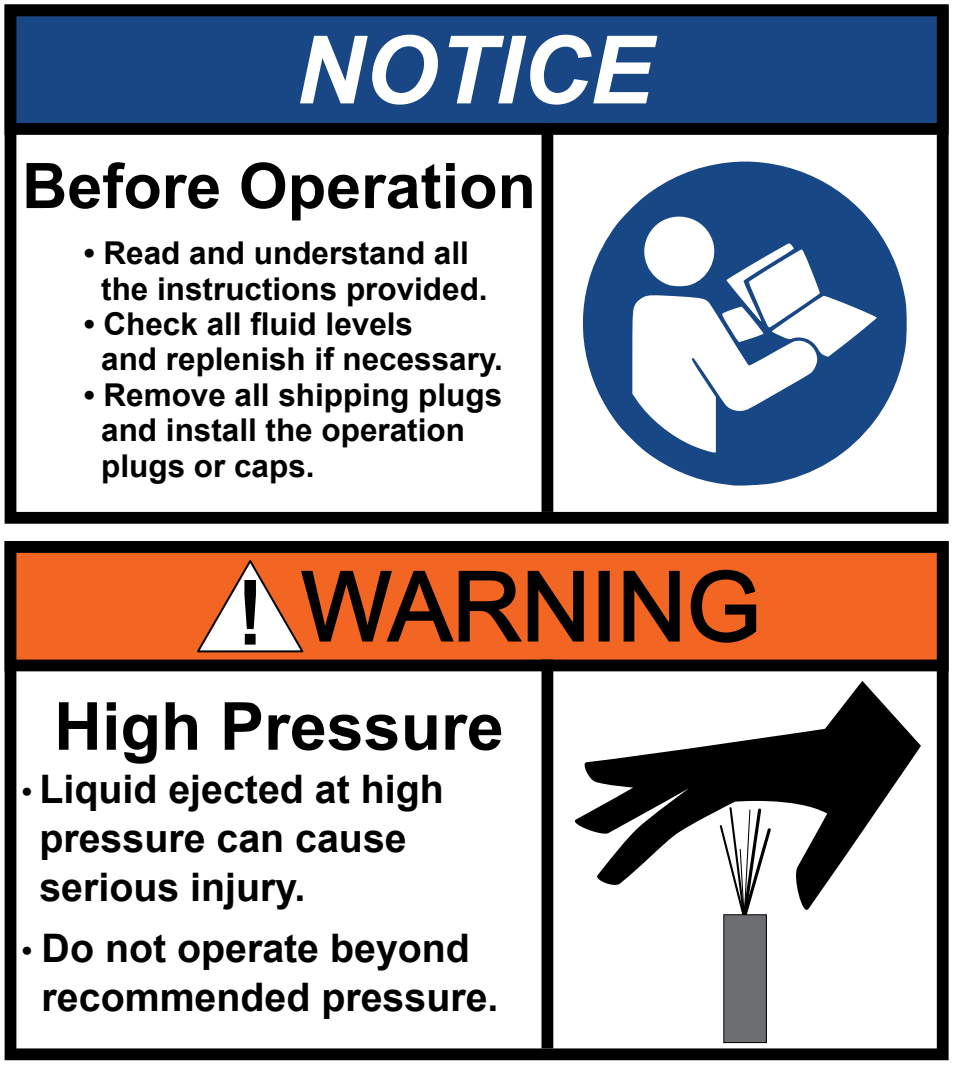
Notes

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, worn, or deteriorated parts.



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.
- Any 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.
- Any equipment described in this document is intended to be operated by a person or persons with the basic knowledge of operating similar equipment.
- Do not install the equipment if you are not familiar with the tools and skills needed to safely perform required procedures—proper installation is the responsibility of the purchaser.

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.

Using this Document

Use the guidelines below when viewing this document.

Viewing the Document Electronically

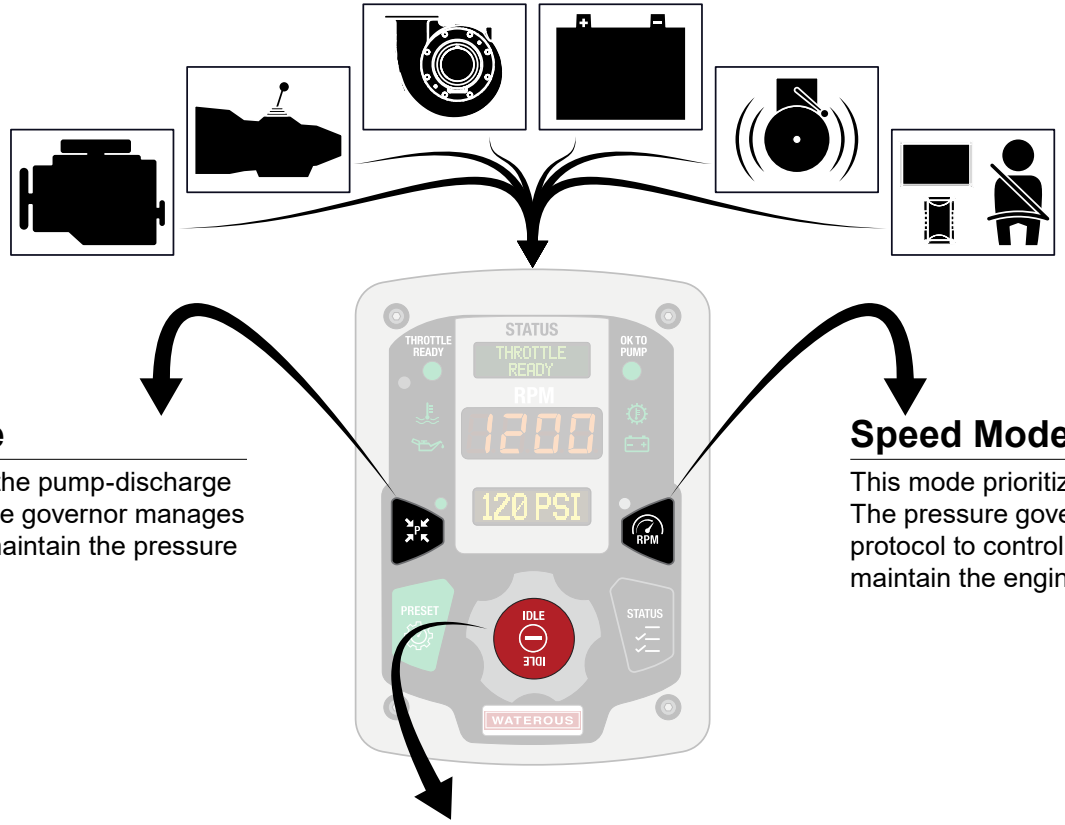
- View this document in landscape orientation.
- Use the table of contents to navigate directly to that section.
- Text **with this appearance** is linked to a reference.

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.

System Overview

The Waterous pressure governor uses various apparatus inputs to control the engine speed and discharge pressure. Additional control and information is available through configuration settings and cable selection. Operating modes are available when interlock settings permit.



Pressure Mode

This mode prioritizes the pump-discharge pressure. The pressure governor manages the engine speed to maintain the pressure set-point.

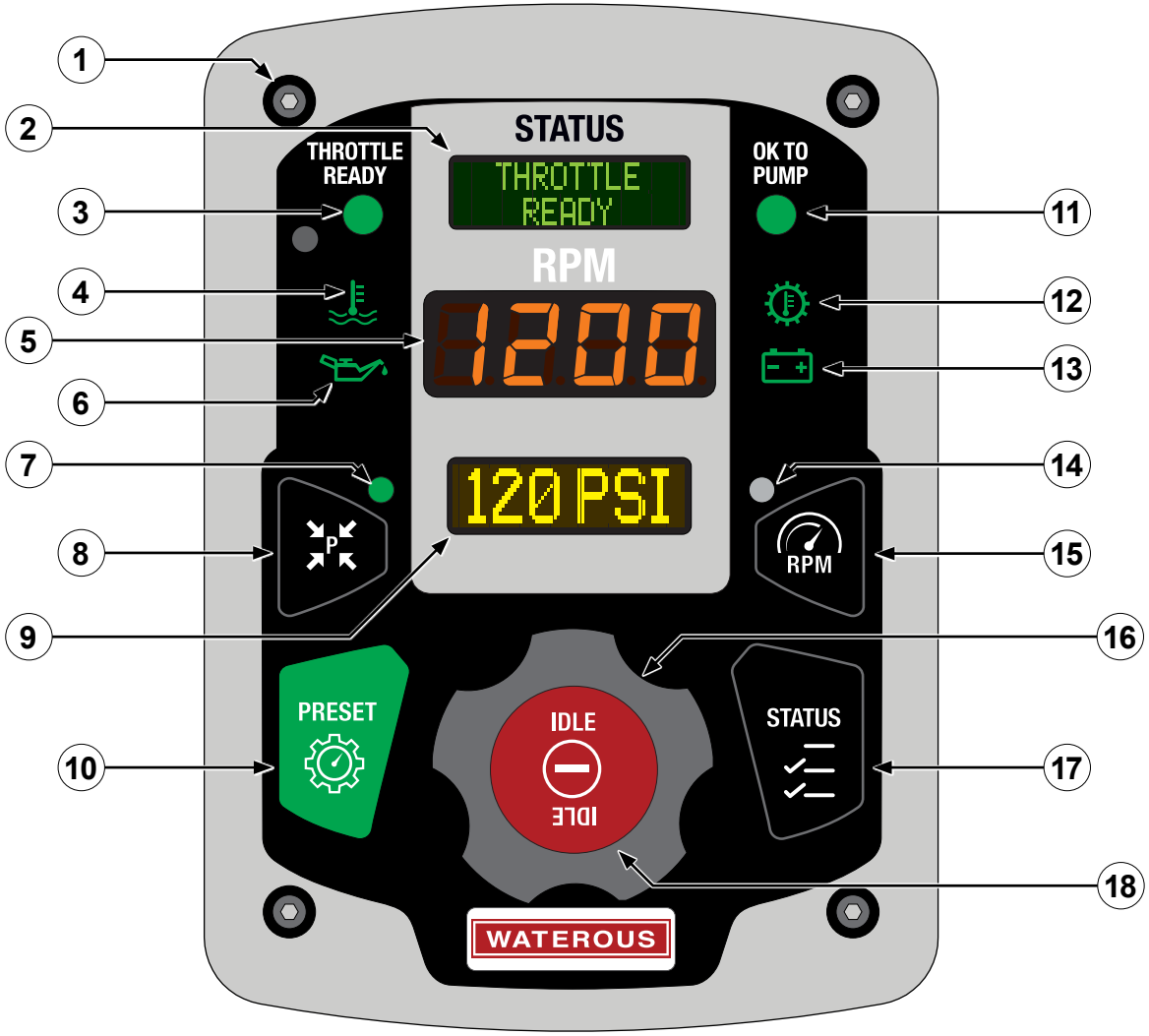
Speed Mode

This mode prioritizes the engine speed. The pressure governor uses SEA J1939 protocol to control the throttle and maintain the engine speed set-point.

Idle Mode

This mode brings the engine speed to idle. The pressure governor uses SEA J1939 protocol to control the throttle and bring engine speed to the idle set-point.

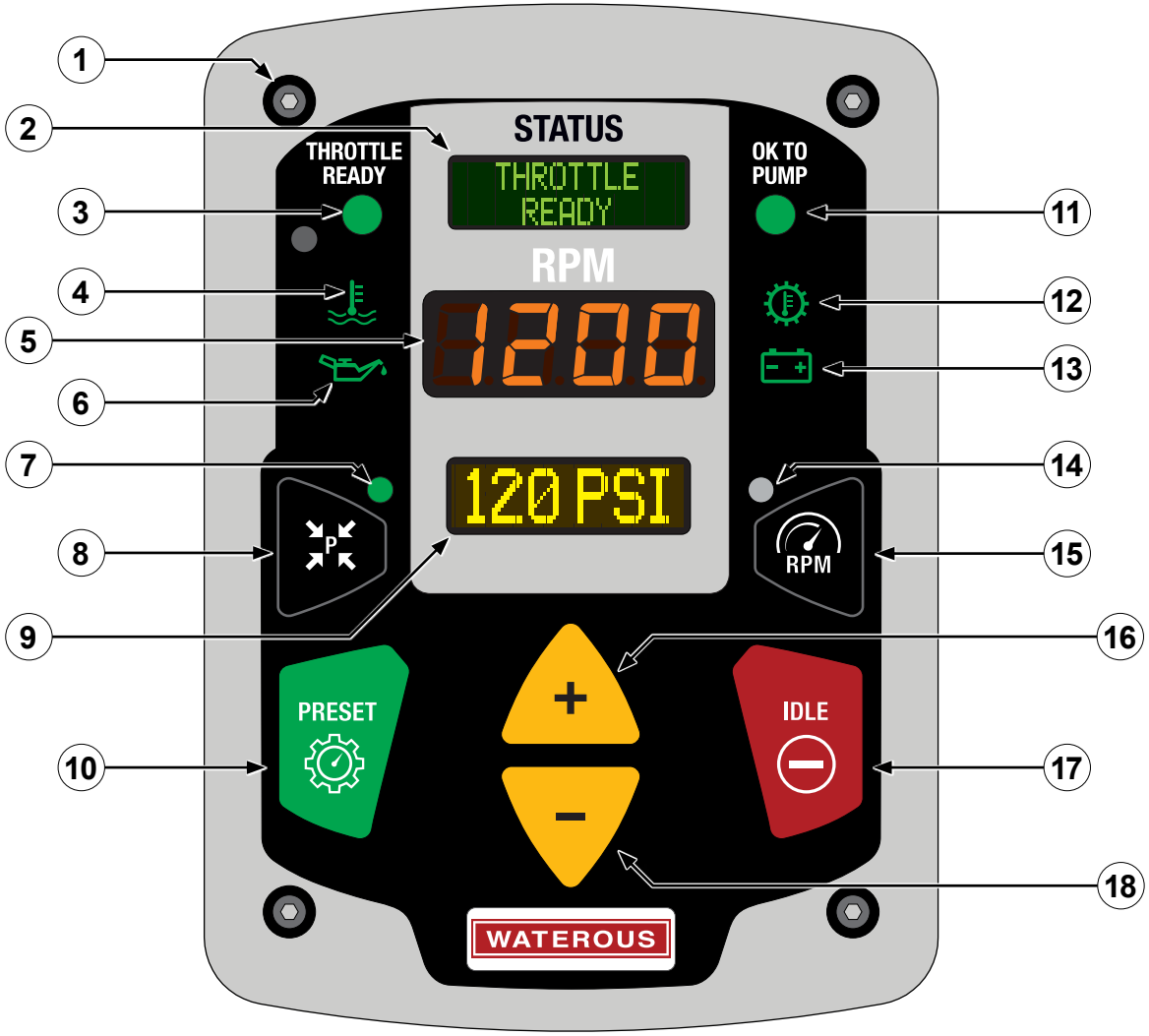
Pressure Governor—Rotary Style



Pressure Governor—Rotary Style

	Feature	Description
1	Mounting holes	This secures the panel to the apparatus.
2	Status display	This displays the interlock conditions, governor operating mode, operator information, engine conditions, transmission conditions, and system alarm information.
3	Throttle ready LED	This indicates the state of the throttle-ready interlock.
4	Engine coolant temperature indicator	This uses 3 colors to indicate the engine coolant temperature. The colors are: green=normal range, yellow=warning range, red=critical range. Each range is defined by SEA J1939 standard or by user defined set-points.
5	Engine speed display	This displays the speed in revolutions per minute (RPM).
6	Oil pressure indicator	This uses 3 colors to indicate the engine oil pressure. The colors are: green=normal range, yellow=warning range, red=critical range. Each range is defined by SEA J1939 standard or by user defined set-points.
7	Pressure mode LED	This indicates the pressure governor is operating in pressure mode.
8	Pressure mode button	This enables/disables the pressure mode.
9	Pump discharge pressure display	This displays the water pump discharge pressure in PSI, kPa, MPa, or bar.
10	Preset button	This brings the engine speed or pump pressure to the preprogrammed PSI or RPM set-point when operating in pressure or speed mode.
11	OK to pump LED	This indicates the state of the OK to pump interlock. The LED illuminates when the throttle ready input and the pump ready input are active. You can also configured it to illuminate when the OK to pump input is active.
12	Transmission temperature LED	This uses 3 colors to indicate the transmission temperature. The colors are: green=normal range, yellow=warning range, red=critical range. Each range is defined by SEA J1939 standard or by user defined set-points.
13	Battery voltage indicator	This uses 3 colors to indicate the apparatus voltage as measured by the pressure governor dc input. The colors are: green=12.5 V or greater, yellow=11.9–12.5 V, red=11.8 or less. You can configure a voltage drop offset if needed.
14	Engine speed mode LED	This indicates the pressure governor is operating in speed mode.
15	Engine speed button	This enables/disables the speed mode.
16	Rotary knob	This increases/decreases the set-point in pressure mode or speed mode. You can configure the knob to increase or decrease in either the clockwise or counterclockwise direction.
17	Status button	This displays various apparatus statistics.
18	Idle button	This enables the idle mode.

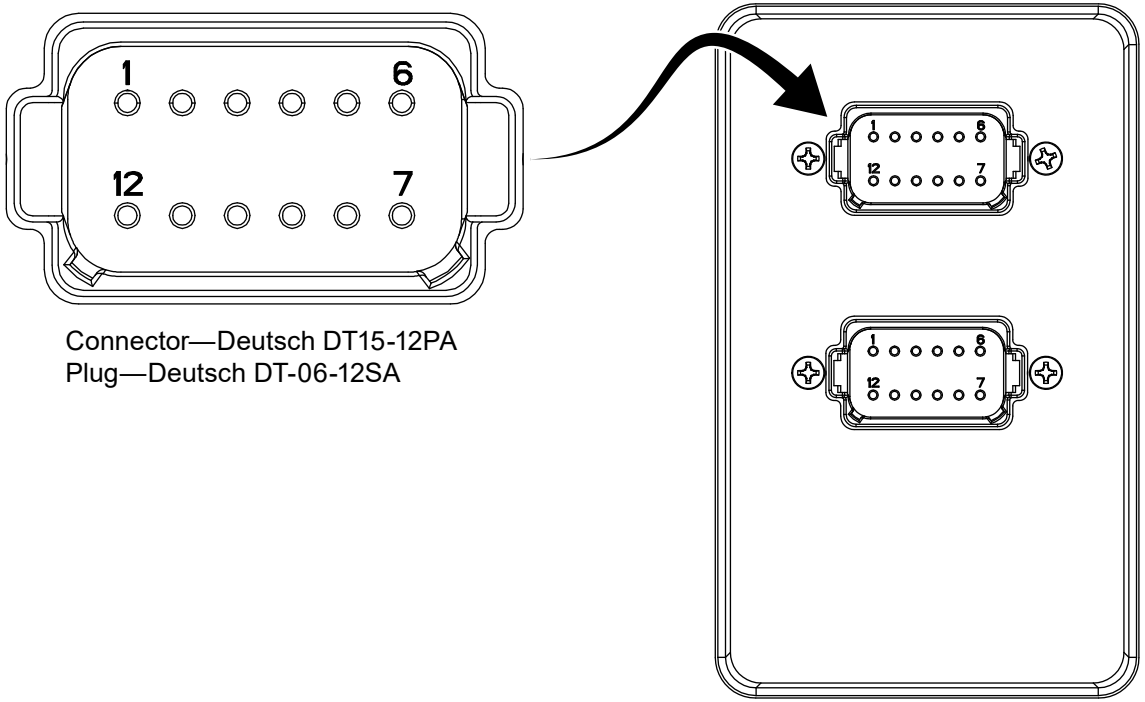
Pressure Governor—Button Style



Pressure Governor—Button Style

	Feature	Description
1	Mounting holes	This secures the controller to the apparatus.
2	Status display	This displays the interlock conditions, governor operating mode, operator information, engine conditions, transmission conditions, and system alarm information.
3	Throttle ready LED	This indicates the state of the throttle-ready interlock.
4	Engine coolant temperature indicator	This uses 3 colors to indicate the engine coolant temperature. The colors are: green=normal range, yellow=warning range, red=critical range. Each range is defined by SEA J1939 standard or by user defined set-points.
5	Engine speed display	This displays the engine speed in revolutions per minute (RPM).
6	Oil pressure indicator	This uses 3 colors to indicate the engine oil pressure. The colors are: green=normal range, yellow=warning range, red=critical range. Each range is defined by SEA J1939 standard or by user defined set-points.
7	Pressure mode LED	This indicates the pressure governor is operating in pressure mode.
8	Pressure mode button	This enables/disables the pressure mode.
9	Pump discharge pressure display	This displays the water pump discharge pressure in PSI, kPa, MPa, or bar.
10	Preset button	This brings the engine speed or pump pressure to the preprogrammed PSI or RPM set-point when operating in pressure or speed mode.
11	OK to pump LED	This indicates the state of the OK to pump interlock. The LED illuminates when the throttle ready input and the pump ready input are active. You can also configured it to illuminate when the OK to pump input is active.
12	Transmission temperature LED	This uses 3 colors to indicate the transmission temperature. The colors are: green=normal range, yellow=warning range, red=critical range. Each range is defined by SEA J1939 standard or by user defined set-points.
13	Battery voltage indicator	This uses 3 colors to indicate the apparatus voltage as measured by the pressure governor dc input. The colors are: green=12.5 V or greater, yellow=11.9–12.5V, red=11.8 or less. You can configure a voltage drop offset if needed.
14	Engine speed mode LED	This indicates the pressure governor is operating in speed mode.
15	Engine speed button	This enables/disables the speed mode.
16	Increase button	This increases the set-point in pressure mode or speed mode.
17	Idle button	This enables the idle mode.
18	Decrease button	This decreases the set-point in mode or speed mode.

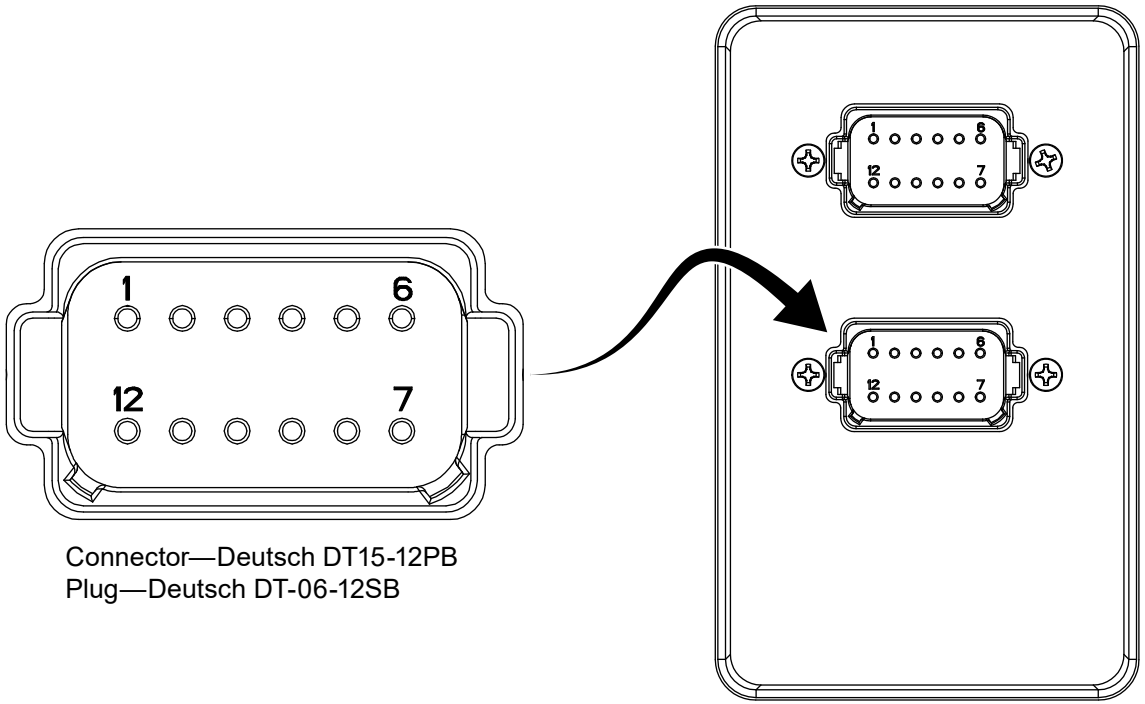
Pressure Governor—Rear Connectors



Connector—Deutsch DT15-12PA
Plug—Deutsch DT-06-12SA

Pin	Name	Description
1	Engine (+) reference	Analog engine control positive reference
2	Throttle ready	Throttle ready interlock input active high
3	High Idle	High idle control input active high
4	OK to pump	OK to pump interlock input active high
5	Discharge sensor ground	Discharge sensor ground
6	Discharge sensor reference	Intake sensor +5VDC power
7	Discharge sensor signal	Intake sensor output signal
8	Engine signal	Analog engine control signal
9	Engine (–) reference	Analog engine control negative reference
10	Pump engage	Pump engaged interlock input active high
11	Delay relay common	Delay relay common input
12	Delay relay normally open	Delay relay normally open output

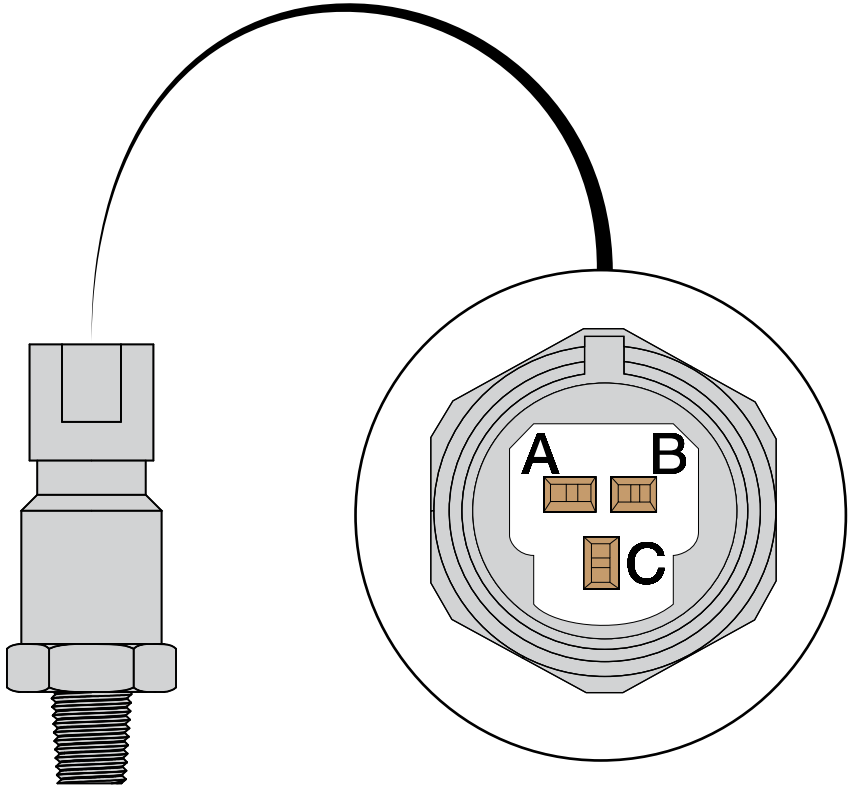
Pressure Governor—Rear Connectors



Connector—Deutsch DT15-12PB
Plug—Deutsch DT-06-12SB

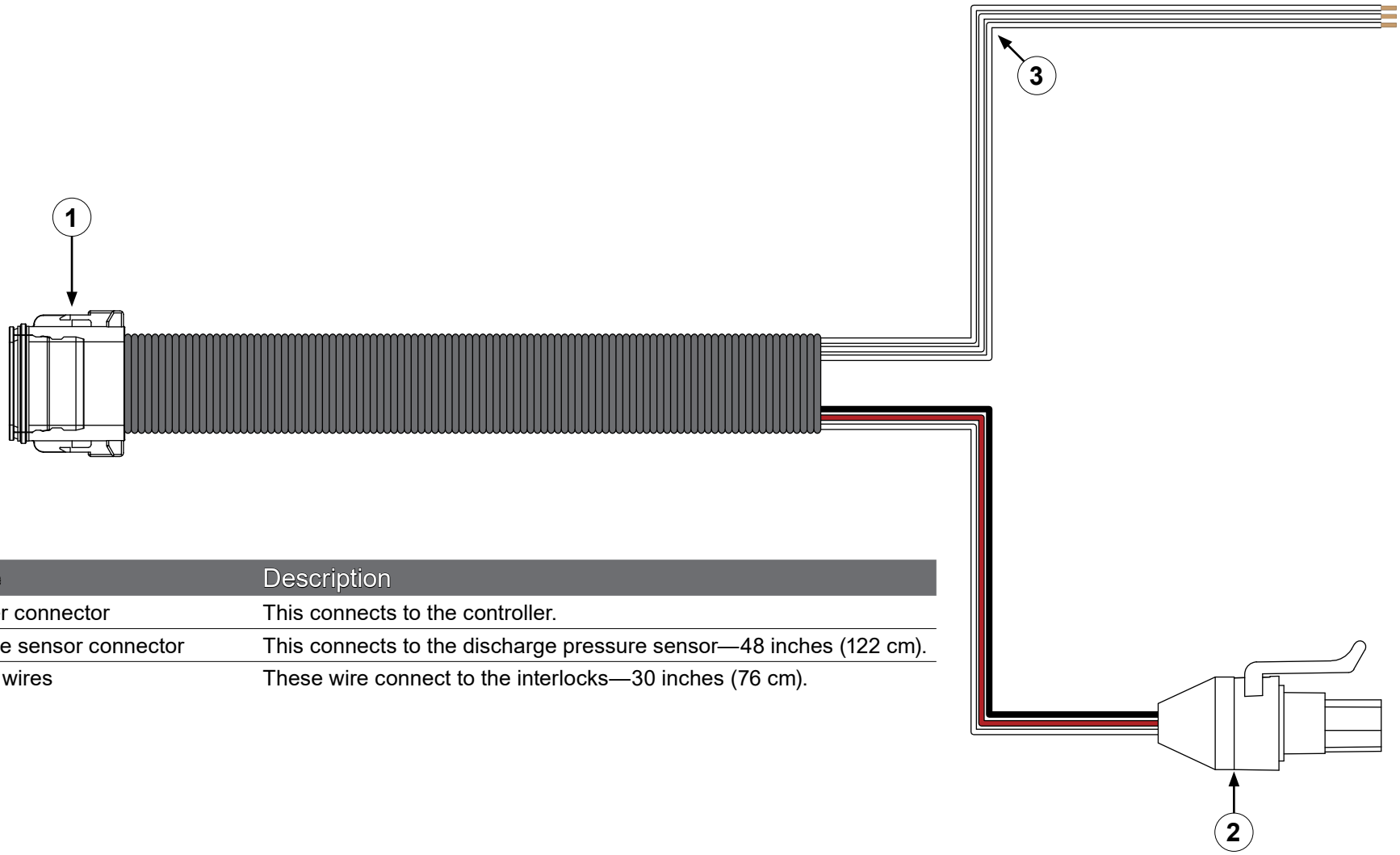
Pin	Name	Description
1	System power	Vehicle system power
2	SAE CAN high	SAE CAN high network signal
3	SAE CAN shield	SAE CAN cable shield
4	IC CAN high	Innovative controls CAN high network signal
5	Intake sensor ground	Intake sensor ground
6	Intake sensor reference	Intake sensor +5VDC power
7	Intake sensor signal	Intake sensor output signal
8	IC CAN shield	Innovative controls CAN cable shield
9	IC CAN low	Innovative controls CAN low network signal
10	Alarm out	Alarm output—active low, 700mA output
11	SAE CAN low	SAE CAN low network signal
12	System ground	Vehicle system ground

Pressure Sensor



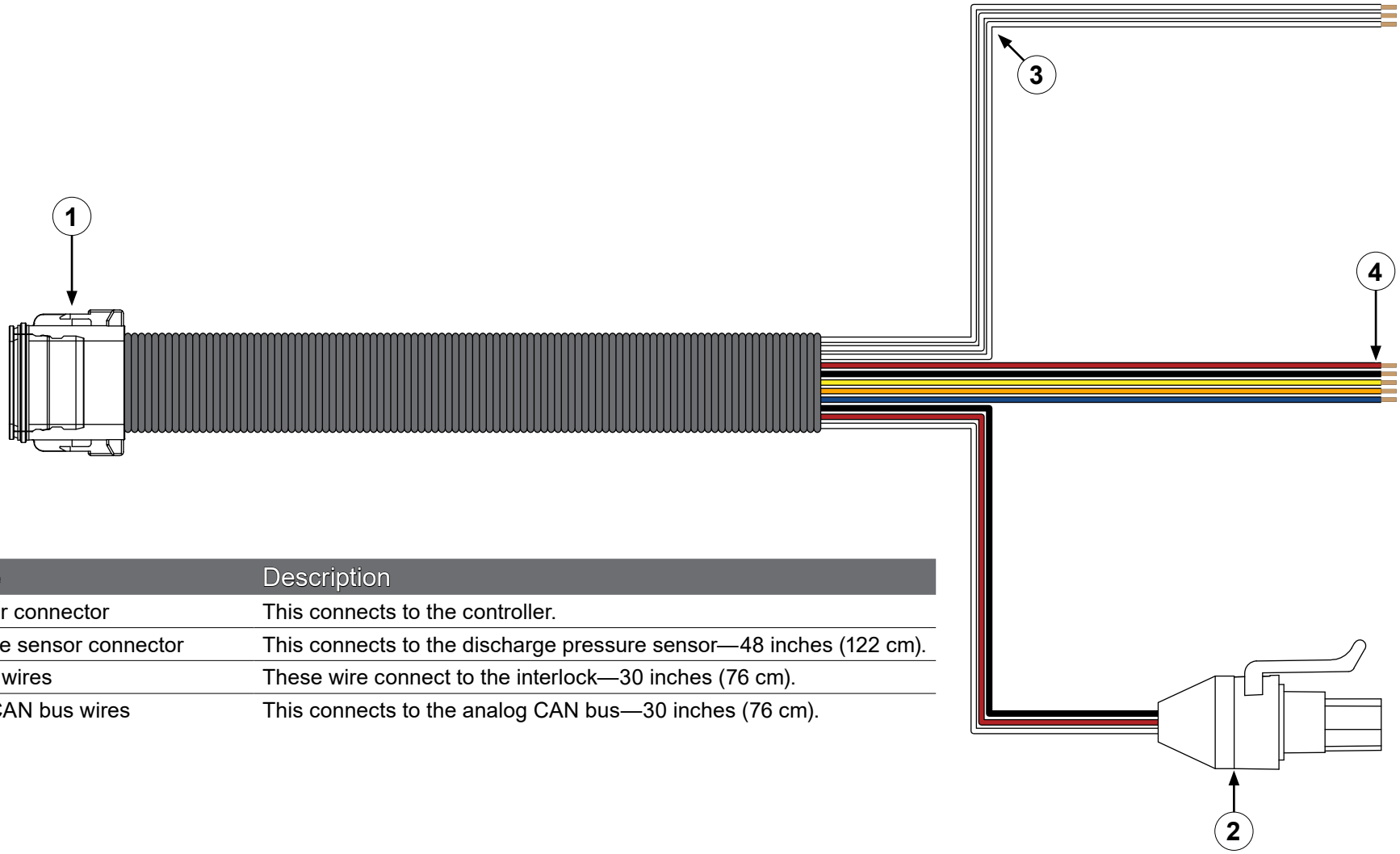
Pin	Name
A	Ground
B	+5VDC
C	Pressure Signal (0.5V to 4.5VDC)

Cable—Interlocks and Discharge Pressure Sensor Connections



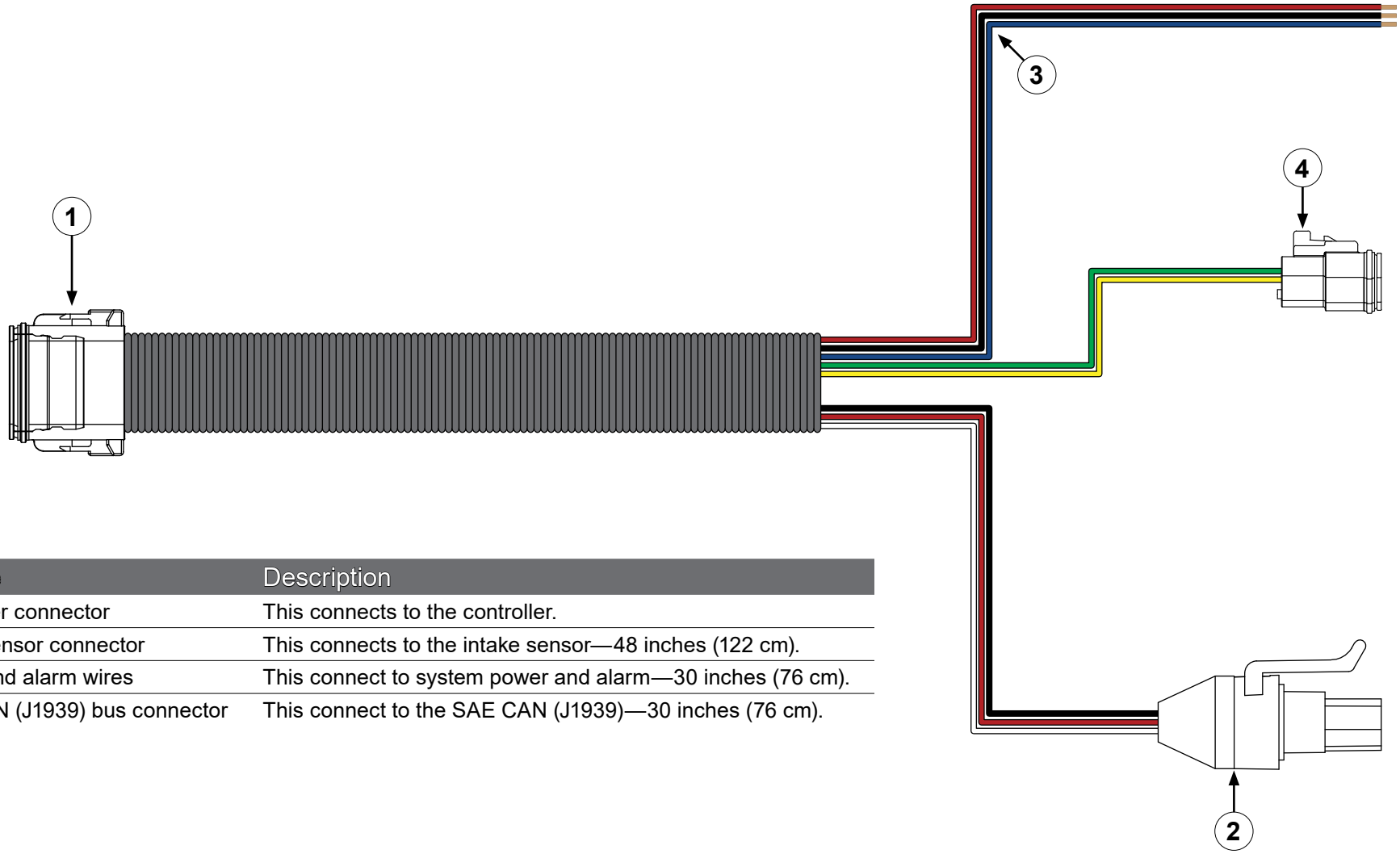
	Feature	Description
1	Controller connector	This connects to the controller.
2	Discharge sensor connector	This connects to the discharge pressure sensor—48 inches (122 cm).
3	Interlock wires	These wire connect to the interlocks—30 inches (76 cm).

Cable—Interlocks, Discharge Pressure Sensor, and Analog Control Connections



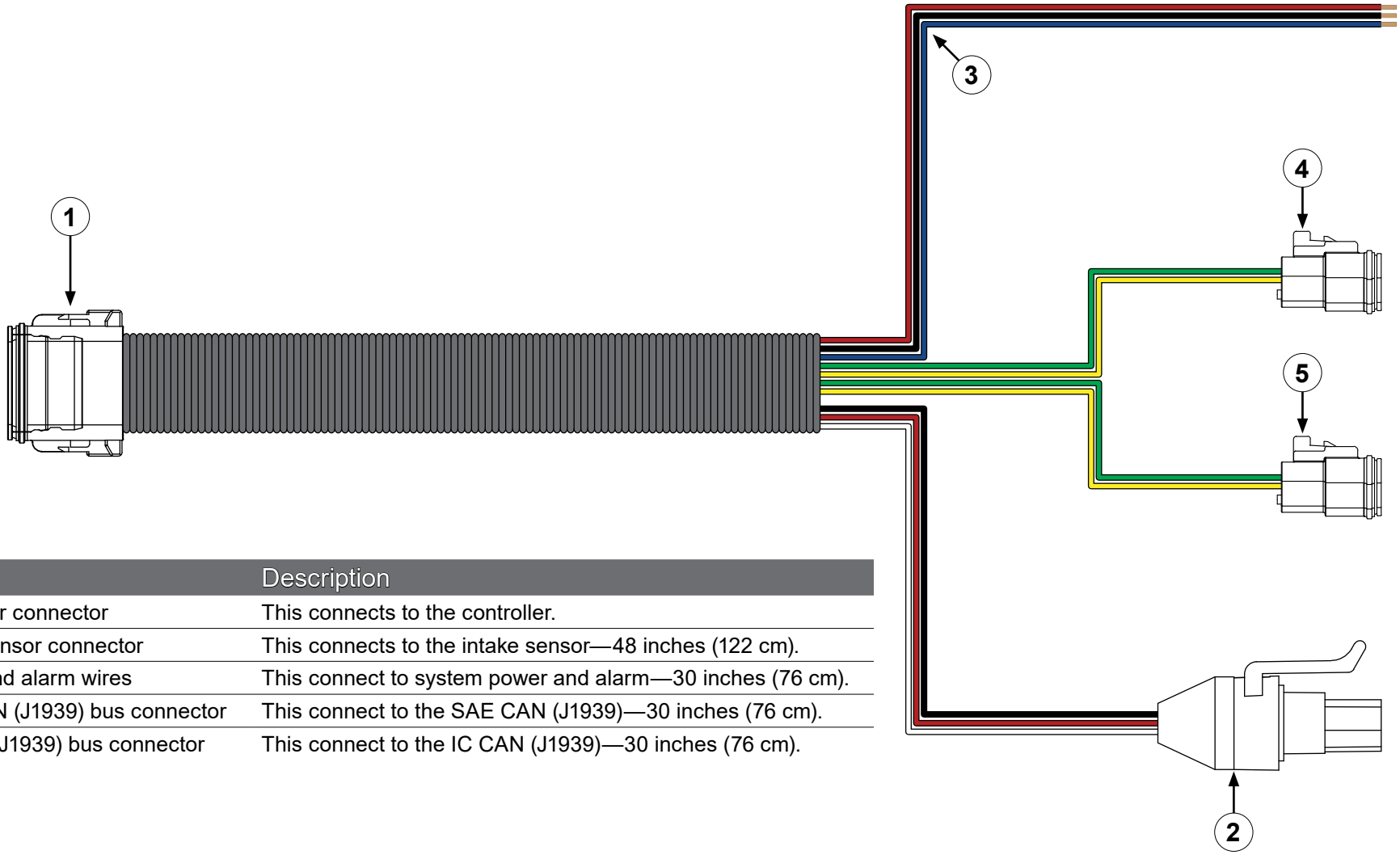
	Feature	Description
1	Controller connector	This connects to the controller.
2	Discharge sensor connector	This connects to the discharge pressure sensor—48 inches (122 cm).
3	Interlock wires	These wire connect to the interlock—30 inches (76 cm).
4	Analog CAN bus wires	This connects to the analog CAN bus—30 inches (76 cm).

Cable—Power, Alarm, SAE CAN (J1939), and Inlet Pressure Sensor Connections



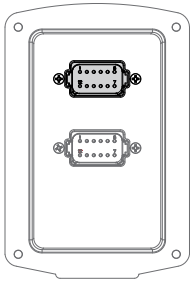
	Feature	Description
1	Controller connector	This connects to the controller.
2	Intake sensor connector	This connects to the intake sensor—48 inches (122 cm).
3	Power and alarm wires	This connect to system power and alarm—30 inches (76 cm).
4	SAE CAN (J1939) bus connector	This connect to the SAE CAN (J1939)—30 inches (76 cm).

Cable—Power, Alarm, SAE CAN (J1939), IC CAN (J1939), and Inlet Pressure Sensor Connections

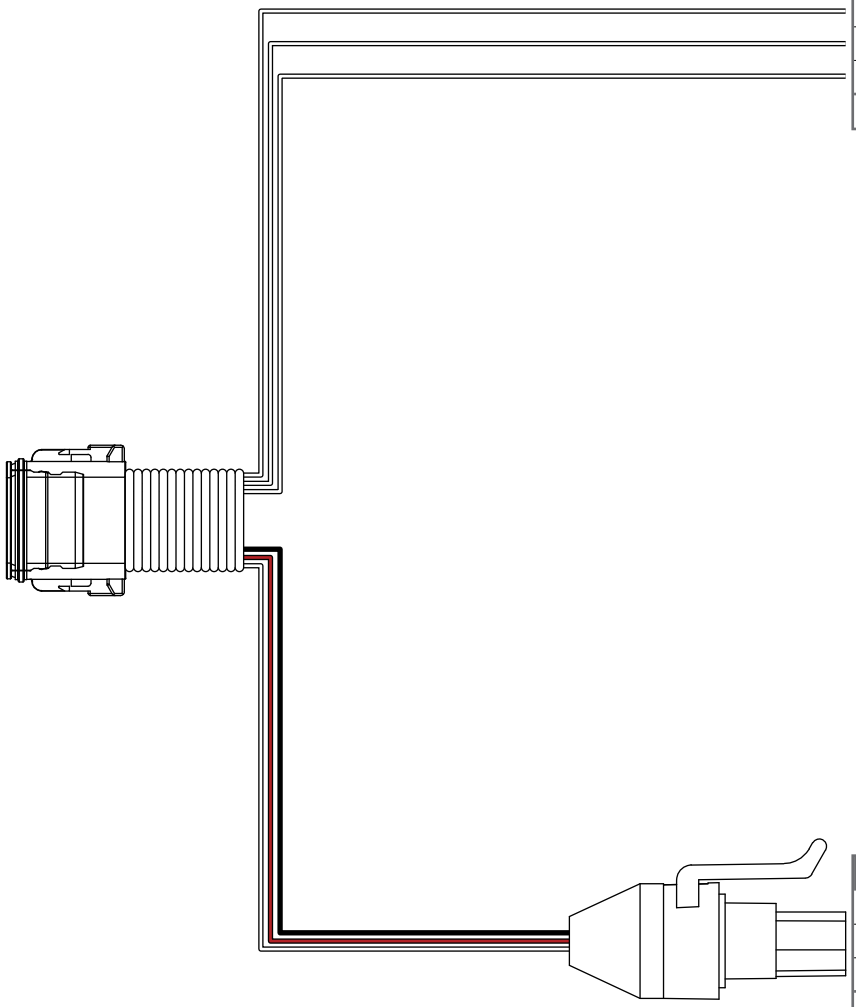


	Feature	Description
1	Controller connector	This connects to the controller.
2	Intake sensor connector	This connects to the intake sensor—48 inches (122 cm).
3	Power and alarm wires	This connect to system power and alarm—30 inches (76 cm).
4	SAE CAN (J1939) bus connector	This connect to the SAE CAN (J1939)—30 inches (76 cm).
5	IC CAN (J1939) bus connector	This connect to the IC CAN (J1939)—30 inches (76 cm).

Engine Cable—Interlocks and Discharge Pressure Sensor



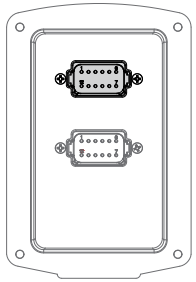
ID	Wire	Description
1		No connection
2	White	Throttle ready
3	White	High idle
4		No connection
5	Black	Discharge sensor ground
6	Red	Discharge sensor reference
7	White	Discharge sensor signal
8		No connection
9		No connection
10	White	Pump engage
11		No connection
12		No connection
Deutsch DT06-12SA		



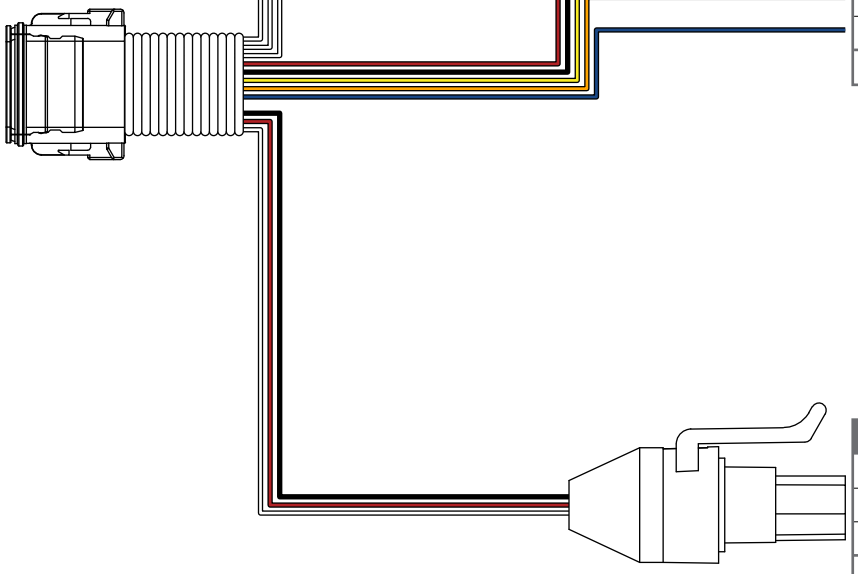
Wire	Description
White	Throttle ready
White	Pump engage
White	High idle
Wire with 1/4 inch stripped end	

ID	Wire	Description
A	Black	Discharge sensor ground
B	Red	Discharge sensor reference
C	White	Discharge sensor signal
Topacx-01-20 AWG		

Engine Cable—Interlocks, Discharge Pressure Sensor, and Analog Control



ID	Wire	Description
1	Red	Engine (+) reference
2	White	Throttle ready
3	White	High idle
4		No connection
5	Black	Discharge sensor ground
6	Red	Discharge sensor reference
7	White	Discharge sensor signal
8	Yellow	Engine signal
9	Black	Engine (–) reference
10	White	Pump engage
11	Orange	Delay relay common
12	Blue	Delay relay normally open
Deutsch DT06-12SA		

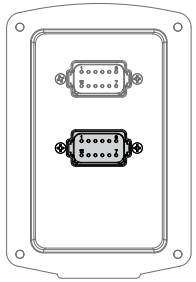


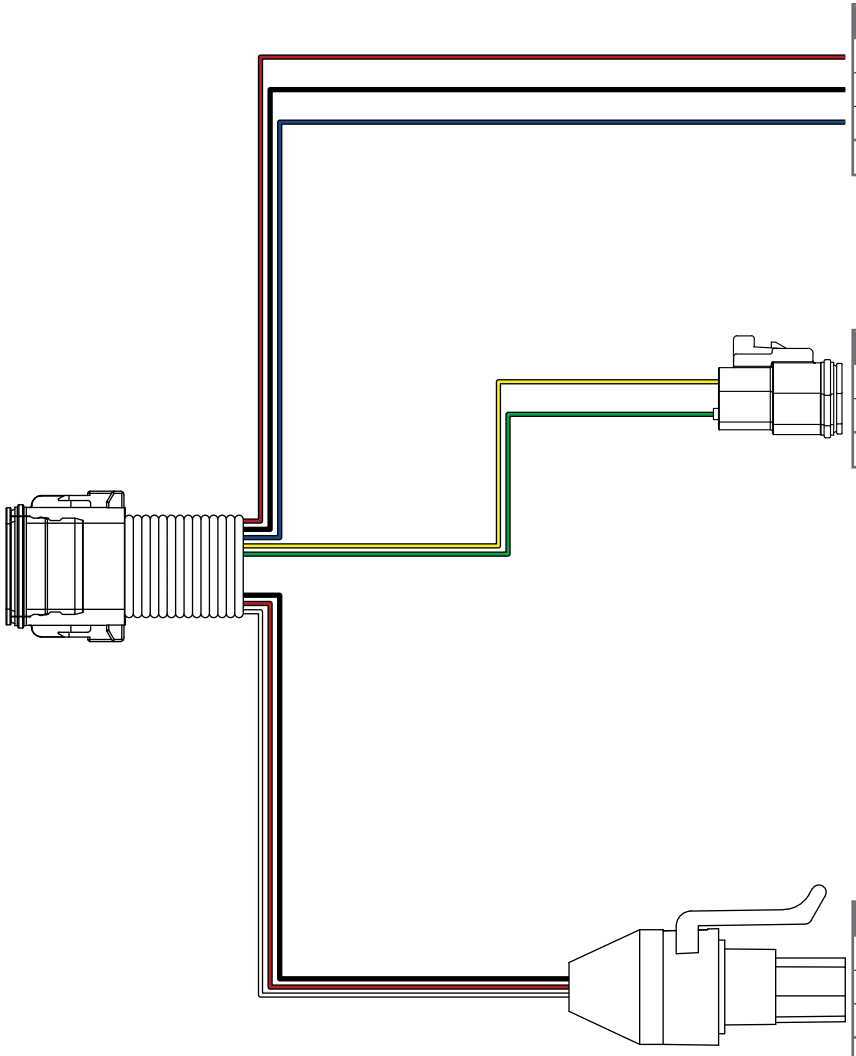
Wire	Description
White	Throttle ready
White	Pump engage
White	High idle
Wire with 1/4 inch stripped end.	

Wire	Description
Red	Engine (+) reference
Black	Engine (–) reference
Yellow	Engine signal
Orange	Delay relay common
Blue	Delay relay normally open
Wire with 1/4 inch stripped end.	

ID	Wire	Description
A	Black	Discharge sensor ground
B	Red	Discharge sensor reference
C	White	Discharge sensor signal
Topacx-01-20 AWG		

Chassis Cable—Power, Alarm, SAE CAN (J1939), and Inlet Pressure Sensor





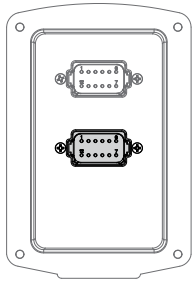
Wire	Description
Red	System power
Black	System ground
Blue	Alarm out
Wire with 1/4 inch stripped end.	

ID	Wire	Description
1	Red	System power
2	Yellow	SAE CAN high
3		No connection
4		No connection
5	Black	Intake sensor ground
6	Red	Intake sensor reference
7	White	Intake sensor signal
8		No connection
9		No connection
10	Blue	Alarm out
11	Green	SAE CAN low
12	Black	System ground
Deutsch DT06-12SB		

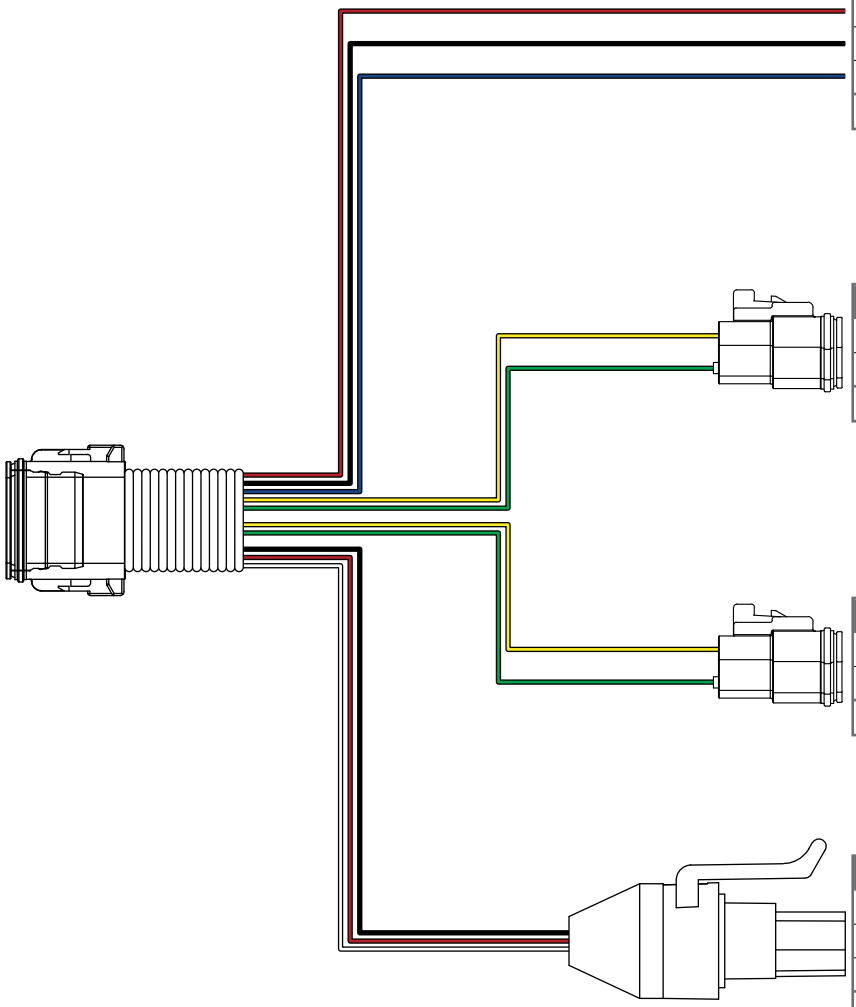
ID	Wire	Description
A	Yellow	SAE CAN high
B	Green	SAE CAN low
Deutsch DT06-3S		

ID	Wire	Description
A	Black	Intake sensor ground
B	Red	Intake sensor reference
C	White	Intake sensor signal
Topacx-01-20 AWG		

Chassis Cable—Power, Alarm, SAE CAN (J1939), IC CAN (J1939), and Inlet Pressure Sensor



ID	Wire	Description
1	Red	System power
2	Yellow	SAE CAN high
3		No connection
4	Yellow	IC CAN high
5	Black	Intake sensor ground
6	Red	Intake sensor reference
7	White	Intake sensor signal
8		No connection
9	Green	IC CAN low
10	Blue	Alarm out
11	Green	SAE CAN low
12	Black	System ground
Deutsch DT06-12SB		



Wire	Description
Red	System power
Black	System ground
Blue	Alarm out
Wire with 1/4 inch stripped end.	

ID	Wire	Description
A	Yellow	SAE CAN high
B	Green	SAE CAN low
Deutsch DT06-3S		

ID	Wire	Description
A	Yellow	IC CAN high
B	Green	IC CAN low
Deutsch DT06-3S		

ID	Wire	Description
A	Black	Intake sensor ground
B	Red	Intake sensor reference
C	White	Intake sensor signal
Topacx-01-20 AWG		

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.
- Connecting electronic devices.
- Configuring and calibrating the system.
- Final testing.

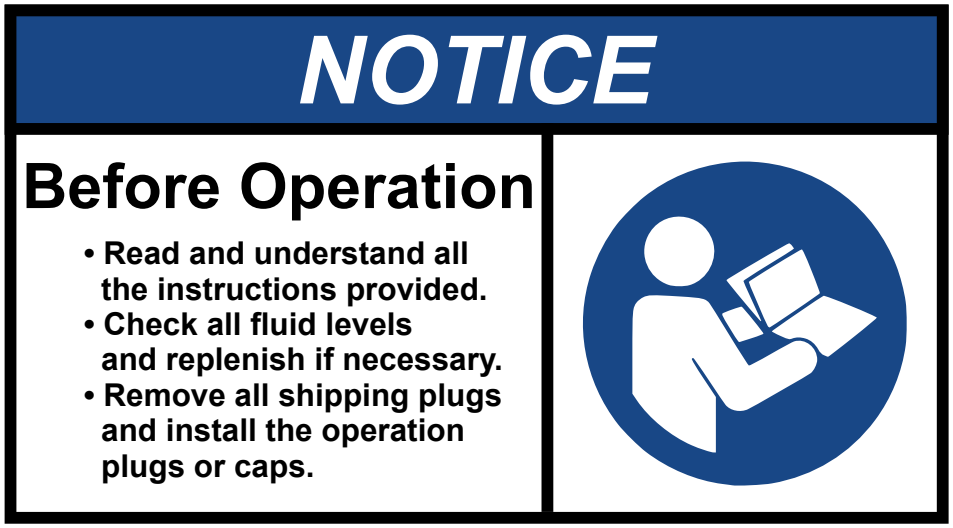
- Do not install the equipment if you are not familiar with the tools and skills needed to safely perform required procedures—proper installation is the responsibility of the purchaser.

Determining Cable and Wire Routing

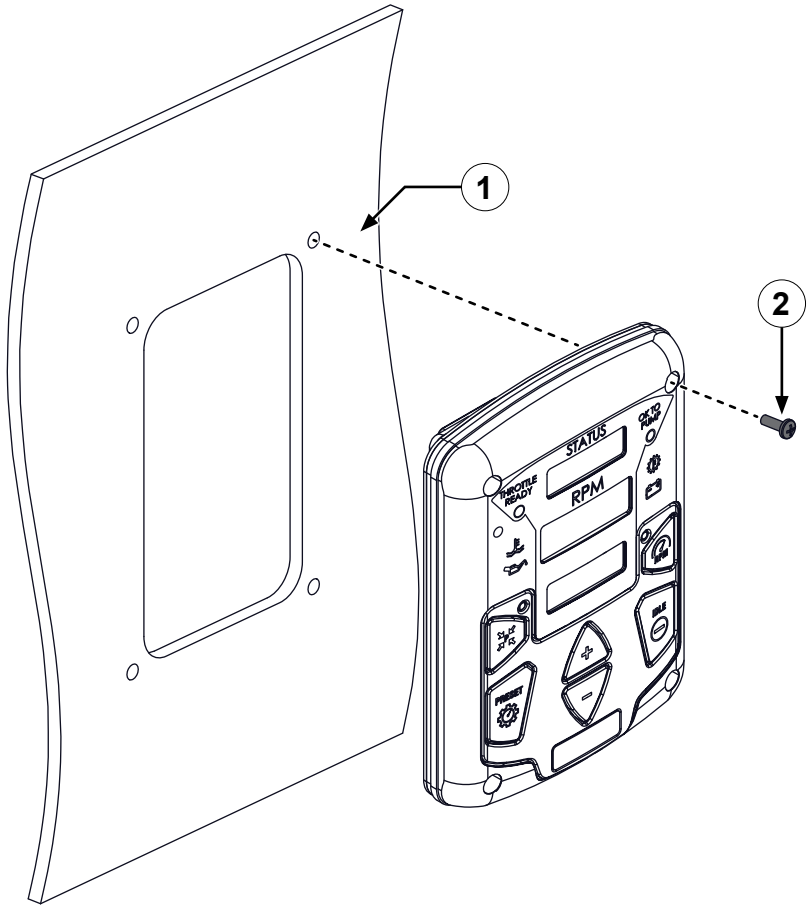
Use the *Wiring Best Practices* document, available at www.waterousco.com, as a guide to select and route wiring for your application.

Preparing for 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.



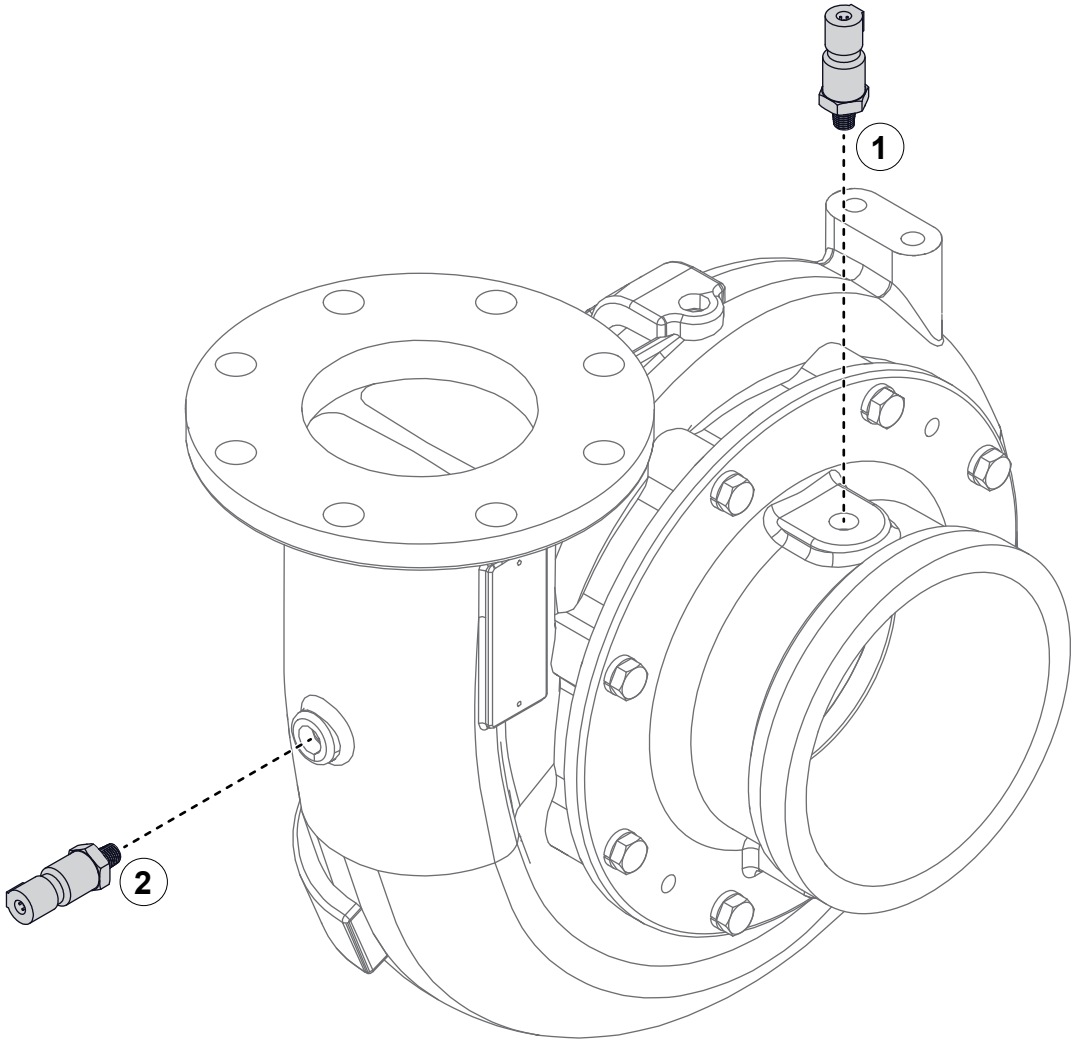
Installing the Pressure Governor



Use the illustrations and instructions to install the pressure governor.

1. Locate and drill the corresponding mounting holes and cutout to secure the pressure governor to the apparatus.
2. Locally source (4), #10 screws and locknuts or the metric equivalents, to secure the pressure governor to the apparatus.

Installing the Pressure Sensors

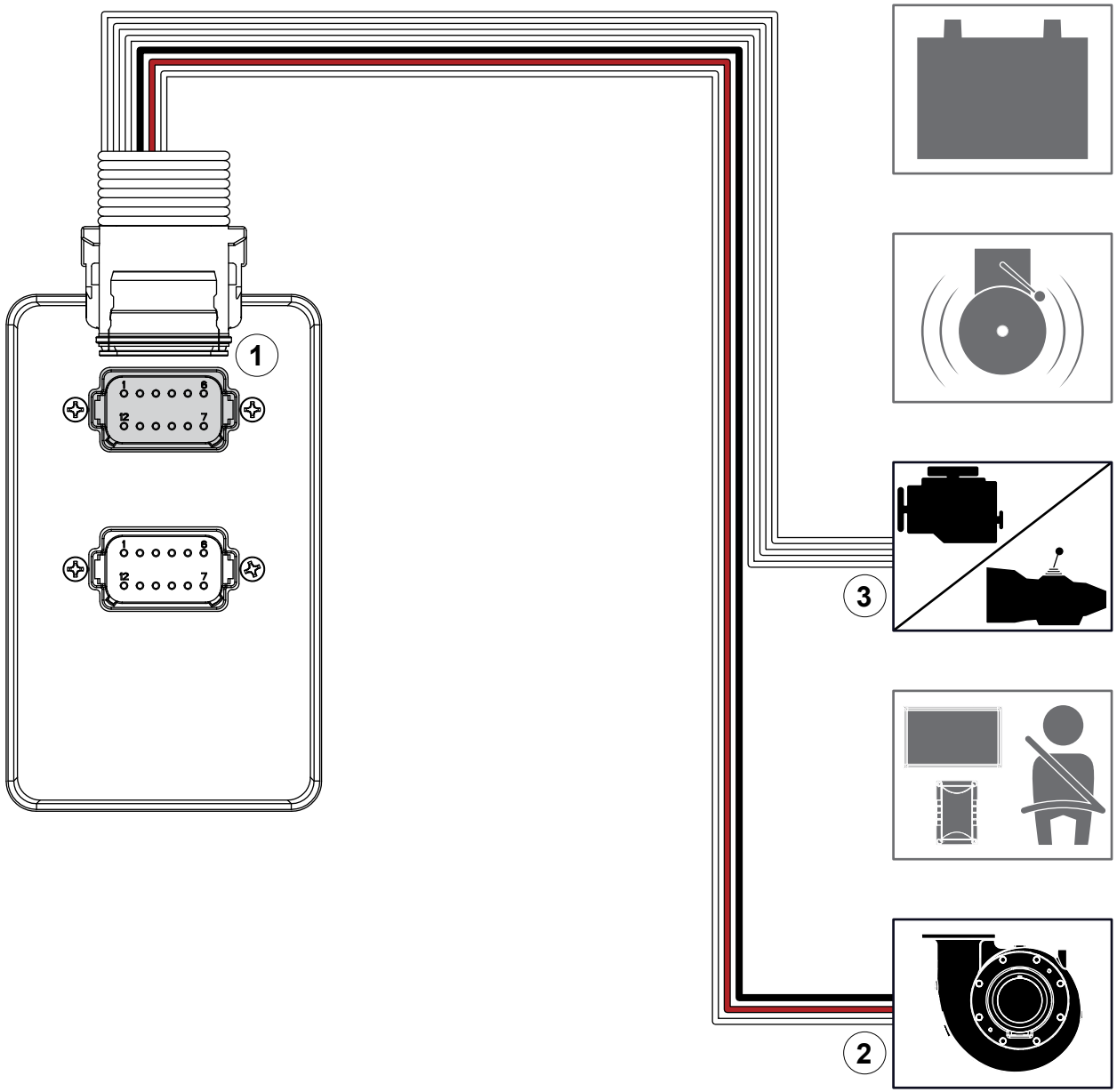


Use the illustration and instructions to install the intake and discharge-pressure sensors.

You can improve the accuracy of the sensors by calibrating them at 0 pressure. You can also calibrate a second set-point using a static pressure source. Refer to: **"Configuring the Pressure Governor—User Configuration Mode" on page 30** to configure the 0 and static set-points.

1. To install the intake-pressure sensor, do the following:
   - Install the intake-pressure sensor to the water-pump intake.
   - Make sure that the intake-pressure sensor is set to 300 PSI. Refer to: **"Configuring the Pressure Governor—User Configuration Mode" on page 30** parameter 17.
2. To install the discharge-pressure sensor, do the following:
   - Install the discharge-pressure sensor to the water-pump discharge.
   - Make sure that the discharge-pressure sensor is set to 300 PSI for a single-stage pump, and 600 PSI for a two-stage pump. Refer to: **"Configuring the Pressure Governor—User Configuration Mode" on page 30** parameter 16.

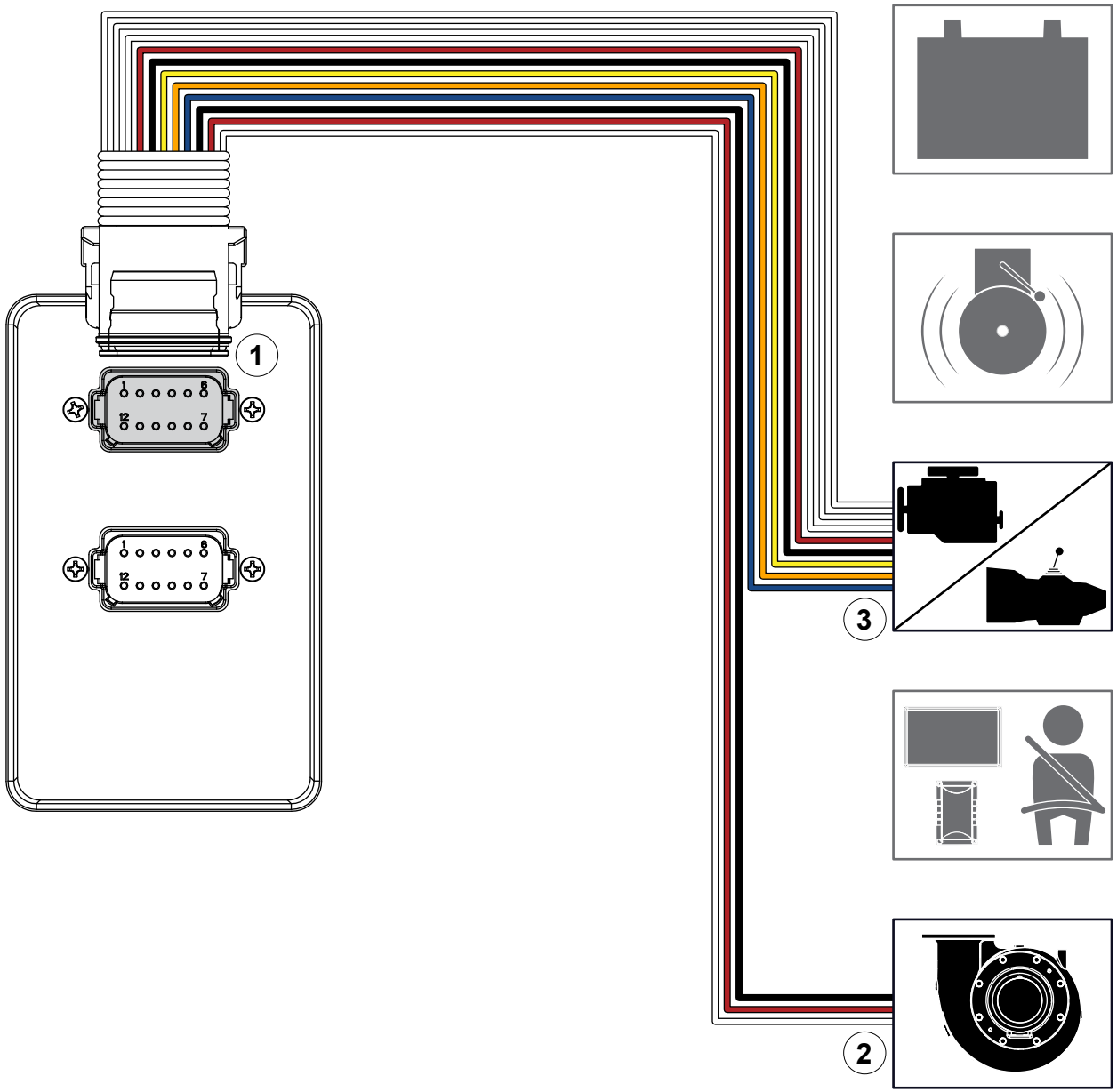
Connecting the Cable—Interlocks and Discharge Pressure Sensor



Use the illustration and instructions to connect the cable to the appropriate component or controller. Use the wire label to determine the appropriate connector.

1. Connect the appropriate connector to the pressure governor.
2. Connect the appropriate connector to the discharge pressure sensor.
3. Connect the interlock wires to the appropriate engine controller.

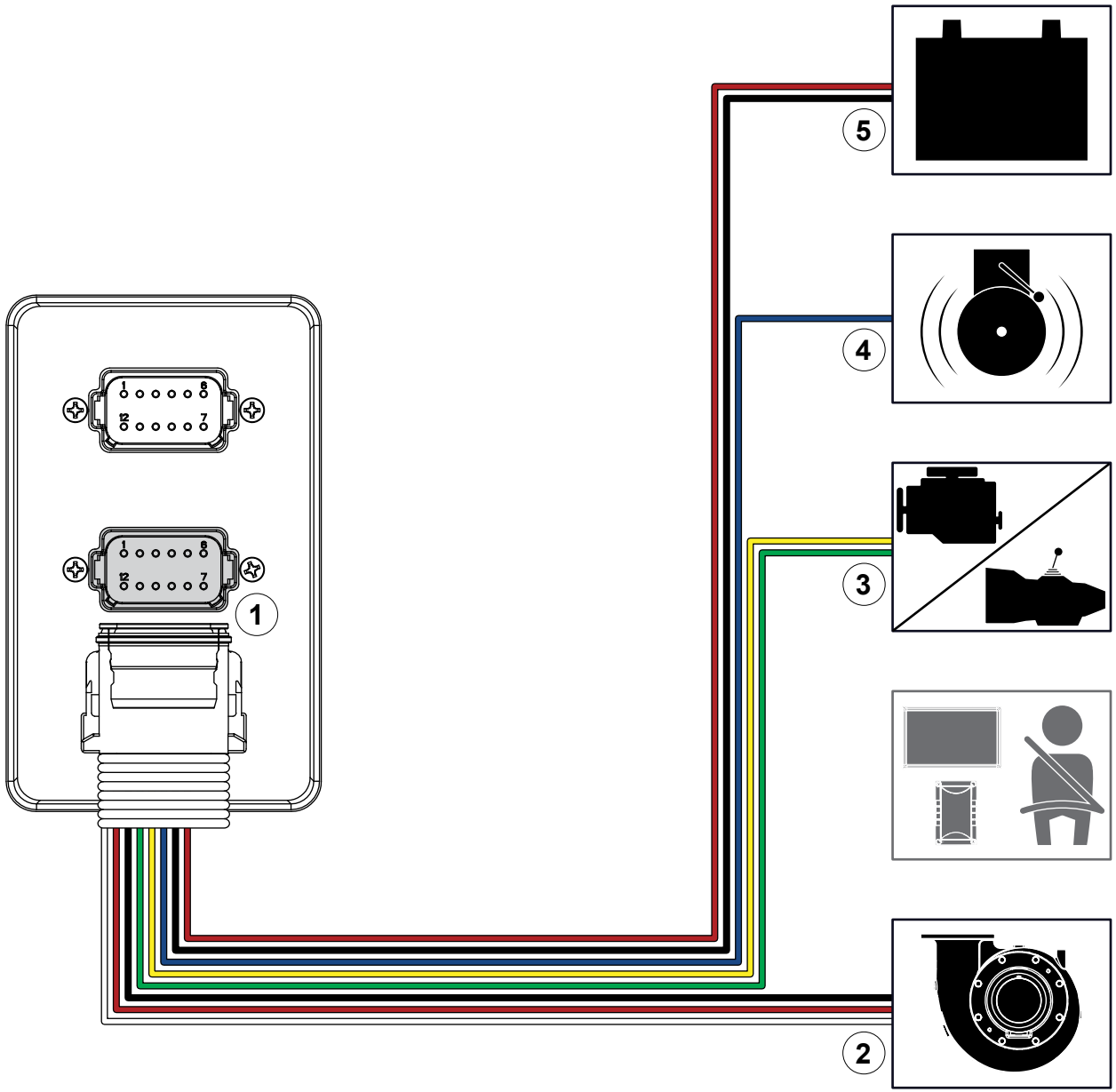
Connecting the Cable—Interlocks, Discharge Pressure Sensor, and Analog Control



Use the illustration and instructions to connect the cable to the appropriate component or controller. Use the wire label to determine the appropriate connector.

1. Connect the appropriate connector to the pressure governor.
2. Connect the appropriate connector to the discharge pressure sensor.
3. Connect the interlock wires to the appropriate engine controller or relay.

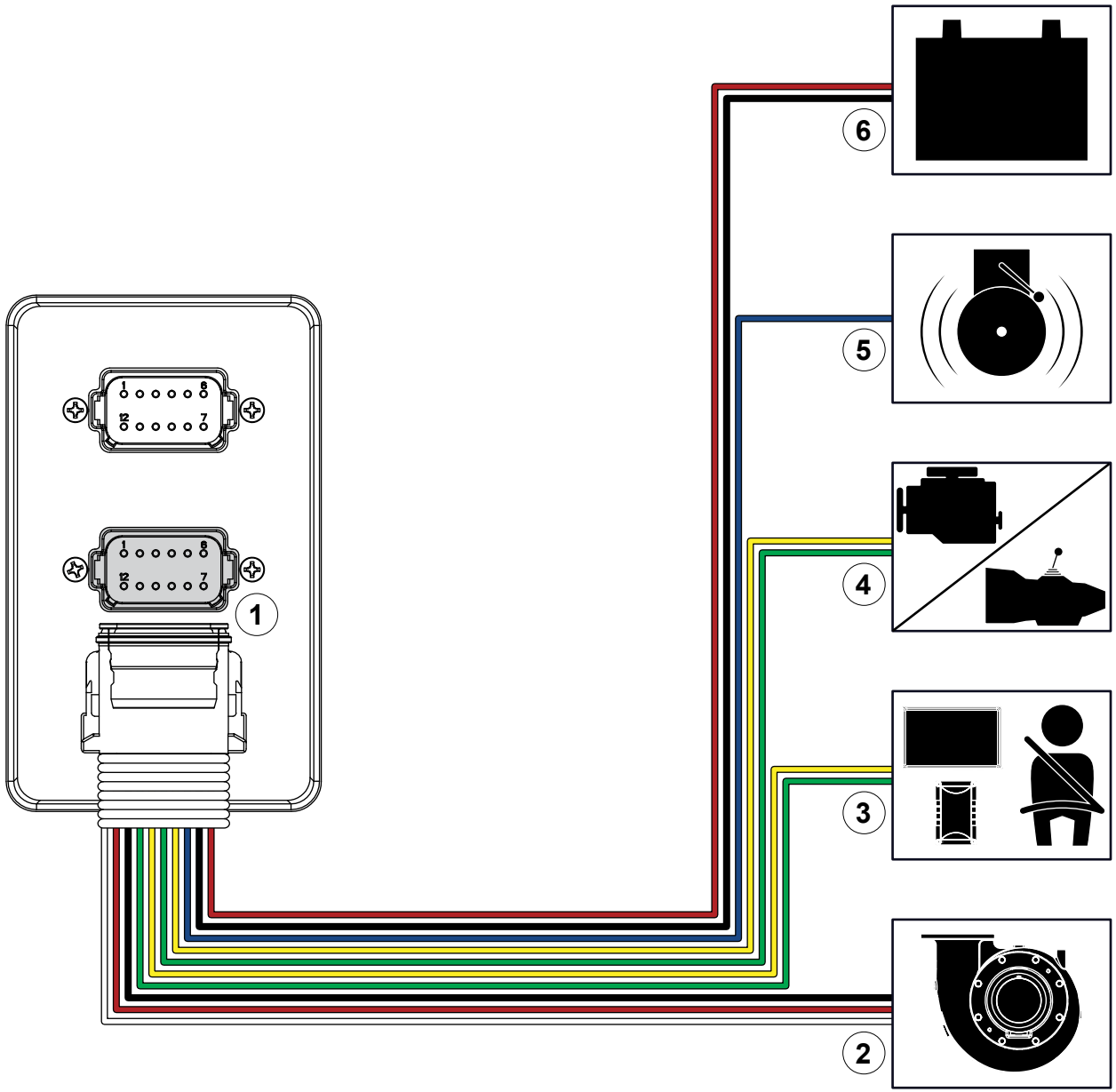
Connecting the Cable—Power, Alarm, SAE CAN (J1939), and Inlet Pressure Sensor



Use the illustration and instructions to connect the cable to the appropriate component or controller. Use the wire label to determine the appropriate connector.

1	Connect the appropriate connector to the pressure governor.
2	Connect the appropriate connector to the intake pressure sensor.
3	Connect the appropriate connector to the SAE CAN bus controller.
4	Connect the appropriate wire to the alarm controller.
5	Connect the appropriate connector to apparatus power.

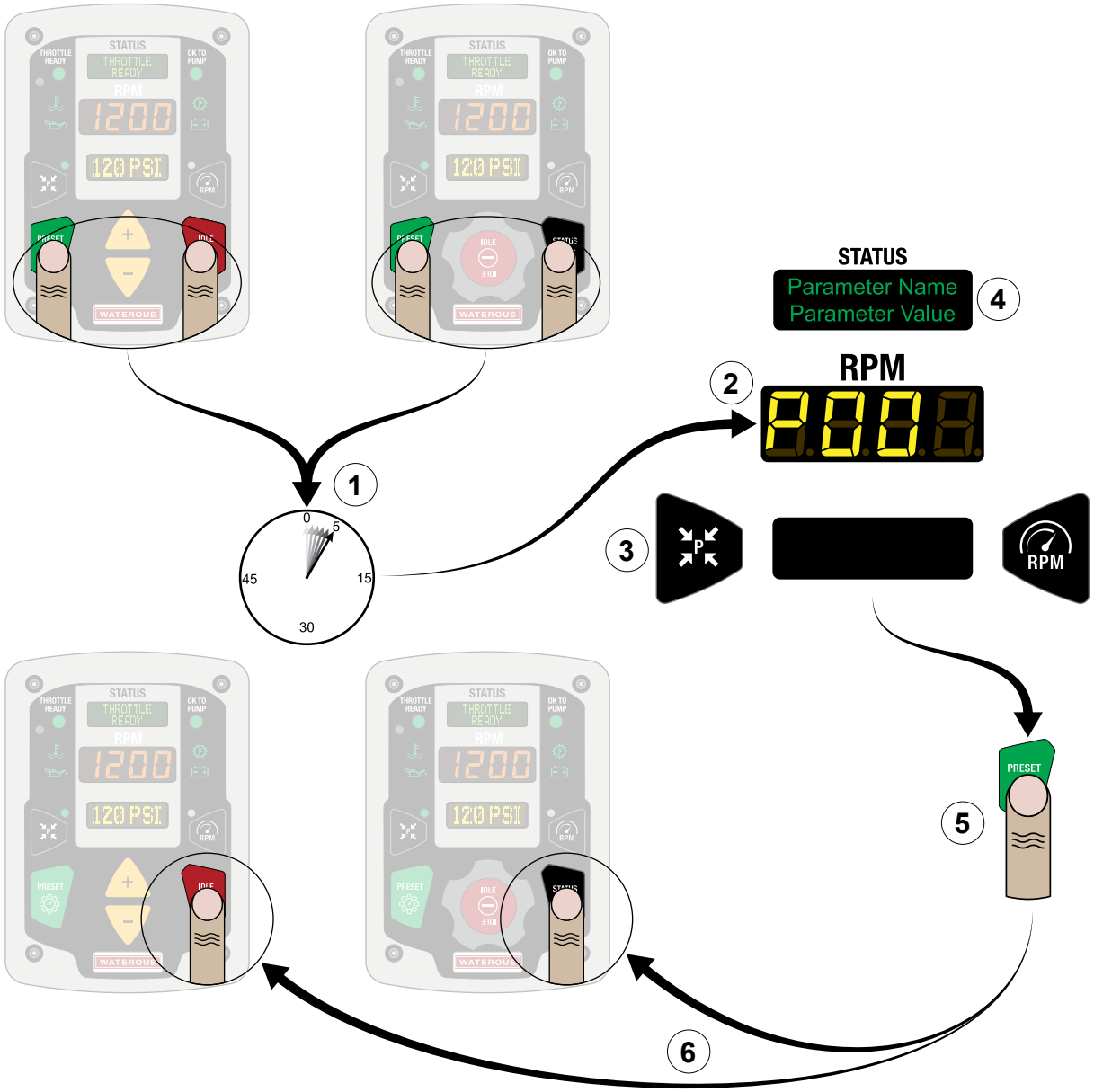
Connecting the Cable—Power, Alarm, SAE CAN (J1939), IC CAN (J1939), and Inlet Pressure Sensor



Use the illustration and instructions to connect the cable to the appropriate component or controller. Use the wire label to determine the appropriate connector.

1	Connect the appropriate connector to the pressure governor.
2	Connect the appropriate connector to the intake pressure sensor.
3	Connect the appropriate connector to the IC CAN bus controller.
4	Connect the appropriate connector to the SAE CAN bus controller.
5	Connect the appropriate wire to the alarm controller.
6	Connect the appropriate connector to apparatus power.

Configuring the Pressure Governor—User Configuration Mode



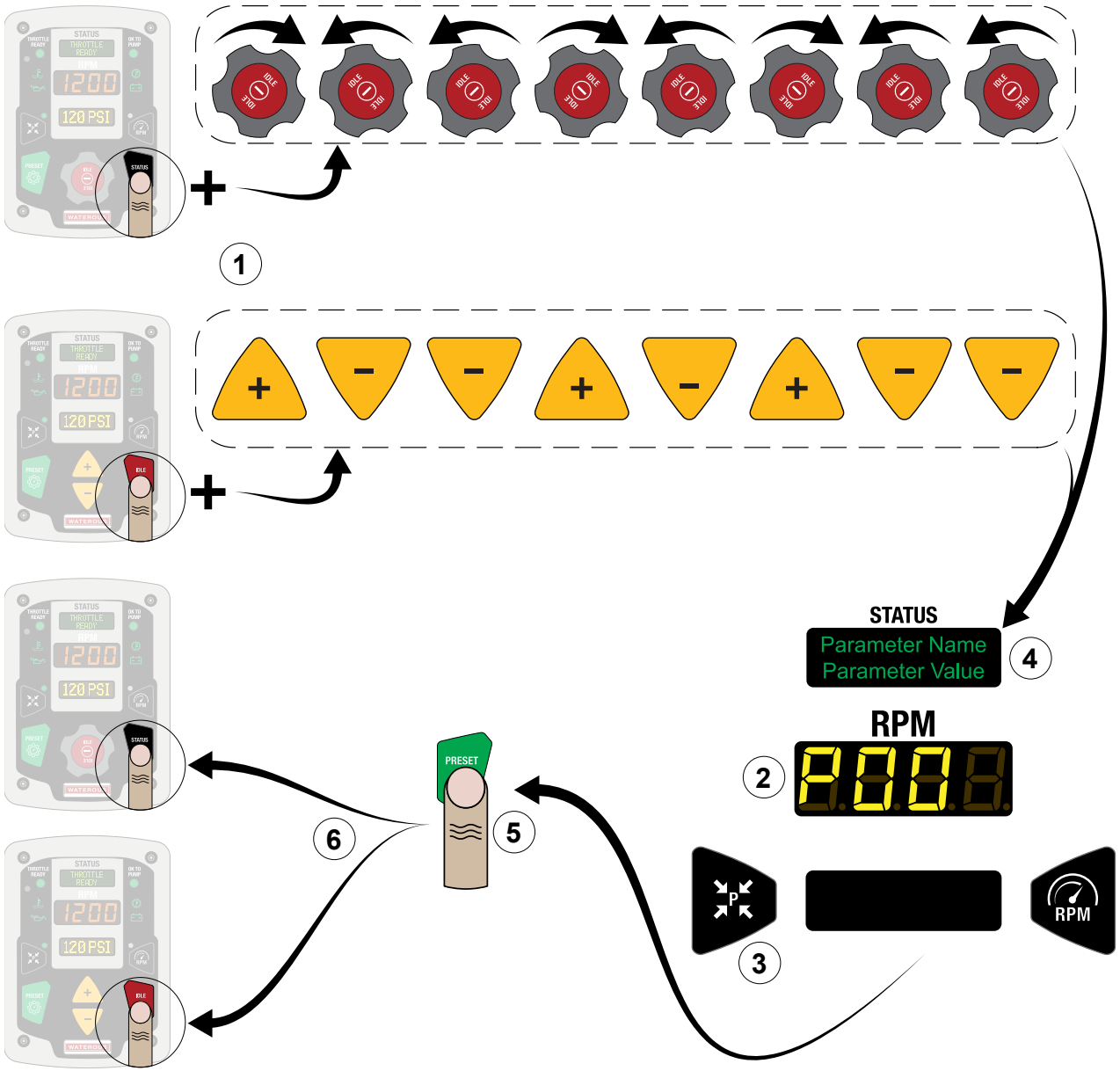
Use the illustration and instructions to open the configuration mode, change parameters, and exit the configuration mode. Configure the pressure governor with the appropriate parameters for your application. For a description of the available parameters in this mode, refer to: **"Configuration Settings" on page 34**.

The menus are divided into 3 levels of access: user, service, and OEM. The user configuration mode gives you access to the user level settings. The service configuration mode gives you access to the service level settings, as well as the user level settings. The OEM configuration mode gives you access to all the settings. Follow the instructions below to access the user configuration mode.

1. From ready mode, press and hold the *PRESET* and *IDLE* or *PRESET* and *STATUS* buttons for 5 seconds to enter the user configuration mode.
2. The RPM display shows P and the selected parameter number when in the configuration mode.
3. Use the *PSI* and *RPM* buttons to change the parameter number.
4. Use the **+** and **–** buttons or the *ROTARY KNOB* to change the parameter value.
5. Press the Preset button to store the parameter value.
6. Press the *IDLE* or *STATUS* button to exit the configuration mode.

Notes

Configuring the Pressure Governor—Service Configuration Mode

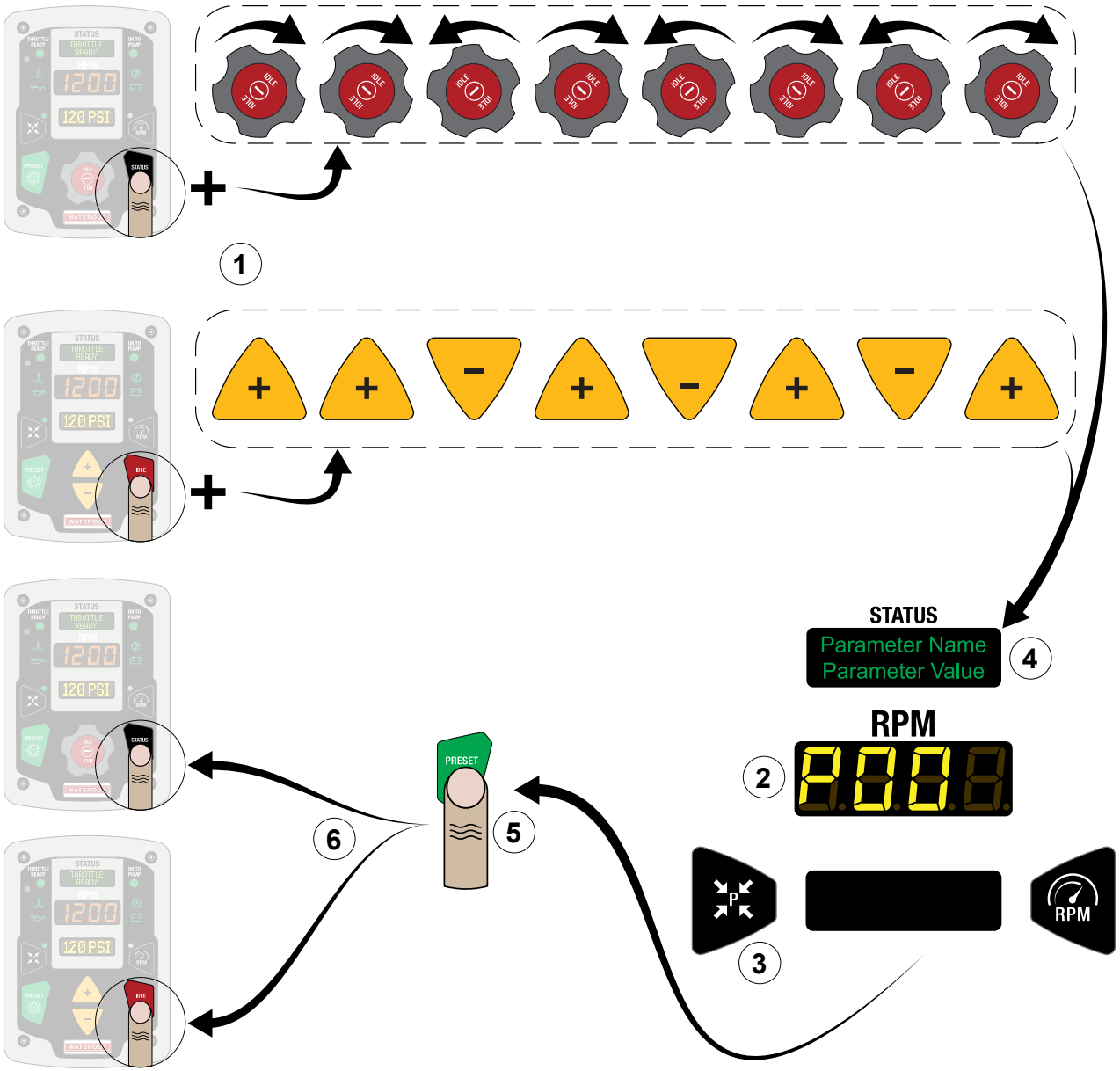


Use the illustration and instructions to open the service configuration mode, change parameters, and exit the configuration mode. Configure the pressure governor with the appropriate parameters for your application. For a description of the available parameters in this mode, refer to: **"Configuration Settings" on page 34**.

The service configuration mode gives you access to the service level settings, as well as the user level settings. Follow the instructions below to access the service configuration mode.

1. From ready mode, press and hold the *IDLE* or *STATUS* button while entering the password sequence as shown.
2. The RPM display shows P and the selected parameter number when in the configuration mode.
3. Use the *PSI* and *RPM* buttons to change the parameter number.
4. Use the **+** and **–** buttons or the *ROTARY KNOB* to change the parameter value.
5. Press the *PRESET* button to store the parameter value.
6. Press the *IDLE* or *STATUS* button to exit the configuration mode.

Configuring the Pressure Governor—OEM Configuration Mode



Use the illustration and instructions to open the OEM configuration mode, change parameters, and exit the configuration mode. Configure the pressure governor with the appropriate parameters for your application. For a description of the parameters in this mode, refer to: **"Configuration Settings" on page 34**.

The OEM configuration mode gives you access to the all settings. Follow the instructions below to access the OEM configuration mode.

1. From ready mode, press and hold the *IDLE* or *STATUS* button while entering the password sequence as shown.
2. The RPM display shows P and the selected parameter number when in the configuration mode.
3. Use the *PSI* and *RPM* buttons to change the parameter number.
4. Use the **+** and **–** buttons or the *ROTARY KNOB* to change the parameter value.
5. Press the *PRESET* button to store the parameter value.
6. Press the *IDLE* or *STATUS* button to exit the configuration mode.

Configuration Settings

	Name	Description	Default	Level
1	UNITS	Displayed units of measure in PSI/°F, kPa/°C, MPa/°C, or bar/°C.	PSI/F	User
2	PRESET RPM	Preset button speed in RPM when in speed mode. Choose: 900 to 1500 RPM in increments of 25.	1000	User
3	PRESET PSI	Preset button pressure when in pressure mode. Choose: 90 to 200 PSI in increments of 10.	90	User
4	HIGH IDLE	Engine speed in RPM when in high idle mode. Choose: 900 to 1400 RPM in 25 RPM steps.	1100	User
5	SENSITIVITY	Engine speed is not adjusted until difference between set-point and actual pressure in PSI is greater than the sensitivity value. Choose: 2 to 10 PSI.	5	User
6	RPM GAIN	Change in engine speed in RPM for each button press of knob detent. Choose: 1 to 30.	15	User
7	PRESS GAIN	Change in pump pressure in PSI for each button press or knob detent. Choose: 1 to 10.	5	User
8	ALLOW PRESET	Enable or disable operation of speed mode preset button when pump pressure is greater than 10 PSI. Choose: yes or no.	No	User
9	PRE SET MIN	Minimum pump discharge pressure in PSI before the preset button will operate in pressure mode. Choose: 0 to 100 PSI in increments of 5.	25	User
10	NUDGE LIMIT	Engine speed is not adjusted until difference between speed set-point and actual engine speed is greater than the nudge limit value. Choose: 0 to 25 RPM in increments of 5.	15	User
11	ROUNDING	Enable or disable rounding of the pressure or speed displays. Choose: no, PSI, RPM, or both.	No	User
12	IDLE RPM	Idle mode engine speed in RPM. Choose: 600 to 900 RPM in increments of 25. ***Note:*** *The speed must be greater than the engines curb idle speed.*	No	User
13	DIS. SENSOR	Discharge sensor full scale pressure. Choose: 300 or 600 PSI. ***Note:*** *Set the value to 300 PSI for a single-stage pump, and 600 PSI for a two-stage pump.*	300	User
14	INT. SENSOR	Intake sensor full scale pressure. Choose: 300 or 600 PSI.	300	Service
15	DIS. 0 CAL	Calibrates the discharge sensor 0 PSI value. Press the preset button with discharge at 0 PSI to run the calibration.	—	Service
16	INT. 0 CAL	Calibrates the intake sensor 0 PSI value. Press the preset button with intake at 0 PSI to run calibration.	—	Service
17	DIS. OFFSET	Calibrates the discharge sensor at a known pressure. Use the +/– buttons or knob controls to set the menu to the applied pressure. Press the preset button to run the calibration. ***Note:*** *The static pressure calibration point must be within 20% of the full sensor value.*	—	Service
18	INT. OFFSET	Calibrates the discharge sensor at a known pressure. Use the +/– buttons or knob controls to set the menu to the applied pressure. Press the preset button to run the calibration. Press the preset button to run the calibration. ***Note:*** *The static pressure calibration point must be within 20% of the full sensor value.*	—	Service

Configuration Settings

	Name	Description	Default	Level
19	ENGINE TYPE	Engine control type. Choose: Cummins FPG, J1939 PGN0, Scania, Volvo, Mercedes, or, analog.	Cummins	OEM
20	BRIGHTNESS	Adjusts display brightness. Automatic adjusts the brightness depending on ambient light conditions. Choose: automatic or manual setting from 1 to 10 in increments of 1.	Automatic	User
21	DISPLAY TEST	Turns on all front panel LED indicators and display pixels for 2 seconds. Press the preset button to start the display test.	—	User
22	ALERT TONE	Enables or disables the double beep alert tone. Choose: yes or no.	Yes	User
23	VOLTS OFFSET	Offset that is applied to the battery voltage display. Choose: –0.5 to 0.5 VDC in increments of 0.1.	0.0	Service
24	KNOB INC DIR	Adjusts which knob direction causes an increase. Choose: CW or CCW.	CW	User
25	KNOB GAIN	Adjusts the rate of change per step when turning the knob. This is a scalar value and does not represent the exact knob step size. Choose: 1 to 10 in increments of 1.	5	OEM
26	BAUD RATE	Adjusts the CAN bus engine control speed. Choose: 250K, 500K or automatic.	500K	Service
27	DEFAULT	Returns all of the configuration parameters to their factory defaults. Press the preset button to set all parameters to default.	—	Service
28	ENGINE ID	Configures the CAN bus source address of the engine. Choose: 0 to 255.	0	OEM
29	DAY	Sets the real-time-clock day of the month. Choose: 1 to 31.	1	User
30	MONTH	Sets the real-time-clock month of the year. Choose: 1 to 12.	1	User
31	YEAR	Sets the real-time-clock year. Choose: 2000 to 3000.	2018	User
32	HOUR	Sets the real-time-clock hour of the day. Choose: 0 to 23.	0	User
33	MINUTE	Sets the real-time-clock minute of the hour. Choose: 0 to 59.	0	User
34	PUMP HOURS	Changes the pump hours value. Use the +/– buttons or knob controls to adjust the pump hours setting. Press the preset button to run the calibration.	0	Service
35	WARNINGS	Determines whether the source of the engine warning set-point is the J1939 CAN link or user ranges. Choose: bus or user.	Bus	OEM
36	WARN. TEMP	Adjusts the engine warning temperature value where the yellow indicator turns on. Choose: 140°F to 260°F in increments of 10.	240	OEM
37	CRIT. TEMP	Adjusts the critical engine temperature value where the red indicator turns on. Choose: 140°F to 260°F in increments of 10.	250	OEM
38	WARN. PSI	Adjusts the engine warning oil pressure value where the yellow indicator turns on. Choose: 5 to 100 PSI in increments of 10.	10	OEM

Configuration Settings

	Name	Description	Default	Level
39	CRIT. PSI	Adjusts the engine critical oil pressure value where the red indicator turns on. Choose: 5 to 100 PSI in increments of 10.	5	OEM
40	HPG MODE	Sets the hydraulic pressure governor message transmission mode. Normal mode causes the message to only be transmitted when the OK to pump interlock is active. PSI mode only transmits the message when in pressure mode. Choose: on, off, normal, and PSI.	On	OEM
41	SOURCE ID	Configures the CAN bus source address for the governor. Choose: 0 to 255.	7	OEM
42	OK TO PUMP	Configures the OK to pump interlock source from either the combination of the pump engaged and throttle ready inputs, or the single OK to pump input. Choose: normal or OK2pump.	Normal	OEM
43	HI IDLE MODE	Configures the high idle operation. Normal mode allows the high idle input to operate if the throttle ready input is on and the pump is not engaged. Bus mode prohibits entering high idle mode unless the engine speed is greater than 600 RPM and the OK to pump interlock is off. Choose: normal or bus.	Normal	OEM
44	INTERLOCKS	Configures the operation of the throttle ready interlock from the wired input, the CAN bus transmission in neutral message, or both sources. Choose: wire, CAN, or both.	Wire	OEM
45	AUTO MODE	Enables or disables the automatic pressure mode engagement when the throttle ready is activated before or after the pump engagement. Choose: no, TR then PE, or PE then TR.	No	OEM
46	DIR PRESET	Enables or disables the automatic mode selection when the preset button is pressed. Choose: no, PSI, or RPM.	No	OEM
47	PRESS P-GAIN	Adjusts the PID control loop proportional gain in pressure mode. Choose: 0 to 100.	60	Service
48	PRESS I-GAIN	Adjusts the PID control loop integral gain in pressure mode. Choose: 0 to 100.	0	Service
49	PRESS D-GAIN	Adjusts the PID control loop derivative gain in pressure mode. Choose from: 0 to 10.	0	Service
50	SPEED P-GAIN	Adjusts the PID control loop proportional gain in speed mode. Choose: 0 to 100.	60	Service
51	SPEED I-GAIN	Adjusts the PID control loop integral gain in speed mode. Choose: 0 to 100.	0	Service
52	SPEED D-GAIN	Adjusts the PID control loop derivative gain in speed mode. Choose: 0 to 10.	0	Service
53	SPN 695	Configures the TSC1 SPN 695 message. Choose: disable, speed, torque, and limit.	Speed	OEM
54	SPN 696	Configures the TSC1 SPN 696 message. Choose: P0, P1, P2, or P3.	P0	OEM
55	SPN 897	Configures the TSC1 SPN 897 message. Choose: highest, high, medium, and low.	High	OEM
56	SPN 3349	Configures the TSC1 SPN 3349 message. Choose: 10ms, 20ms, 100ms, 250ms, or 500ms.	10 ms	OEM
57	SPN 3350	Configures the TSC1 SPN 3350 message. Choose: P03 or P32.	P03	OEM
58	RPM MAX	Sets the maximum speed of the engine in RPM. Choose: 1500 to 3000 RPM.	300	OEM

Configuration Settings

	Name	Description	Default	Level
59	POC ASSERT	Sets the analog control mode power on value to the 0 or the idle value. Choose: no or yes.	No	OEM
60	ANOLOG IDLE	Sets the analog control idle value in 10 millivolt steps. Choose: 0 to 60.	32	OEM
61	DITHER	Enables or disables the +/– 5 RPM speed dithering handshake. Choose: on or off.	Off	OEM
62	ECM MSG TX	Enables or disables the engine control message when in idle mode. Choose: no TX @ idle or TX @ idle.	No Tx @ Idle	User
63	CHASSIS	Chassis, engine, and pump preset configuration. Choose: 0 to 255. ***Note:*** *Choosing 0 means that there is no preset configuration.*	0	User
64	PRESS LIMIT	Configures the maximum allowed pressure increase when in RPM mode. Choose: 10 to 100 PSI in increments of 5.	30	Service
65	RPM LIMIT	Configures the minimum change in pressure expected (when in pressure mode) for an increase of 200 RPM in engine speed. Range is 5 to 100 RPM, adjustable in 5 RPM steps.	10	Service
66	RPM TIMEOUT	Configures delay (in seconds) between “RPM LIMIT” detection and the application of the restriction/limit of set-point in pressure mode. Range is 0 to 30 seconds, adjustable in 1 second steps.	1	Service
67	H20 TIMEOUT	Configures delay (in seconds) between “PRESSURE DROPPED” detection and the application of the restriction/limit of set-point in RPM mode. Range is 5 to 120 seconds, adjustable in 5 second steps.	10	Service
68	DECEL RATE	Configures RPM deceleration rate to IDLE preset. Range is 200 to 2000 RPM, adjustable in 100 RPM steps.	500	Service
69	COMPANY	Configures the company name that is displayed during startup.	Waterous	OEM
70	OBD ↔ J1939	Configures the OBD to J1939 gateway protocol (typically used only in Ford chassis). Options currently available are NONE, 1939CM405A, 1939XR501A, 1939CM506AP, and 1939CM550AP.	None	OEM
71	FUEL LOW	Configures the fuel percentage at which the FUEL LOW alarm is set. Range is 0% to 100%, adjustable in 5% steps.	15 %	Service
72	DEF LOW	Configures the DEF percentage at which the DEF LOW alarm is set. Range is 0% to 100%, adjustable in 5% steps.	15 %	Service
73	CONTROL MODE	Configures the control modes allowed for use. Options are “PSI & RPM”, “PSI ONLY”, and “RPM ONLY”.	PSI & RPM	OEM
74	P-TIME	Configures sample rate in milliseconds (ms) for analog pressure control mode. Range is 10ms to 1000ms, adjustable in 10ms steps.	500 ms	OEM
75	S-TIME	Configures sample rate in milliseconds (ms) for analog speed control mode. Range is 10ms to 1000ms, adjustable in 10ms steps.	500 ms	OEM
76	WARN. TRANS	Configures the temperature above which the transmission oil temperature will turn on the transmission warning (yellow) lamp. Range is 140°F to 260°F, adjustable in 10°F steps.	230°F	OEM

Configuration Settings

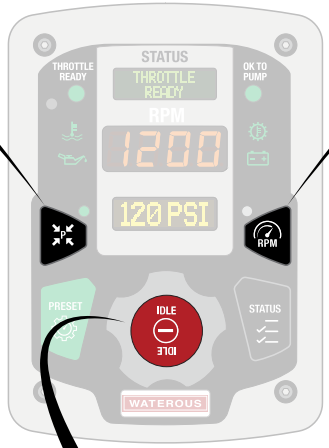
	Name	Description	Default	Level
77	CRIT. TRANS	Configures the temperature above which the transmission oil temperature will turn on the transmission critical (red) lamp. Range is 140°F to 260°F, adjustable in 10°F steps.	250°F	OEM
78	DIS. P-THRES	Configures the discharge pressure threshold under which the discharge pressure will turn on the NO WATER alarm. Range is 15 to 250 PSI, adjustable in 5 PSI steps.	15 PSI	OEM
79	PRES HIGH	Configures the minimum discharge pressure required before a PRESSURE DROPPED alarm message is possible. Range is 50 to 250 PSI, adjustable in 5 PSI steps.	50 PSI	OEM
80	PRES LOW	Configures the discharge pressure threshold under which the discharge pressure will turn on the PRESSURE DROPPED alarm. Range is 30 to 250 PSI, adjustable in 5 PSI steps.	30 PSI	OEM
81	LOW INTAKE	Configures the LOW INTAKE alarm. Range is ENABLED, DISABLED.	DISABLED	OEM
82	INT. P-THRES	Configures the intake pressure threshold. Range is 0 to 50 PSI, adjustable in 5 PSI steps.	40 PSI	Service
83	INT. PRES L	Configures the intake pressure threshold under which the intake pressure will turn on the LOW INTAKE PRESSURE alarm. Range is 5 to 40 PSI, adjustable in 5 PSI steps.	20 PSI	Service
84	INT. TIMEOUT	Configures delay (in seconds). Range is 0 to 120, adjustable in 5 second steps.	0	Service
85	PSI IDLE	Configures the engine idle RPM for pressure mode. Choose DISABLED, or a range from 600 to 900 in 25 RPM increments.	DISABLED	Service
86	RPM IDLE	Configures the engine idle RPM for speed mode. Choose: DISABLED, or a range from 600 to 900 in 25 RPM increments.	DISABLED	Service
87	STAY IN MODE	Configures the ability to remain in pressure or speed mode until the pump, throttle, or OK to pump interlocks are disengaged. This means that alarm timeouts, or pressing the idle button, will return the vehicle to idle speed, but the Governor will remain in an active mode. Choose: ENABLED or DISABLED.	DISABLED	OEM

Pressure Governor Operation

The Waterous pressure governor uses various inputs to control the engine speed and discharge pressure. Additional control and information is available through configuration settings and cable selection. Operating modes are available when the interlock settings permit. Upon power-up, 3 interlock inputs are available, *THROTTLE READY*, *PUMP ENGAGED*, and *OK TO PUMP*. The *THROTTLE READY* interlock allows the pressure governor to control the engine. The *PUMP ENGAGED* interlock allows the pressure governor to control the fire pump. The *OK TO PUMP* interlock is active when 1 of 2 conditions occur. One condition is when the *THROTTLE READY* and *PUMP ENGAGED* interlocks are simultaneously active. The second condition is when the *OK TO PUMP* interlock is active, and the OKTOPUMP configuration parameter is set to OKTOPUMP. High-idle mode is activated when the *HIGH-IDLE* input and *THROTTLE READY* interlock are active, and the fire pump is inactive.

Pressure Mode

This mode prioritizes the pump-discharge pressure. The pressure governor manages the engine speed to keep the discharge pressure at the selected set-point.



Speed Mode

This mode prioritizes the engine speed. The pressure governor manages the throttle to keep the engine speed at the selected set-point.

Idle Mode

This mode brings the engine speed to idle. The pressure governor manages the engine and brings the engine speed to the selected idle set-point.

High-Idle Mode

This mode raises the engine speed to resolve a low-battery condition. A low-battery condition is indicated by a yellow or red battery icon.

Use the table to determine the available modes at given interlock states.

Available Mode	Throttle Ready Input	Pump Engaged Input	OK To Pump Input	OKTOPUMP Configuration
None	Inactive	Inactive	Inactive	NORMAL
Speed or High-Idle	Active	Inactive	Inactive	NORMAL
None	Inactive	Active	Inactive	NORMAL
Speed or Pressure	Active	Active	Inactive	NORMAL
None	Inactive	Inactive	Inactive	OK2PUMP
Speed or Pressure	Do Not Care	Do Not Care	Active	OK2PUMP

Pressure Mode

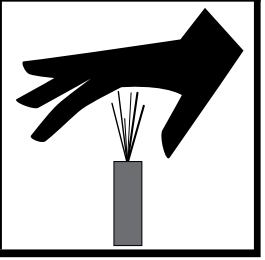
Use the illustrations and instructions to operate the pressure governor in pressure mode. Pressure mode is available when the *THROTTLE READY* and *PUMP ENGAGED* inputs are active, and the *OK TO PUMP* input is inactive, if the OK to pump setting is configured to NORMAL. Or, when the *OK TO PUMP* input is active and the OK to pump setting is configured to OK2PUMP.

Configure the settings to adjust the parameters that effect the pressure mode. Refer to: **"Configuring the Pressure Governor—User Configuration Mode" on page 30**.

⚠ WARNING

High Pressure

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



In pressure mode, the pump-discharge pressure is maintain regardless of the number of open discharges. Develop and follow discharge safety protocols to prevent injury.

1	Press the PSI button to enable or disable pressure mode.
2	Rotate the knob or use the buttons to adjust the discharge pressure.

Speed Mode

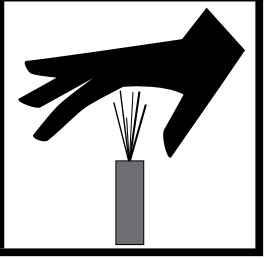
Use the illustrations and instructions to operate the pressure governor in speed mode. Speed mode is available when the *THROTTLE READY* input is active, and the *PUMP ENGAGED* and *OK TO PUMP* inputs are inactive, if the OK to pump setting is configured to NORMAL. Or, when the *OK TO PUMP* input is active and the OK to pump setting is configured to OK2PUMP.

Configure the settings to adjust the parameters that effect the speed mode. Refer to: **"Configuring the Pressure Governor—User Configuration Mode" on page 30**.

⚠ WARNING

High Pressure

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



The discharge pressure is not monitored when operating in speed mode. Undesired pressure buildup can occur, and result in injury when safety protocols are not followed.

1 Press the RPM button to enable or disable speed mode.

2 Rotate the knob or use the buttons to adjust the engine speed.

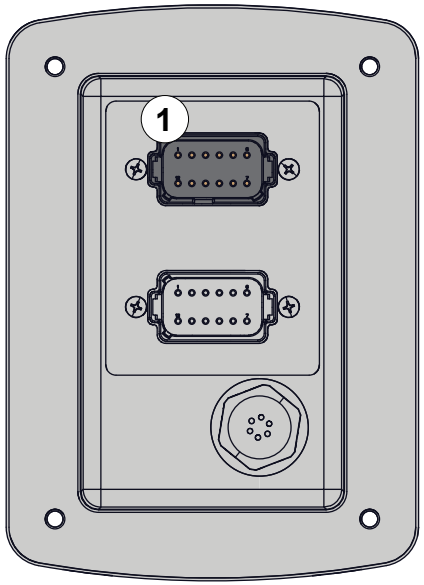
Idle Mode

Use the illustration and instructions to understand the idle mode. Idle mode brings the engine to idle speed.

Configure the settings to adjust the parameters that effect the idle speed value. Refer to: **"Configuring the Pressure Governor—User Configuration Mode" on page 30**.

1 Press the idle button to engage the idle mode.

High-Idle Mode



Use the illustration and instructions to understand the high-idle mode. High-idle mode raises the engine idle speed to a set-point sufficient to charge a depleted battery. High-idle mode is available when the *THROTTLE READY* input is active, and the *PUMP ENGAGED* and *OK TO PUMP* inputs are inactive, when the OK to pump setting is configured to NORMAL. The mode is activated when high-idle pin is active, and the battery system is below 12.5VDC.

Configure the settings to adjust the parameters that effect the high-idle speed mode. Refer to: **"Configuring the Pressure Governor—User Configuration Mode" on page 30**.

1	Apply an active signal to the high-idle pin.
2	The mode is activated when the battery system is below 12.5VDC and the appropriate interlock conditions exist.

Display Messages

Display	Description
PSI MODE	This displays when the pressure governor is in pressure mode.
RPM MODE	This displays when the pressure governor is in speed mode.
IDLE	This displays when the pressure governor is in idle mode.
HIGH IDLE	This displays when the pressure governor is in high-idle mode.
NO J1939 ENGINE COMM	This displays when the J1939 network cannot establish communication over the engine.
NO J1939 ENGINE CONT	This displays when the J1936 network cannot establish control over the engine.
CHECK ENGINE	This displays when a check engine code is received from the engine over the J1939 network.
STOP ENGINE	This displays when a stop engine code is received from the engine over the J1939 network.
BATTERY WARNING	This displays when the battery voltage is within the warning range.
BATTERY CRITICAL	This displays when the battery voltage is within the critical range.
ENGINE TEMP	This displays when the engine temperature is within the warning or critical range.
ENGINE OIL	This displays when the engine oil pressure is within the warning or critical range.
TRANSMISSION TEMP	This displays when the transmission temperature is within the warning or critical range.
CHECK TRANSMISSION	This displays when a transmission error message sent over J1939 network.
NO MODE SELECTED	This displays when you press the increment (+) or decrement (–) buttons, or turn the rotary knob before you select speed or pressure mode.
THROTTLE NOT READY	This displays when you press the RPM button to enter speed mode and the throttle ready interlock input is inactive.

Display Messages

Display	Description
THROTTLE READY	This displays when the throttle ready interlock input is active and the pump engaged interlock is inactive.
PUMP NOT ENGAGED	This displays when you press the pressure button to enter pressure mode and the pump engaged interlock input is inactive.
PUMP ENGAGED	This displays when the pump engaged interlock input is active and the throttle ready interlock is inactive.
OK TO PUMP	This displays when the both the throttle ready and pump engaged inputs are active, or the OK to pump input is active, and the OK to pump configuration is set to OK2pump.
DISCHARGE SENSOR LOW	This displays when the discharge sensor signal voltage is less than 0.3VDC.
DISCHARGE SENSOR HIGH	This displays when the discharge sensor signal voltage is more than 4.9VDC.
INTAKE SENSOR LOW	This displays when the intake sensor signal voltage is less than 0.3VDC.
INTAKE SENSOR HIGH	This displays when the intake sensor signal voltage is more than 4.9VDC.
PRESSURE LIMITED	In speed mode, this displays when the pump pressure increased greater than the pressure limit configuration parameter from the initial pressure when mode was started. Refer to the PRESS LIMIT parameter in **"Configuration Settings" on page 35**
RPM LIMIT NO PRESS INC	In pressure mode, this displays when the engine speed increases are limited, because the last 200RPM engine speed increase did not raise the pump discharge pressure.
NO WATER SUPPLY	In speed mode, this displays when the pump discharge pressure is less than 15PSI.
LOW WATER SUPPLY	In pressure mode, this displays when the engine speed has increased and the discharge pressure has decreased, or pump intake sensor pressure is below the low limit.
PRESSURE DROPPED	In pressure mode, this displays when the discharge pressure was above 50PSI and then dropped below 30PSI.
PRESET NOT ALLOWED	This displays when the preset button is pressed in speed mode, and allow preset parameter is configured as NO. Refer to the ALLOW PRESET parameter in **"Configuration Settings" on page 34**.
ALARMS NONE	This displays the number of active alarms. If no alarms are active the display shows NONE.
BATTERY nn.n VDC	This displays the battery voltage, as measured, at the pressure governor DC power input.

Display Messages

Display	Description
ENGINE OIL nn PSI	This displays the engine oil pressure from J1939 PGN 65263, SPN 100. The display shows NO DATA when the SPN is not received.
ENGINE OIL nnn F	This displays the engine oil temperature from J1939 PGN 65262, SPN 175. The display shows NO DATA when the SPN is not received.
ENG COOLANT nnn F	This displays the engine coolant temperature from J1939 PGN 65262, SPN 110. The display shows NO DATA when the SPN is not received.
FUEL RATE n.n G/h	This displays the engine fuel consumption rate from J1939 PGN 65266, SPN 183. The display shows NO DATA when the SPN is not received.
ENGINE TIME nnn.nn HRS	This displays the engine total hours of operation from J1939 PGN 65253, SPN 247. The display shows NO DATA when the SPN is not received.
TRANSMISSION nnn F	This displays the transmission oil temperature from J1939 PGN 65272, SPN 177. The display shows NO DATA when the SPN is not received.
DISCHARGE nnn PSI	This displays the pump discharge pressure as measured by the discharge sensor.
INTAKE nnn PSI	This displays the pump intake pressure as measured by the intake sensor.
PUMP TIME nn.n HRS	This displays the amount of hours the pump engaged interlock input is active.
ANALOG POS REF	This displays when the analog engine control positive reference signal is out of tolerance.
ANALOG NEG REF	This displays when the analog engine control negative reference signal is out of tolerance.
ANALOG ERROR	This displays when the analog engine control feedback is out of tolerance.

Notes

WATEROUS

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