



DOC023.52.93058

Polymetron 9500 Controller

05/2015, Edition 6

User Manual

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Specifications

Specifications are subject to change without notice.

Specification	Details
Component description	Microprocessor-controlled and menu-driven controller that operates the sensor and displays measured values.
Operating temperature	-20 to 60 °C (-4 to 140 °F); 95% relative humidity, non-condensing with sensor load <7 W; -20 to 50 °C (-4 to 104 °F) with sensor load <28 W
Storage temperature	-20 to 70 °C (-4 to 158 °F); 95% relative humidity, non-condensing
Enclosure	NEMA 4X/IP66 metal enclosure with a corrosion-resistant finish
European standards	EN 61326-1: 2006; EN 61010-1:2010
ETL approved	File 65454
Power requirements	<p>AC powered controller: 100-240 VAC ±10%, 50/60 Hz; Power 50 VA with 7 W sensor/network module load, 100 VA with 28 W sensor/network module load (optional Modbus RS232/RS485 or Profibus DPV1 network connection).</p> <p>24 VDC powered controller: 24 VDC—15%, + 20%; Power 15 W with 7 W sensor/network module load, 40 W with 28 W sensor/network module load (optional Modbus RS232/RS485 or Profibus DPV1 network connection).</p>
Altitude requirements	Standard 2000 m (6562 ft) ASL (Above Sea Level)
Pollution degree / Installation category	Pollution Degree 2; Installation Category II
Outputs	Two analog (0-20 mA or 4-20 mA) outputs. Each analog output can be set to 0-20 mA or 4-20 mA, and can be assigned to represent a measured parameter such as pH, temperature, flow or calculated values. Optional 3 additional analog outputs. Secure Digital Memory card for use in data logging and software updates.
Relays	Four SPDT, user-configured contacts, rated 5A 250 VAC (resistive). Contacts are rated 250 VAC, 5 Amp resistive maximum for the AC powered controller and 24 VDC, 5A resistive maximum for the DC powered controller. Relays are designed for connection to AC Mains circuits (i.e., whenever the controller is operated with 115 - 240 VAC power) or DC circuits (i.e., whenever the controller is operated with 24 VDC power).
Dimensions	½ DIN—144 x 144 x 180.9 mm (5.7 x 5.7 x 7.12 in.)
Weight	1.7 kg (3.75 lb)
Digital communication	Optional Modbus RS485/RS232 or Profibus DPV1 network connection for data transmission
Data logging	Secure Digital Card or special RS232 cable connector for data logging and performing software updates
Warranty	2 years

General information

In no event will the manufacturer be liable for direct, indirect, special, incidental or consequential damages resulting from any defect or omission in this manual. The manufacturer reserves the right to make changes in this manual and the products it describes at any time, without notice or obligation. Revised editions are found on the manufacturer's website.

Safety information

NOTICE

The manufacturer is not responsible for any damages due to misapplication or misuse of this product including, without limitation, direct, incidental and consequential damages, and disclaims such damages to the full extent permitted under applicable law. The user is solely responsible to identify critical application risks and install appropriate mechanisms to protect processes during a possible equipment malfunction.

Please read this entire manual before unpacking, setting up or operating this equipment. Pay attention to all danger and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment.

Make sure that the protection provided by this equipment is not impaired. Do not use or install this equipment in any manner other than that specified in this manual.

Use of hazard information

⚠ DANGER

Indicates a potentially or imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION






Indicates a potentially hazardous situation that may result in minor or moderate injury.



NOTICE

Indicates a situation which, if not avoided, may cause damage to the instrument. Information that requires special emphasis.

Precautionary labels

Read all labels and tags attached to the product. Personal injury or damage to the product could occur if not observed. A symbol on the instrument is referenced in the manual with a precautionary statement.

	This symbol, when noted on a product, indicates a potential hazard which could cause serious personal injury and/or death. The user should reference this instruction manual for operation and/or safety information.
	This symbol, when noted on a product enclosure or barrier, indicates that a risk of electrical shock and/or electrocution exists and indicates that only individuals qualified to work with hazardous voltages should open the enclosure or remove the barrier.
	This symbol, when noted on the product, indicates the presence of devices sensitive to electrostatic discharge and indicates that care must be taken to prevent damage to them.
	This symbol, when noted on a product, indicates the instrument is connected to alternate current.
	Electrical equipment marked with this symbol may not be disposed of in European public disposal systems. In conformity with European local and national regulations, European electrical equipment users must now return old or end-of-life equipment to the manufacturer for disposal at no charge to the user. <i>Note: For return for recycling, please contact the equipment producer or supplier for instructions on how to return end-of-life equipment, producer-supplied electrical accessories, and all auxiliary items for proper disposal.</i>

	Products marked with this symbol indicates that the product contains toxic or hazardous substances or elements. The number inside the symbol indicates the environmental protection use period in years.
	Products marked with this symbol indicates that the product conforms to relevant South Korean EMC standards.

EMC compliance statement (Korea)

Type of equipment	Additional information
A 급 기기 (업무용 방송통신기자재)	이 기기는 업무용 (A 급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.
Class A equipment (Industrial Broadcasting and Communication Equipment)	This equipment meets Industrial (Class A) EMC requirements. This equipment is for use in industrial environments only.

Certification

Canadian Radio Interference-Causing Equipment Regulation, IECS-003, Class A:

Supporting test records reside with the manufacturer.

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

FCC Part 15, Class "A" Limits

Supporting test records reside with the manufacturer. The device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

1. The equipment may not cause harmful interference.
2. The equipment must accept any interference received, including interference that may cause undesired operation.

Changes or modifications to this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at their expense. The following techniques can be used to reduce interference problems:

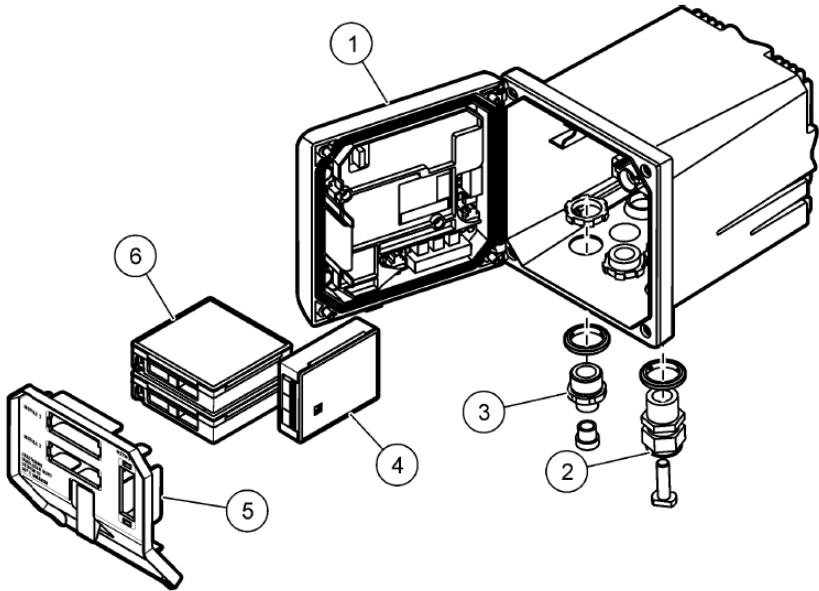
1. Disconnect the equipment from its power source to verify that it is or is not the source of the interference.
2. If the equipment is connected to the same outlet as the device experiencing interference, connect the equipment to a different outlet.
3. Move the equipment away from the device receiving the interference.
4. Reposition the receiving antenna for the device receiving the interference.
5. Try combinations of the above.

Product overview

The controller displays sensor measurements and other data, can transmit analog and digital signals, and can interact with and control other devices through outputs and relays. Outputs, relays, sensors and sensor modules are configured and calibrated through the user interface on the front of the controller.

Figure 1 shows the product components. Components may vary according to controller configuration. Contact the manufacturer if parts are damaged or missing.

Figure 1 System components



1 Controller	4 Network module (optional)
2 Cable gland assembly	5 High-voltage barrier
3 Additional connection fitting	6 Sensor modules (optional)

Sensors and sensor modules

The controller accepts up to a maximum of two sensor modules along with one communication module. A variety of sensors can be wired to the sensor modules. Sensor wiring information is given in the specific sensor manuals and in the user instructions for specific modules.

Relays, outputs and signals

The controller has four configurable relay switches and two analog outputs. An optional analog output module can increase the number of analog outputs to five.

Device scans

With two exceptions, the controller automatically scans for connected devices without user input when it is powered on. The first exception is when the controller is powered on for the first time before initial use. The second exception is after the controller configuration settings have been set to their default values and the controller is powered on. In both cases, the controller first displays the language, date and time edit screens. After the language, date and time entries are accepted, the controller performs a device scan.

Controller enclosure

The controller enclosure is NEMA 4X/IP66-rated and has a corrosion-resistant finish designed to withstand corrosive environmental constituents such as salt spray and hydrogen sulfide. Protection against environmental damage is strongly recommended for outdoor use.

Note: Units that have the Underwriters Laboratories (UL) certification are intended for indoor use only and do not have a NEMA 4X/IP66 rating.

Controller mounting options

The controller can be mounted to a panel, to a wall or to a vertical or horizontal pipe. A neoprene sealing gasket is included and can be used to reduce vibration. The gasket can be used as a template for panel mounting before the inner gasket component is separated.

Installation

Mounting components and dimensions

⚠ CAUTION

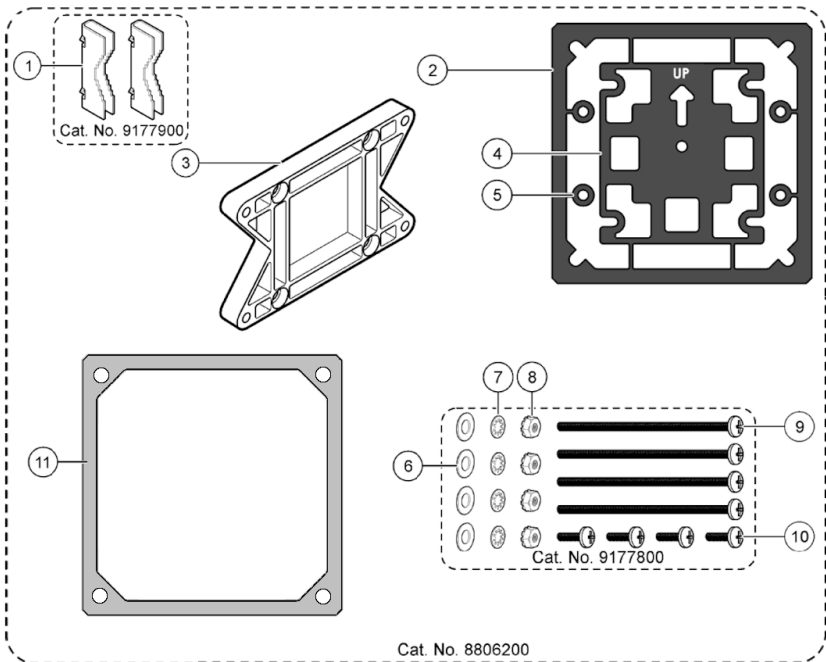
Personal injury hazard. Only qualified personnel should conduct the tasks described in this section of the manual.

The controller can be installed on a surface, panel or pipe (horizontal or vertical). For mounting options and instructions, refer to [Figure 2](#), [Figure 3](#) on page 8, [Figure 4](#) on page 9, [Figure 5](#) on page 10 and [Figure 6](#) on page 11.

For horizontal pipe mounts, the mounting feet ([Figure 2](#)) must be attached to the mounting bracket in a vertical position.

For both horizontal and vertical pipe mounts, attach the mounting bracket to the controller as shown in [Figure 5](#) on page 10.

Figure 2 Mounting components



1 Mounting foot (2x)	7 Lock washer, 1/4-inch ID (4x)
2 Sealing gasket for panel mount, Neoprene	8 M5 x 0.8 Keps hexnut (4x)
3 Bracket for wall and pipe mounting	9 Pan head screws, M5 x 0.8 x 100mm (4x) (Used for variable diameter pipe mount installations)
4 Vibration isolation gasket for pipe mount	10 Pan head screws, M5 x 0.8 x 15 mm (4x)
5 Vibration isolation washer for pipe mount (4x)	11 Bracket for panel mounting
6 Flat washer, 1/4-inch ID (4x)	

Controller mounting

Figure 3 Surface mounting dimensions

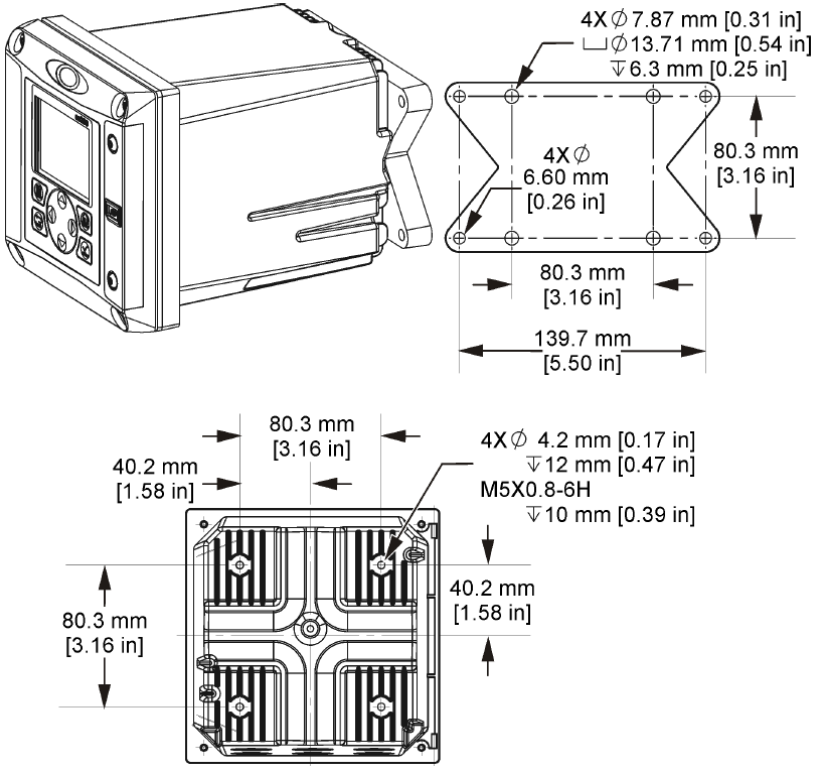
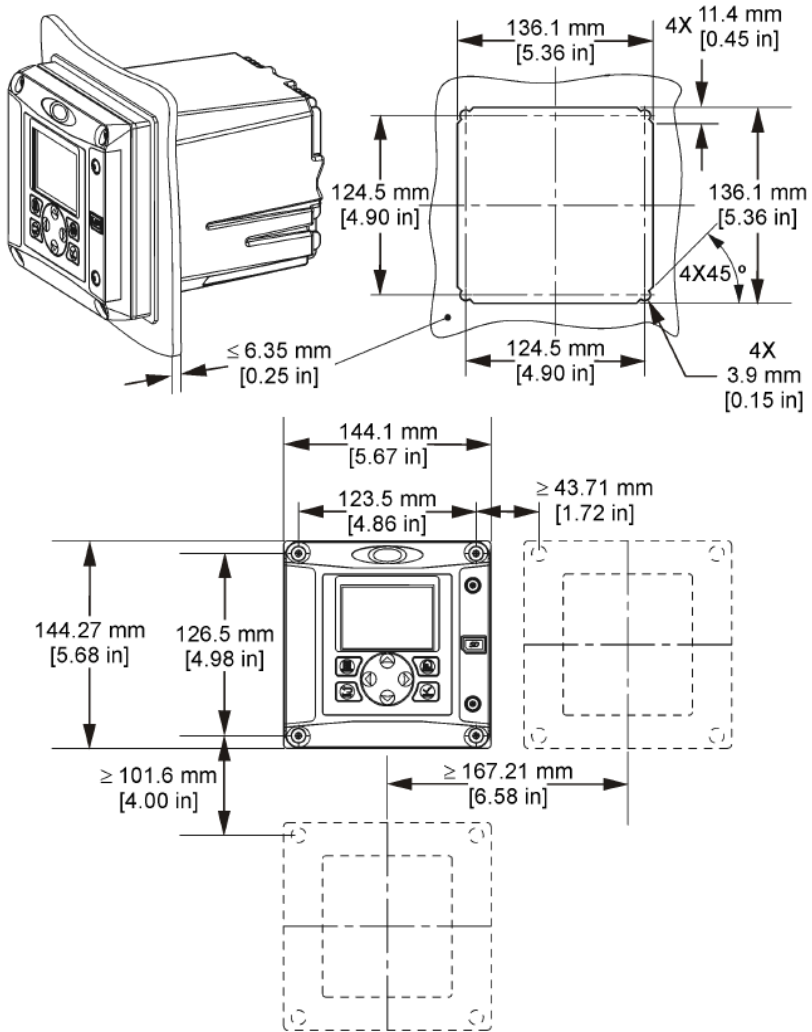


Figure 4 Panel mounting dimensions



Note: If using the bracket for panel mounting (supplied), push the controller through the hole in the panel and then slide the bracket over the controller on the back side of the panel. Use the four 15 mm pan head screws (supplied) to attach the bracket to the controller and secure the controller to the panel.

Figure 5 Pipe mounting (vertical pipe)

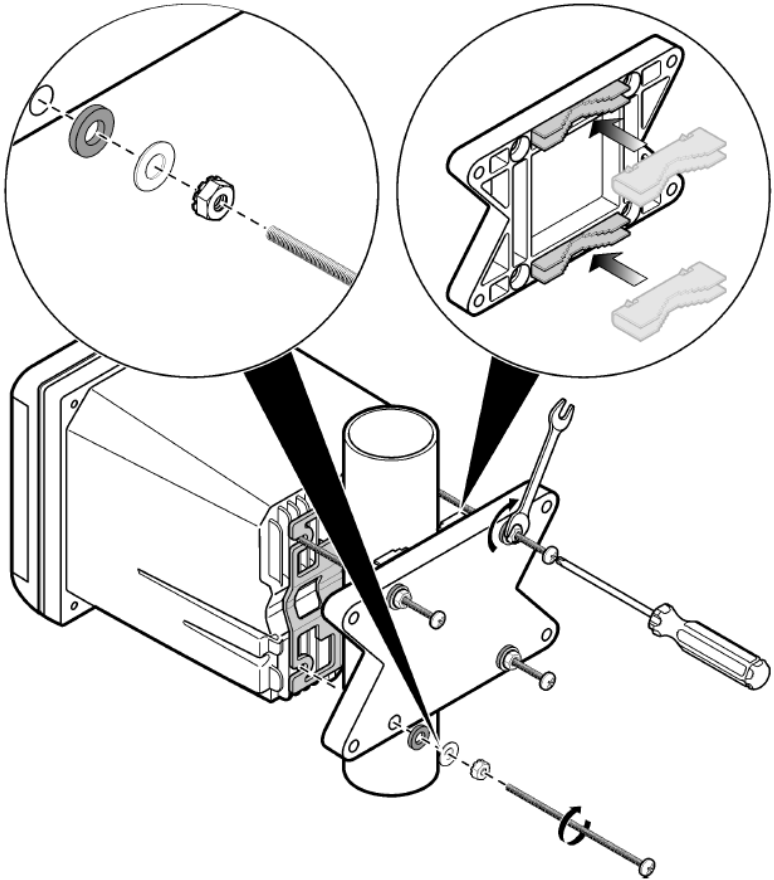
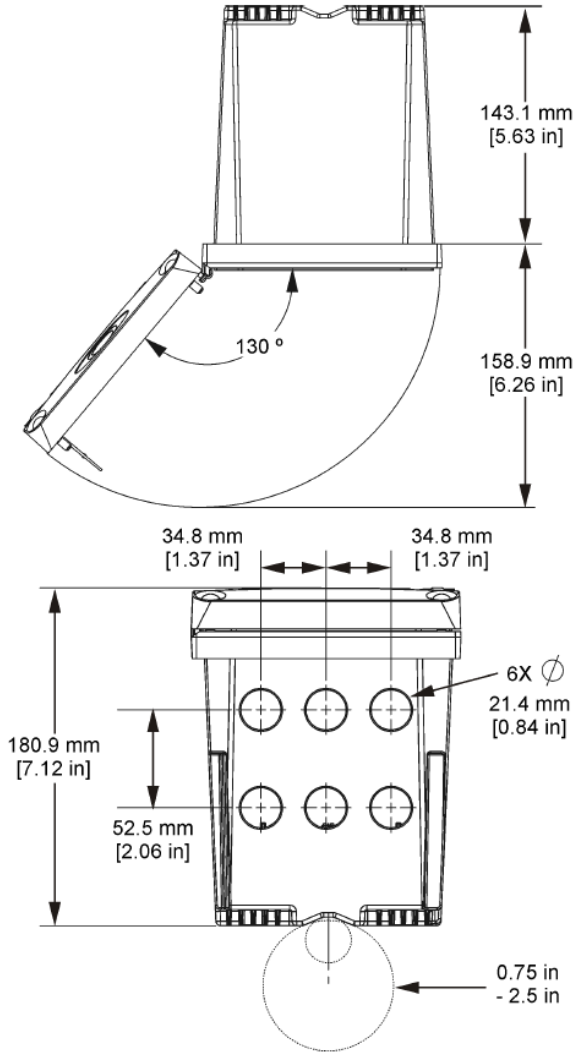


Figure 6 Top and bottom views



High-voltage barrier

High-voltage wiring for the controller is located behind the high-voltage barrier in the controller enclosure. The barrier must remain in place except when installing modules or when a qualified installation technician is wiring for power, alarms, outputs or relays. Do not remove the barrier while power is applied to the controller.

Electrostatic discharge (ESD) considerations

NOTICE

Potential Instrument Damage. Delicate internal electronic components can be damaged by static electricity, resulting in degraded performance or eventual failure.

Refer to the steps in this procedure to prevent ESD damage to the instrument:

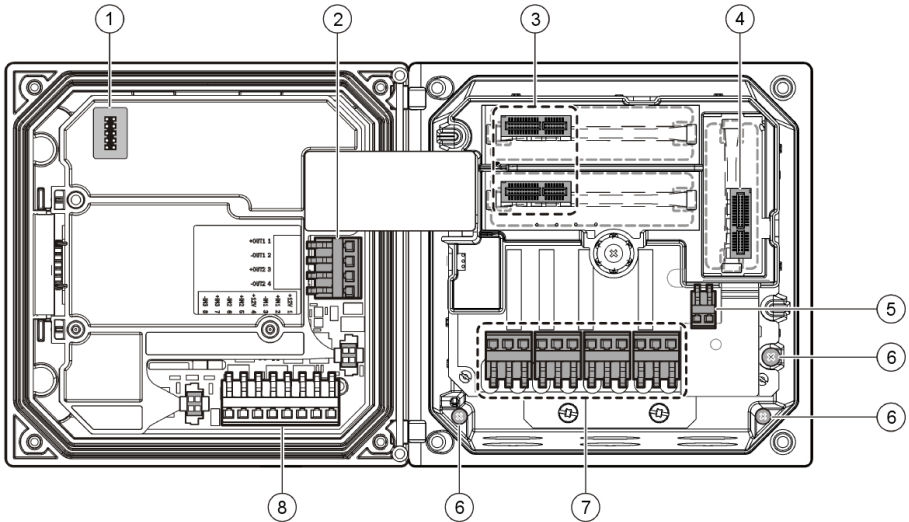
- Touch an earth-grounded metal surface such as the chassis of an instrument, a metal conduit or pipe to discharge static electricity from the body.
- Avoid excessive movement. Transport static-sensitive components in anti-static containers or packages.
- Wear a wrist strap connected by a wire to earth ground.
- Work in a static-safe area with anti-static floor pads and work bench pads.

Wiring overview

Figure 7 shows an overview of the wiring connections inside the controller with the high voltage barrier removed. The left side of the figure shows the back side of the controller cover.

Note: Remove connector caps from the connectors before module installation.

Figure 7 Wiring connections overview



1 Service cable connection	4 Communication module connector (e.g., Modbus, Profibus, optional 4-20 mA module, etc.)	7 Relay connections ¹
2 4-20 mA output ¹	5 AC and DC power connector ¹	8 Discrete input wiring connector ¹
3 Sensor module connector	6 Ground terminals	

Wiring for power

⚠ WARNING

Potential Electrocutation Hazard. Always disconnect power to the instrument when making electrical connections.

⚠ WARNING

Potential Electrocutation Hazard. If this equipment is used outdoors or in potentially wet locations, a **Ground Fault Interrupt** device must be used for connecting the equipment to its mains power source.

¹ Terminals can be removed for improved access.

▲ DANGER

Electrocution Hazard. Do not connect AC power to a 24 VDC powered model.

▲ WARNING

Potential Electrocution Hazard. A protective earth (PE) ground connection is required for both 100-240 VAC and 24 VDC wiring applications. Failure to connect a good PE ground connection can result in shock hazards and poor performance due to electromagnetic interferences. ALWAYS connect a good PE ground to the controller terminal.

NOTICE

Install the device in a location and position that gives easy access to the disconnect device and its operation.

The controller can be purchased as either a 100-240 VAC powered model or a 24 VDC powered model. Follow the appropriate wiring instructions for the purchased model.

The controller can be wired for line power by hard-wiring in conduit or wiring to a power cord. Regardless of the wire used, the connections are made at the same terminals. A local disconnect designed to meet local electrical code is required and must be identified for all types of installation. In hard-wired applications, the power and safety ground service drops for the instrument must be 18 to 12 AWG.

Notes:

- The voltage barrier must be removed before making any electrical connections. After making all connections, replace the voltage barrier before closing the controller cover.
- A sealing type cable gland and a power cord less than 3 meters (10 feet) in length with three 18-gauge conductors (including a safety ground wire) can be used to maintain the NEMA 4X/IP66 environmental rating.
- Controllers can be ordered with AC power cords pre-installed. Additional power cords may also be ordered.
- The DC power source that supplies power to the 24 VDC powered controller must maintain voltage regulation within the specified 24 VDC-15% +20% voltage limits. The DC power source must also provide adequate protection against surges and line transients.

Wiring procedure

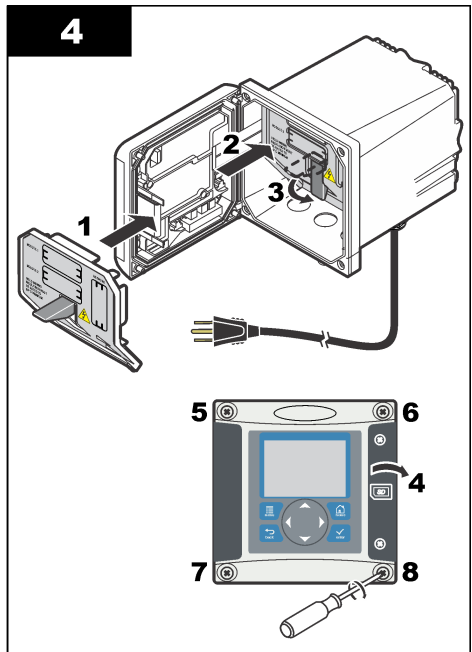
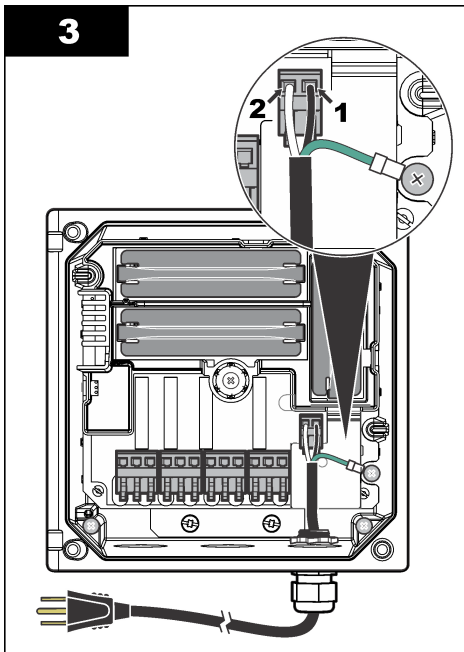
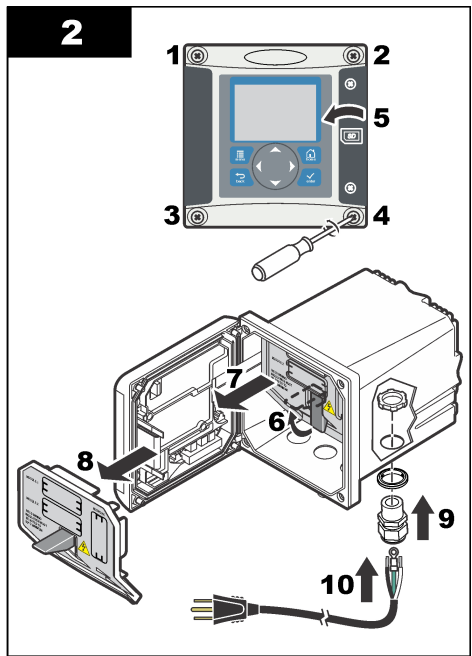
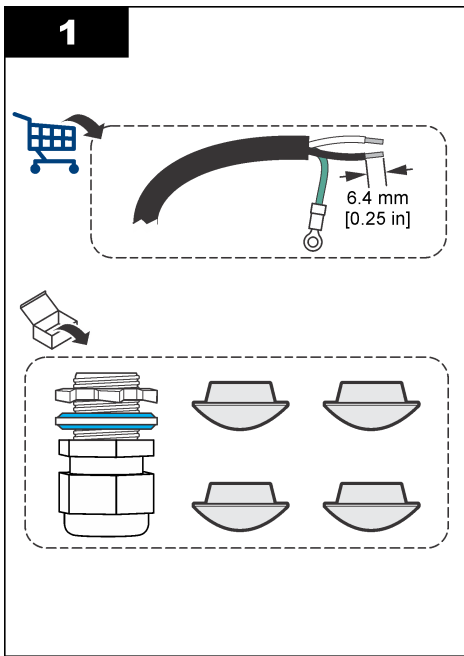
Follow the numbered steps and [Table 1](#) or [Table 2](#) to wire the controller for power. Insert each wire into the appropriate terminal until the insulation is seated against the connector with no bare wire exposed. Tug gently after insertion to make a secure connection. Seal any unused openings in the controller box with conduit opening sealing plugs.

Table 1 AC power wiring information (AC powered models only)

Terminal	Description	Color—N. America	Color—EU
1	Hot (L1)	Black	Brown
2	Neutral (L2)	White	Blue
—	Protective earth (PE) Ground lug	Green	Green and yellow

Table 2 DC power wiring information (DC powered models only)

Terminal	Description	Color—N. America	Color—EU
1	+24 VDC	Red	Red
2	24 VDC return	Black	Black
—	Protective earth (PE) Ground lug	Green	Green and yellow



Alarms and relays

The controller is equipped with four unpowered, single pole relays rated 100-250 VAC, 50/60 Hz, 5 amp resistive maximum. Contacts are rated 250 VAC, 5 amp resistive maximum for the AC

powered controller and 24 VDC, 5A resistive maximum for the DC powered controller. The relays are not rated for inductive loads.

Wiring relays

⚠ WARNING

Potential Electrocution Hazard. Always disconnect power to the instrument when making electrical connections.

⚠ WARNING

Potential fire hazard. The relay contacts are rated 5A and are not fused. External loads connected to the relays must have current limiting devices provided to limit current to < 5 A.

⚠ WARNING

Potential fire hazard. Do not daisy-chain the common relay connections or jumper wire from the mains power connection inside the instrument.

⚠ WARNING

Potential electrocution hazard. In order to maintain the NEMA/IP environmental ratings of the enclosure, use only conduit fittings and cable glands rated for at least NEMA 4X/IP66 to route cables in to the instrument.

AC line (100—250 V) powered controllers

⚠ WARNING

Potential electrocution hazard. AC mains powered controllers (115 V–230 V) are designed for relay connections to AC mains circuits (i.e. voltages greater than 16 V-RMS, 22.6 V-PEAK or 35 VDC).

The wiring compartment is not designed for voltage connections in excess of 250 VAC.

24 VDC powered controllers

⚠ WARNING

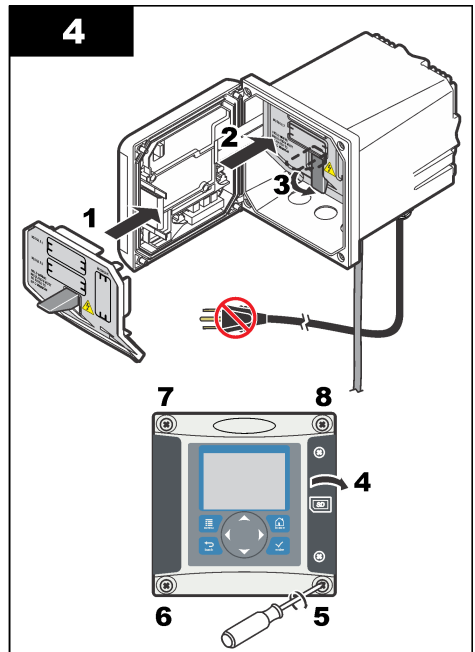
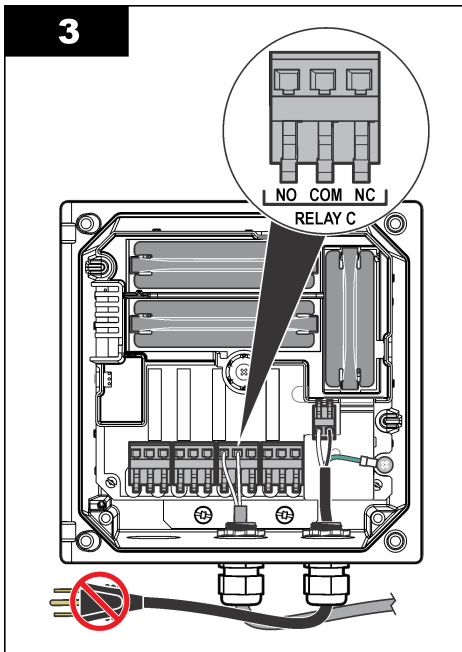
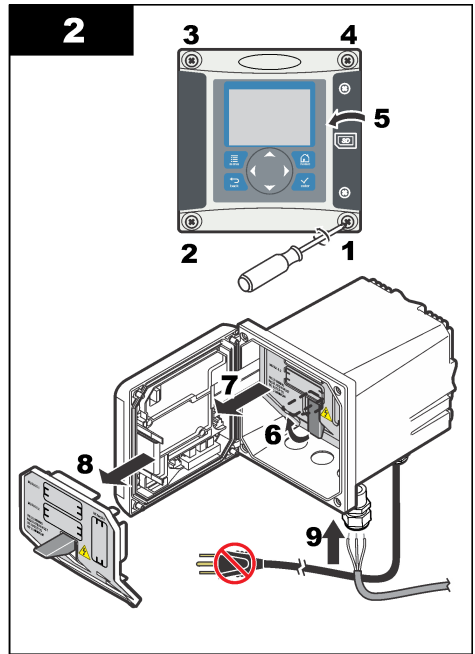
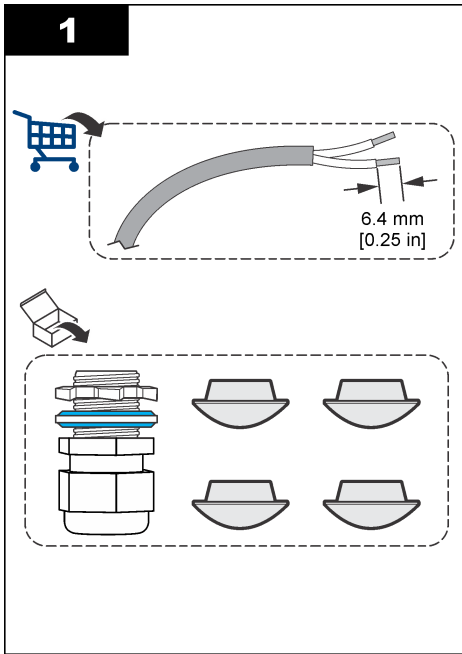
Potential electrocution hazard. 24 V powered controllers are designed for relay connections to low voltage circuits (i.e. voltages less than 16 V-RMS, 22.6 V-PEAK or 35 VDC).

The 24 VDC controller relays are designed for connection to LOW voltage circuits (i.e., voltages less than 30 V-RMS, 42.2 V-PEAK or 60 VDC). The wiring compartment is not designed for voltage connections above these levels.

The relay connector accepts 18-12 AWG wire (as determined by load application). Wire gauge less than 18 AWG is not recommended.

The Normally Open (NO) and Common (COM) relay contacts will be connected when an alarm or other condition is active. The Normally Closed (NC) and Common relay contacts will be connected when an alarm or other condition is inactive (unless the Fail Safe is set to Yes) or when power is removed from the controller.

Most relay connections use either the NO and COM terminals or the NC and COM terminals. The numbered installation steps show connection to the NO and COM terminals.



Analog output connections

⚠ WARNING

Potential Electrocution Hazard. Always disconnect power to the instrument when making electrical connections.

▲ WARNING

Potential electrocution hazard. In order to maintain the NEMA/IP environmental ratings of the enclosure, use only conduit fittings and cable glands rated for at least NEMA 4X/IP66 to route cables in to the instrument.

Two isolated analog outputs are provided. Such outputs are commonly used for analog signaling or to control other external devices. Make wiring connections to the controller as shown in [Figure 8](#) and [Table 3](#).

Note: [Figure 8](#) shows the back of the controller cover and not the inside of the main controller compartment.

Figure 8 Analog output connections

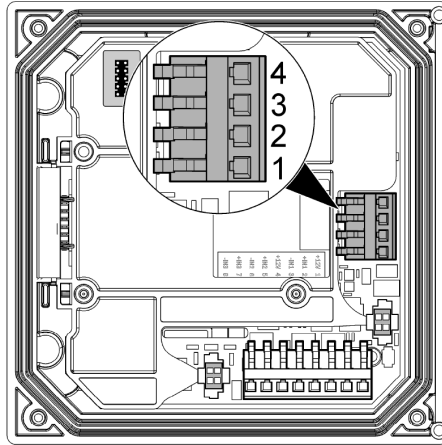


Table 3 Output connections

Recorder wires	Circuit board position
Output 2-	4
Output 2+	3
Output 1-	2
Output 1+	1

1. Open the controller cover.
2. Feed the wires through the cable gland.
3. Adjust the wire as necessary and tighten the cable gland.
4. Make connections with twisted-pair shielded wire and connect the shield at the controlled component end or at the control loop end.
 - Do not connect the shield at both ends of the cable.
 - Use of non-shielded cable may result in radio frequency emission or susceptibility levels higher than allowed.
 - Maximum loop resistance is 500 ohm.
5. Close the controller cover and tighten the cover screws.
6. Configure outputs in the controller.

Discrete input wiring connections

▲ WARNING

Potential Electrocution Hazard. Always disconnect power to the instrument when making electrical connections.

⚠ WARNING

Potential electrocution hazard. In order to maintain the NEMA/IP environmental ratings of the enclosure, use only conduit fittings and cable glands rated for at least NEMA 4X/IP66 to route cables in to the instrument.

Three discrete inputs are provided for switch closure inputs or logic level voltage inputs. Make wiring connections and configure jumper settings to the controller as shown in [Figure 9](#), [Table 4](#) and [Figure 10](#).

Note: [Figure 9](#) shows the back of the controller cover and not the inside of the main controller compartment.

Figure 9 Discrete input wiring connections

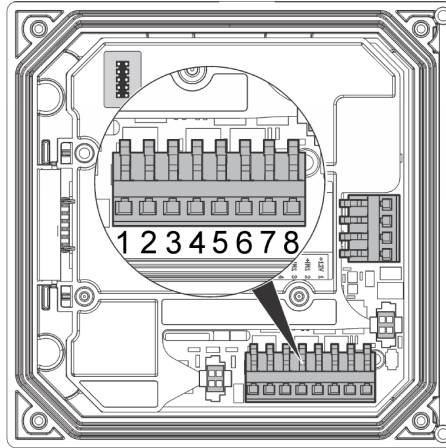
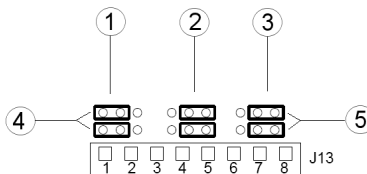


Table 4 Input connections

Discrete inputs	Connector position - Switch input	Connector position - Voltage input
Input 1+	3	2
Input 1-	2	3
Input 2+	6	5
Input 2-	5	6
Input 3+	8	7
Input 3-	7	8

Figure 10 Jumper settings



1 Input 1 configuration jumpers	3 Input 3 configuration jumpers	5 Jumpers positioned to the right for voltage inputs
2 Input 2 configuration jumpers	4 Jumpers positioned to the left for switch inputs	

1. Open the controller cover.
2. Feed the wires through the cable gland.
3. Adjust the wire as necessary and tighten the cable gland.
4. The jumpers are positioned immediately behind the connector. Remove the connector for improved access to the jumpers and configure the jumper settings according to the type of input as shown in [Figure 10](#).
5. Close the controller cover and tighten the cover screws.
6. Configure inputs in the controller.

Note: In **switch input** mode the controller supplies 12 volts to the switch and is not isolated from the controller. In **voltage input** mode the inputs are isolated from the controller (user input voltage from 0 to 30 volts).

Connect the optional digital communication output

The manufacturer supports Modbus RS485, Modbus RS232 and Profibus DPV1 communication protocols. The optional digital output module is installed in the location indicated by item 4 in [Figure 7](#) on page 12. Refer to the manual supplied with the network module for more details.

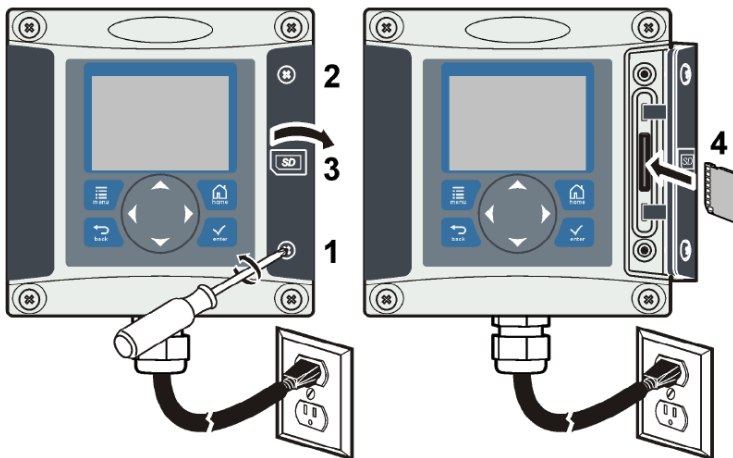
For information about Modbus registers, refer to <http://www.hach-lange.com> or <http://www.hach.com>.

Install a Secure Digital (SD) memory card

For instructions on how to install an SD card in the controller, refer to [Figure 11](#). Information on how to use the SD memory card can be found in [Using the secure digital memory \(SD\) card](#) on page 38.

To remove an SD card, push down on the edge of the card and release, then pull the card up and out of the slot. After the card is removed, close the slot cover and tighten the cover screws.

Figure 11 SD card installation

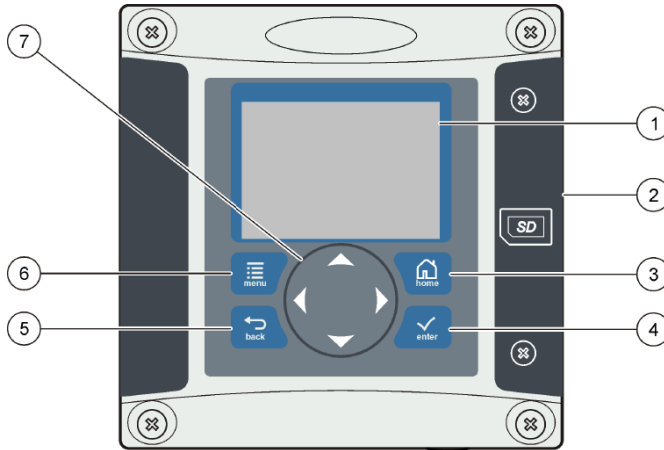


User interface and navigation

User interface

The keypad has four menu keys and four directional keys as shown in [Figure 12](#).

Figure 12 Keypad and front panel overview



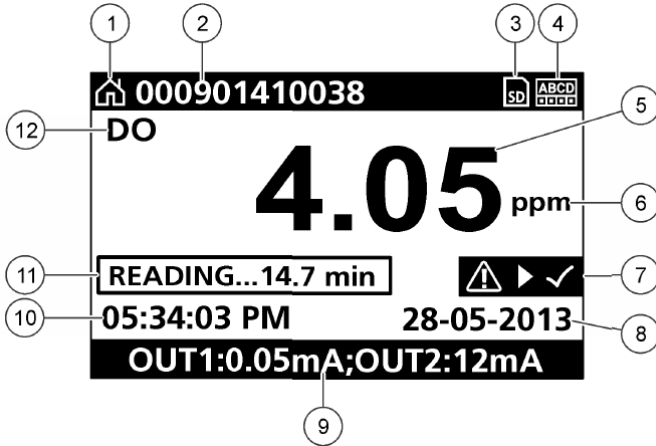
<p>1 Instrument display</p>	<p>5 back key. Moves back one level in the menu structure.</p>
<p>2 Cover for secure digital memory card slot</p>	<p>6 menu key. Moves to the Settings Menu from other screens and submenus.</p>
<p>3 home key. Moves to the Main Measurement screen from other screens and submenus. On the graphical measurement screen can be used to change the graph settings.</p>	<p>7 Directional keys. Used to navigate through the measurement screens, menus, change settings, and increment or decrement digits.</p>
<p>4 enter key. Accepts input values, updates, or displayed menu options. On the measurement screen can be used to display diagnostic information.</p>	

Inputs and outputs are set up and configured through the front panel using the keypad and display screen. This user interface is used to set up and configure inputs and outputs, create log information and calculated values, and calibrate sensors. The SD interface can be used to save logs and update software.

Display

Figure 13 shows an example of the main measurement screen with a DO sensor connected to the controller.

Figure 13 Example of Main Measurement screen



1 Home screen icon	7 Warning status bar
2 Sensor name	8 Date
3 SD Memory card icon	9 Analog output values
4 Relay status indicator	10 Time
5 Measurement value	11 Progress bar
6 Measurement unit	12 Measurement parameter

Table 5 Icon descriptions

Icon	Description
Home screen	The icon may vary depending on the screen or menu being displayed. For example, if an SD card is installed, an SD card icon appears here when the user is in the SD Card Setup menu.
SD memory card	This icon appears only if an SD card is in the reader slot. When a user is in the SD Card Setup menu, this icon appears in the upper left corner.
Warning	A warning icon consists of an exclamation point within a triangle. Warning icons appear on the right of the main display below the measurement value. Push the enter key then select the device to view any problems associated with that device. The warning icon will no longer be displayed once all problems have been corrected or acknowledged.
Error	An error icon consists of an exclamation point within a circle. When an error occurs, the error icon and the measurement screen flash alternately in the main display. To view errors, push the menu key and select DIAGNOSTICS. Then select the device to view any problems associated with that device.

Additional display formats

- From the main measurement screen push the up and down arrow keys to switch between measurement parameters
- From the main measurement screen push the right arrow key to switch to a split display of up to 4 measurement parameters. Push the right arrow key to include additional measurements. Push the left arrow key as needed to return to the main measurement screen
- From the main measurement screen push the left arrow key to switch to the graphical display (see [Graphical display](#) on page 22 to define the parameters). Push the up and down arrow keys to switch measurement graphs

Graphical display

The graph shows concentration and temperature measurements for each channel in use. The graph supplies easy monitoring of trends and shows changes in the process.

1. From the graphical display screen use the up and down arrow keys to select a graph and push the **home** key.
2. Select an option:

Option	Description
MEASUREMENT VALUE	Set the measurement value for the selected channel. Select between AUTO SCALE and MANUALLY SCALE. For manual scaling enter the minimum and maximum measurement values.
DATE & TIME RANGE	Select the date and time range from the available options.

System startup

When initially powered up, the LANGUAGE, DATE FORMAT and DATE/TIME screens appear in order. After these options are set, the controller performs a device scan and displays the message **SCANNING FOR DEVICES. PLEASE WAIT...** If a new device is found, the controller performs an installation process before displaying a main measurement screen.

If the scan finds previously installed devices without configuration changes, the main measurement screen of the device in the number one position appears immediately after the scan is complete.

If a device has been removed from the controller or is not found during the next power-cycled or menu-driven scan, the controller displays a **DEVICE MISSING** message and prompts to delete the missing device.

If no sensor is connected to an installed analog module, the controller will indicate an error. If devices are connected but not found by the controller, refer to the **Troubleshooting** section of this manual.

Set the language, date and time for the first time

The controller displays the language, date and time edit screens when the controller is powered on for the first time, and when it is powered on after the configuration settings have been set to their default values.

After the language, date and time options are set for the first time, update the options as necessary through the setup menu.

1. In the LANGUAGE screen, highlight a language in the options list and push the **enter** key. English is the default language for the controller.
2. In the DATE FORMAT screen, highlight a format and push the **enter** key.
3. In the DATE/TIME screen, push the **right** or **left** arrow keys to highlight a field, then push the **up** and **down** arrow keys to update the value in the field. Update the other fields as necessary.
4. Push the **enter** key. The changes are saved and the controller performs a start-up scan for devices. If connected devices are found, the controller displays the main measurement screen for the device in the number one position. If the controller fails to find connected devices, refer to the **Troubleshooting** section of this manual.

Controller configuration information

General information about configuration options is listed in the table.

1. Push the **menu** key and select Polymetron 9500 SETUP.

Option	Description
SECURITY SETUP	Sets the passcode preferences.
OUTPUT SETUP	Configures the controller analog outputs.

Option	Description
RELAY SETUP	Configures the controller relays.
DISPLAY SETUP	<p>Configures the controller display.</p> <p>ADJUST ORDER—View and modify the measurement display order.</p> <ul style="list-style-type: none"> • SEE CURRENT ORDER—View the current display order • ADD MEASUREMENTS—Add selected measurements to the display • REMOVE MEASUREMENTS—Remove selected measurements from the display • REORDER LIST—Select one or more measurements and change their order in the display • SEE DEFAULT ORDER—View the default display order • SET TO DEFAULT—Set the display order to the default configuration <p><i>Note: Some of the above will not be available if no adjustment is possible for that option (e.g. REORDER LIST and REMOVE MEASUREMENTS will not be available if only one measurement is selected for display).</i></p> <p>DISPLAY CONTRAST—Adjusts the contrast of the controller display.</p> <p>EDIT NAME—Assigns a name to the controller.</p>
SET DATE/TIME	Sets the controller time and date.
DATALOG SETUP	Configures data logging options. Available only if CALCULATION has been setup.
MANAGE DATA	Select the device from the list of installed components and then select VIEW DATA LOG or VIEW EVENT LOG depending on the type of log entry to view. Specify the selection period to list all log entries matching the selection criteria. Push the up and down arrows to select an entry and then push enter to view more details.
ERROR HOLD MODE	<p>HOLD OUTPUTS—Holds outputs at last known value when controller loses communication with the sensor.</p> <p>TRANSFER OUTPUTS—Switches to transfer mode when controller loses communication with the sensor. Outputs transfer to a pre-defined value.</p>
CALCULATION	<p>Configures the controller math function.</p> <p>SET VARIABLE X—Selects the sensor for the x variable.</p> <p>SET PARAMETER X—Selects the sensor measurement for the x variable.</p> <p>SET VARIABLE Y—Selects the sensor for the y variable.</p> <p>SET PARAMETER Y—Selects the sensor measurement for the y variable.</p> <p>SET FORMULA—Select the math function to implement:</p> <ul style="list-style-type: none"> • None—Disables the math function • X-Y—Subtraction function • X+Y—Addition function • X/Y—Division function • [X/Y]%—Percentage function • [X+Y]/2—Average function • [X*Y]—Multiplication function • [X-Y]/X—Difference function <p>DISPLAY FORMAT—Selects the number of digits and decimal points.</p> <p>SET UNITS—Selects the units for the calculated reading.</p> <p>SET PARAMETER—Selects the parameter for the calculated reading.</p>
DISCRETE INPUT SETUP	Configures three discrete input channels.
LANGUAGE	Assigns the language used in the controller.

2. Select an option and push **enter** to activate the menu item.

Advanced operation

Security setup

Enable or disable the pass code

By default the pass code option is disabled and all configuration settings and calibrations can be changed. When the pass code function is enabled, access to a number of menus and menu options will require a pass code.

1. Push the **menu** key and select Polymetron 9500 SETUP>SECURITY SETUP>SET PASS CODE.
2. Select DISABLED or ENABLED and push **enter**.
3. Push the **home** key to enable the new security setting.

Edit the pass code

The pass code is factory set to sc200. The EDIT PASS CODE menu option appears in the SECURITY SETUP menu only after the pass code feature is enabled and a valid pass code has been entered.

A pass code consists of up to six upper or lower-case alpha, numeric and special characters. Pass codes are case-sensitive.

To edit the pass code:

1. Make sure the pass code is enabled. Refer to [Enable or disable the pass code](#) on page 24 for information on how to enable the pass code.
2. Push the **menu** key and select Polymetron 9500 SETUP>SECURITY SETUP.
3. Use the arrow keys to enter the current valid pass code and push **enter**.
4. Select EDIT PASS CODE and push **enter**.
5. Use the arrow keys to edit the pass code and push **enter**.
6. Push the **home** key to save the new pass code.

Configure a 4-20 mA input module

An analog module must be installed in the controller.

1. Determine what output the connected device is using (0-20 mA or 4-20 mA). This information will be used to set the scale.
2. Determine what the 20 mA value is equal to (e.g. 100 psi).
3. Determine what the low end (0 or 4 mA) value is equal to (e.g. 10 psi). This information will be used to set the display range.
4. Push the **menu** key and select SENSOR SETUP>CONFIGURE.
5. Update the options.
 - a. Highlight an option and push **enter**.
 - b. Make a selection or update the entries.
 - c. Push **enter** to save the changes.

Option	Description
EDIT NAME	Edits the module name
EDIT UNITS	Edits the measurement units
EDIT PARAMETER	Edits the parameter name

Option	Description
DISPLAY RANGE For the 0-20 mA scale: <ul style="list-style-type: none"> • Set the 20 mA value • Set the 0 mA value For the 4-20 mA scale: <ul style="list-style-type: none"> • Set the 20 mA value • Set the 4 mA value 	Sets the values used for the selected scale (0-20 mA or 4-20 mA)
SIGNAL AVERAGE	Sets how often signals are averaged. Higher values produce a smoother signal but increase the time it takes for a signal to respond to a change in the process value.
SET RESOLUTION— X.XXX, XX.XX, XXX.X, XXXX	Sets the number of decimal places used in the display.
SELECT SCALE— 4-20 mA or 0-20 mA	Sets scale used for the 4-20 mA input
LOG SETUP— 5 sec, 30 sec, 1 min, 2 min, 5 min, 10 min, 15 min, 30 min, 60 min	Sets how often data is logged to the internal controller memory.
RESET DEFAULTS— Push enter to reset configuration settings or push the back key to cancel.	Resets configuration settings to the default values.

Configure a 4-20 mA output module

The NETWORK SETUP option appears in the Settings Menu only if an analog output module or other network module such as Modbus or Profibus is installed in the controller.

Outputs for analog output modules are set at 4-20 mA. Outputs can be assigned to represent a measured parameter such as pH, temperature, flow or calculated values.

For configuration information refer to the manual for the output module installed.

Configure the controller analog outputs

The controller analog outputs can be assigned to represent the measured parameter or secondary measurements such as temperature and calculations.

1. Push the **menu** key and select Polymetron 9500 SETUP>OUTPUT SETUP.
2. Select OUTPUT 1 or OUTPUT 2.
3. Choose SELECT SOURCE and select a source from the list. Typically the source is one of the sensors attached to the system. If an analog input card is installed, the analog input may be used as a source.
4. From the OUTPUT SETUP menu, choose SET PARAMETER and choose an option from the list. Parameters will vary depending on the type of sensors installed.
5. From the OUTPUT SETUP menu, select SET FUNCTION and choose a function. Further setup options will vary depending on which function is chosen.

Option	Description
LINEAR CONTROL	Signal is linearly dependent on the process value.
PID CONTROL	Signal works as a PID (Proportional, Integral, Derivative) controller.
LOGARITHMIC	Signal is represented logarithmically within the process variable range.
BILINEAR	Signal is represented as two linear segments within the process variable range.

6. From the OUTPUT SETUP menu, select ACTIVATION. Use the information in the table below the chosen function to configure the options.
7. If TRANSFER is or will be selected as the ERROR HOLD MODE, or if the transfer will be used during calibration or other functions within the sensor menu, select SET TRANSFER from the OUTPUT SETUP menu and enter the transfer value.
8. From the OUTPUT SETUP menu, select SET FILTER and enter the filter value.
9. From the OUTPUT SETUP menu, select SCALE and choose the scale (0-20 mA or 4-20 mA).

- **Linear control**

Option	Description
SET LOW VALUE	Sets the low endpoint of the process variable range.
SET HIGH VALUE	Sets the high endpoint of the process variable range.

- **PID control**

Option	Description
SET MODE	AUTO—the signal is automatically controlled by the algorithm within the analyzer using proportional, integral, and derivative inputs. MANUAL—the signal is controlled by the user through manual adjustment of the % change value. This option is shown as MANUAL OUTPUT after the manual set mode is selected.
PHASE	The direction in which the signal responds to process change. DIRECT—signal increases as the process increases. REVERSE—signal increases as process decreases.
SET SETPOINT	Creates a desired control point of process.
PROP BAND	A function of the difference between the measured signal and the desired setpoint.
INTEGRAL	The period of time from the injection point of a reagent to contact with the measuring device.
DERIVATIVE	Used to compensate for the 2 nd order effects of the process. The majority of applications can be controlled without the use of the derivative setting.
TRANSIT TIME	Stops all PID control for a selected period of time as the sample travels from the control pump to the measurement sensor.

- **Logarithmic**

Option	Description
SET 50% VALUE	Sets the value corresponding to 50% of the process variable range.
SET HIGH VALUE	Sets the upper value of the process variable range.

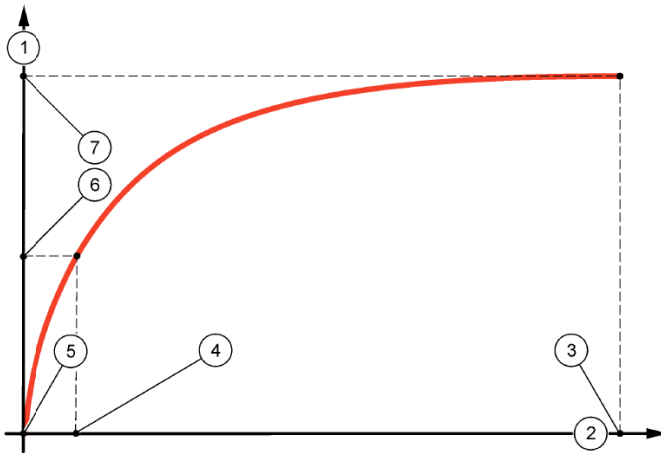
- **Bilinear**

Option	Description
SET LOW VALUE	Sets the low endpoint value of the process variable range.
SET HIGH VALUE	Sets the high endpoint value of the process variable range.
SET KNEE POINT VALUE	Sets the value at which the process variable range divides into another linear segment.
SET KNEE POINT CURRENT	Sets the value of the current at the knee point value.

Logarithmic output mode

Figure 14 shows in graph form the operation of the logarithmic output mode.

Figure 14 Logarithmic output

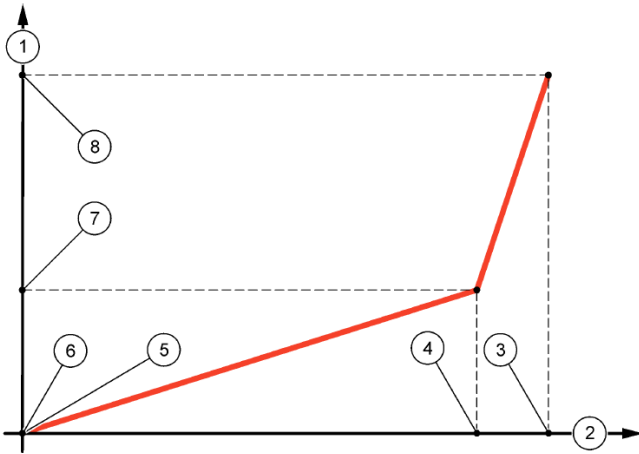


1 Output current axis	4 50% value	7 Maximum output current (20 mA)
2 Source value axis	5 Minimum output current (0-4 mA)	
3 High value	6 50% output current	

Bilinear output mode

Figure 15 shows in graph form the operation of the bilinear output mode.

Figure 15 Bilinear output



1 Output current axis	4 Knee point value	7 Knee point current
2 Source value axis	5 Low value	8 Maximum output current (20 mA)
3 High value	6 Minimum output current (0-4 mA)	

Configure relays

The Normally Open (NO) and Common (COM) relay contacts will be connected when an alarm or other condition is active. The Normally Closed (NC) and Common relay contacts will be connected when an alarm or other condition is inactive (unless the FAIL SAFE is set to YES), or when power is removed from the controller. To select a menu option, highlight the option and push **enter**.

1. Push the **menu** key and select Polymetron 9500 SETUP>RELAY SETUP.
2. Select a relay from the list.
3. From the RELAY SETUP menu, choose SELECT SOURCE and push **enter**. Normally, a source is one of the sensors attached to the system, but the controller can also function as a source. If an analog input module is installed, the source may be the analog input.
4. From the RELAY SETUP menu, select SET PARAMETER and choose from the list of parameters. The list of parameter options will vary with the type of attached sensor.
5. From the RELAY SETUP menu, select SET FUNCTION and choose from the list. Further setup will depend on the function chosen.

Option	Description
SCHEDULER (available if the controller is selected as the relay source)	Relay switches at certain times independently of any process value
ALARM	Relay activates when upper or lower alarm value is exceeded
FEEDER CONTROL	Relay indicates if a process value exceeds or falls below a setpoint
EVENT CONTROL	Relay toggles if a process value reaches an upper or lower limit

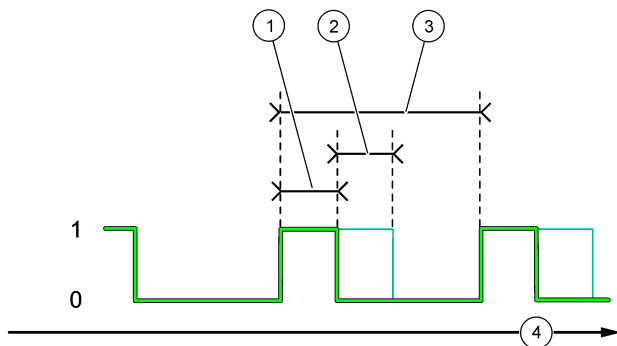
Option	Description
PWM CONTROL	Relay uses a PWM (Pulse Width Modulation) control depending on a process value
FREQ CONTROL	Relay switches with a frequency depending on a process value
WARNING	Relay indicates warning and error conditions in sensors

6. From the RELAY SETUP menu, select SET TRANSFER and choose ACTIVE or INACTIVE.
7. From the RELAY SETUP menu, select FAIL SAFE and choose YES or NO.
8. From the RELAY SETUP menu, select ACTIVATION. The activation options for the selected function appear.
9. Test the relay function to make sure it is properly energizing the connected device. To do relay testing, Push the **menu** key and select TEST/MAINT>TEST RELAY.

- **Scheduler function (refer to Figure 16)**

Option	Description
HOLD OUTPUTS	Holds outputs in the present ON or OFF state
RUN DAYS	Sets the weekday(s) that the relay operates.
START TIME	Sets the start time.
INTERVAL	Sets the time between activation cycles (default value: 5 min).
DURATION	Sets the period of time the relay is energized (default value: 30 sec).
OFF DELAY	Sets the time for additional hold/output time after the relay has been turned off.

Figure 16 Scheduler function



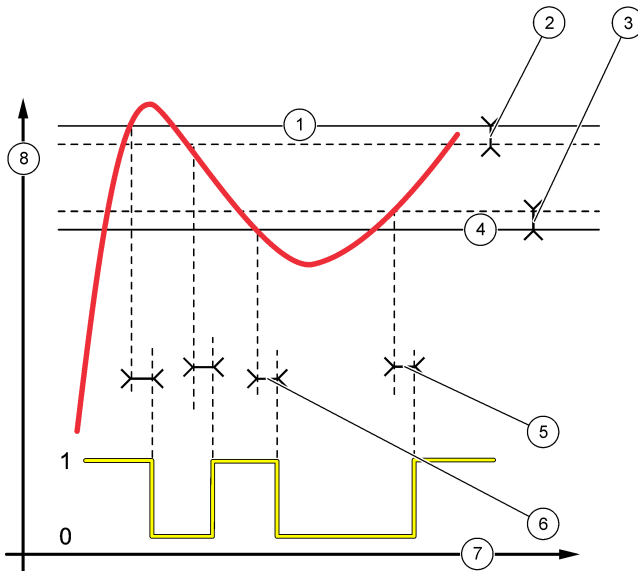
1 Duration	3 Interval
2 OFF delay	4 Time (x-axis)

- **Alarm function (refer to Figure 17)**

Option	Description
LOW ALARM	Sets the value where the relay will turn on in response to decreasing measured value. For example, if the low alarm is set for 1.0 and the measured value drops to 0.9, the relay activates.
HIGH ALARM	Sets the value where the relay will turn on in response to increasing measured value. For example, if the high alarm is set for 1.0 and the measured value increases to 1.1, the relay activates.

Option	Description
LOW DEADBAND	Sets the range where the relay remains on after the measured value increases above the low alarm value. For example, if the low alarm is set for 1.0 and the low deadband is set for 0.5, the relay remains on between 1.0 and 1.5. Default is 5% of the range.
HIGH DEADBAND	Sets the range where the relay remains on after the measured value decreases below the high alarm value. For example, if the high alarm is set for 4.0 and the high deadband is set for 0.5, the relay remains on between 3.5 and 4.0. Default is 5% of the range.
OFF DELAY	Sets a time (0-300 seconds) to delay the relay from normally turning off (default: 0 seconds).
ON DELAY	Sets a delay time for the relay to turn on (default: 0 seconds).

Figure 17 Alarm function



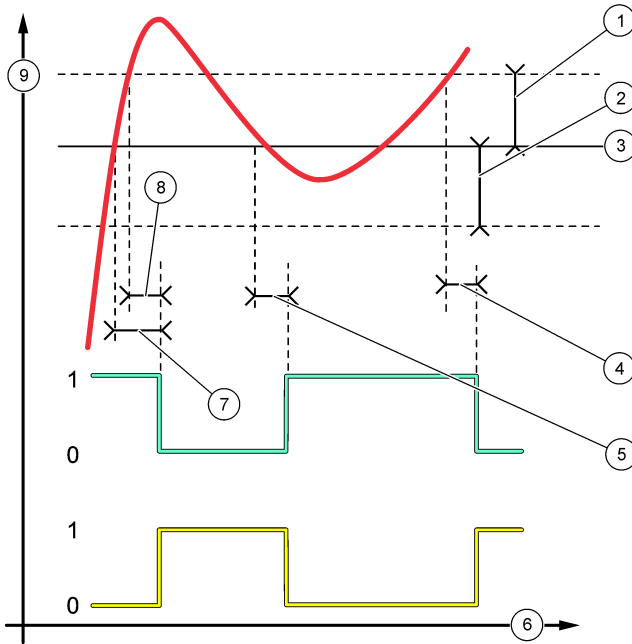
1 High alarm	4 Low alarm	7 Time (x-axis)
2 High deadband	5 ON delay	8 Source (y-axis)
3 Low deadband	6 OFF delay	

- **Feeder control function (refer to [Figure 18](#) and [Figure 19](#))**

Option	Description
PHASE	Defines the relay status if the process value exceeds the setpoint. HIGH (default)—turns the relay on when the process value exceeds the setpoint. LOW—turns the relay on when the process value falls below the setpoint.
SET SETPOINT	Sets the process value at which the relay toggles. The default value is different for each sensor.
DEADBAND	Sets the area for an amount of change necessary after the relay setpoint is reached in order to satisfy a condition.
OVERFEED TIMER	Sets a time period for de-activating an active relay if the process setpoint cannot be reached. Once an overfeed alarm is present, it must be manually reset.

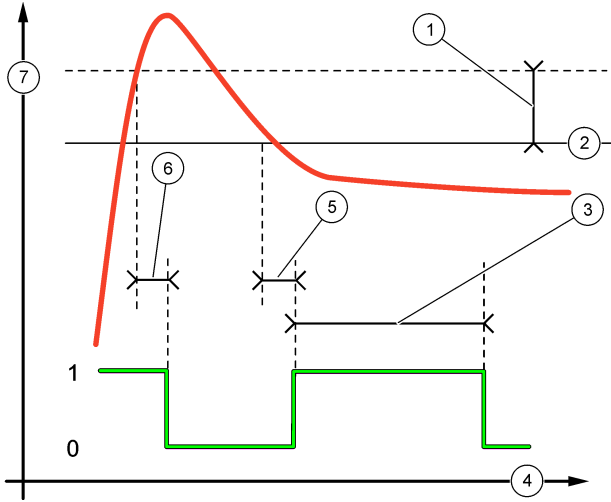
Option	Description
OFF DELAY	Sets a delay time for the relay to turn off (default: 0 seconds).
ON DELAY	Sets a delay time for the relay to turn on (default: 0 seconds).

Figure 18 Feeder control function



1 Deadband (Phase = Low)	4 OFF delay (phase set high)	7 ON delay (phase set high)
2 Deadband (Phase = High)	5 ON delay (phase set low)	8 OFF delay (phase set low)
3 Setpoint	6 Time (x-axis)	9 Source (y-axis)

Figure 19 Feeder control function (phase low, overfeed timer)

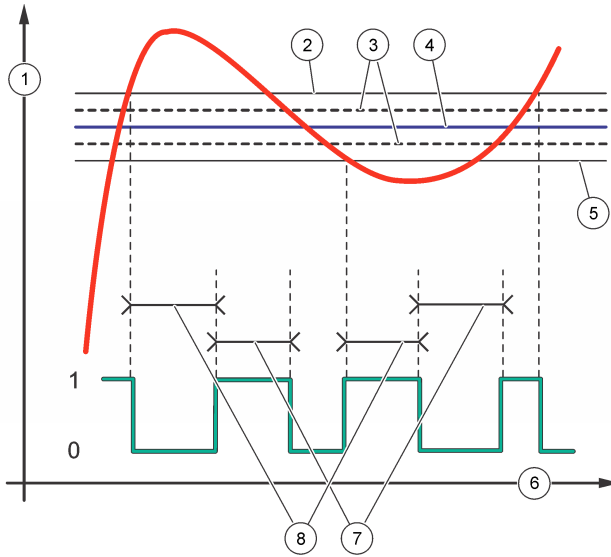


1 Deadband	4 Time (x-axis)	7 Source (y-axis)
2 Setpoint	5 ON delay	
3 Overfeed timer	6 OFF delay	

• **Event control function (refer to [Figure 20](#), [Figure 21](#) and [Figure 22](#))**

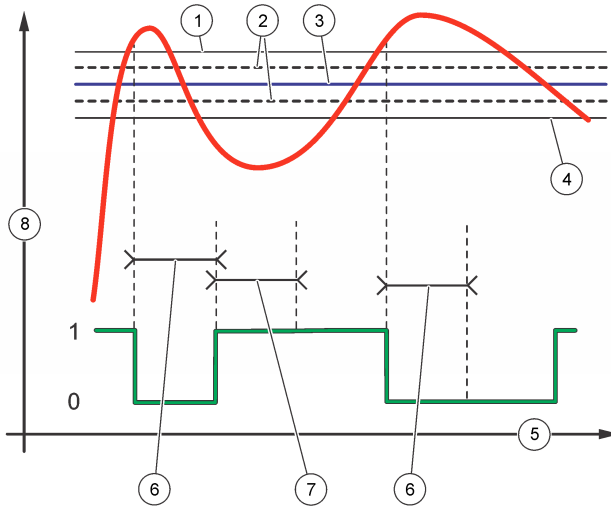
Option	Description
SET SETPOINT	Sets the value where the relay will turn on.
DEADBAND	Sets a hysteresis so the relay will not swing unregulated when the process value converges to the setpoint.
OnMax TIMER	Sets the maximum time the relay can stay on independent from the measured value (default: + 0 min).
OffMax TIMER	Sets the maximum time the relay can stay off independent from the measured value (default: + 0 min).
OnMin TIMER	Sets the minimum time the relay can stay on independent from the measured value (default: + 0 min).
OffMin TIMER	Sets the minimum time the relay can stay off independent from the measured value (default: + 0 min).

Figure 20 Event control function (no delay)



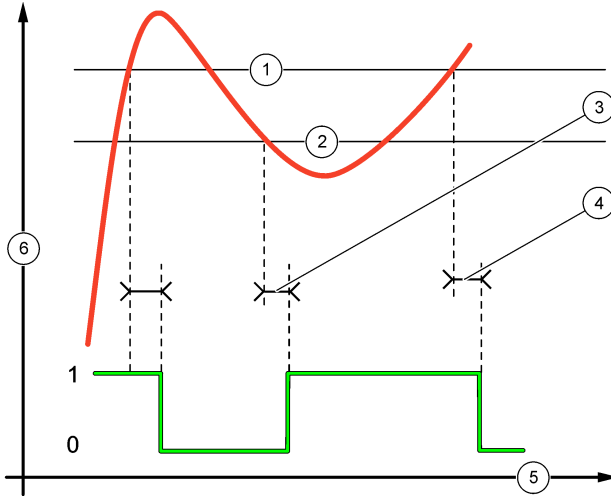
1 Source (y-axis)	4 Setpoint	7 OnMax-time
2 High alarm	5 Low alarm	8 OffMax-time
3 Deadband	6 Time (x-axis)	

Figure 21 Event control function (OnMin timer, OffMin timer)



1 High alarm	4 Low alarm	7 OnMin timer
2 Deadband	5 Time (x-axis)	8 Source (y-axis)
3 Setpoint	6 OffMin timer	

Figure 22 Event control function (ON/OFF delay)

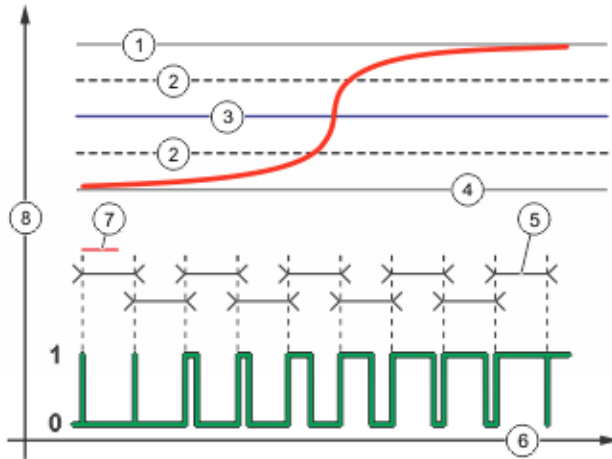


1 High alarm	3 ON delay	5 Time (x-axis)
2 Low alarm	4 OFF delay	6 Source (y-axis)

• **PWM control function (refer to [Figure 23](#))**

Option	Description
SET MODE	AUTO—the relay output works as a PID controller. MANUAL—the signal is controlled by the user through manual adjustment of the % change value. This option is shown as Manual Output after the manual set mode is selected.
PHASE	Reverses the leading sign of the control deviation for the PID controller (default: REVERSE). The phase selects whether the relay will operate at the first part of a cycle (direct phase) or the second part (reverse phase).
SET SETPOINT	Creates a setpoint value.
DEAD ZONE	The range above and below the setpoint. In this set range, the PID controller does not take action to change the Pulse Width Modulation On/Off Ratio output signal until the limits of the dead zone are reached.
PERIOD	Sets the cycle duration of the PWM output signal (default: 5 seconds).
MIN WIDTH	Sets the minimum PWM ratio (default: 1.0 second).
MAX WIDTH	Sets the maximum PWM ratio (default: 4.0 seconds).
PROP BAND	Sets the proportional part of the PID controller. The proportional part of the controller supplies an output signal which is linearly dependent to the control deviation. The proportional part reacts on any changes at the input but starts to oscillate easily if the value is set high. The proportional part cannot completely compensate for disturbances.
INTEGRAL	Sets the integral part of the PID controller (default: 000 minutes). The integration part of the controller supplies an output signal. The output signal increases linearly if the control deviation is constant. The integration part responds slower than the proportional part and can completely compensate disturbances. The higher the integration part, the slower it responds. If the integration part is set too low, it starts to oscillate.

Figure 23 PWM control function (linear mode)

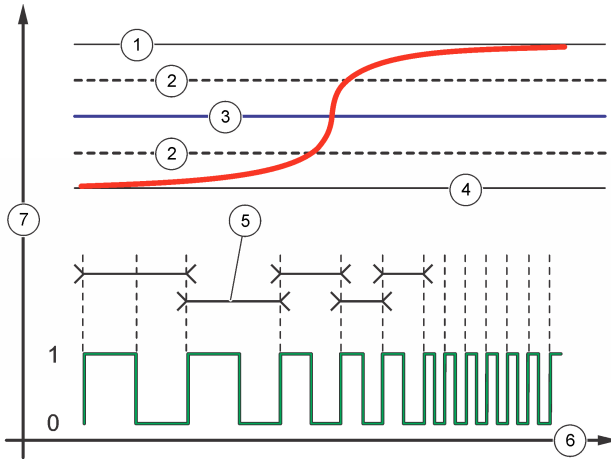


1 High alarm	4 Low alarm	7 Phase
2 Deadband	5 Period	8 Selected source (y-axis)
3 Setpoint	6 Time (x-axis)	

• **Frequency control function (refer to [Figure 24](#))**

Option	Description
SET MODE	AUTO—The relay works as a PID controller. MANUAL—the signal is controlled by the user through manual adjustment of the % change value. This option is shown as MANUAL OUTPUT after the manual set mode is selected.
PHASE	Reverses the leading sign of the control deviation for the PID controller (default: REVERSE). The phase selects whether the relay will operate at the first part of a cycle (direct phase) or the second part (reverse phase).
SET SETPOINT	Sets the process value which is controlled by the PID controller.
DEAD ZONE	In this set range, the PID controller does not take action to change the output frequency until within the limits of the dead zone.
PULSE WIDTH	Sets the cycle duration (0-600 seconds) of the PWM output signal. (default: 0.5 seconds) The cycle duration is equal to the duty cycle of the output signal.
MINIMUM PULSES	Sets the minimum number of pulses per minute at which the relay can operate. Range: 0.001–4.000 (default: 1.000)
MAXIMUM PULSES	Sets the maximum number of pulses per minute at which the relay can operate. Range: 0.001–60.000 (default: 04.000). This value cannot be set lower than MINIMUM PULSES value.
PROP BAND	Sets the proportional part of the PID controller. The proportional part of the controller supplies an output signal which is linearly dependent to the control deviation. The proportional part reacts on any changes at the input but starts to oscillate easily if the value is set high. The proportional part cannot fully compensate for disturbances.
INTEGRAL	Sets the derivative part of the PID controller (default: 000 minutes). The integration part of the controller generates an output signal. The output signal increases linearly if the control deviation is constant. The integration part responds slower than the proportional part and can fully compensate disturbances. The higher the integration part, the slower it responds. If the integration part is set too low, it starts to oscillate.

Figure 24 Frequency control function



1 High limit	4 Low limit	7 Selected source (y-axis)
2 Deadband	5 Cycle duration	
3 Setpoint	6 Time (x-axis)	

• **Warning function**

Option	Description
--------	-------------

WARNING Sets the level for warning activation. Refer to the sensor manual for the numbers for individual warning messages.

Set up the discrete inputs

Use these inputs to switch closure inputs or logic level voltage inputs.

1. Push the **menu** key and select Polymetron 9500 SETUP>DISCRETE INPUT SETUP.
2. Select the desired channel (INPUT 1, INPUT 2 or INPUT 3) and push **enter**.
3. Select a control logic option and push **enter**.

Option	Description
--------	-------------

DISABLE This channel is disabled and not used.

ON/HIGH This channel is active when either the switch input is On (or closed), or the logic level voltage input is at a High level.

OFF/LOW This channel is active when either the switch input is Off (or opened), or the logic level voltage input is at a Low level.

4. Select a warning option and push **enter**.

Option	Description
--------	-------------

OFF An active discrete input does not trigger a device warning.

ON An active discrete input triggers a device warning.

- Select an output mode option and push **enter**.

Option	Description
ACTIVE	Output level continues to represent operating conditions.
HOLD	Output level is held static.
TRANSFER	Output level moves to a pre-configured value.

- Select the sensors that will have their outputs (analog and relay) affected when one of the discrete inputs becomes active. Push **enter**.
- Use the arrows to select the ON DELAY value (the duration time delay between the discrete input activation and the configured response of the controller). Push **enter**.
- Use the arrows to select the OFF DELAY value (the duration time delay between the discrete input de-activation and the configured response of the controller). Push **enter**.
- Repeat steps 4–8 for each desired channel.
- If a discrete input needs to be changed after initially set up:
 - Repeat steps 1–2 and an INPUT SETTINGS menu appears with the following options:
 - CONTROL LOGIC
 - SET WARNING
 - OUTPUT MODE
 - ON DELAY
 - OFF DELAY
 - Select the desired option and push **enter**.
 - Make the desired changes and push **enter** to save the changes and return to the INPUT SETTINGS menu.

Set up a calculation

Two sensors must be installed in the controller.

- Push the **menu** key and select Polymetron 9500 SETUP>CALCULATION.
- Select a menu option and choose from the displayed list or update the entry.

Option	Description
SET VARIABLE X	Selects the sensor that corresponds to the variable set as "X".
SET PARAMETER X	Selects the measurement type that corresponds to the variable set as "X".
SET VARIABLE Y	Selects the sensor that corresponds to the variable set as "Y".
SET PARAMETER Y	Selects the measurement type that corresponds to the variable set as "Y".
SET FORMULA	NONE, X-Y, X/Y, [X/Y]%, [X+Y]/2, X*Y, [X-Y]% / X.
DISPLAY FORMAT	Sets the number of decimal places displayed in a calculation result.
SET UNITS	Sets the units of measurement.
SET PARAMETER	Assigns the name of the measurement.

- Push **enter** to save the selection or setting and return to the CALCULATION menu.

Set the datalog mode and interval

Datalog Setup is available if a calculation has been set up.

1. Push the **menu** key and select Polymetron 9500 SETUP>DATALOG SETUP.

Option	Description
SET MODE	Select an option (SNAP SHOT, AVERAGE, MAXIMUM, MINIMUM).
SET INTERVAL	Select an interval from the list.

Using the secure digital memory (SD) card

An SD card must be installed in the controller.

- The SD card can be used to update software and firmware and to download event and data logs. If the SD card is installed while the controller is in the main menu, push the **home** key and then the **menu** key to verify the option is visible. The SD icon will also be visible in the upper status bar of the main measurement screen when a card is installed.
- Data log files on the SD card are available in XML and binary formats.
- DataCom is used to convert files from binary to CSV format. Refer to the DataCom manual for more information on how to use the application. For a copy of the DataCom manual, software updates or other downloadable resources, go to <http://www.hach-lange.com> or <http://www.hach.com> and search *DataCom*.

Updating software

Notes:

- The controller does not automatically transfer information to or from an SD card.
- When the SD card is put in multiple controllers, each controller has a separate set of folders in the SD card memory. To make sure software updates are in the correct folder for the controller in use, it is best to use a separate dedicated SD card for each controller.

1. Push the **menu** key and select SD CARD SETUP.
2. Select UPGRADE SOFTWARE and push the **enter** key.
Note: If the UPGRADE SOFTWARE option does not appear, perform the steps in [Firmware updates with SD cards on page 40](#).
3. Select a device from the list and push the **enter** key. The list of options includes the controller and all connected devices that have software placed in the appropriate folder on the SD card.
4. If more than one version of the upgrade software is available, select the version with the highest number and push the **enter** key.
5. Push the **enter** key to begin the software transfer. The display will show "TRANSFERRING FILES. PLEASE WAIT..." The percentage of completion appears in the bottom left corner of the display. The upgrade cannot be halted once it has begun.
 - When the transfer is successful, the display will show "TRANSFER COMPLETE" along with a prompt to push **enter** to restart the controller or to push the **back** key and exit to the SD CARD SETUP menu. Controller updates take effect when the controller is restarted. A restart is not necessary for sensor updates.
 - If the transfer is unsuccessful, the display will show "TRANSFER FAILED" and an error message. Push the **enter** key to acknowledge the warning and exit out of the menu. Error messages are different for each sensor. Refer to the applicable sensor manual.

Save data and event logs with SD cards

Notes:

- Data and event logs can be downloaded to an SD card and viewed with any device capable of reading an SD card.

- Data logs store the measurement data at selected intervals in a packed binary format (.flg file).
- Event logs store a variety of events that occur on the devices such as configuration changes, alarms, and warning conditions. Event logs are set up during the sensor or module configuration process. Event logs are stored in a CSV format.

1. Push the **menu** key and select SD CARD SETUP>SAVE LOGS.
2. If more than one device appears on the screen, all devices are selected by default. To deselect an item, highlight the selection and push the left arrow key. Select the devices from which logs will be saved and push the **enter** key.
3. Select the time period from which logs are to be saved.

Option	Description
LAST DAY	All logs from the last full 24 hours, starting from 12:00 a.m., and any additional time remaining on the current day.
LAST WEEK	All logs from the last full week (7 days) starting from 12:00 a.m., and any additional time remaining on the current day.
LAST MONTH	All logs from the last full month (30 days) starting from 12:00 a.m., and any additional time remaining on the current day.
ALL	Save all logs in memory.
NEW	All logs that are new since the last time logs were saved to the SD card.

4. Push the **enter** key to confirm the choice, and push the **enter** key again to begin the file transfers.
5. Allow time for the files to transfer. The display will show TRANSFERRING FILES. PLEASE WAIT... and the percentage of files transferred. If the transfer is successful, the display will show "TRANSFER COMPLETE". If the transfer is not successful, the display will show "TRANSFER FAILED".
6. Push the **enter** key to return to the SD CARD SETUP menu.

Access data and event log files on the SD card

A PC, a USB or other SD card reader device, Excel 2003 or higher (for XML files) or the DataCom application (for binary flg files) are necessary to view the event and data logs stored on an SD card.

Data logs have the following structure: Device Name, Device Serial Number, Device Identification, Data Log, Time Stamp.

Event logs have the following structure: Device Name, Device Serial Number, Device Identification, Event Log, Time Stamp.

To view data or event log files stored on the SD card:

1. Attach the card reader device to the PC (if necessary) and install the SD card that contains the files in the reader device.
2. In the SD card directory, open the HACH folder.
3. Select the Logs folder.
4. Select a device folder.
The event and data log files in the folder are shown.
5. To view XML data log files:
 - a. Make sure the HachDatalog.xsl style sheet exists in the device folder.
 - b. Open the Excel application.
 - c. Go to File, Open.
 - d. Select the data log file.
 - e. In the Import XML dialog box, select **Open the file with the following style sheet applied** and select **HachDatalog.xml**.

- f. Click OK to view the data.
6. To view binary data log (.flg) files:
 - a. Make sure the device driver (.flg.driv) file exists in the device folder.
 - b. Open DataCom.
 - c. In the File Viewer section, click Open.
 - d. Select the data log file.

The data log file is shown in the box and a comma separated values (csv) file with the same file name is created. This csv file can be opened in Excel.

Firmware updates with SD cards

The latest firmware updates can be placed on an SD card. The SD card can then be used to update the controller or device firmware.

A PC and a USB card reader or other device capable of reading an SD card are necessary.

1. Find the zip file at <http://www.hach-lange.com> or <http://www.hach.com> and copy it to the PC.
2. Extract file(s) from the zip folder and save them to the SD card.
3. Remove the SD card and update the controller and device firmware. Refer to [Updating software](#) on page 38.

Backup settings to an SD card

Saves the configuration of a device to the SD card.

1. Push the **menu** key and select SD CARD SETUP>MANAGE CONFIGURATION>BACKUP SETTINGS.
2. Select the devices to be backed up. All devices are selected by default. To deselect an item, highlight the selection and push the left arrow key. Push **enter** to begin the file transfers. If backup files already exist on the SD card, a confirmation window appears. Select the devices again and push **enter**. Wait for the "TRANSFER COMPLETE" message.
3. Push **enter** again to return to the MANAGE CONFIGURATION menu.

Restore settings to the controller

This menu selection only appears if a (serial number-specific) backup file for the controller or one of the sensors connected to it exists on the SD Card. This menu selection loads the configuration of a specific device from the SD card to the same device (serial number-controlled function).

1. Push the **menu** key and select SD CARD SETUP>MANAGE CONFIGURATION>RESTORE SETTINGS.
2. Select the device that will be restored. All devices are selected by default. To deselect an item, highlight the selection and push the left arrow key. Push **enter** to begin the file transfers.
3. To have the settings take effect immediately, push **enter** to restart the controller or push the **back** key to return to the MANAGE CONFIGURATION menu.

Transfer settings to another device

Allows the configuration settings for a device to be transferred to an SD card and then to another device of the same type.

1. Push the **menu** key and select SD CARD SETUP>MANAGE CONFIGURATION>TRANSFER SETTINGS.
2. Two options appear:
 - RETRIEVE SETTINGS
 - COPY SETTINGS

3. To retrieve settings from the controller (or a device connected to it) and put the settings on the SD card:
 - a. Select RETRIEVE SETTINGS and push **enter**.
 - b. Select the devices that contain the information to be transferred. All devices are selected by default. To deselect an item, highlight the selection and push the left arrow key. Push **enter** to begin the file transfers. Wait for the "TRANSFER COMPLETE" message.
 - c. If files already exist on the SD card, a confirmation window appears. Select the devices again and push **enter**. Wait for the "TRANSFER COMPLETE" message.
 - d. Push **enter** to return to the MANAGE CONFIGURATION menu.
4. To copy settings from the SD card to a controller (or a device connected to it):
 - a. Select COPY SETTINGS and push **enter**.
 - b. Select the devices on the SD card. All devices are selected by default. To deselect an item, highlight the selection and push the left arrow key. Push **enter** to begin the file transfers. Wait for the "TRANSFER COMPLETE" message.
 - c. When the transfer is complete, push **enter** to restart the connected devices.
 - d. Push **enter** to restart the controller or push **back** to return to the MANAGE CONFIGURATION menu.

Using the service port

The service port is used to download data files from the controller and install new versions of controller and sensor firmware. To download data and update software, use the service port in combination with DataCom and a service cable (LZX887).

Using DataCom

When using the service port, it is necessary to use DataCom. DataCom is a PC Application Utility that downloads data log and event log files from the controller and installed sensors. Files are downloaded from the controller through the controller service port or they can be placed on a Secure Digital Memory (SD) card installed in the controller. In addition, DataCom is used to upload software for the controller and sensors. The DataCom application must be installed on a PC to read the files.

Refer to the DataCom manual for more information on how to use the application. The DataCom manual, software updates and other downloadable resources are available at <http://www.hach-lange.com> or <http://www.hach.com>.

Update the display language

1. Push the **menu** key and select Polymetron 9500 SETUP>LANGUAGE to display the list of language options.
2. Highlight the language to be used for the controller and push **enter**.

Update the date and time

1. Push the **menu** key and select Polymetron 9500 SETUP>SET DATE/TIME.
2. Select DATE FORMAT and push **enter**.
3. Select a format and push **enter**.
4. Select DATE/TIME and push **enter**.
5. Update the entries.
 - a. Use the right and left arrow keys to highlight a field.
 - b. Use the up and down arrow keys to change the values in the field and push **enter**.
 - c. At the end of the date field, push the right arrow to wrap down to the time fields.
 - d. Use the up and down and arrow keys to update the time fields.
6. Push **enter** to save the changes.

Maintenance

⚠ DANGER

Multiple hazards. Only qualified personnel must conduct the tasks described in this section of the document.

Cleaning the controller

⚠ DANGER

Always remove power from the controller before performing maintenance activities.

Note: Never use flammable or corrosive solvents to clean any part of the controller. Use of these solvents may degrade the environmental protection of the unit and may void the warranty.

1. Make sure the controller cover is securely closed.
2. Wipe the controller exterior with a cloth dampened with water, or with a mixture of water and mild detergent.

Fuse replacement

Fuses are not user-serviceable items. The need for fuse replacement in controllers indicates severe technical failure and is therefore considered to be a service activity. If a blown fuse is suspected, contact Technical Support.

Battery replacement

The lithium ion backup battery is not user replaceable. Contact Technical Support for replacement.

Troubleshooting

Problem	Resolution
No current output	Verify current output configuration.
	Test current output signal using the Test/Maintenance submenu. Input a current value and verify the output signal at the controller connections.
	Contact Technical Support.
Incorrect current output	Verify current output configuration.
	Test current output signal using the Test/Maintenance submenu. Input a current value and verify the output signal at the controller connections. If the output is incorrect, perform an output calibration.
No relay activation	Make sure relay connections are secure.
	If using an external power source, make sure the relay wiring is correct.
	Make sure the relay configuration is correct.
	Test the relay activation through the Test/Maintenance menu. The relay should energize and de-energize as selected.
	Make sure the controller is not in calibration mode and that the relay is not being held.
Reset the Overfeed Timer to make sure the timer has not expired.	

Problem	Resolution
Secure Digital Memory (SD) card not recognized by the controller	Make sure the SD card is properly oriented. The copper traces should face toward the controller display.
	Make sure the SD card is fully seated in the slot and the spring lock is engaged.
	Make sure the SD card is properly formatted with a Fat 32 format. The MMC format is not supported. Follow the instructions of the card manufacturer to format the SD card on a PC.
	Make sure the card is not larger than 32 GB.
	Make sure an SD card is being used. Other types of cards (such as xSD, micro SD, mini SD) will not work properly.
Information not saving, or not saving properly to the SD card.	Make sure the SD card is properly formatted with the FAT 32 format. The MMC format is not supported. Follow the instructions of the card manufacturer to format the SD card on a PC.
	If the SD card has previously been in use, format the card with the Fat 32 format, install the card in the controller, and try downloading files.
	Try a different SD card.
SD card full	Read the SD card with a PC or other card reader device. Save important files and then delete some or all of the files on the SD card.
Controller cannot find software updates on the SD card.	Make sure an appropriate folder is created by installing the SD card in the controller. An update folder will automatically be created.
	Install the SD card on a PC and make sure the software files are located in the appropriate update folder.
	If the same SD card is used with multiple controllers, each controller will have a separate folder on the system. Make sure the software updates are in the folder dedicated to the controller in use.
Display is lit but shows no characters or characters are faint or blurry.	Adjust the display contrast
	Make sure protective film has been removed from display.
	Clean the outside of the controller, including the display screen.
Controller will not power up, or powers up intermittently	Make sure the AC power connections are properly terminated in the controller.
	Make sure the power strip, line power, wall plug are all properly plugged in.
	Contact Technical Support
Network or sensor module not recognized	Make sure the module is properly installed.
	Make sure the module selector switch is set to the proper number.
	Remove sensor module and install the module into the second analog slot. Apply power to the controller and allow the controller to perform a device scan.
	Contact Technical Support.

Problem	Resolution
Sensor not recognized	If the sensor and a corresponding module is installed in the controller, refer to the instructions supplied with the Network or Sensor Module.
	Contact Technical Support
Device Missing error message appears	Perform a Device Scan from the Test/Maintenance menu.
	Power cycle the controller

Test and maintenance menu

1. Push the **menu** key and select TEST/MAINT.

Option	Description
SCAN DEVICES	Performs a scan for active and missing devices.
OUTPUT CAL	Lets the user calibrate the 4–20 mA outputs with a 250 ohm resistor in series to the mA output terminals. The settings for each output are adjusted until the correct value (4 mA or 20 mA) is supplied.
• OUTPUT 1	CAL 4 mA output (Min: 0 Max: 25000)
• OUTPUT 2	CAL 20 mA output (Min: 35000 Max: 65533)
HOLD OUTPUTS	Sets the value the controller sends to an external system for a defined period of time. After the time period, the instrument goes back to reporting real time values. ACTIVATION—LAUNCH or RELEASE SET OUTMODE—HOLD OUTPUTS (default) or TRANSFER OUTPUTS SET CHANNELS—ALL (default) or select from hardware list
TEST OUTPUT	Lets the user select a mA value that is sent by the controller for verification. Min: 0 mA (default +04.00) Max: 25.00 mA
• OUTPUT 1	
• OUTPUT 2	
STATUS	View status of all modules, sensors and relays.
TEST RELAY—A, B, C, D	ENERGIZE or DE-ENERGIZE the selected relay.
OVERFEED RESET	Resets the overfeed timer.
RESET DEFAULT CONFIG	Resets the controller configuration settings to the default values (language, date and time, relay function and data output function).
RESTART	Performs a controller restart.
SIMULATION (only displays if sensors or modules are connected)	After the SIM VALUE is entered, the controller outputs this value as if it was the value sent from the sensor. The simulation stops after the user exits the screen. SELECT SOURCE— • <Module 1> • <Module 2> (footer displays current source selection) SET PARAMETER—Source measurement type (footer displays current source selection) SET SIM VALUE—Use arrow keys to change value (footer displays current source selection)

Option	Description
MODBUS STATS	Displays Error and Good count stats for selected port. <ul style="list-style-type: none"> • Sensor port 1, 2, 3 or 4 • Network port • Service port • Clear stats
SYSTEM DATA	Displays the current system current, temperature and voltage data.

Warning and error conditions

Follow the steps below to acknowledge controller warnings.

1. Push the **menu** key and select DIAGNOSTICS.
2. Select the device (controller, sensor, network card) with the warning or error and push **enter**.
3. Select the warning, error or event list and push **enter**.
4. Select YES and push **enter** to acknowledge the warning.

Note: Errors cannot be acknowledged.

Device scan information

Display message	Action
INSTALLING DEVICE... PLEASE WAIT	The controller has found a new device. No action is necessary. The controller automatically performs an installation process for the new device and displays the main measurement screen of the device installed in the number one position.
DEVICE MISSING <device id>	<p>A previously installed device has been removed from the controller or is not detected.</p> <ul style="list-style-type: none"> • Push the enter key to continue. • Push the left arrow key to select or de-select a missing device. • Push the enter key to delete the missing device. <p>The controller will display the main measurement screen for the device in the number one position.</p> <p>Note: This message also displays when a device is missing and a new device has been installed. After the missing device is deleted, the controller automatically installs the new device and displays INSTALLING DEVICE... PLEASE WAIT. The controller then displays the main measurement screen for the device installed in the number one position.</p>

Replacement parts and accessories

Note: Product and article numbers may vary for some selling regions. Contact the appropriate distributor or refer to the company website for contact information.

General

Description	Item number
4 GB Secure Digital Memory (SD) card	9218100
Controller installation kit	8806200
DataCom cable	LZX887

General (continued)

Description	Item number
Mounting bracket inserts	9177900
Plug, conduit opening (set of 3)	5868700
Power cord kit, with cable gland, 125 VAC, U.S.-style plug	9202900
Power cord kit, with cable gland, 230 VAC, European-style plug	9203000
Screw driver	6134300
SD card reader	9218200
SD card cover kit for controller	9200900
Screws for controller installation kit	9177800
Cord grip kit (1)	9178000
Sealing washer for cord grip assembly	1033814
UV protection screen	8809200
Weather and sun shield w/ UV protection screen	9220600

Sensor and communication modules

Description	Item number
Conductivity module	9013000
Flow module	9012700
4-20 mA input module	9012800
pH and DO module	9012900
4-20 mA output module	9334600
Modbus network module	9013200
Profibus network module	YAB104
Profibus M12 connector kit	9178500
Profibus M12 socket (hard wire to quick connector adapter)	9178200
Profibus M12 T-splitter	9178400



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