

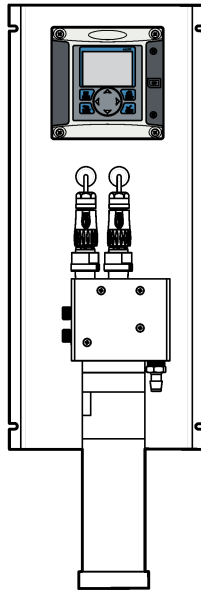


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Hach 9523sc pH Calculator

05/2015, Edition 4

User Manual



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Additional information

Additional information is available on the manufacturer's website.

Specifications

Specifications are subject to change without notice.

Analyzer

Specification	Details
Dimensions	748 x 250 x 236 mm (29.4 x 9.8 x 9.3 in.)
Weight	7 kg (15.4 lb)
Sample flow rate	5—20 liters/hour
Ambient temperature	0—60 °C (32—140 °F)
Relative humidity	10—90%
Temperature sensor	Pt100
Accuracy	± 1% of displayed value; temperature < ± 0.2 °C
Calculated pH	Accuracy on conductivity measurement: ± 2%; Maximum difference calculated-theoretical value: 0.1 pH
Display range	NH ₃ ; 7 < pH < 10; 2.8 µS/cm < C1 < 28 µS/cm; C2 < 0.5 µS/cm
	NaOH; 7 < pH < 10.7; 2.5 µS/cm < C1 < 125 µS/cm; C2 < 100 µS/cm
Display resolution	Conductivity/resistivity: automatic point drift (minimum resolution 0.001 µS/cm) < 0.1 °C
Sample tubing	Polyethylene or PTFE or FEP; 0.2 to 6 bars (3 to 90 psi); 5 to 50 °C (40 to 120 °F); Input: 6-mm (standard) or 1/4-inch (with adapter); Output: 12-mm or 1/2-inch
Certifications	EN 61326-1: 2006; EN 61010-1: 2010

Sensor

Specification	Details
Sensor body material	Black PSU
Conductivity electrodes, internal and external	Stainless steel 316L
Cell constant K	0.01 (cm ⁻¹)
Conductivity range	0.01—200 µS.cm ⁻¹ ; Resistivity range: 5k Ω.cm—100 MΩ.cm
Maximum pressure	10 bar
Maximum temperature	125 °C (257 °F)
Accuracy	< 2%
Temperature response	< 30 seconds
Insulator	PSU
Connector	Glass polyester (IP65)

Controller

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 ¹	NEMA 4X/IP66 metal enclosure with a corrosion-resistant finish
Power requirements	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, Profibus DPV1 or HART network connection).
	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, Profibus DPV1 or HART network connection).
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 assigned to represent a measured parameter such as pH, temperature, flow or calculated values. Optional module supplies three additional analog outputs (5 total).
Relays	Four SPDT, user-configured contacts, 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)
Compliance information ²	CE approved (with all sensor types). Listed for use in general locations to UL and CSA safety standards by ETL (with all sensor types). Certain AC mains powered models are listed for use in general safety locations to UL and CSA safety standards by Underwriters Laboratories (with all sensor types).
Digital communication	Optional Modbus, RS232/RS485, Profibus DPV1 or HART network connection for data transmission
Data logging	Secure Digital Card (32 GB maximum) or special RS232 cable connector for data logging and performing software updates. The controller will keep approximately 20,000 data points per sensor.
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.

¹ Units that have the Underwriters Laboratories (UL) certification are intended for indoor use only and do not have a NEMA 4X/IP66 rating.

² DC powered units are not listed by UL.

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.
	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 components

Make sure that all components have been received. If any items are missing or damaged, contact the manufacturer or a sales representative immediately.

Product overview

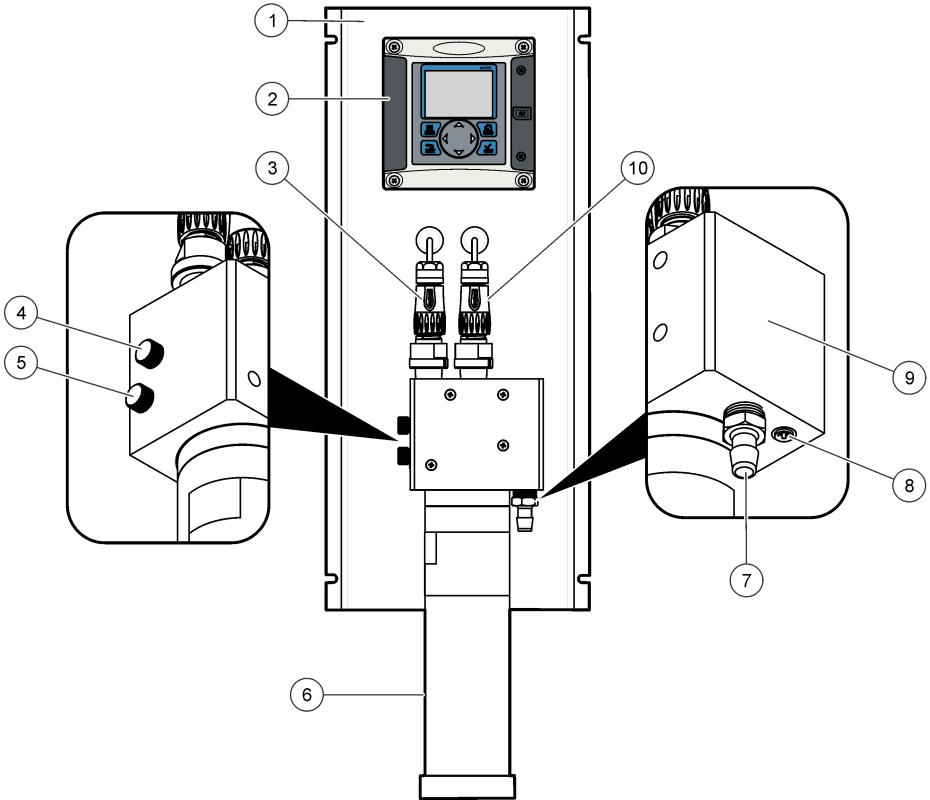
The analyzer measures conductivity and calculates the pH in low-conductivity applications. The system can include the controller as shown in [Figure 1](#) or the controller can be installed as an external component.

The system can be configured to function in numerous applications in the following industry sectors:

- Measurement in pure and ultrapure water, power plants, semiconductor industry, pharmaceutical
- Drinking water

- Industrial processes (chemistry, paper mills, sugar refineries, etc.)

Figure 1 Analyzer overview



1 Mounting panel	6 Cationic resin cartridge
2 Controller	7 Sample output
3 Channel 1 conductivity probe	8 Sample input
4 Degassing valve	9 Measurement cell
5 Sample flow adjustment valve	10 Channel 2 conductivity probe

Principle of operation (pH calculation)

The Polymetron 9523 analyzer adheres to the recommendations contained in the guidelines for feedwaters, boiler water and steam quality for power and industrial plants.

The pH calculations can only be applied under the following strict chemical conditions:

- The sample must only contain an alkaline agent (ammonia, sodium hydroxide or ethanolamine)
- Any impurity is principally NaCl (sodium chloride)
- The concentration of impurity must be negligible in comparison to the alkaline agent

Control of conductivity values

Control of the minimum and maximum conductivity values depends upon the volatile conditioner. These values are illustrated in the following two tables.

Note: AVT (All Volatile Treatment) - Conditioning concept where only volatile alkalizing agents are used; mainly ammonia.


NH₃ Conditioner:

	AVT
pH	7 - 10.0
Conductivity C1 (μS/cm)	2.8 - 28
Acid conductivity C2 (μS/cm)	< 0.5

NaOH Conditioner:

	AVT
pH	7 - 10.7
Conductivity C1 (μS/cm)	2.5 - 125
Acid conductivity C2 (μS/cm)	< 100

Installation

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

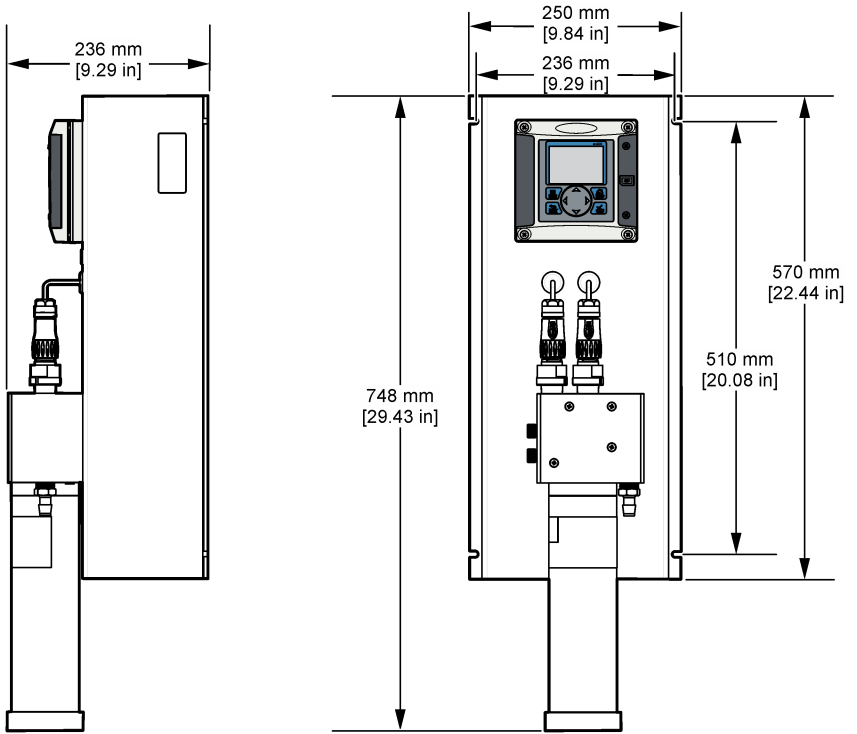
Analyzer mounting

Attach the analyzer to a stable, vertical surface. Refer to the guidelines that follow and [Figure 2](#).

Note: *If an external controller is used, refer to the controller documentation for mounting instructions.*

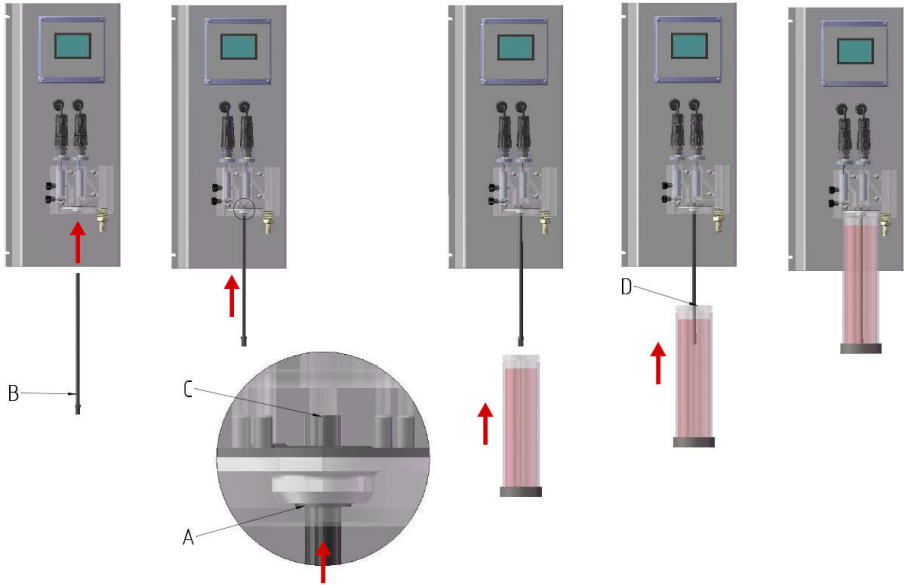
- Put the instrument in a location that has access for operation, service and calibration.
- Make sure that there is good view of the display and controls.
- Keep the instrument away from a heat source.
- Keep the instrument away from vibrations.
- Keep the sample tubing as short as possible to minimize the response time.
- Make sure that there is no air in the sample supply line.

Figure 2 Dimensions



Resin cartridge installation

Figure 3 Resin cartridge installation



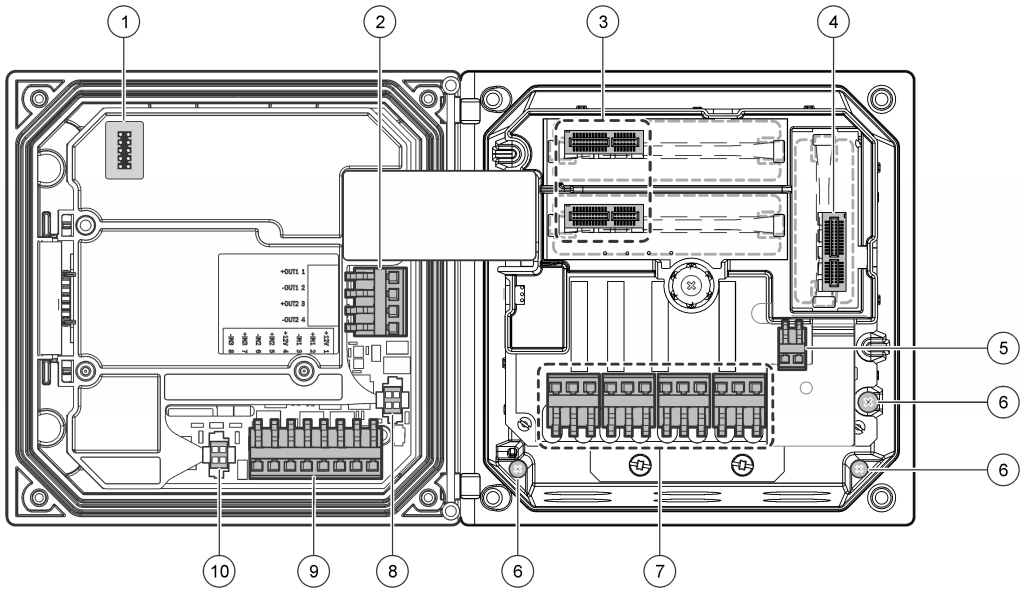
1. Insert the steel tube (B) into the quick lock connector (A).
2. Push the steel tube (B) as far as possible into the measuring cell (C).
3. Take the resin cartridge and turn it upside down 2 or 3 times until the resin comes away from the sides of the cartridge and settles at the bottom, at the opposite end to the marker line.
4. Unscrew the cap off the top of the cartridge, by the marker line. Discard this cap and the flat black sealing cap following the safety and disposal information for used cartridges.
5. Place the end of the steel tube into the center of the cartridge (D).
6. Slowly raise the cartridge to the measuring cell and screw into place to obtain an airtight and watertight fitting.

Wiring overview

Figure 4 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 4 Wiring connections overview



1 Service cable connection	5 AC and DC power connector ³	9 Discrete input wiring connector ³
2 4-20 mA output ³	6 Ground terminals	10 Digital sensor connector ³
3 Sensor module connector	7 Relay connections ³	
4 Communication module connector (e.g., Modbus, Profibus, HART, optional 4-20 mA module, etc.)	8 Digital sensor connector ³	

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.

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.

³ 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 strain relief 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

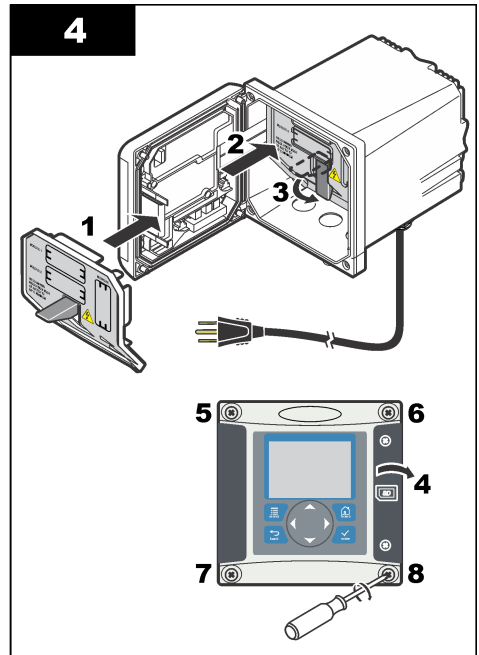
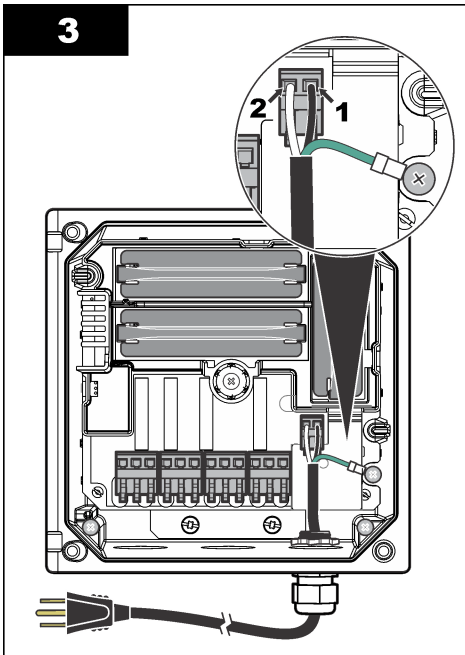
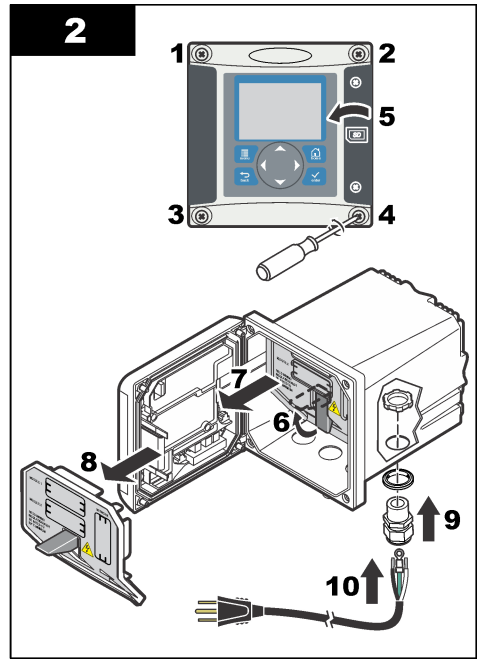
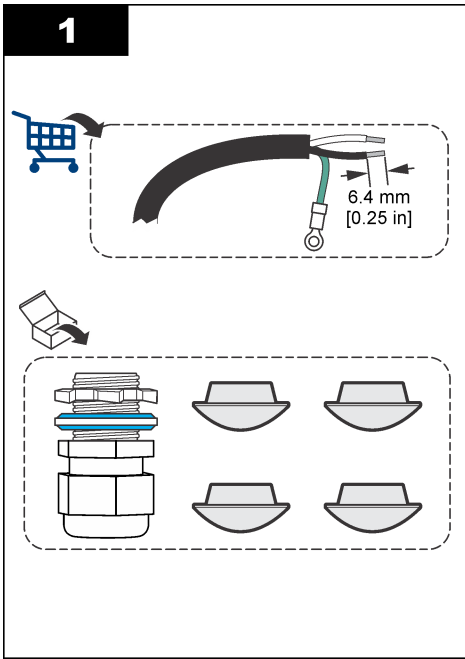
Refer to the illustrated steps that follow and [Table 1](#) or [Table 2](#) to wire the controller for power. Insert each wire into the appropriate terminal until the insulation is seated against the connector with no bare wire exposed. Tug gently after insertion to make sure that there is a secure connection. 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—North America	Color—EU
1	Hot (L1)	Black	Brown
2	Neutral (N)	White	Blue
—	Protective Earth (PE) Ground lug	Green	Green with yellow stripe

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

Terminal	Description	Color—North America	Color—EU
1	+24 VDC	Red	Red
2	24 VDC return	Black	Black
—	Protective Earth (PE) Ground lug	Green	Green with yellow stripe







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

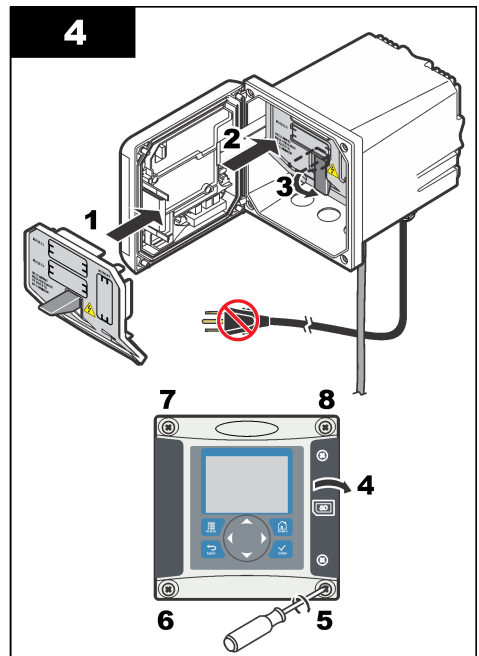
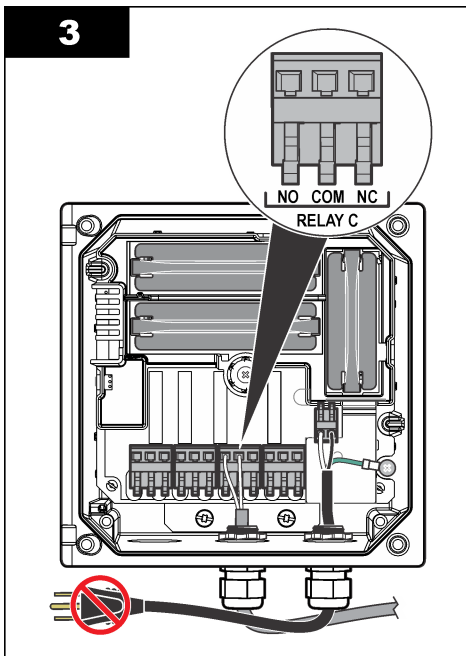
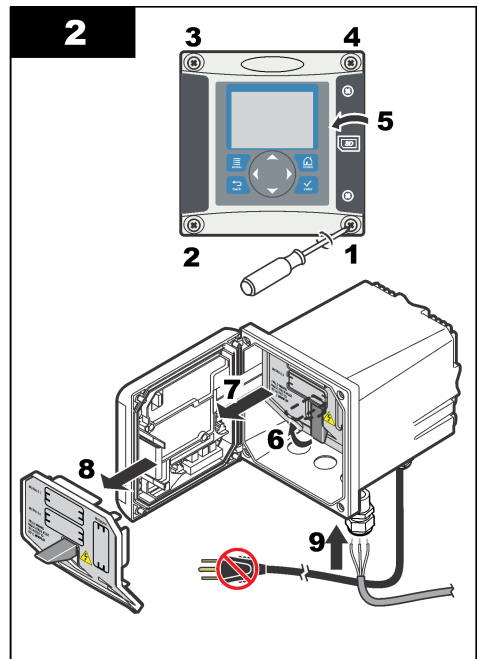
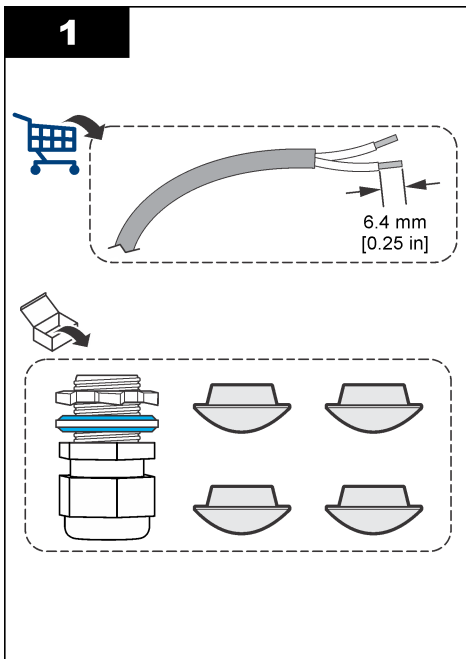
▲ WARNING	
	Potential electrocution hazard. 24 V powered controllers are designed for relay connections to low voltage circuits (i.e., voltages less than 16 V-RMS, 22.6 V-PEAK or 35 VDC).

The 24 VDC controller relays are designed for the 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 (1 and 2) are provided (Figure 5). Such outputs are commonly used for analog signaling or to control other external devices.

Make wiring connections to the controller as shown in Figure 5 and Table 3.

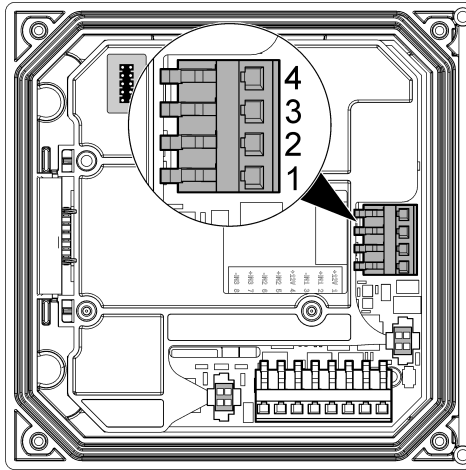
Note: Figure 5 shows the back of the controller cover and not the inside of the main controller compartment.

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 strain relief.
3. Adjust the wire as necessary and tighten the strain relief.
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.

Figure 5 Analog output connections



Discrete input wiring connections

▲ WARNING

Potential Electrocutation 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 6](#), [Table 4](#) and [Figure 7](#).

Note: [Figure 6](#) shows the back of the controller cover and not the inside of the main controller compartment.

Figure 6 Discrete input wiring connections

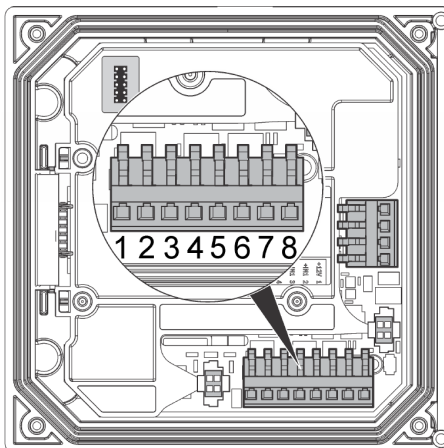
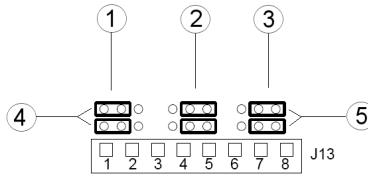


Table 4 Input connections

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 7 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 7](#).
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, Profibus DPV1 and HART communication protocols. The optional digital output module is installed in the location indicated by item 4 in [Figure 4](#) on page 11. Refer to the instructions supplied with the network module for more details.

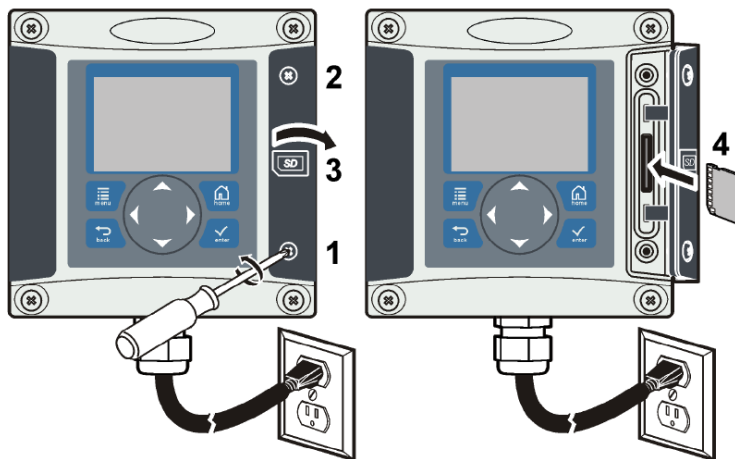
For information about Modbus registers, go to <http://www.hach-lange.com> or <http://www.hach.com> and search *Modbus registers* or go to any sc200 product page.

Install a Secure Digital (SD) memory card

For instructions on how to install an SD card in the controller, refer to [Figure 8](#). Information on how to use the SD memory card can be found in [Using the secure digital memory \(SD\) card](#) on page 24.

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 8 SD card installation



Plumb the sample and drain lines

After the panel is attached to a wall, connect the sample and drain lines to the fittings on the panel. Make sure that the tubing meets the [Specifications](#) on page 3. Refer to the steps that follow and [Figure 1](#) on page 7.

1. Insert the sample tubing into the input quick-connect fitting under the flow chamber ([Figure 1](#) on page 7).
2. Connect a drain line to sample output fitting. Keep the drain line as short as possible to prevent back-pressure.

Analyzer startup

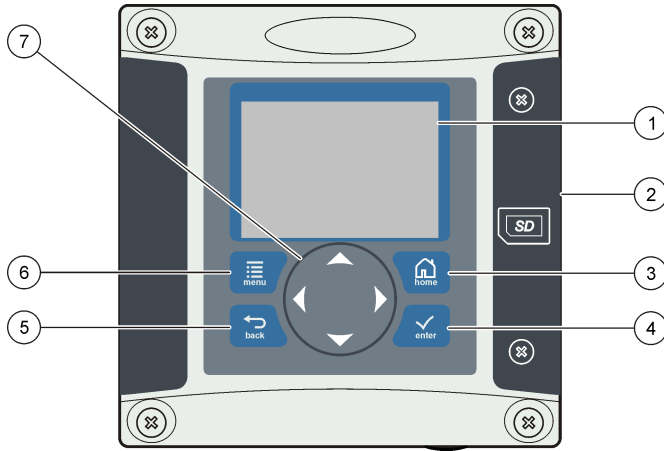
1. Open the degassing valve.
2. Open the sample flow adjustment valve and ensure everything is watertight and there are no leaks.
3. Close the degassing valve when the measuring cell is free of air.
4. Set the sample flow to the required rate (between 5 and 20 L/h).
5. Pass about 10 liters of sample through the resin to thoroughly rinse it and prepare the analyzer for measurements.

User interface and navigation

User interface

The keypad has four menu keys and four directional keys as shown in [Figure 9](#).

Figure 9 Keypad and front panel overview



1 Instrument display	5 BACK key. Moves back one level in the menu structure.
2 Cover for secure digital memory card slot	6 MENU key. Moves to the Settings Menu from other screens and submenus.
3 HOME key. Moves to the Main Measurement screen from other screens and submenus.	7 Directional keys. Used to navigate through the menus, change settings, and increment or decrement digits.
4 ENTER key. Accepts input values, updates, or displayed menu options.	

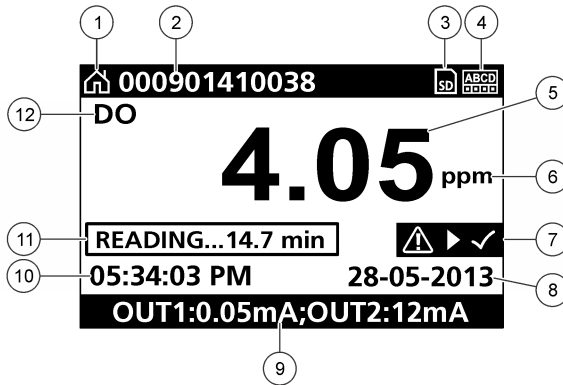
Inputs and outputs are set up and configured through the front panel using the keypad and display screen. This user interface is used to set up and configure inputs and outputs, create log information and calculated values, and calibrate sensors. The SD interface can be used to save logs and update software.

Display

Figure 10 shows an example of the main measurement screen with the sensor connected to the controller.

The front panel display screen shows sensor measurement data, calibration and configuration settings, errors, warnings and other information.

Figure 10 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 21 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.
RELAY SETUP	Configures the controller relays.

Option	Description
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>
sc200 INFORMATION	Displays information about the controller including serial number and software versions.
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.

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 26.
 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.xml 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.drv) 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 24.

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.

Operation

Contacting conductivity sensor configuration

Use the CONFIGURE menu to enter identification information for the sensor and to change options for data handling and storage.

1. Push the **menu** key and select SENSOR SETUP>[Select Sensor]>CONFIGURE.
2. Select an option and push **enter**. To enter numbers, characters or punctuation, push and hold the **up** or **down** arrow keys. Push the **right** arrow key to advance to the next space.

Option	Description
EDIT NAME	Changes the name that corresponds to the sensor on the top of the measure screen. The name is limited to 16 characters in any combination of letters, numbers, spaces or punctuation. Only the first 12 characters are displayed on the controller.
SENSOR S/N	Allows the user to enter the serial number of the sensor, limited to 16 characters in any combination of letters, numbers, spaces or punctuation.
SELECT MEASURE	Changes the measured parameter to CONDUCTIVITY (default), TDS (total dissolved solids), SALINITY or RESISTIVITY. All other configured settings are reset to the default values. <i>Note: If SALINITY is selected, the measurement unit is defined as ppt (parts per thousand) and cannot be changed.</i>
DISPLAY FORMAT	Changes the number of decimal places that are shown on the measure screen. When set to auto, the number of decimal places changes automatically with changes in the measured value.
MEAS UNITS	Changes the units for the selected measurement—select the unit from the list available.
TEMP UNITS	Sets the temperature units to °C (default) or °F.
T-COMPENSATION	Adds a temperature-dependent correction to the measured value: <ul style="list-style-type: none"> • NONE—Temperature compensation not required • USP—Set the alarm level for the standard USP definition table • ULTRA PURE WATER—Not available for TDS. Set the compensation type according to the sample characteristics—Select NaCl , HCl, AMMONIA or ULTRA PURE WATER • USER—Select BUILT IN LINEAR, LINEAR or TEMP TABLE: <ul style="list-style-type: none"> • BUILT IN LINEAR—Use the pre-defined linear table (slope defined as 2.0%/°C, reference temperature as 25 °C) • LINEAR—Set the slope and reference temperature parameters if different from the built-in parameters • TEMP TABLE—Set the temperature and multiplication factor points (refer to the conductivity module documentation) • NATURAL WATER—Not available for TDS

Option	Description
CONFIG TDS	TDS only—changes the factor that is used to convert conductivity to TDS: NaCl (0.49 ppm/ μ S) or CUSTOM (enter factor between 0.01 and 99.99 ppm/ μ S).
CABLE PARAM	Sets the sensor cable parameters to improve measurement accuracy when the sensor cable is extended or shortened from the standard 5 m. Enter the cable length, resistance and capacitance.
TEMP ELEMENT	Sets the temperature element to PT100 or PT1000 for automatic temperature compensation. If no element is used, the type can be set to MANUAL and a value for temperature compensation can be entered.
FILTER	Sets a time constant to increase signal stability. The time constant calculates the average value during a specified time—0 (no effect) to 60 seconds (average of signal value for 60 seconds). The filter increases the time for the sensor signal to respond to actual changes in the process.
LOG SETUP	Sets the time interval for data storage in the data log—5, 30 seconds, 1, 2, 5, 10, 15 (default), 30, 60 minutes.
RESET DEFAULTS	Sets the configuration menu to the default settings. All sensor information is lost.

Resin option

Use the RESIN option to view and change the parameters related to the resin cartridge. These parameters must be defined before the analyzer is used for the first time.

1. Push the **menu** key and select TEST/MAINT>RESIN.
2. To monitor the status of the resin select the TRACK option and push **enter**.

Option	Description
YES	Monitor the resin status. When the life expectancy of the resin is less than 10 days a warning message is triggered. When the life expectancy reaches 0 days a system error is triggered.
NO	The resin is not monitored.

3. To view the current status of the resin select the STATUS option and push **enter**. The date the resin was last changed and the current life expectancy are displayed. Push **back** to return to the menu or **enter** to reset the parameters.
4. To reset the resin parameters select PARAMETERS and push **enter**. Based on the values input, the life expectancy of the resin is recalculated.

Option	Description
CAPACITY	Use the arrow keys to enter the resin exchange capacity (0.5 to 5.0 mole/liter).
VOLUME	Use the arrow keys to enter the volume of resin (0.5 to 20 liters).
FLOW	Use the arrow keys to enter the sample flow rate through the cartridge (2 to 20 liters/hour).
CONCENTRATION	Use the arrow keys to enter the resin concentration (0 to 20 ppm).

Calibration

About sensor calibration

The sensor characteristics slowly shift over time and cause the sensor to lose accuracy. The sensor must be calibrated regularly to maintain accuracy. The calibration frequency varies with the application and is best determined by experience.

Use air (zero calibration) and the process sample to define the calibration curve. When the process sample is used, the reference value must be determined with a secondary verification instrument.

Cell constant

Before making a calibration make sure the sensor cell parameters are correct.

1. Push the **menu** key and select SENSOR SETUP>[Select Sensor]>CALIBRATE.
2. If the pass code is enabled in the security menu for the controller, enter the pass code.
3. Select CELL CONSTANT and push **enter**.
4. **Contacting conductivity sensors:** Select the cell K range for the sensor (0.01, 0.1 or 1.0) then enter the actual K value as printed on the label attached to the sensor.
Inductive conductivity sensors: Enter the actual K value as printed on the label attached to the sensor.

Temperature calibration

It is recommended to calibrate the temperature sensor once a year. Calibrate the temperature sensor before calibrating the measurement sensor.

1. Measure the temperature of the water with an accurate thermometer or independent instrument.
2. Push the **menu** key and select SENSOR SETUP>CALIBRATE.
3. If the pass code is enabled in the security menu for the controller, enter the pass code.
4. Select 1 PT TEMP CAL and push **enter**.
5. The raw temperature value is displayed. Push **enter**.
6. Enter the correct value if different from that displayed and push **enter**.
7. Push **enter** to confirm the calibration. The temperature offset is displayed.

Zero calibration procedure

Use the zero calibration procedure to define the unique zero point of the sensor.

1. Remove the sensor from the process. Wipe with a clean towel to make sure the sensor is dry.
2. Push the **menu** key and select SENSOR SETUP>[Select Sensor]>CALIBRATE.
3. If the pass code is enabled in the security menu for the controller, enter the pass code.
4. Select ZERO CAL and push **enter**.
5. Select the option for the output signal during calibration:

Option	Description
ACTIVE	The instrument sends the current measured output value during the calibration procedure.
HOLD	The sensor output value is held at the current measured value during the calibration procedure.
TRANSFER	A preset output value is sent during calibration. Refer to the controller user manual to change the preset value.

6. Place the sensor in air, push **enter**.
7. Review the calibration result:
 - PASS—the sensor is calibrated and ready to measure samples.
 - FAIL—the calibration is outside of accepted limits. Repeat the calibration with fresh reference solutions. Refer to [Troubleshooting](#) on page 32 for more information.
8. If the calibration passed, push **enter** to continue.
9. If the option for operator ID is set to YES in the CAL OPTIONS menu, enter an operator ID. Refer to [Change calibration options](#) on page 30.
10. On the NEW SENSOR screen, select whether the sensor is new:

Option	Description
YES	The sensor was not calibrated previously with this controller. The days of operation and previous calibration curves for the sensor are reset.
NO	The sensor was calibrated previously with this controller.

- Return the sensor to the process and push **enter**. The output signal returns to the active state and the measured sample value is shown on the measure screen.

Note: If the output mode is set to hold or transfer, select the delay time when the outputs return to the active state.

Calibration with the process sample

The sensor can remain in the process sample.

- Push the **menu** key and select SENSOR SETUP>CALIBRATE.
- If the pass code is enabled in the security menu for the controller, enter the pass code.
- Select SAMPLE CAL and push **enter**.
- Select the option for the output signal during calibration:

Option	Description
ACTIVE	The instrument sends the current measured output value during the calibration procedure.
HOLD	The sensor output value is held at the current measured value during the calibration procedure.
TRANSFER	A preset output value is sent during calibration. Refer to the controller user manual to change the preset value.

- With the sensor in the process sample, push **enter**. The measured value is shown. Wait for the value to stabilize and push **enter**.
- With a certified secondary verification instrument measure the concentration value of the sample. To avoid impurities in the sample take the measurement before the sample enters the flow chamber. Use the arrow keys to enter this value if different from the value displayed and push **enter**.
- Review the calibration result:
 - PASS**—the sensor is calibrated and the calibration factor is displayed.
 - FAIL**—the calibration is outside of accepted limits. Clean the sensor and retry. Refer to [Troubleshooting](#) on page 32 for more information.
- If the calibration passed, push **enter** to continue.
- If the option for operator ID is set to YES in the CAL OPTIONS menu, enter an operator ID. Refer to [Change calibration options](#) on page 30.
- On the NEW SENSOR screen, select whether the sensor is new:

Option	Description
YES	The sensor was not calibrated previously with this controller. The days of operation and previous calibration curves for the sensor are reset.
NO	The sensor was calibrated previously with this controller.

- With the sensor still in the process push **enter**. The output signal returns to the active state and the measured sample value is shown on the measure screen.

Note: If the output mode is set to hold or transfer, select the delay time when the outputs return to the active state.

Change calibration options

The user can set a calibration reminder or include an operator ID with calibration data from this menu.

- Push the **menu** key and select SENSOR SETUP>[Select Sensor]>CALIBRATE.
- If the pass code is enabled in the security menu for the controller, enter the pass code.

3. Select CAL OPTIONS and push **enter**.
4. Use the arrow keys to select an option and push **enter**.

Option	Description
CAL REMINDER	Sets a reminder for the next calibration in days, months or years—OFF (default), 1 day, 7, 30, 60, or 90 days, 6 or 9 months, 1 or 2 years.
OP ID ON CAL	Includes an operator ID with calibration data—YES or NO (default). The ID is entered during the calibration.

Maintenance

▲ DANGER

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

Service schedule

The following table shows the recommended service schedule:

	Every 3 Months	Every 6 Months	Yearly	As Needed
Validation (check with referenced measure)	X	X	X	X
Calibration (measure)			X	X
Calibration (temperature)			X	
The following items are performed by the Hach Lange service group				
Re-qualification (Inputs/Outputs)			X	
External audit			X	

Cleaning and decontamination

▲ DANGER

Always remove power from the controller before performing maintenance activities.

The analyzer does not normally require any cleaning or decontamination. If needed, clean the exterior of the instrument with a moist cloth and a mild soap solution. Never use cleaning agents such as turpentine, acetone or similar products to clean the instrument, including the display and any accessories.

Replace the resin

▲ CAUTION



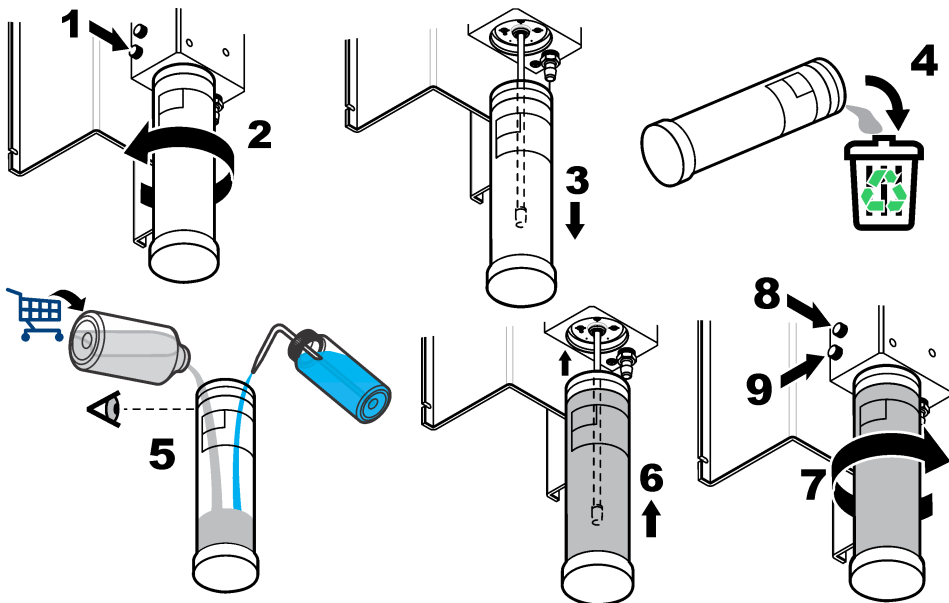
Chemical exposure hazard. Dispose of chemicals and wastes in accordance with local, regional and national regulations.

The cartridge of resin can be replaced with a new cartridge, or as an alternative, keep the cartridge and replace only the resin. In order to take advantage of the full system specifications, we recommend the use of nuclear grade cationic resin.

1. Stop the sample flow using the sample flow adjustment valve.
2. Replace the cartridge or resin:
 - Cartridge—refer to [Resin cartridge installation](#) on page 10.

- Resin—refer to [Figure 11](#). Make sure to add deionized water at regular intervals when new resin is added to compact the resin.
3. Open the degassing valve.
 4. Open the sample flow adjustment valve and ensure everything is watertight and there are no leaks.
 5. Close the degassing valve when the measuring cell is free of air.
 6. Set the sample flow to the required rate (between 5 and 20 L/h).
 7. Reset the resin options. Refer to [Resin option](#) on page 28.

Figure 11 Resin replacement



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

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.

Option	Description
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.
<ul style="list-style-type: none"> • OUTPUT 1 • OUTPUT 2 	CAL 4 mA output (Min: 0 Max: 25000) 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.
<ul style="list-style-type: none"> • OUTPUT 1 • OUTPUT 2 	Min: 0 mA (default +04.00) Max: 25.00 mA
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— <ul style="list-style-type: none"> • <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)
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.

Sensor diagnostic and test menu

The sensor diagnostic and test menu shows current and historical information about the instrument. Refer to [Table 6](#).

Table 6 Sensor DIAG/TEST menu

Option	Description
MODULE INFORMATION	Shows information about the sensor module.
SENSOR INFORMATION	Shows the name and serial number that was entered by the user.
CAL DAYS	Shows the number of days since the last calibration.
CAL HISTORY	Shows a list of all calibrations by date/time stamp. Use the arrows keys to select a calibration and push enter to view the details.
RESET CAL HISTORY	Resets the calibration history for the sensor (requires service-level passcode). All previous calibration data is lost.
POLARIZATION	Contacting conductivity sensors only. Shows information about the electrode polarization, the cable capacitance and the time before the next measurement.
SENSOR SIGNALS	Shows the current sensor signal information.
FACTORY CAL	Reserved for service technicians only.
DIAG MEAS	Shows diagnostic information about the current measurement.

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.

Warning list

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. A warning does not affect the operation of menus, relays and outputs. To view warnings, push the **menu** key and select DIAGNOSTICS. Then select the device to view any problems associated with that device. The warning icon will no longer be displayed once the problem has been corrected or acknowledged.

A list of possible warnings is shown in [Table 7](#).

Table 7 Warning list for conductivity sensors

Warning	Description	Resolution
MEAS TOO HIGH	The measured value is > 2 S/cm, 1,000,000 ppm, 200% or 20,000 ppt	Make sure that the display format is set for the correct measurement range
MEAS TOO LOW	The measured value is < 0 μ S/cm, 0 ppm, 0% or 0 ppt	Make sure that the sensor is configured for the correct cell constant.

Table 7 Warning list for conductivity sensors (continued)

Warning	Description	Resolution
ZERO TOO HIGH	The zero calibration value is >300,000 counts	Make sure that the sensor is held in air during zero calibration and is not located near radio frequency or electromagnetic interference. Make sure that the cable is shielded by metal conduit.
ZERO TOO LOW	The zero calibration value is < -300,000 counts	
TEMP TOO HIGH	The measured temperature is > 100 °C	Make sure that the sensor is configured for the correct temperature element.
TEMP TOO LOW	The measured temperature is < 0 °C	
CAL OVERDUE	The Cal Reminder time has expired	Calibrate the sensor.
NOT CALIBRATED	The sensor has not been calibrated	Calibrate the sensor.
REPLACE SENSOR	The sensor has been in operation > 365 days	Calibrate the sensor with a reference solution and reset the sensor days. Refer to Sensor diagnostic and test menu on page 33. If the calibration fails, call technical support.
CAL IN PROGRESS	A calibration was started but not completed	Return to calibration.
OUTPUTS ON HOLD	During calibration, the outputs were set to hold for a selected time.	The outputs will become active after the selected time period.
WRONG LINEAR TC	The user-defined linear temperature compensation is out of range	The value must be between 0 and 4%/°C; 0 to 200 °C.
WRONG TC TABLE	The user-defined temperature compensation table is out of range	The temperature is above or below the temperature range defined by the table.

Error list

Errors may occur for various reasons. 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. All outputs are held when specified in the controller menu. To view errors, push the **menu** key and select DIAGNOSTICS. Then select the device to view any problems associated with that device.

A list of possible errors is shown in [Table 8](#).

Table 8 Error list for conductivity sensors

Error	Description	Resolution
ADC FAILURE	The analog to digital conversion failed	Make sure that the sensor module is fully inserted into the controller connector. Replace the sensor module.
SENSOR MISSING	The sensor is missing or disconnected	Examine the wiring and connections for the sensor and for the module. Make sure that the terminal block is fully inserted into the module.
SENS OUT RANGE	The sensor signal is outside of the accepted limits (2 S/cm)	Make sure that the display format is set for the correct measurement range.

Spare 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.

Description	Item no.
Conductivity probe	08310=A=0000
Cable for 8310 probe (1 meter)	09123=A=8001
Dual measurement cell	09523=C=0100
Sample flow adjustment valve	09184=C=4010
O-Ring for flow regulation valve	429=042=019
Outlet quick connector	583=012=012
Spare resin cartridge complete with resin	09523=A=7000
Viton flat gasket	09123=C=0500
Cationic resin cartridge (empty)	09523=C=0200
Resin cartridge closure	09523=C=0300
Sample outlet tube (1 meter)	359110,52012
Cationic resin (2 liters)	09523=A=7010

Material safety data sheets (MSDS)

MSDS - Cationic resin

The information listed below corresponds to our current state of knowledge. They serve as a description of the products in regard to necessary safety measures and do not guarantee the described chemical properties. These indications describe the safety precautions to take against the related product and they are not a guaranty of the described product properties.

1. IDENTIFICATION OF THE SUBSTANCE

Product name: LEWATIT S 100 G1

2. COMPOSITION / INFORMATION ON INGREDIENTS

CAS no: 69011-20-7

Styrene-divinylbenzene-copolymer with sulphonic acid groups in H-form - 45-50% (weight)

3. HAZARDS IDENTIFICATION

Risk of serious damage to eyes.

4. FIRST AID MEASURES

Inhalation: Move exposed person to fresh air. Keep person warm and at rest. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Ingestion: Wash out mouth with water. Move exposed person to fresh air. Keep person warm and at rest. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention if adverse health effects persist or are severe. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact: Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Eye contact: Get medical attention immediately. Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician.

5. FIRE FIGHTING MEASURES

Extinguishing media: In case of fire, use water spray (fog), foam, dry chemical or CO₂.

Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

6. MEASURES IN CASE OF ACCIDENTAL SPILLAGE

No action shall be taken involving any personal risk or without suitable training. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Provide adequate ventilation. Put on appropriate personal protective equipment (see Section 8).

Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Move containers from spill area. Vacuum or sweep up material and place in a designated, labelled waste container. Dispose of via a licensed waste disposal contractor.

Move containers from spill area. Prevent entry into sewers, water courses, basements or confined areas. Vacuum or sweep up material and place in a designated, labelled waste container. Dispose of via a licensed waste disposal contractor.

7. HANDLING AND STORAGE

Put on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Do not get in eyes or on skin or clothing. Do not ingest. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous.

Store between the following temperatures: -20 to 40 °C (-4 to 104 °F). Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination.

Take precautionary measures against electrostatic discharges. Do not allow to dry out.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Safety eye wear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. Recommended: safety glasses with side-shields.

Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. After contamination with product change the gloves immediately and dispose of them according to relevant national and local regulations.

Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

9. PHYSICAL AND CHEMICAL PROPERTIES

Form: Solid [Beads]

Color: Brown [Light]

Odor: Odorless

Density: 1.22 kg/L (20 °C)

Bulk density: 800 to 900 kg/m³

Solubility: Insoluble in the following materials: cold water

pH value: approx. 1 [Conc. (% w/w): 10%]

Ignition temperature: >250 °C

10. STABILITY AND REACTIVITY

Reactivity: No specific test data related to reactivity available for this product or its ingredients.

Chemical stability: The product is stable.

Possibility of hazardous reactions: Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid: Take precautionary measures against static discharges. Contact with strong oxidizing agents may cause hazardous reactions.

Incompatible materials: No specific data.

Hazardous decomposition products: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

11. TOXICOLOGICAL INFORMATION

Acute toxicity (LD50 oral): >5000 mg/kg - tested on rats

Skin: Non-irritating. Test results on an analogous product.

Eyes: Corrosive. Risk of serious damage to eyes. Test results on an analogous product.

12. ECOLOGICAL INFORMATION

The product is insoluble in water. Therefore, ecological tests have not been conducted. The product does not contain organically bound halogens which could lead to an AOX value in waste water.

13. DISPOSAL CONSIDERATIONS

Methods of product disposal: Examine possibilities for re-utilisation. Product residues and uncleaned empty containers should be packaged, sealed, labelled, and disposed of or recycled according to relevant national and local regulations. Where large quantities are concerned, consult the supplier. When uncleaned empty containers are passed on, the recipient must be warned of any possible hazard that may be caused by residues. For disposal within the EC, the appropriate code according to the European Waste List (EWL) should be used. It is among the tasks of the polluter to assign the waste to waste codes specific to industrial sectors and processes according to the European Waste List (EWL).

Hazardous waste: The classification of the product may meet the criteria for a hazardous waste.

Methods of packaging disposal: The generation of waste should be avoided or minimized wherever possible. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible.

Special precautions: This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

14. TRANSPORT INFORMATION

Not dangerous cargo.

Avoid temperatures below -20 °C.

Avoid heat above +40 °C.

Keep separated from foodstuffs.

15. REGULATORY INFORMATION

Labelling in accordance with the EEC directives:

Xi, hazard description: irritant styrene-divinylbenzene-copolymer with sulphonic acid groups

R 41: Risk of serious damage to eyes.

S 26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S 39: Wear eye/face protection.

The above-mentioned data correspond to our current state of knowledge. They serve as a description of the products in regard to necessary safety measures and do not guarantee the described chemical properties. These indications describe the safety precautions to take against the related product and they are not a guaranty of the described product properties.



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