Hach 9586sc Oxygen Scavenger Analyzer

05/2018, Edition 6

User Manual
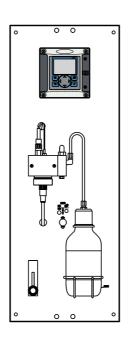
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Specifications

Specifications are subject to change without notice.

Panel

Specification	Details
Dimensions	817 x 300 x 140 mm (32.2 x 11.8 x 5.5 in)
Weight	14.6 kg (32.15 lbs)
Sample flow rate	10—15 liters/hour
Working pressure	0.5—6 bar (7—87 psi)
Ambient temperature	0—60 °C (-32—140 °F)
Relative humidity	10—90%
Working electrode	Platinum
Counter electrode	Stainless steel
Reference	Ag / AgCl / KCl 0.1 M
Measuring cell	Acrylic
Sample conditioner	DIPA (diisopropylamine)
European standards	EN 61326 Class A for EMC; EN 601010-1 for low voltage safety
International standards	cETLus

Sensor

Specification	Details
Measuring range	0—500 ppb hydrazine; 0—100 ppb carbohydrazide
Sensitivity	< 0.2 ppb
Repeatability	1 ppb or ± 2% of measurement whichever is the greater
Detection limit	≤ 1 ppb
Response time	< 60 seconds
Sample temperature measurement range	5—45 °C (41—113 °F)

Controller

Specification	Details
Component description	Microprocessor-controlled and menu-driven controller that operates the sensor and displays measured values.
Operating temperature	-20 to 60 ºC (-4 to 140 ºF); 95% relative humidity, non-condensing with sensor load <7 W; -20 to 50 ºC (-4 to 104 ºF) with sensor load <28 W
Storage temperature	-20 to 70 ºC (-4 to 158 ºF); 95% relative humidity, non-condensing
Enclosure[1]	NEMA 4X/IP66 metal enclosure with a corrosion-resistant finish

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

Specification	Details
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	Polution 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)
EMC requirements	EN61326-1: EMC Directive *Note: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.*
Korean registration	**User Guidance for EMC Class A Equipment** 업무용을 위한 EMC 등급 A 장치에 대한 사용자 지침 사용자안내문 A 급 기기 (업무용 방송통신기자재) 이 기기는 업무용 (A 급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며 , 가정외의 지역에서 사용하는 것을 목적으로 합니다.
CE compliance	EN61010-1: LVD Directive
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.

Safety information

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

⚠**D A N G E R**

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

⚠**W A R N I N G**

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

⚠**C A U T I O N**

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

N O T I C E

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 instrument. Personal injury or damage to the instrument could occur if not observed. A symbol on the instrument is referenced in the manual with a precautionary statement.

⚠	This is the safety alert symbol. Obey all safety messages that follow this symbol to avoid potential injury. If on the instrument, refer to the instruction manual for operation or safety information.
⚡	This symbol indicates that a risk of electrical shock and/or electrocution exists.
⚠	This symbol indicates the presence of devices sensitive to Electro-static Discharge (ESD) and indicates that care must be taken to prevent damage with the equipment.
∿	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 domestic or public disposal systems. Return old or end-of-life equipment to the manufacturer for disposal at no charge to the user.

	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 is designed to continuously measure the amount of oxygen scavengers (hydrazine or carbohydrazide) in water.

Figure 1 Front and rear view

1	Controller	**6**	Chemical zero cartridge (option)
2	Measuring cell	**7**	Pressure regulator
3	Chemical zero on/off (option)	**8**	Sample in, 4/6 mm tube
4	Flow meter	**9**	Sample drain, 6/8 mm tube, atmospheric pressure
5	Sample conditioning bottle (DIPA)		

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. Use a level to make sure that the analyzer is completely vertical. Refer to the guidelines that follow.

• 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.

Wiring overview

Figure 2 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 2 Wiring connections overview

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

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

⚠ W A R N I N G

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

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[2] Terminals can be removed for improved access.

<table>
<tr><td colspan="2">⚠ **W A R N I N G**</td></tr>
<tr><td>⚡</td><td>Potential Electrocution 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.</td></tr>
</table>

<table>
<tr><td colspan="2">⚠ **D A N G E R**</td></tr>
<tr><td>⚡</td><td>Electrocution Hazard. Do not connect AC power to a 24 VDC powered model.</td></tr>
</table>

<table>
<tr><td colspan="2">⚠ **W A R N I N G**</td></tr>
<tr><td>⚡</td><td>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.</td></tr>
</table>

<table>
<tr><td colspan="2">*N O T I C E*</td></tr>
<tr><td colspan="2">Install the device in a location and position that gives easy access to the disconnect device and its operation.</td></tr>
</table>

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. Make sure that the field wiring insulation is rated 80 °C (176 °F) minimum.

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

⚠ W A R N I N G

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

⚠ W A R N I N G

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.

⚠ W A R N I N G

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

⚠ W A R N I N G

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

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

24 VDC powered controllers

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. Make sure that the field wiring insulation is rated 80 °C (176 °F) minimum.

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

> ⚠ **W A R N I N G**
>
> Potential Electrocution Hazard. Always disconnect power to the instrument when making electrical connections.

> ⚠ **W A R N I N G**
>
> 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 3). Such outputs are commonly used for analog signaling or to control other external devices.

Make wiring connections to the controller as shown in Figure 3 and Table 3.
Note: Figure 3 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 3 Analog output connections

Discrete input wiring connections

<table>
<tr><td align="center">⚠ **W A R N I N G**</td></tr>
<tr><td>Potential Electrocution Hazard. Always disconnect power to the instrument when making electrical connections.</td></tr>
</table>

<table>
<tr><td align="center">⚠ **W A R N I N G**</td></tr>
<tr><td>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.</td></tr>
</table>

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 4, Table 4 and
Figure 5.
Note: Figure 4 shows the back of the controller cover and not the inside of the main controller compartment.

Figure 4 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 5 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 5.

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 2 on page 9. Refer to the instructions supplied with the network module for more details.

For information about Modbus registers, go to http://www.de.hach.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 6. Information on how to use the SD memory card can be found in Using the secure digital memory (SD) card on page 22.

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 6   SD card installation

Plumb the sample and drain lines

Connect the sample and drain lines to the fittings on the back of the panel.

1. Connect the sample line to the inlet 4/6-mm OD tube fitting.
2. Connect a drain line to the drain 6/8-mm OD tube fitting. Keep the drain line as short as possible at atmospheric pressure.

Install the reagents

<div style="border: 1px solid orange;">

⚠ W A R N I N G

Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Refer to the current safety data sheets (MSDS/SDS) for safety protocols.

</div>

1. Fill the empty sample conditioning bottle with DIPA (diisopropylamine) and enter the hazardous reagent information on the blank label attached to the bottle.
2. Install the sample conditioning bottle on the front of the analyzer.
3. Connect the supplied tube to the measuring cell. Install the tube completely into the bottle of conditioning solution. Make sure that the tube fittings are tight to prevent leakage of fumes from the conditioning bottle into the atmosphere.
4. If the chemical zero cartridge is used, install the cartridge on the rear of the analyzer.

Startup

Make sure that the flow rate and pressure do not exceed the values in Specifications on page 3.

1. Open the valve on the sample line to let sample flow through the analyzer.
2. Turn the knob on the flow meter to set the flow rate.
3. Examine the plumbing for leaks and stop any leaks if found.
4. Apply power to the controller.
5. Make the applicable menu selections when the controller starts.

User interface and navigation

User interface

The keypad has four menu keys and four directional keys as shown in Figure 7.

Figure 7 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 8 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 8 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 20 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.
DISPLAY SETUP	Configures the controller display. ADJUST ORDER—View and modify the measurement display order. • 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 *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).* DISPLAY CONTRAST—Adjusts the contrast of the controller display. EDIT NAME—Assigns a name to the controller.
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.

Option	Description
ERROR HOLD MODE	HOLD OUTPUTS—Holds outputs at last known value when controller loses communication with the sensor.
	TRANSFER OUTPUTS—Switches to transfer mode when controller loses communication with the sensor. Outputs transfer to a pre-defined value.
CALCULATION	Configures the controller math function.
	SET VARIABLE X—Selects the sensor for the x variable.
	SET PARAMETER X—Selects the sensor measurement for the x variable.
	SET VARIABLE Y—Selects the sensor for the y variable.
	SET PARAMETER Y—Selects the sensor measurement for the y variable.
	SET FORMULA—Select the math function to implement:
	• 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
	DISPLAY FORMAT—Selects the number of digits and decimal points.
	SET UNITS—Selects the units for the calculated reading.
	SET PARAMETER—Selects the parameter for the calculated reading.
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 24.*

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.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.comand 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 23.

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

Configure the sensor

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, select SENSOR SETUP>CONFIGURE.
2. Use the arrow keys to 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.
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.
MEAS UNITS	Changes the measurement units—Select the unit from the list available.
TEMP UNITS	Sets the temperature units to °C (default) or °F
FILTER	Sets a time constant to increase signal stability. The time constant calculates the average value during a specified time—0 (no effect, default) 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.

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.

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

The zero value has been factory calibrated. Use the zero calibration procedure to define the unique zero point of the sensor.

1. If the sample concentration is < 10 ppb, for best results it is recommended to use the optional zero calibration cartridge (refer to Replacement parts and accessories on page 34) and leave the sensor in place. Otherwise remove the sensor from the process and rinse in distilled water.
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 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. If not using the optional zero calibration cartridge place the clean sensor in a hydrazine free solution such as ultra pure water, push **enter**.
7. Wait for up to one hour for the value to stabilize and push **enter**.
8. Review the calibration result:
   • PASS—the sensor is calibrated and the offset is displayed.
   • FAIL—the calibration is outside of accepted limits. Clean the sensor and retry. Refer to Troubleshooting on page 29 for more information.
9. If the calibration passed, push **enter** to continue.
10. 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 28.
11. 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.

12. If not using the optional zero calibration cartridge 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.

1. Push the **menu** key and select SENSOR SETUP>CALIBRATE.
2. If the pass code is enabled in the security menu for the controller, enter the pass code.
3. Select SAMPLE CAL and push **enter**.
4. 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.

5. With the sensor in the process sample, push **enter**. The measured value is shown. Wait for the value to stabilize and push **enter**.

6. 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**.
7. 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 29 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 28.
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.

11. 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.

Exit calibration procedure

If the **back** key is pushed during a calibration, the user can exit the calibration.

1. Push the **back** key during a calibration. Three options are shown:

Option	Description
QUIT CAL	Stop the calibration. A new calibration must start from the beginning.
BACK TO CAL	Return to the calibration.
LEAVE CAL	Exit the calibration temporarily. Access to other menus is allowed. To return to the calibration, push the **menu** key and select SENSOR SETUP.

2. Use the arrow keys to select one of the options and push **enter**.

Change calibration options

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

1. Push the **menu** key and select SENSOR SETUP>CALIBRATE.
2. 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—select the required delay from the list.
OP ID ON CAL	Includes an operator ID with calibration data—YES or NO (default). The ID is entered during the calibration.

Reset calibration options

This option is reserved for Hach Lange service technicians.

Maintenance

<table>
<tr><td colspan="2" align="center">⚠ **D A N G E R**</td></tr>
<tr><td>Multiple hazards. Only qualified personnel must conduct the tasks described in this section of the document.</td></tr>
</table>

Cleaning and decontamination

<table>
<tr><td align="center">⚠ **D A N G E R**</td></tr>
<tr><td>Always remove power from the controller before performing maintenance activities.</td></tr>
</table>

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.

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

General troubleshooting

Table 6 Controller

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.

Table 6 Controller (continued)

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.

Table 6 Controller (continued)

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

Table 7 Measurement

Problem	Probable cause	Resolution
pH < 10.5	The bottle of conditioning solution is empty.	Replace the bottle of conditioning solution.
	The concentration of the conditioning solution is too low.	
	Poor conditioning due to fouling of the venturi injection nozzle.	Unscrew the venturi injection nozzle and clean with compressed air.
The signal is decreasing.	Fouling of the platinum electrode.	Carefully clean the surface of the electrode with a soft and absorbent tissue. Calibrate the instrument.
Lack of accuracy.	The potential between the reference electrode and the platinum electrode is > 480 mV.	Change the reference electrode.
Measurement instability.	Unstable sample flow rate.	Calibrate the instrument with the same flow rate as the measurement flow rate.
Liquid leaking from the top of the flow chamber.	Sample output not draining correctly.	Verify the atmospheric pressure drainage. Check there are no blockages or kinks in the tubing.

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 • **OUTPUT 1** • **OUTPUT 2**	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. 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 • **OUTPUT 1** • **OUTPUT 2**	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

Option	Description
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)
MODBUS STATS	Displays Error and Good count stats for selected port. • 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 8.

To access the sensor diagnostic and test menu, push the **menu** key and select SENSOR SETUP>DIAG/TEST.

Table 8 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.

Table 8 Sensor DIAG/TEST menu (continued)

Option	Description
MEMBRANE DAYS	Shows the number of days that the membrane has been in operation.
RESET MEMBRANE	Resets the number of days that the membrane has been in operation and resets all calibration data to defaults.

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 9.

Table 9 Warning list for oxygen scavenger sensors

Warning	Description	Resolution
O2 SCAVENGER TOO HIGH	The measured value is > 10000 ppm	Make sure that the oxygen scavenger (hydrazine or carbohydrazide) level in the process water is within the operating limits of the sensor. Calibrate or replace the sensor.
O2 SCAVENGER TOO LOW	The measured value is < 0 ppm	Calibrate or replace the sensor.
TEMP TOO HIGH	The measured temperature is > 50 °C	Reduce sample temperature.
TEMP TOO LOW	The measured temperature is < 0 °C	Increase sample temperature.
CURRENT TOO HIGH	The measured current > 200 mA	Make sure that the oxygen scavenger (hydrazine or carbohydrazide) level in the process water is within the operating limits of the sensor. Calibrate or replace the sensor.
CURRENT TOO LOW	The measured current < -0.5 mA	Calibrate or replace the sensor.
CAL OVERDUE	The Cal Reminder time has expired	Calibrate the sensor.
REPLACE SENSOR	The sensor has been in operation > 365 days	Replace the sensor cartridge and calibrate the sensor. If the calibration result is pass, reset the membrane days in the DIAG/TEST menu.
NOT CALIBRATED	The sensor has not been calibrated	Calibrate the sensor.
CAL IN PROGRESS	A calibration was started but not completed	Return to calibration.

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 10.

Table 10 Error list for oxygen scavenger sensors

Error	Description	Resolution
ADC FAILURE	The analog to digital conversion failed	Power off and power on the controller. Call technical support.
TEMP SENSOR MISSING	The temperature 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.

Replacement parts and accessories

Refer to the replacement parts and accessories section of the controller documentation for controller 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.

Spare parts kit for 2 years - 09186=A=8000

Description	Quantity	Item no.
Filter	6	363877,06000
Reference electrode	1	368429,00000
Venturi injection nozzle	1	359090,00024
O-Ring for Venturi injection nozzle	1	356099,05090
Plastic cleaning beads	7	588801,75008
4 × 6 mm PE tubing	2 meters	151575,00006

Measuring cell

Description	Item no.
Measuring cell	09186=A=0100
Reference electrode	368429,00000
Working electrode	09186=A=0300
Inlet elbow fitting G1/8 DN 4/6	359103,10070
Outlet fitting G1/8 DN6/8	359103,10055
Plug NPT1/8	431=201=018
Conditioning bottle with equipment	09186=A=0200
Brown glass bottle	490=010=011
Porous cartridge	09073=C=0340
Fitting G1/8 DN4/6	359103,10065

Measuring cell (continued)

Description	Item no.
Equipped flow rate controller	09186=A=0400
Inlet fitting G1/4 DN4/6	587=006=002
Short elbow fitting G1/4 DN4/6	359103,10072
Long elbow fitting G1/4 DN4/6	587=906=002
Flow meter	694=000=001
Elbow fitting NPT1/8 DN4/6	359103,10170

Accessories

Description	Item no.
Cartridge for chemical zero calibration	09186=A=0600

Material safety data sheets (MSDS)

MSDS - Diisopropylamine

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 code: 803646
Product name: Diisopropylamine for synthesis.

2. COMPOSITION / INFORMATION ON INGREDIENTS
CAS no: 108-18-9
Molecular weight: 101.19
Molecular formula: $C_6H_{15}N$
EC index number: 612-048-00-5
EINECS: 203-558-5

3. HAZARDS IDENTIFICATION
Highly flammable. Irritating to eyes, respiratory system and skin.

4. FIRST AID MEASURES
After skin contact: wash off with plenty of water. Remove contaminated clothing.
After eye contact: rinse out with plenty of water for at least 10 minutes with the eyelid held wide open. Summon eye specialist.
After inhalation: fresh air.
If swallowed: give plenty of water to drink, induce vomiting. Summon doctor.

5. FIRE FIGHTING MEASURES
Extinguishing media: Water, CO_2, foam, powder.
Special risks: combustible. Vapors heavier than air. Formation of explosive mixtures possible with air. Keep away from sources of ignition. The following may develop in event of fire: NO.

6. MEASURES IN CASE OF ACCIDENTAL SPILLAGE
Soak up with a liquid absorbent, e.g. Chemizorb® or Rhonesec®. Clean contaminated area.

7. HANDLING AND STORAGE
Handling: no further requirements.
Storage: store tightly closed, cool, dry, protected from air. Take measures to prevent electrostatic charging.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION
Personal protective equipment:

- respiratory protection: required when vapors/aerosols are generated. Filter K (acc. to DIN 3181) for NH_3
- eye protection: required
- hand protection: required
- industrial hygiene: change contaminated clothing. Application of skin-protective barrier cream recommended. Wash hands after working with substance.

9. PHYSICAL AND CHEMICAL PROPERTIES
Form: liquid
Color: colorless
Odor: amine-like
pH value: not available
Melting temperature: -96°C
Boiling temperature: 83 - 84°C
Ignition temperature: 295°C DIN51794
Flash point: -17°C DIN51755
Explosion limits:

- Lower: 1.5 vol%
- Upper: 8.5 vol%

Vapor pressure: (20°C) 100 hPa
Density: (20°C) 0.72 g/cm^3
Solubility in:

- water (20°C) soluble
- organic solvents (20°C) soluble

10. STABILITY AND REACTIVITY

Conditions to be avoided: none

Substances to be avoided: oxidizing agents, acids

Hazardous decomposition products: no information available

Further information: hygroscopic, sensitive to air

11. TOXICOLOGICAL INFORMATION

Acute toxicity: DL50 (oral, rat) = 770 mg/kg

Further toxicological information:

- after skin contact: severe irritations
- after eye contact: severe irritation
- after inhalation: irritations of the mucous membranes, coughing, and dyspnea. Danger of skin absorption

12. ECOLOGICAL INFORMATION

Do not allow to enter drinking water supplies, waste water, or soil!

13. DISPOSAL CONSIDERATIONS

Product: there are no uniform EC regulation for the disposal of chemicals or residues. Chemical residues generally count as special waste. The disposal of the latter is regulated in the EC member countries through corresponding laws and regulations, and in the federal republic of germany also by the individual federal states. We recommend that you contact either the authorities in charge or approved waste disposal companies which will advise you on how to dispose of special waste.

Packaging: disposal in accordance with local legal provisions.

14. TRANSPORT INFORMATION

DOT and IATA:

- Shipping Name: Diisopropylamine
- UN Number: UN1158
- Hazard Class: 3.8
- Packing Group: PG II
- Label(s): Flammable liquid, corrosive

15. REGULATORY INFORMATION

United States:

- Toxic Substance Control Act (TSCA): Listed
- Superfund Amendments and Reauthorization Act (SARA 302): Not Listed
- Superfund Amendments and Reauthorization Act (SARA 313): Not Listed

International:

- European Inventory of Existing Chemical Substances (EINECS): No. 203-558-5

Canada:

- Canadian Domestic Substances List (DSL): Listed
- Canadian Non Domestic Substances List (NDSL): Not Listed

16. OTHER INFORMATION

Consider all national and local rules and regulations.

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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