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# **1200 sc Combination pH & ORP Sensor**

Operation Manual

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Operation Manual



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# Section 1 Specifications

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*Note: The digital combination pH & ORP sensor 1200 sc consists of an analog sensor using a compatible gateway and set of cables.*

*For specifications of the analog sensor please refer to the appropriate technical data sheet.*

Specifications are subject to change without notice.

**Table 1 Digital Gateway Specifications**

<b>Weight</b>	145 g (5 oz)
<b>Dimensions</b>	17.5 x 3.4 cm (7 x 1 <sup>3</sup> / <sub>8</sub> in.)
<b>Operating Temperature</b>	-20 to 60 °C (-4 to 140 °F)





# Section 2 General Information

## 2.1 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.

To ensure 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.

### 2.1.1 Use of Hazard Information

**DANGER**

*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.*

**Important Note:** *Information that requires special emphasis.*

**Note:** *Information that supplements points in the main text.*

### 2.1.2 Precautionary Labels

Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not observed.

	This symbol, if noted on the instrument, references the 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.
	This symbol, if noted on the product, indicates the need for protective eye wear.
	This symbol, when noted on the product, identifies the location of the connection for Protective Earth (ground).
	This symbol, when noted on the product, identifies the location of a fuse or current limiting device.
	Electrical equipment marked with this symbol may not be disposed of in European public disposal systems after 12 August of 2005. In conformity with European local and national regulations (EU Directive 2002/96/EC), European electrical equipment users must now return old or end-of life equipment to the Producer for disposal at no charge to the user. <b>Note:</b> <i>For all electrical products (marked or unmarked) which are supplied or produced by Hach-Lange, please contact the local Hach-Lange sales office for instructions for proper disposal.</i>

### 2.2 General Sensor Information

Optional equipment, such as mounting hardware for the probe, is supplied with instructions for all user installation tasks. Several mounting options are available, allowing the probe to be adapted for use in many different applications.

#### 2.2.1 Sensor Body Styles

The body styles are depending on the particular sensor. The Digital Gateway

The digital gateway was developed to provide a means to use existing analog sensors with the new digital controllers. The gateway contains all the necessary software and hardware to interface with the controller and output a digital signal.

### 2.3 Operating Precaution

Before placing the pH or ORP sensor into operation, remove the protective cap to expose the process electrode and reference junction. Save the protective cap for future use.

For short-term storage (when sensor is out of the process for more than one hour), fill the protective cap with pH 4 buffer or DI water and place the cap back on the sensor. Keeping the process electrode and reference junction moist will avoid slow response when the sensor is placed back in operation.

For extended storage, repeat the short-term storage procedure every 2 to 4 weeks, depending on the surrounding environmental conditions.

#### **CAUTION**

***If the pH process electrode breaks, handle the sensor very carefully to prevent injury.***

The process electrode at the pH sensor tip has a glass bulb, which can break. Do not subject this electrode to abrupt impact or other mechanical abuse.

The gold or platinum process electrode at the ORP sensor tip has a glass shank (hidden by the salt bridge) which can break. Do not subject this electrode to impact or other mechanical abuse.

## Section 3 Installation

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### **DANGER**

**Only qualified personnel should conduct the tasks described in this section of the manual.**

The Combination pH/ORP Sensor can be used with either an sc100 or sc1000 controller. Refer to Chapter 3.2 on page 15 for installation instructions.

The sc sensor should be wired to the digital gateway before connecting the digital gateway to the sc100 or sc1000 Controller. The digital gateway is designed to provide a digital interface to the appropriate digital controller. Refer to section 3.1 for more information.

### 3.1 Wiring the sc Sensor to the Digital Gateway

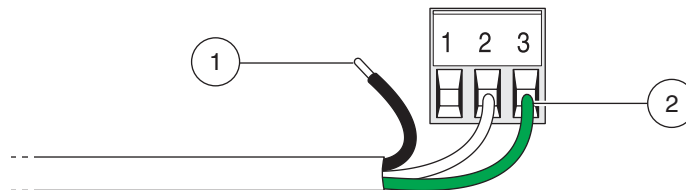
1. Route the cable from the sensor through the strain relief in the digital gateway then properly terminate the wire ends (see Figure 1).

**Note:** Do not tighten the strain relief until the digital gateway is wired and the two halves are threaded securely together.

2. Insert the wires as shown in Chapter 3.1.2, 3.1.3, 3.1.4 and Figure 2.
3. Make sure the O-ring is properly installed between the two halves of the digital gateway and thread the two halves together. Hand tighten.
4. Tighten the strain relief to secure the sensor cable.
5. Connect the digital gateway to the controller.

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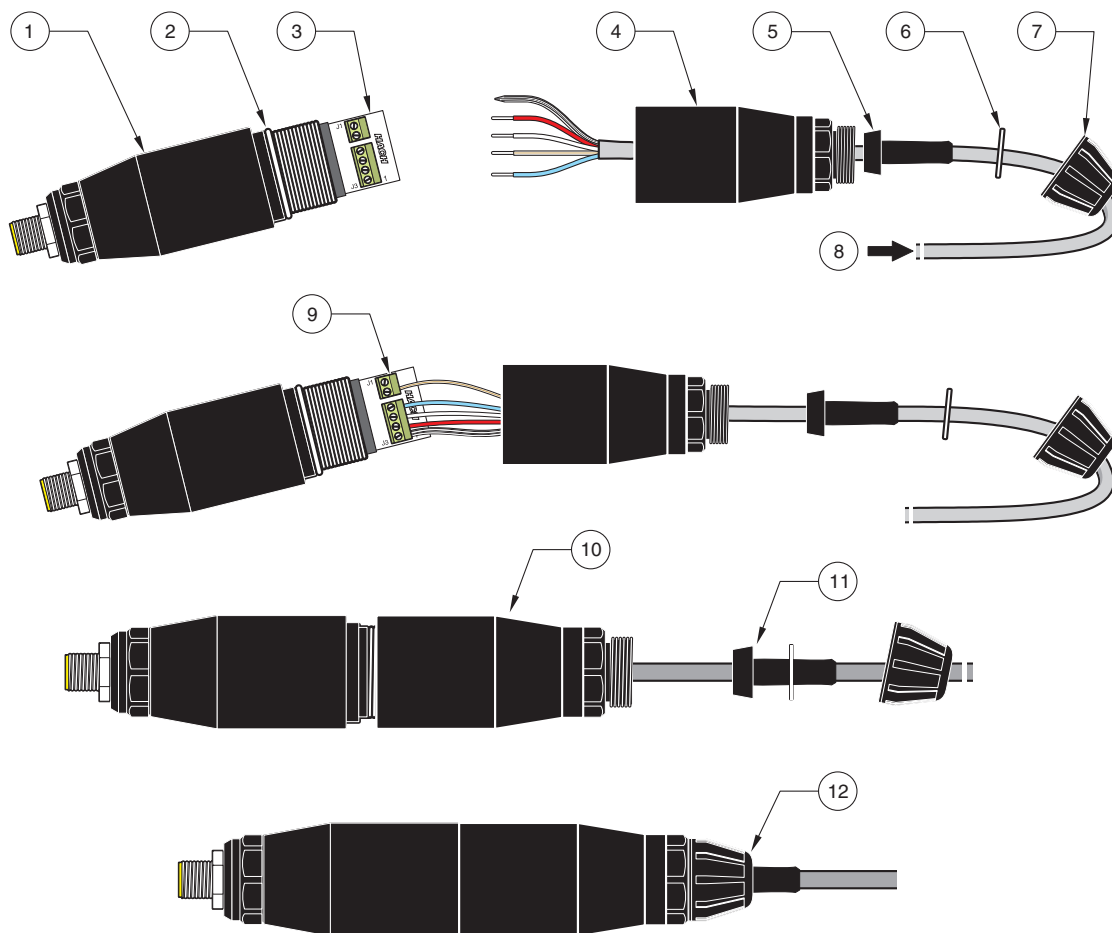
**Figure 1** Proper Wire Preparation and Insertion



1. Strip ¼-inch of insulation.

2. Seat insulation against connector with no bare wire exposed.

Figure 2 Wiring and Assembling the Digital Gateway (Cat. No. 6120600)



1. Digital gateway front	7. Cord grip
2. O-ring	8. From sensor
3. Sensor wire connector	9. Insert wires into connector according to the tables in Chapter 3.1.2, 3.1.3 and 3.1.4. Use the included 2 mm screwdriver (Cat. No. 6134300) to secure connections.
4. Digital gateway back	10. Screw back of digital gateway onto front.
5. Cable bushing	11. Push cable bushing and anti-rotation washer into back.
6. Anti-rotation washer	12. Fasten cord grip securely. Assembly is complete.

### 3.1.1 Wiring of 3/4-inch Combination pH and ORP PCK and RCK Sensors

**Note:** When a sensor of this type with an internal temperature sensor is used, select PT1000 in the Sensor Setup Menu.

Sensor (wire color)	Sensor Signal without Ground Rod	Sensor Signal with Ground Rod <sup>1</sup>	Digital Gateway
Metal Braid <sup>2</sup>	Jumper 2 from J3-1 to J3-3 <sup>3</sup>	Ref	J3-1
White	Temp +	Temp +	J3-2
Red	Temp –	Temp –	J3-3
Blue	Ref	Solution Ground	J3-4
Clear	Active/Measuring	Active/Measuring	J1-5
not used	not used	not used	J1-6

<sup>1</sup> Some applications require the use of an external ground rod with the combination electrode. Use this wiring scheme for these applications.

<sup>2</sup> If Metal Braid is “tinned”, cut the tinned area off and twist the wire to insert into connector.

<sup>3</sup> Customer-supplied (required)

### 3.1.2 Wiring of HACH LANGE combination electrodes

**LZX473, LZX475, LZX477, LZX518, LZX533, LZX535, LZX536, LZX537, LZX539, LZX540, LZX544, LZX545, LZX561**

**Note:** When a sensor of this type with an internal temperature sensor is used, select PT100 in the Sensor Setup Menu.

Jumper is customer supplied

LZY288 cable gland kit is required to connect these electrodes to the gateway.

Sensor cable	Sensor Signal without Ground Rod	Digital-Gateway
Jumper	Jumper from J3-1 to J3-3	J3-1
Red (if exist)	Temp +	J3-2
Jumper/White (if exist)	Temp –	J3-3
Black	Ref	J3-4
Transparent	Aktiv/Measuring	J1-5
	not used	J1-6

### 3.1.3 Wiring of 8350/8351 combination electrodes

**Note:** When a sensor of this type with an internal temperature sensor is used, select PT100 in the Sensor Setup Menu.

**Note:** LZY288 cable gland kit is required to connect these electrodes to the gateway.

Z08350=C=0004, Z08350=C=0005 Z08350=A=0003	Sensor Signal with Ground Rod	Digital-Gateway
Black	Ref	J3-1
Red	Temp +	J3-2
White	Temp –	J3-3
Blue	Solution Ground	J3-4
Transparent	Aktiv/Measuring	J1-5
	not used	J1-6

## Installation

pH Sensor Z08350=A=0000	Sensor Signal without Ground Rod	Digital-Gateway
Jumper	Jumper from J3-1 to J3-3	J3-1
Red	Temp +	J3-2
Jumper/White	Temp –	J3-3
Black	Ref	J3-4
Transparent	Aktiv/Measuring	J1-5
	not used	J1-6

ORP Sensor 8351	Sensor Signal without Ground Rod	Digital-Gateway
Jumper	Jumper from J3-1 to J3-3	J3-1
-	Temp +	J3-2
Jumper	Temp –	J3-3
Black	Ref	J3-4
Transparent	Aktiv/Measuring	J1-5
	not used	J1-6

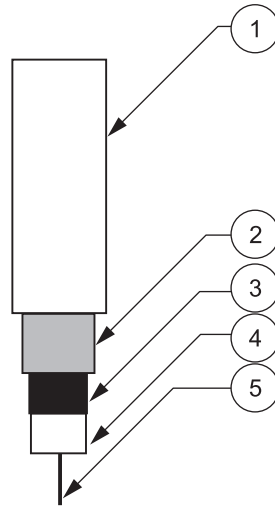
### 3.1.4 Wiring of other electrodes

*Note: LZY288 cable gland kit is required to connect this electrodes to the gateway.*

	Sensor Signal with Ground Rod	Digital- Gateway
Reference	Ref	J3-1
(Temp. sensor)	Temp +	J3-2
(Temp. sensor)	Temp –	J3-3
Ground rod	Solution Ground	J3-4
Sensor Signal	Aktiv/Measuring	J1-5
	not used	J1-6

	Sensor Signal without Ground Rod	Digital-Gateway
	Jumper from J3-1 to J3-3	J3-1
(Temp. sensor)	Temp +	J3-2
(Temp. sensor)	Temp –	J3-3
Reference	Ref	J3-4
Sensor Signal	Aktiv/Measuring	J1-5
	not used	J1-6

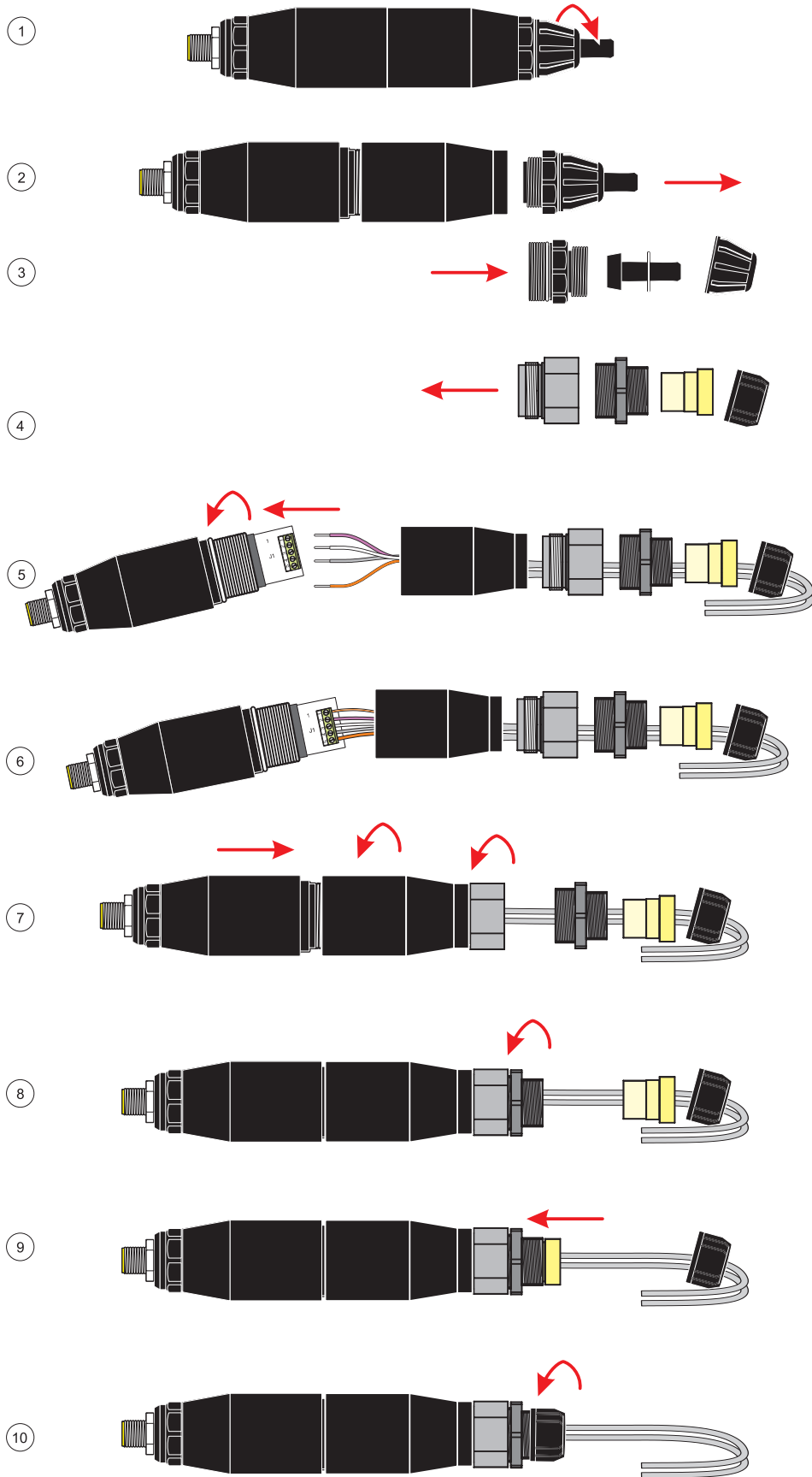
Example:



1. Cable insulation	4. Inner insulation. This distance must be at least 15 mm.
2. Shield	5. Inner conductor
3. Semi-conductor layer	

**Note:** Remove the black semi-conductor layer so that at least 15 mm of the inner insulation is exposed.

## 3.1.5 Assembling of the Cable Gland Kit





### 3.2 Connecting the Digital Gateway to the sc Controller

The digital gateway should be wired to the sensor before connecting to the controller.

The Digital Gateway system can be used with any sc controller. Refer to the controller manual for installation instructions.

#### 3.2.1 Attaching a Digital Gateway with a Quick-connect Fitting

The Digital Gateway cable is supplied with a keyed quick-connect fitting for easy attachment to the controller (Figure 3). Retain the connector cap to seal the connector opening in case the sensor must be removed. Optional extension cables may be purchased to extend the sensor cable length. If the total cable length exceeds 100 m (300 ft), a termination box must be installed.

**Note:** Use of a load termination box other than Cat. No. 5867000 may result in a hazard.

Figure 3 Attaching the Digital Gateway using the Quick-connect Fitting

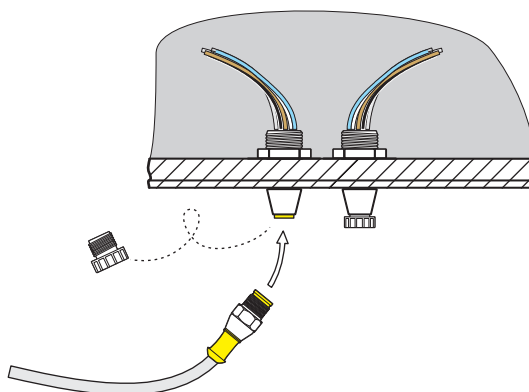
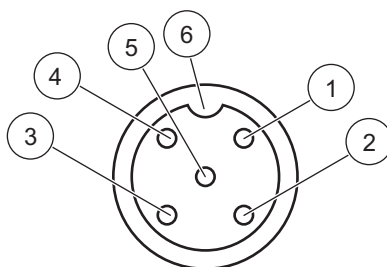


Figure 4 Quick-connect Fitting pin assignment

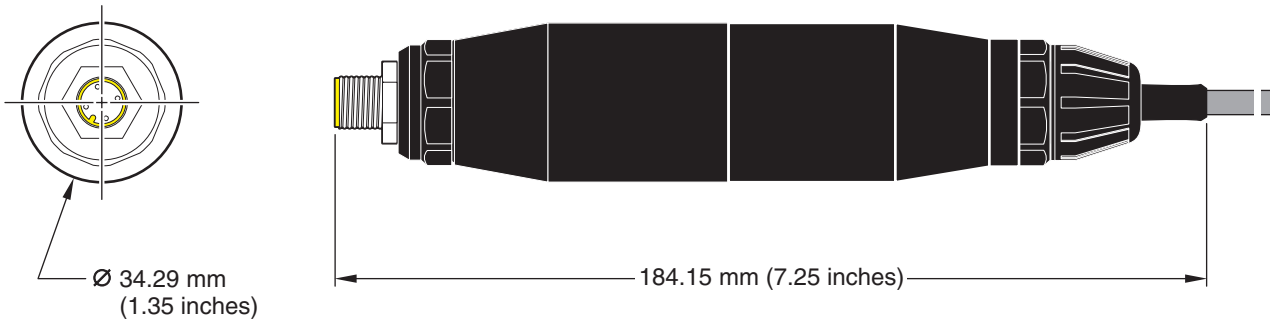


Number	Designation	Wire Color
1	+12 VDC	Brown
2	Circuit Common	Black
3	Data (+)	Blue
4	Data (-)	White
5	Shield	Shield (grey wire in existing quick-disconnect fitting)
6	Groove	

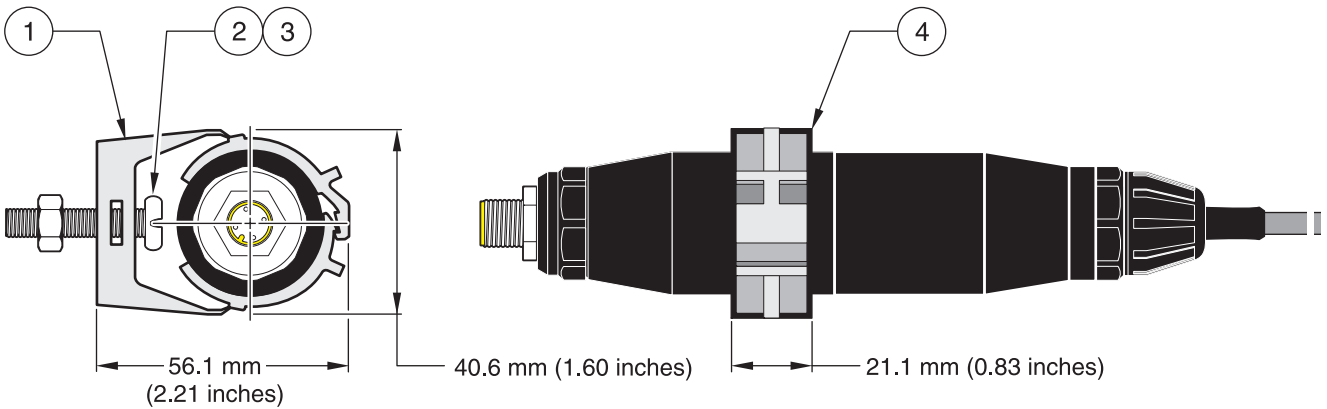
### 3.3 Mounting the Digital Gateway

The digital gateway is supplied with a mounting clip for mounting to a wall or other flat surface. See [Figure 5](#) for dimensions. Use an appropriate fastener to secure it to the wall, see [Figure 6](#). After the sensor is wired to the digital gateway and the two halves are threaded together, place the mounting clip over the center of the digital gateway and squeeze the clip together to secure.

**Figure 5** Digital Gateway Dimensions



**Figure 6** Mounting the Digital Gateway



1. Mounting Clip	3. Hex Nut, 1/4-28
2. Screw, pan head, 1/4-28 x 1.25-in.	4. Mount clip, insert digital gateway, squeeze clip closed.

## Section 4 Operation

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### 4.1 Using the sc Controller

Before using the sensor in combination with the sc controller make yourself familiar with the operating mode of the controller. Refer to the controller user manual and learn how to use and navigate the menu functions.

### 4.2 Sensor Setup

When a sensor is initially installed, the serial number of the sensor will be displayed as the sensor name. To change the sensor name refer to the following instructions:

1. Select Main Menu.
2. From the Main Menu, select SENSOR SETUP and confirm.
3. Highlight the appropriate sensor if more than one sensor is attached and confirm.
4. Select CONFIGURE and confirm.
5. Select EDIT NAME and edit the name. Confirm or cancel to return to the Sensor Setup menu.

### 4.3 Sensor Data Logging

The sc controller provides one data log and one event log for each sensor. The data log stores the measurement data at selected intervals. The event log stores a variety of events that occur on the devices such as configuration changes, alarms, warning conditions, etc. The data log and the event log can be read out in a CSV format. For downloading the logs please refer to the controller user manual. .

### 4.4 Sensor Diagnostics Menu for pH and ORP

<b>SELECT SENSOR</b>
ERROR LIST—See <a href="#">section 6.1 on page 27</a> .
WARNING LIST—See <a href="#">section 6.2 on page 27</a> .

### 4.5 pH Sensor Setup Menu

<b>SELECT SENSOR (if more than one sensor is attached)</b>
<b>CALIBRATE</b>
<b>1 POINT AUTO</b>
Calibration with a single buffer — normally pH 7.
<b>2 POINT AUTO</b>
Calibration with two buffers — normally pH 7 and pH 4 or 10.
<b>1 POINT MANUAL</b>
Calibration against a single known sample.
<b>2 POINT MANUAL</b>
Calibration against two samples, both with a known pH.
<b>TEMP ADJUST</b>

## 4.5 pH Sensor Setup Menu (continued)

Adjust the displayed temperature by up to $\pm 15$ °C.
<b>DEFAULT SETUP</b>
Restores the system to the original factory calibration.
<b>CONFIGURE</b>
<b>EDIT NAME</b>
Enter up to a 10-digit name in any combination of symbols and alpha or numeric characters.
<b>SELECT MEASURE</b>
Select the appropriate measurement units to display.
<b>DISPLAY FORMAT</b>
Select the measurement resolution (xx.xx pH or xx.x pH).
<b>TEMP UNITS</b>
Choose from the displayed options (°C or °F).
<b>LOG SETUP</b>
Choose SENSOR INTERVAL to set the sensor log interval or select TEMP INTERVAL to set the temperature log interval.
<b>REJECT FREQ</b>
Choose 50 or 60 Hz depending on the power line frequency for optimal noise rejection. Default is 60 Hz.
<b>FILTER</b>
Select 0–60 second signal averaging time.
<b>TEMP ELEMENT</b>
Select type of temperature element from the displayed choices.
<b>SELECT BUFFER</b>
Select the buffer type (standard 4, 7, 10 or DIN 19267) from the displayed choices.
<b>PURE H2O COMP</b>
Allows the user to specify that ammonia, morpholine, or other user-defined electrolyte is being used in the application, allowing a temperature-dependent linear slope factor to be applied to the measured pH.
<b>CAL DAYS</b>
Number of days since the last calibration. Default notification at 60 days.
<b>SENSOR DAYS</b>
Number of days the sensor has been in operation. Default notification at 365 days.
<b>DEFAULT SETUP</b>
Resets all user-editable options to their factory-defaults.

## 4.5 pH Sensor Setup Menu (continued)

<b>DIAG/TEST</b>	
<b>PROBE INFO</b>	Display the sensor type, entered name of the sensor (Default: Digital Gateway serial number and name), the sensor serial number, the software version number, and the sensor driver version number.
<b>CAL DATA</b>	Displays the pH slope and the date of the last calibration.
<b>SIGNALS</b>	<p>SENSOR SIGNAL: Displays the sensor output in mV</p> <p>SENSOR ADC COUNTS: Displays the sensor ADC counts</p> <p>TEMP ADC COUNTS: Displays raw data for temperature ADC counts. ADC counts are comparable to A/D counts and are for sensor electronic diagnostic purposes only.</p> <p>ELECTRODE STATE: Identifies the state of the electrode (good or bad) depending on whether the impedance is within preset limits.</p> <p>ACTIVE ELECT: Displays the impedance (Mohms) of the active electrode if Imped Status is set to Enabled.</p> <p>IMPED STATUS: Sensor diagnostic. Choose Enabled or Disabled.</p>
<b>COUNTERS</b>	<p>SENSOR DAYS: Displays the cumulative days the sensor has been in use.</p> <p>RESET SENSOR: Allows the sensor counter to be reset to zero.</p> <p>ELECTRODE DAYS: Cumulative days the electrode has been in use.</p>

## 4.6 ORP Sensor Setup Menu

<b>SELECT SENSOR (if more than one sensor is attached)</b>	
<b>CALIBRATE</b>	
<b>1 POINT MANUAL</b>	Calibration against a single known sample.
<b>TEMP ADJUST</b>	Adjust the displayed temperature by up to $\pm 15$ °C.
<b>DEFAULT SETUP</b>	Restores the system to the original factory calibration.
<b>CONFIGURE</b>	
<b>EDIT NAME</b>	Enter up to a 10-digit name in any combination of symbols and alpha or numeric characters.
<b>SELECT SENSOR</b>	Choose from the displayed sensor type (pH or ORP).
<b>TEMP UNITS</b>	Choose from the displayed options (°C or °F).
<b>LOG SETUP</b>	Choose SENSOR INTERVAL to set the sensor log interval or select TEMP INTERVAL to set the temperature log interval.
<b>AC FREQUENCY</b>	Choose 50 or 60 Hz depending on the power line frequency for optimal noise rejection. Default is 60 Hz.

## 4.6 ORP Sensor Setup Menu (continued)

<b>CONFIGURE (continued)</b>	
<b>FILTER</b>	Select 0–60 second signal averaging time.
<b>TEMP ELEMENT</b>	Select type of temperature element from the displayed choices.
<b>CAL DAYS</b>	Number of days since the last calibration. Default notification at 60 days.
<b>SENSOR DAYS</b>	Number of days the sensor has been in operation. Default notification at 365 days.
<b>IMPED LIMITS</b>	Set min/max electrode sensor impedance limits.
<b>DEFAULT SETUP</b>	Resets all user-editable options to their factory-defaults.
<b>DIAG/TEST</b>	
<b>PROBE INFO</b>	Display the sensor type, entered name of the sensor (Default: Digital Gateway serial number and name), the sensor serial number, the software version number, and the sensor driver version number.
<b>CAL DATA</b>	Displays the slope and the date of the last calibration.
<b>SIGNALS</b>	<p>SENSOR SIGNAL: displays the sensor output in mV</p> <p>SENSOR ADC COUNTS: displays the sensor ADC counts</p> <p>TEMP ADC COUNTS: shows raw data for temperature ADC counts. ADC counts are comparable to A/D counts and are for sensor electronic diagnostic purposes only.</p> <p>ELECTRODE STATE: Identifies the state of the electrode (good or bad) depending on whether the impedance is within preset limits.</p> <p>ACTIVE ELECT: Shows the impedance (Mohms) of the active electrode if Imped Status is set to Enabled.</p> <p>IMPED STATUS: Sensor diagnostic. Choose Enabled or Disabled.</p>
<b>COUNTERS</b>	<p>SENSOR DAYS: displays the cumulative days the sensor has been in use.</p> <p>RESET SENSOR: allows the sensor counter to be reset to zero.</p> <p>ELECTRODE DAYS: Cumulative days the electrode has been in use.</p>

---

## 4.7 pH Calibration

The manufacturer offers one and two point automatic and manual calibrations for pH. An automatic calibration identifies the buffer table corresponding to the chosen buffer and automatically calibrates the probe after it stabilizes. A manual calibration is performed by placing the pH sensor in any buffer or sample with a known value and then entering that known value into the controller.

The value of the sample used in the manual calibration may be determined by laboratory analysis or comparison reading.

### 4.7.1 One Point Automatic Calibration

1. From the Main Menu, select SENSOR SETUP and confirm.
2. Select the appropriate sensor if more than one is attached and confirm.
3. Select CALIBRATE and confirm.
4. Select 1 POINT AUTO and select the available Output Mode (Active, Hold, or Transfer) from the list box and confirm.
5. Move the clean probe to buffer and confirm to continue.
6. Confirm when stable. A screen will display 1 Point Auto Complete and the slope (XX.X mV/pH).
7. Return the probe to process.

### 4.7.2 Two Point Automatic Calibration

1. From the Main Menu, select SENSOR SETUP and confirm.
2. Select the appropriate sensor if more than one is attached and confirm.
3. Select CALIBRATE and confirm.
4. Select 2 POINT AUTO and select the available Output Mode (Active, Hold, or Transfer) from the list box and confirm.
5. Move the clean probe to Buffer 1 and confirm.
6. Confirm when stable.
7. Move the clean probe to Buffer 2 and confirm.
8. Confirm when stable. A screen will display 2 Point Calibration Complete and the slope (XX.X mV/pH).
9. Return the probe to process.

### 4.7.3 One Point Manual Calibration

1. From the Main Menu, select SENSOR SETUP and confirm.
2. Select the appropriate sensor if more than one is attached and confirm.
3. Select CALIBRATE and confirm.
4. Select 1 POINT MANUAL and select the available Output Mode (Active, Hold, or Transfer) from the list box and confirm.
5. Move the clean probe to solution and confirm to continue.
6. Press enter when stable. Edit the solution value using the keypad and confirm.
7. Confirm when stable. A screen will display 1 Point Manual Complete and the slope (XX.X mV/pH).
8. Return the probe to process.

### 4.7.4 Two Point Manual Calibration

1. From the Main Menu, select SENSOR SETUP and confirm.
2. Select the appropriate sensor if more than one is attached and confirm.
3. Select CALIBRATE and confirm.
4. Select 2 POINT MANUAL CAL and select the available Output Mode (Active, Hold, or Transfer) from the list box and confirm.
5. Move the clean probe to Solution 1 and confirm.
6. Press enter when stable. Edit the solution value using the keypad and confirm.
7. Move probe to solution 1 and confirm.
8. Press enter when stable. Edit the solution value using the keypad and confirm.
9. A screen will display 2 Point Manual Cal Complete and the slope (XX.X mV/pH).
10. Return the probe to process.



---

## 4.8 ORP Calibration

### 4.8.1 One-point Manual Calibration

The manufacturer offers a one point manual calibration for ORP. The value of the sample used in the manual calibration may be determined by laboratory analysis or comparison reading.

1. From the Main Menu, select SENSOR SETUP and confirm.
2. Select the appropriate sensor if more than one is attached and confirm.
3. Select CALIBRATE and confirm.
4. Select 1 POINT MANUAL CAL and select the available Output Mode (Active, Hold, or Transfer) from the list box and confirm.
5. Move the clean probe to Solution and confirm.
6. Press enter when stable. Edit the solution value using the keypad and confirm.
7. A screen will display 1 Point Manual Complete and the slope (XX.X mV).
8. Return the probe to process.

## 4.9 Concurrent Calibration of Two Sensors for pH and ORP

1. Begin a calibration on the first sensor and continue until "Wait to Stabilize" is displayed.
2. Select LEAVE and confirm. The display will return to the main measurement screen. The reading for the sensor currently being calibrated will flash.
3. Begin the calibration for the second sensor and continue until "Wait to Stabilize" is displayed.
4. Select LEAVE and confirm. The display will return to the main measurement screen and the reading for both sensors will flash. The calibration for both sensors are now running in the background.
5. Return to the calibration of either sensor by selecting the Main Menu button. Select SENSOR SETUP and confirm. Select the appropriate sensor and confirm.
6. The calibration in progress will be displayed. Continue with the calibration.

### 4.10 Adjusting the Temperature

View or change the temperature using the steps below:

1. From the Main Menu, select SENSOR SETUP and confirm.
2. Select the appropriate sensor if more than one is attached and confirm.
3. Select CALIBRATE and confirm.
4. Select TEMP ADJUST and confirm.
5. Select MEASURED TEMP and confirm.
6. The temperature will be displayed. Edit the temperature and confirm.

## Section 5 Maintenance

---

**DANGER**

*Only qualified personnel should conduct the tasks described in this section of the manual.*



**DANGER**

*Explosion hazard. Do not connect or disconnect equipment unless power has been switched off or the area is known to be non-hazardous.*

### 5.1 Maintenance Schedule

Maintenance Task	90 days	Annually
Clean the sensor <sup>1</sup>	x	
Inspect sensor for damage	x	
Calibrate Sensor (if required by regulatory agency)	<b>Per the schedule mandated by your regulatory agency.</b>	

<sup>1</sup> Cleaning frequency is application dependent. More or less frequent cleaning will be appropriate in some applications.

### 5.2 Cleaning the Sensor

**CAUTION**

**Before cleaning with acid, determine if the chemical reaction between the acid and the sample will create a hazardous chemical reaction. (For example, do not put a sensor that is used in a cyanide bath directly into a strong acid for cleaning because this chemical combination may produce poisonous cyanide gas.)**

**DANGER**

**Acids are hazardous. Always wear appropriate eye protection and clothing in accordance with material safety data sheet recommendations.**

1. Clean the exterior of the sensor with a stream of water. If debris remains remove loose contaminate buildup by carefully wiping the entire measuring end of the sensor with a soft clean cloth. Rinse the sensor with clean, warm water.
2. Prepare a mild soap solution of warm water and dish detergent or other non-abrasive soap that does not contain lanolin.

**Note:** Lanolin will coat the glass process electrode and can adversely affect sensor performance.

3. Soak the sensor for 2 to 3 minutes in the soap solution.
4. Use a small soft-bristle brush and scrub the entire measuring end of the sensor, thoroughly cleaning the electrode and reference junction surfaces. If surface deposits cannot be removed by detergent solution cleaning, use muriatic acid (or other dilute acid) to dissolve them. The acid should be as dilute as possible, do not use stronger than 3% HCL. Experience will determine which acid to use and the appropriate dilution ratio. Some stubborn coatings may require a different cleaning agent. For assistance, contact the technical service.
5. Soak the entire measuring end of the sensor in dilute acid for no more than 5 minutes. Rinse the sensor with clean, warm water then place the sensor back into the mild soap solution for 2 to 3 minutes to neutralize any remaining acid.
6. Remove the sensor from the soap solution, and rinse the sensor again in clean, warm water.
7. After cleaning, always calibrate the measurement system. Refer to [section 4.7 on page 21](#).

## Section 6 Troubleshooting

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### 6.1 Error Codes

When a sensor is experiencing an error condition, the sensor reading on the measurement screen will flash and all relays and analog outputs associated with this sensor will be held. The following conditions will cause the sensor reading to flash:

- Sensor calibration
- Relay timer washing cycle
- Loss of communication

Highlight the Sensor Diag menu and press **ENTER**. Highlight Errors and press **ENTER** to determine the cause of the error. Errors are defined in [Table 2](#).

**Table 2 Error Codes**

Displayed Error	Definition	Resolution
ADC FAILURE	System measurement fails	Contact Technical Consulting Services.

### 6.2 Warnings

A sensor warning will leave all menus, relays, and outputs functioning normally, but will cause a warning icon to flash on the right side of the display. Highlight the Sensor Diag menu and press **ENTER** to determine the cause of the warning.

A warning may be used to trigger a relay and users can set warning levels to define the severity of the warning. Warnings are defined in [Table 3](#).

**Table 3 Warning Codes**

Displayed Warning	Definition	Resolution
PROBE OUT RANGE	Measured pH/ORP exceeds the expected value range.	Contact Technical Consulting Services.
TEMP OUT RANGE	Measured temperature exceeds the expected value range.	Contact Technical Consulting Services.
FLASH FAILURE	System flash memory write has failed.	Contact Technical Consulting Services.
REF ELECTRODE	Standard Electrode is not performing within the required specifications.	Contact Technical Consulting Services.

### 6.3 Troubleshooting the pH or ORP Sensor

Clean the sensor using the procedure described in [section 5.2 on page 26](#) and then calibrate the sensor as shown in [section 4.7 on page 21](#). If the measuring system cannot be calibrated after cleaning, contact the technical service.



## Section 7 Replacement Parts and Accessories

### 7.1 Replacement Items, Accessories, and Reagent and Standards

Item Description	QTY	Catalog Number
Instruction manual, Combination pH System, English	each	6120118
Cable, sensor extension, 1 m (3 ft)	each	6122400
Cable, sensor extension, 7.7 m (25 ft)	each	5796000
Cable, sensor extension, 15 m (50 ft)	each	5796100
Cable, sensor extension, 31 m (100 ft)	each	5796200
Connector Safety Lock	each	6139900
Termination box	each	586700
Plug, sealing, conduit opening	each	5868700
Strain relief, Heyco	each	16664
Buffer, pH 7	500 mL (1 pint)	2283549
Buffer, pH 4	500 mL (1 pint)	2283449
Buffer, pH 10	500 mL (1 pint)	2283649
Buffer, pH 7	1 gallon	2283556
Buffer, pH 4	1 gallon	2283456
Buffer, pH 10	1 gallon	2283656
ORP Standard Solution, 200 mV	500 mL (1 pint)	25M2A1001-115
ORP Standard Solution, 600 mV	500 mL (1 pint)	25M2A1002-115
ORP Standard Solution, 200 mV	1 gallon	25M2A1001-123
ORP Standard Solution, 600 mV	1 gallon	25M2A1002-123
Cable Gland Kit	each	LZY288





## Section 8    **Warranty, liability and complaints**

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HACH LANGE GmbH warrants that the product supplied is free of material and manufacturing defects and undertakes the obligation to repair or replace any defective parts at zero cost.

The warranty period for instruments is 24 months. If a service contract is taken out within 6 months of purchase, the warranty period is extended to 60 months.

With the exclusion of the further claims, the supplier is liable for defects including the lack of assured properties as follows: all those parts that can be demonstrated to have become unusable or that can only be used with significant limitations due to a situation present prior to the transfer of risk, in particular due to incorrect design, poor materials or inadequate finish will be improved or replaced, at the supplier's discretion. The identification of such defects must be notified to the supplier in writing without delay, however at the latest 7 days after the identification of the fault. If the customer fails to notify the supplier, the product is considered approved despite the defect. Further liability for any direct or indirect damages is not accepted.

If instrument-specific maintenance and servicing work defined by the supplier is to be performed within the warranty period by the customer (maintenance) or by the supplier (servicing) and these requirements are not met, claims for damages due to the failure to comply with the requirements are rendered void.

Any further claims, in particular claims for consequential damages cannot be made.

Consumables and damage caused by improper handling, poor installation or incorrect use are excluded from this clause.

HACH LANGE GmbH process instruments are of proven reliability in many applications and are therefore often used in automatic control loops to provide the most economical possible operation of the related process.

To avoid or limit consequential damage, it is therefore recommended to design the control loop such that a malfunction in an instrument results in an automatic change over to the backup control system; this is the safest operating state for the environment and the process.

### 8.1 Compliance Information

#### Immunity

This equipment was tested for industrial level EMC per:

**EN 61326** (EMC Requirements for Electrical Equipment for Measurement, Control and Laboratory Use) **per 89/336/EEC EMC**: Supporting test records by Hach Company, certified compliance by Hach Company.

**Standards include:**

IEC 1000-4-2:1995 (EN 61000-4-2:1995) Electrostatic Discharge Immunity (Criteria B)  
IEC 1000-4-3:1995 (EN 61000-4-3:1996) Radiated RF Electromagnetic Field Immunity (Criteria A)  
IEC 1000-4-4:1995 (EN 61000-4-4:1995) Electrical Fast Transients/Burst (Criteria B)  
IEC 1000-4-5:1995 (EN 61000-4-5:1995) Surge (Criteria B)  
IEC 1000-4-6:1996 (EN 61000-4-6:1996) Conducted Disturbances Induced by RF Fields (Criteria A)  
IEC 1000-4-11:1994 (EN 61000-4-11:1994) Voltage Dip/Short Interruptions (Criteria B)

**Additional Immunity Standard/s include:**

ENV 50204:1996 Radiated Electromagnetic Field from Digital Telephones (Criteria A)

#### Emissions

This equipment was tested for Radio Frequency Emissions as follows:

Per **89/336/EEC EMC**: **EN 61326:1998** (Electrical Equipment for measurement, control and laboratory use—EMC requirements) Class “A” emission limits. Supporting test records by Hewlett Packard, Fort Collins, Colorado Hardware Test Center (A2LA # 0905-01) and certified compliance by Hach Company.

**Standards include:**

EN 61000-3-2 Harmonic Disturbances Caused by Electrical Equipment  
EN 61000-3-3 Voltage Fluctuation (Flicker) Disturbances Caused by Electrical Equipment

**Additional Emissions Standard/s include:**

**EN 55011 (CISPR 11)**, Class “A” emission limits

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# Appendix A Modbus Register Information

**Table 4 Sensor Modbus Registers**

Group Name	Tag Name	Register #	Data Type	Length	R/W	Description
Tags	SensorMeasTag	40001	Integer	1	R	Sensor measurement tag
Measurements	pHMeas	40002	Float	2	R	pH /ORP measurement
Tags	TempMeasTag	40004	Integer	1	R	Temperature measurement tag
Measurements	TempDegCMeas	40005	Float	2	R	Temperature measurement
Configuration	SensorName	40007	String	6	R/W	Sensor name
Tags	FuncCode	40013	Integer	1	R/W	Function code tag
Tags	NextState	40014	Integer	1	R/W	Next state tag
Configuration	MeasType	40015	Integer	1	R/W	Measurement type—pH or ORP
Configuration	TempUnits	40016	Integer	1	R/W	Temperature units—C or F
Configuration	pHFormat	40017	Integer	1	R/W	pH display format
Configuration	TaggedPhFormat	40018	Long	2	R	pH display tagged format
Configuration	Filter	40020	Integer	1	R/W	Sensor filter
Configuration	TempElementType	40021	Integer	1	R/W	Temperature element type
Tags	TempUserValueTag	40022	Integer	1	R	Temperature user value tag
Configuration	TempUserDegCValue	40023	Float	2	R/W	Temperature user value
Configuration	pHBuffer	40025	Integer	1	R/W	pH buffer type
Configuration	PureWaterCompType	40026	Integer	1	R/W	Pure H <sub>2</sub> O compensation type
Configuration	PureWaterCompUser	40027	Float	2	R/W	Pure H <sub>2</sub> O compensation user val
Calibration	OutputMode	40029	Integer	1	R/W	Output mode
Calibration	CalLeave	40030	Integer	1	R/W	Cal leave mode
Calibration	CalAbort	40031	Integer	1	R/W	Cal abort mode
Tags	CalEditValueTag	40032	Integer	1	R	Cal edit value tag
Calibration	CalEditPhValue	40033	Float	2	R/W	Cal edit value
Diagnostics	pHSlope	40035	Float	2	R	pH slope
Diagnostics	SoftwareVersion	40037	String	6	R	Software version
Diagnostics	SerialNumber	40043	String	6	R	Serial number
Diagnostics	pHOffset	40049	Float	2	R	pH offset
Diagnostics	OrpOffset	40051	Float	2	R	Orp offset
Calibration	CalCode	40053	Integer	1	R	Cal code
Configuration	SensorLogInterval	40054	Integer	1	R/W	Sensor data log interval
Configuration	TempLogInterval	40055	Integer	1	R/W	Temperature data log interval
Diagnostics	pHmV	40056	Float	2	R	pH mV
Diagnostics	ProdDate	40058	Date	2	R/W	Production date
Diagnostics	StdElectrode	40060	Float	2	R	Standard electrode impedance
Diagnostics	RefElectrode	40062	Float	2	R	Reference electrode impedance
Diagnostics	LastCalDate	40064	Date	2	R	Last calibration date
Diagnostics	SensorDays	40066	Integer	1	R	Sensor running days
Diagnostics	ElectrodeDays	40067	Integer	1	R	Electrode running days
Diagnostics	ElectrodeStatus	40068	Integer	1	R	Electrode status
Diagnostics	SensorType	40069	Integer	1	R	Sensor type
Configuration	RejectFrequency	40070	Integer	1	R/W	Reject frequency
Diagnostics	DeviceDriver	40071	String	5	R	Device driver
Configuration	CalWarningDays	40076	Integer	1	R/W	Calibration warning days
Configuration	SensorWarningDays	40077	Integer	1	R/W	Sensor warning days



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