3700 sc Inductive Conductivity Sensor

Operation Manual

HACH **LANGE**

UNITED FOR WATER QUALITY

DOC023.52.00022

3700sc Digital Conductivity Sensor

Opration Manual

Table of Contents

Table of Contents

Section 1   Specifications

Specifications are subject to change without notice.

Table 1 Inductive Conductivity Probe Specifications

Components	Corrosion-resistant materials, fully-immersible probe with 6 m (20 ft) cable
Conductivity Measuring Range	0.0 to 200.0; 0 to 2,000,000 microSiemens/cm
Measuring Range (Temperature)	–10 to 200.0 °C (–14 to 392 °F) limited by sensor body material
Probe Operating Temperature	–10 to 200 °C (–14 to 392 °F); limited only by sensor body material and mounting hardware
Pressure/Temperature Limits (in pure water only)	Polypropylene: 6.9 bar at 100 °C (100 psi at 212 °F) PVDF: 6.9 bar at 120 °C (100 psi at 248 °F) PEEK®[1]: 13.8 bar at 200 °C (200 psi at 392 °F) PFA Teflon®[2]: 13.8 bar at 200 °C (200 psi at 392 °F)
Maximum Flow Rate	3 m (10 ft) per second
Temperature Compensator	PT 1000 RTD
Sensor Cable	Polyproplyene and PVDF sensors: 5-conductor (plus two isolated shields) with XLPE (cross-linked polyethylene) jacket; rated to 150 °C (302 °F; 20 ft (6 m) long PEEK® and PFA Teflon® sensors: 5-conductor (plus two isolated shields) with Teflon®-coated jacket; rated to 200 °C (392 °F); 6 m (20 ft) long.
Probe Dimensions	See Figure 1 and Figure 2 on page 8.

[1] PEEK® is a registered trademark of ICI Americas, Inc.
[2] Teflon® is a registered trademark of Dupont Co.

Table 2 Digital Gateway Specifications

Weight	145 g (5 oz)
Dimensions	17.5 x 3.4 cm (7 x 1$\frac{3}{8}$ in.)
Operating Temperature	–20 to 60 °C (–4 to 140 °F)

Specifications

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. *Note: 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.*

2.2 General Sensor Information

Optional equipment, such as mounting hardware for the probe, is supplied with instructions for all user installation tasks.

Figure 1   Sanitary-style Sensor

5/8-11UNC

⌀ 39.6 mm (1.56 inches)

50.8 mm (2.06 inches)

30 mm (1.18 inches)

35.0 mm (1.38 inches)

69.85 mm (2.75 inches)

102.9 mm (4.05 inches)

127 mm (5.00 inches)
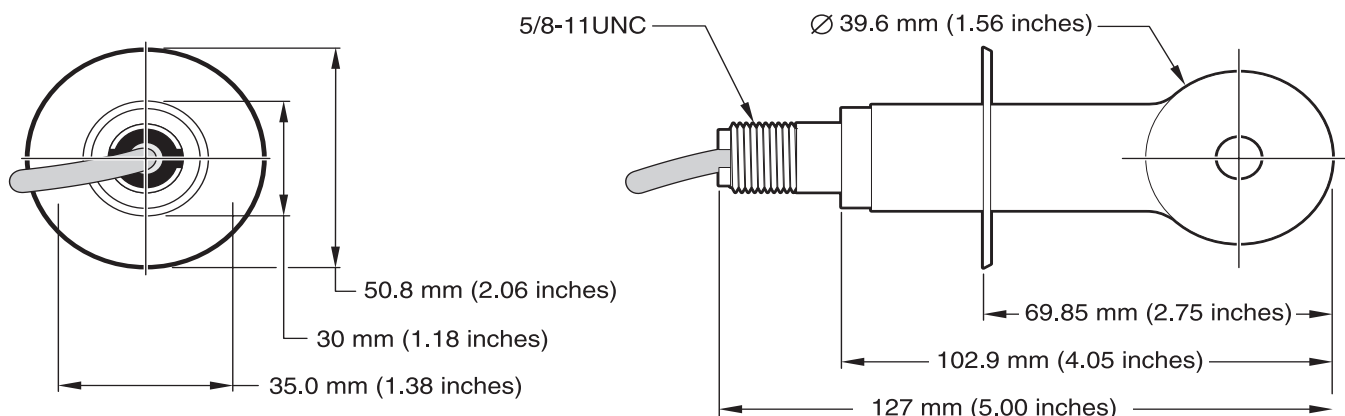
Figure 2   Convertible-style Sensor

5/8-11UNC   3/4-inch NPT

⌀ 39.6 mm (1.56 inches)

39.6 mm (1.56 inches)

30 mm (1.18 inches)

35.0 mm (1.38 inches)

79.2 mm (3.12 inches)

102.9 mm (4.05 inches)

127 mm (5.00 inches)
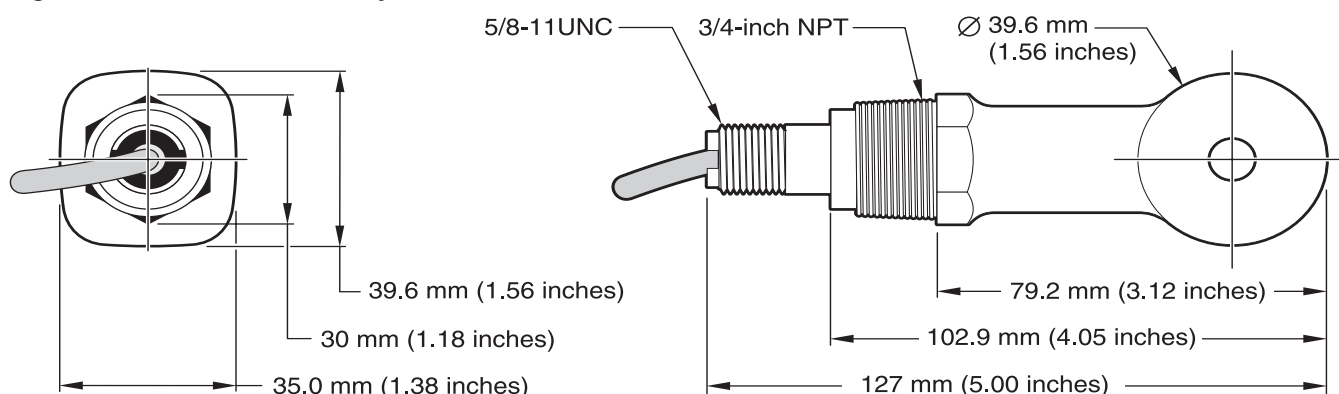
2.3 The Digital Gateway

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.

2.4 Theory of Operation

Inductive conductivity measurements are made by passing an AC current through a toroidal drive coil which induces a current in the electrolyte solution. This induced solution current produces a current in a second toroidal coil. The amount of current induced in the second coil is proportional to the solution conductivity.

The major advantage of toroidal conductivity is that the coils are not in contact with the solution. Because the coils are isolated from the solution, oils and other contaminants in moderate amounts do not interfere with the measurement. In addition, the coil housing can be chosen to withstand corrosive environments which would quickly corrode traditional sensors with metal electrodes.

Section 3   Installation

DANGER

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

The 3700sc Digital Conductivity Sensor can be used with any sc controller. Refer to the controller manual for installation instructions.

The sc sensor should be wired to the digital gateway before connecting it to the sc 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

DANGER

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

1. Route the cable from the sensor through the strain relief in the digital gateway then properly terminate the wire ends (see Figure 3).

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 Table 3 and Figure 3.

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.

Figure 3   Wiring and Assembling the Digital Gateway
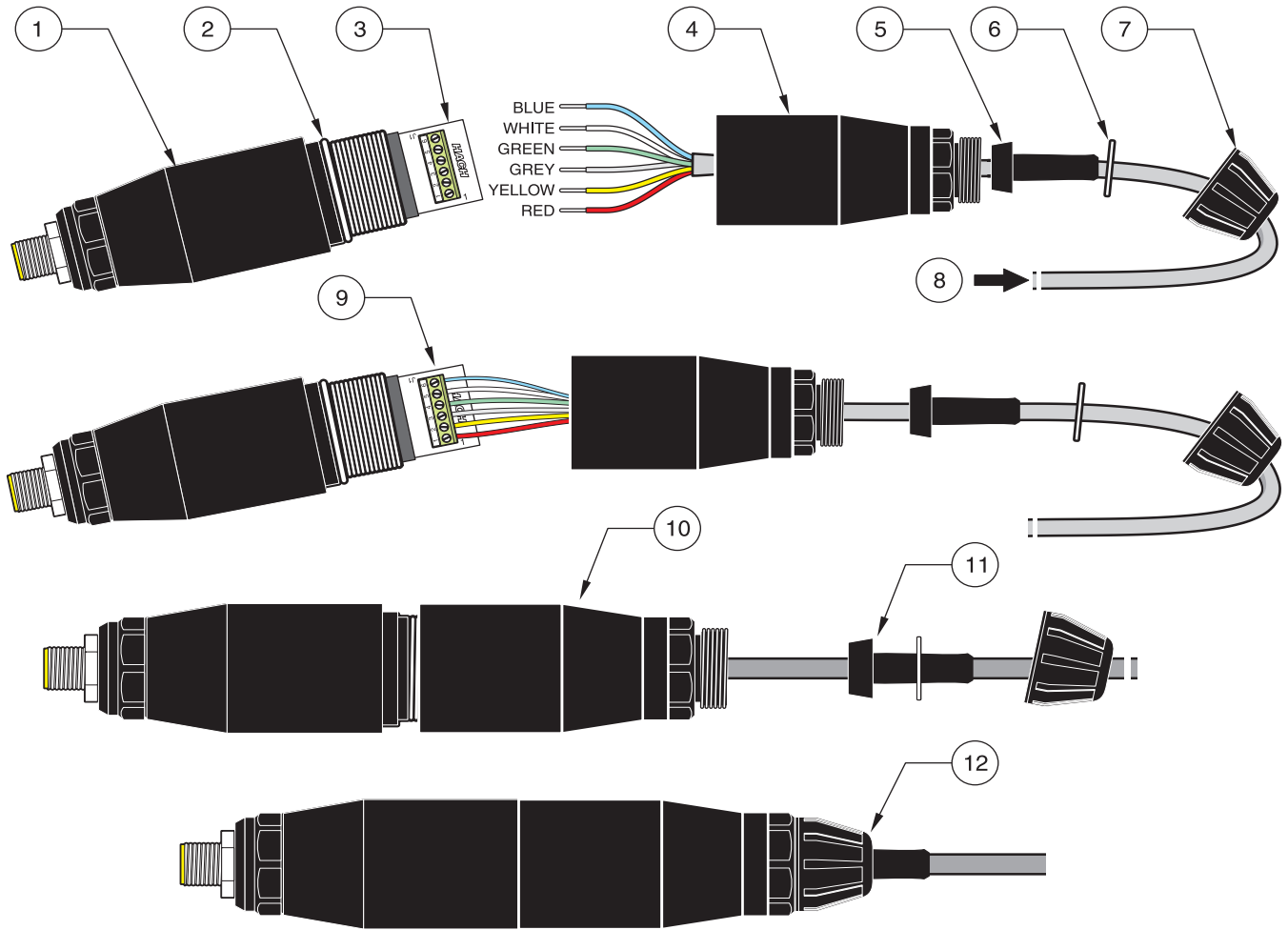
1.	Digital gateway front	**7.**	Nut, strain relief
2.	O-ring	**8.**	From sensor
3.	Sensor wire connector	**9.**	Insert wires into the connector according to Table 3. Use the included 2-mm screwdriver (Cat. No. 6134300) to secure connections.
4.	Digital gateway back	**10.**	Screw back of digital gateway 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.

Table 3 Wiring the Digital Gateway

Sensor (wire color)	Sensor Signal	Digital Gateway Sensor Wire connector
Red	Temp +	1
Yellow	Temp –	2
Shield (grey)	Shield	3
Green	Sense	4
White	Drive +	5
Blue	Drive –	6

3.2 Connecting Digital Gateway to the sc Controller

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

3.2.1 Attaching a sc Sensor with a Quick-connect Fitting

The sensor cable is supplied with a keyed quick-connect fitting for easy attachment to the controller (see Figure 4: Attaching the Sensor using the Quick-connect Fitting). 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 4:   **Attaching the Sensor using the Quick-connect Fitting**
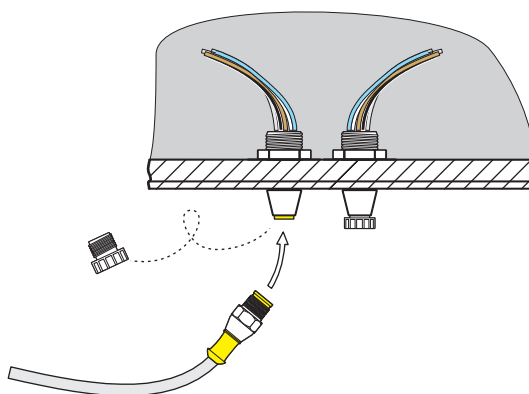
Figure 5   **Quick-connect Fitting pin assignment**
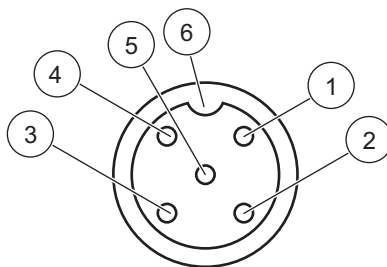
Number	Designation	Wire Color
1	+12 VDC	Brown
2	Circuit Common	Black
3	Data (+)	Blue
4	Data (−)	White
5	Shield	Shield (grey wire in existing quick-disconnect fitting)
6	Groove	

Table 4 Wiring the Sensor at Terminal Block J5

Terminal Number	Terminal Designation	Wire Color
1	Data (+)	Blue
2	Data (−)	White
3	Service Request	No Connection
4	+12 V dc	Brown
5	Circuit Common	Black
6	Shield	Shield (grey wire in existing quick disconnect fitting)

3.3 Mounting the Digital Gateway

The digital gateway is supplied with a mounting clip for mounting to a wall or other flat surface. Digital gateway dimensions are shown in Figure 6. Use an appropriate fastener to secure it to the wall. 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. See Figure 7.

Figure 6   Digital Gateway Dimensions

Ø 34.29 mm
(1.35 inches)

184.15 mm (7.25 inches)
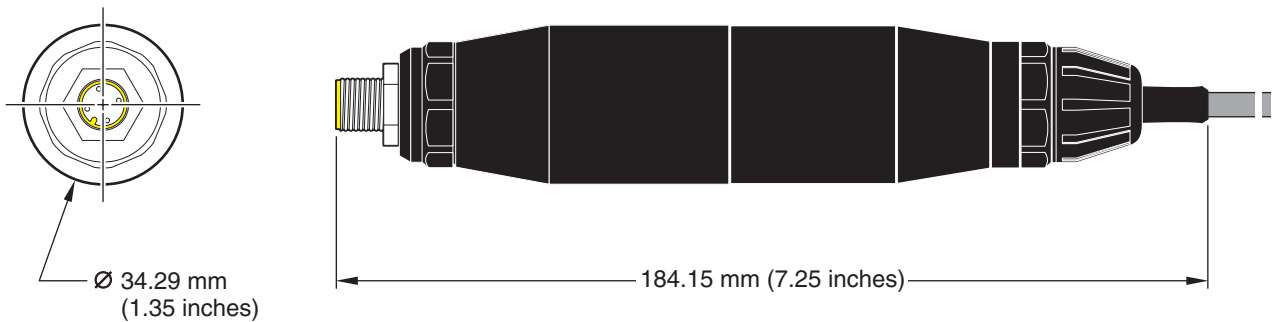
Figure 7   Mounting the Digital Gateway

56.1 mm
(2.21 inches)

40.6 mm (1.60 inches)

21.1 mm (0.83 inches)
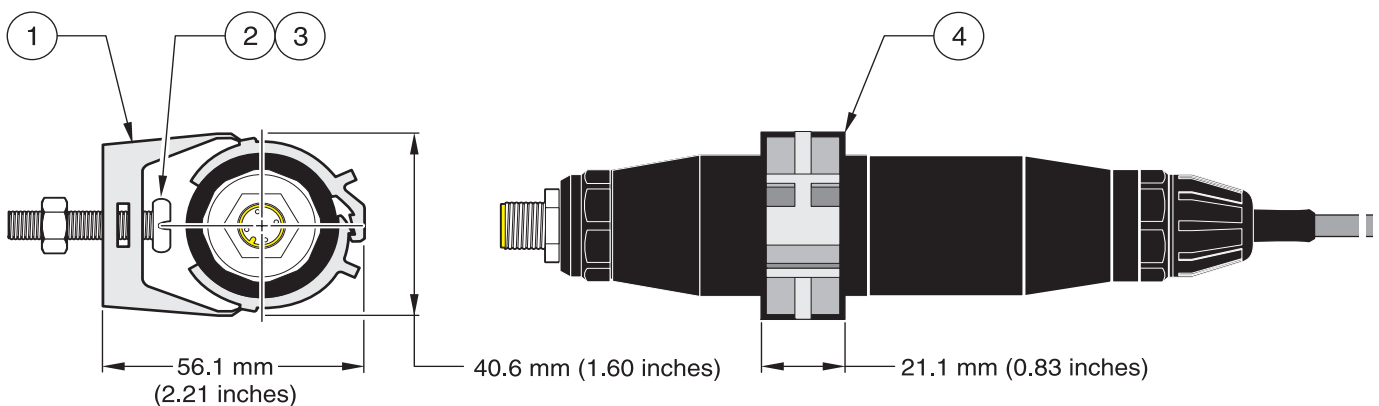
1.	Mounting clip	**3.**	Hex nut, ¼-28
2.	Screw, pan head, ¼-28 x 1.25-in.es	**4.**	Mount clip, insert digital gateway, squeeze clip closed

3.4 Installing the Sensor in the Sample Stream

Locate the sensor as close a possible to the instrument. The convertible style sensor may be immersion mounted by threading it onto the end of a pipe of an appropriate length. It may also be mounted in any standard 2-in. NPT pipe tee, weldolet, or pipe saddle using the special union mount adapter. In addition, the sensor may be installed in a ball valve in a pressurized or non-pressurized process pipe/vessel.

The sanitary-style sensor may be clamp-mounted for clean-in-place applications using a sanitary clamp-type tee or ferrule and a heavy-duty clamp.

Examples of common sensor installations are shown in Figure 8 and dimension drawings are shown in Figure 1 and Figure 2 on page 8. Refer to the instructions supplied with the mounting hardware for installation specifics.

Figure 8   Sensor Installation Examples
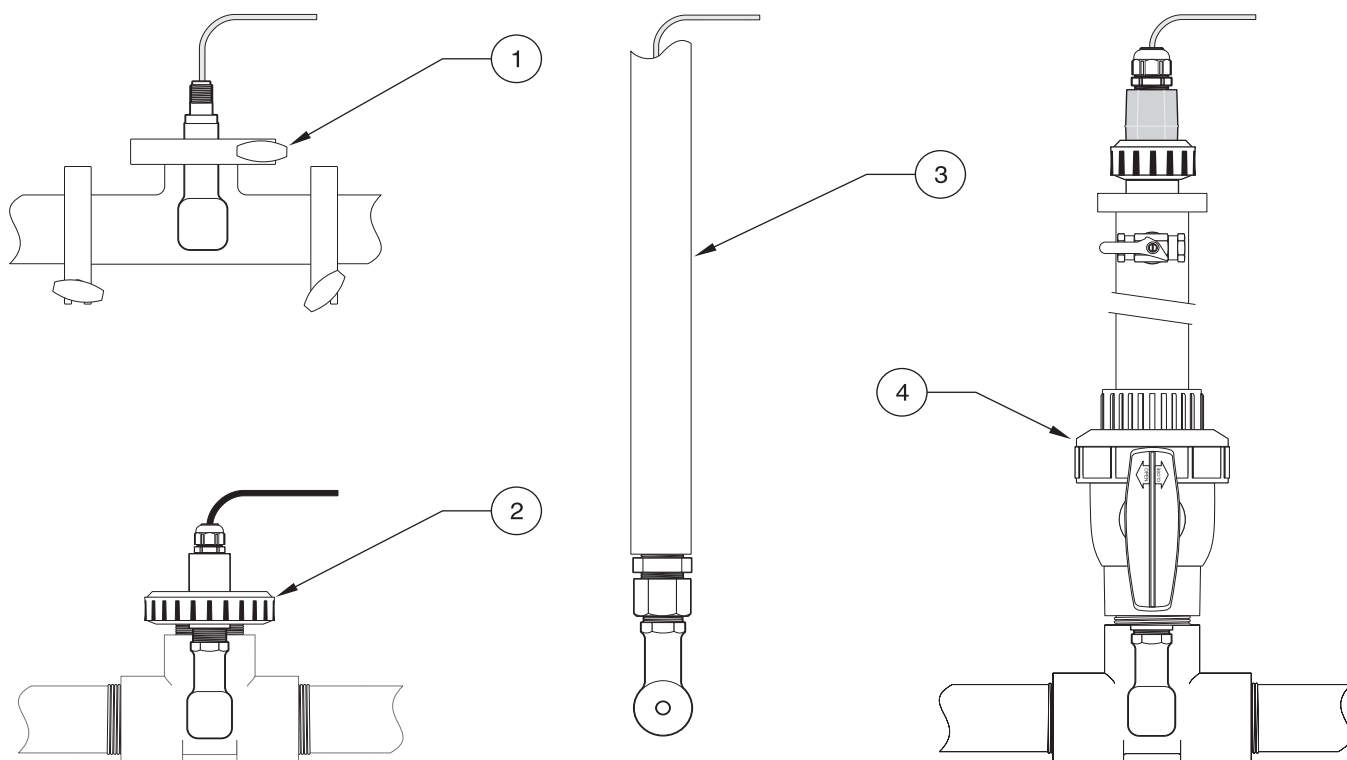
1.	Sanitary-style sensor sanitary clamp mounting	**3.**	Convertible-style sensor immersion mounting
2.	Convertible-style sensor union mounting	**4.**	Convertible-style sensor ball valve mounting

Section 4   Operation

4.1   Using the sc Controller

Before using the sensor in combination with an 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 the Main Menu.

2. From the Main Menu, select SENSOR SETUP and confirm.

3. Select 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 Status Menu

SELECT SENSOR
ERROR LIST—See section 6.1 on page 25.
WARNING LIST—See section 6.2 on page 25.

4.5   Sensor Setup Menu

CALIBRATE
SELECT SENSOR (if more than one sensor is attached)
ZERO
Perform a zero cal to remove sensor offset.
SAMPLE CAL
Perform a single point calibration.
COND CAL
After setting the reference temperature and slope, conduct a single-point calibration of the conductivity sensor.
TEMP ADJUST
Adjust the displayed temperature by up to ±15 °C.
DEFAULT SETUP

4.5   Sensor Setup Menu (continued)

Resets all user-editable options to their factory-defaults.

CONFIGURE

EDIT NAME
Enter a 10-digit name in any combination of symbols and alpha or numeric characters.

SELECT MEASURE
Choose from Conductivity, Concentration, TDS, or Salinity. If Concentration is selected, the option to configure the concentration settings is offered. Press the down arrow to Config Conc. Two concentration types are offered: Built-in and User Defined. The Built-in menu offers an array of chemicals and concentrations to choose from.

COND UNITS
Choose from the displayed units (dependent on the parameter selected in the Select Measure menu)

TEMP UNITS
Select Celsius or Fahrenheit.

T–COMPENSATION
The factory default for temperature compensation is linear with a 2.00% per °C slope and a 25 °C reference temperature. The default settings are appropriate for most aqueous solutions. The menu options are different depending on the measurement that is selected in the Configure>Select Measure menu. The options are as follows: NONE: No temperature compensation. LINEAR: Recommended for most applications. Press **ENTER** to change the slope or reference temperature. NATURAL WATER: Contact Technical Consulting Services for application specific information and assistance. TEMP TABLE: Use to configure a temperature compensation table by entering up to 10 x-axis values and 10 y-axis values. See section 4.8.1 on page 21 to enter values. Contact Technical Consulting Services for additional information and assistance.

LOG SETUP
Choose from Sensor Interval or Temp Interval. If the interval is enabled, choose from the displayed options to specify the frequency to log the sensor or temperature reading. Default is Disabled.

AC FREQUENCY
Select 50 Hertz or 60 Hertz to specify the frequency to be excluded.

FILTER
Average the measurement over time by entering a number between 0–60. Default is 0 seconds.

TEMP ELEMENT
Select the temperature element type (100PT, 1000PT (default), or manual) then choose Select Factor to enter the specific "T" Factor supplied with the sensor.

CAL DAYS
Number of days since the last calibration. Default notification at 60 days.

SENSOR DAYS
Number of days the sensor has been in operation. Default notification at 365 days.

DEFAULT SETUP
Reset the configure settings to the factory defaults.

4.5   Sensor Setup Menu (continued)

DIAG/TEST
PROBE INFO
Display the entered name of the sensor, the sensor serial number, the software version number, and the sensor driver version number.
CAL DATA
Displays the current offset correction and the date of the last calibration.
SIGNALS
SENSOR SIGNAL allows the user to set the sensor range and display the sensor ADC counts and TEMP ADC COUNTS shows raw data for temperature ADC counts. Comparable to A/D counts.
COUNTERS
SENSOR DAYS displays the cumulative days the sensor has been in use and RESET SENSOR allows the sensor counter to be reset to zero.

4.6   Pressure and Elevation

Note: If the barometric pressure from Table 5 is entered in the meter, the altitude entered in combination with this value must be 0 feet.

Table 5 can be used to estimate the true barometric pressure at certain elevations. The correspondence is based on the assumption that at sea level the barometric pressure is 760 mm Hg. After determining the barometric pressure from the table or obtaining it from a local weather service, enter this value into the instrument.

Table 5 Elevation Barometric Pressure

Elevation in feet	Barometric pressure in mm Hg	Elevation in feet	Barometric pressure in mm Hg
0	760	6000	613
500	746	6500	601
1000	733	7000	590
1500	720	7500	579
2000	708	8000	568
2500	695	8500	559
3000	683	9000	548
3500	671	9500	538
4000	659	10000	527
4500	647	10500	517
5000	635	11000	506
5500	624	—	—

4.7 Calibration

Calibration Methods When Measuring Conductivity:

- **Sample Cal Method:** Enter the known conductivity value of the sample determined by laboratory analysis or a comparison reading.

- **Conductivity Cal Method:** Enter the known conductivity value of calibration solution, and its linear % per °C and reference temperature values.

- **Zero Cal Method**: Enter the zero value (in air).

Calibration Methods When Measuring Percent Concentration:

- **Process Cal (Conc) Method:** Enter the known % concentration value of calibration solution (ideally, process solution)

- **Conductivity Cal Method:** Enter the known conductivity value of calibration solution, and its linear % per °C and reference temperature values.

- **Sample Cal Method:** Enter the known % concentration value of the sample determined by laboratory analysis or a comparison reading.

Calibration Methods When Measuring TDS

- **Process Cal (ppm) Method:** Enter the known TDS ppm value of calibration solution (ideally, process solution)

- **Conductivity Cal Method:** Enter the known conductivity value of calibration solution, and its linear % per °C and reference temperature values.

- **Sample Cal Method:** Enter the known TDS ppm value of the sample determined by laboratory analysis or a comparison reading.

4.7.1 Preparing a Conductivity Reference Solution

Add the listed grams of pure, dried NaCl to one liter of high-purity, deionized, CO_2-free water that is at a temperature of 25 °C.

Table 6 Conductivity Reference Solutions

Desired Solution Value			Grams NaCl To Be Added
µS/cm	mS/cm	ppm (NaCl)*	
200	0.20	100	0.1
500	0.5	250	0.25
1000	01.00	500	0.50
2000	2.00	1010	1.01
3000	3.00	1530	1.53
4000	4.00	2060	2.06
5000	5.00	2610	2.61
8000	8.00	4340	4.34
10,000	10.00	5560	5.56
20,000	20.00	11,590	11.59
50,000	50.00	31,950	31.95
100,000	100.00	72,710	72.71

4.7.2 Zero Cal

A zero cal will mask interferences when mounting configurations are too close to objects (including the pipe when mounted in-line) in the sample or sample stream.

1. From the Main Menu, select SENSOR SETUP and confirm.

2. Highlight the appropriate sensor if more than one sensor is attached and confirm.

3. Select CALIBRATE and confirm.

4. Select ZERO. Select the available Output Mode (Active, Hold, or Transfer) from the list box and confirm.

5. Move the sensor to air and confirm to continue.

6. The zero calibration procedure will begin and "Wait to Stabilize" will be displayed. The current value and temperature will be displayed. Confirm.

7. Return the sensor to the process.

4.7.3 Sample Cal

1. From the Main Menu, select SENSOR SETUP and confirm.

2. Highlight the appropriate sensor if more than one sensor is attached and confirm.

3. Select CALIBRATE and confirm.

4. Select SAMPLE CAL. Select the available Output Mode (Active, Hold, or Transfer) from the list box and confirm.

5. Move the probe to sample and confirm to continue.

6. Confirm when stable. A Sample Cal complete and the slope will be displayed.

7. Return the sensor to the process.

4.7.4 Cond Cal

1. From the Main Menu, select SENSOR SETUP and confirm.

2. Highlight the appropriate sensor if more than one sensor is attached and confirm.

3. Select CALIBRATE and confirm.

4. Select COND CAL. Select the available Output Mode (Active, Hold, or Transfer) from the list box and confirm.

5. Select SET REF TEMP and confirm.

6. Select SET SLOPE and confirm.

7. Move the probe to the solution and confirm to continue.

8. Confirm when stable. A CAL Complete will be displayed and confirm.

9. Return the sensor to process.

4.7.5 Concurrent Calibration of Two Sensors

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 and the reading for both sensors will be flashing.

3. Begin the calibration for the second sensor and continue until "Wait to Stabilize" is displayed.

4. Select LEAVE. The display will return to the Main Measurement screen and the reading for both sensors will be flashing. The calibration for both sensors are now running in the background.

5. To return to the calibration of either sensor select the Main Menu. Select Sensor Setup and confirm. Select the appropriate sensor and confirm.

6. The calibration in progress will be displayed. Continue with the calibration.

4.8 Temperature Compensation

The factory default for temperature compensation is linear with a 2.00% per °C slope and a 25 °C reference temperature.

Change the type of sensor compensation by choosing Select Type. The available types are as follows:

- NONE: No temperature compensation is applied.

- LINEAR: Recommended for most applications. Choose Config Linear and confirm to access the menus for changing the slope or reference temperature.

- NATURAL WATER: Not available for TDS.

- TEMP TABLE: Use to configure a temperature compensation table by entering up to 10 x-axis parameters and 10 y-axis parameters.

4.8.1 Entering Values into the Temperature Compensation Table

1. From the Main Menu, select SENSOR SETUP and confirm.

2. Highlight the appropriate sensor if more than one sensor is attached and confirm.

3. Select CONFIGURE and confirm.

4. Select T-COMPENSATION and confirm.

5. Select SELECT TYPE and confirm.

6. Select TEMP TABLE and confirm.

7. Select CONFIG TABLE and confirm.

8. Confirm again to edit the points.

4.8.2 Entering Values into the Configuring Concentration Table

If Concentration has been selected in the Select Measure menu, the user may choose to enter values into the user defined table as follows:

1. From the Main Menu, select SENSOR SETUP and confirm.

2. Highlight the appropriate sensor if more than one sensor is attached and confirm.

3. Select SELECT MEASURE and change to Conc and confirm.

4. Select CONFIG CONC and confirm.

5. Select SELECT TYPE. Select USER DEFINED or BUILT-IN and confirm.

If USER DEFINED is selected:

   a. Select CONFIG TABLE and confirm.

   b. Confirm again to edit the points.

If BUILT-IN is selected:

   a. Choose from the list of built-in tables.

4.8.3 Entering Values into the Configuring TDS Table

If TDS has been selected in the Select Measure menu, the user may choose to enter values into the user defined table as follows:

1. From the Main Menu, select SENSOR SETUP and confirm.

2. Highlight the appropriate sensor if more than one sensor is attached and confirm.

3. Select SELECT MEASURE and change to Conc and confirm.

4. Select CONFIG TDS and confirm.

5. Select SELECT FACTOR and confirm.

6. Choose NaCl or USER DEFINED. If NaCl is selected, not other configuration is necessary.

If USER DEFINED is selected:

   a. Select SET FACTOR and confirm.

   b. Enter the value.

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
Clean the sensor[1]	x
Inspect sensor for damage	x
Calibrate Sensor (if required by regulatory agency)	**Per the schedule mandated by your regulatory agency.**

[1] Cleaning frequency is application dependent. More or less frequent cleaning will be appropriate in some applications.

5.2 Cleaning the Sensor

Clean the exterior of the sensor with a stream of clean water. If debris remains, use a wet cloth or brush.

Section 6   Troubleshooting

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
- Loss of communication

Highlight the Sensor Diag menu and confirm. Highlight Errors and confirm to determine the cause of the error. Errors are defined in Table 7.

Table 7 Error Codes

Displayed Error	Definition	Resolution
ADC FAILURE	A/D conversion failed	Contact customer service.

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 confirm 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. Errors are defined in Table 8.

Table 8 Warning Codes

Displayed Warning	Definition	Resolution
PROBE OUT RANGE	No probe connected or measurement reading is out of range.	Verify the solution concentration and ensure that the sensor in use has the correct measurement range.
TEMP OUT RANGE	No temperature element connected or temperature reading is out of range.	Verify that the solution temperature is between –20 to 200 °C.
FLASH FAILURE	Cannot write flash memory.	Contact customer service.
CAL REQUIRED	Past the calibration days since last cal date.	Calibrate system.
REPLACE SENSOR	Past the total days of current sensor in use. New sensor may need to be installed.	Inspect sensor. If physically damaged or malfunctioning, replace the sensor. Otherwise, reset timer and allow sensor to remain in operation.

Section 7   Replacement Parts and Accessories

7.1 Replacement Items, Accessories, and Reagent and Standards

Item	Quantity	Catalog Number
Cable, sensor extension, 0,35 m	each	LZX847
Cable, sensor extension, 1 m	each	6122400
Cable, sensor extension, 5 m	each	LZX848
Cable, sensor extension, 10 m	each	LZX849
Cable, sensor extension, 15 m	each	LZX850
Cable, sensor extension, 20 m	each	LZX851
Cable, sensor extension, 30 m	each	LZX852
Cable, sensor extension, 50 m	each	LZX853
Conductivity Reference Solution, 100–1000 µs/cm	1L	25M3A2000-119
Conductivity Reference Solution, 1000–2000 µs/cm	1L	25M3A2050-119
Conductivity Reference Solution, 2000–150,000 µs/cm	1L	25M3A2100-119
Conductivity Reference Solution, 200,000–300,000 µs/cm	1L	25M3A2200-119
Digital Gateway for Inductive Conductivity	each	61208-00
Instruction manual, Inductive Conductivity System, English	each	DOC023.52.00022

Replacement Parts and Accessories

Section 8   Warranty, liability and complaints

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

Hach Co. certifies this instrument was tested thoroughly, inspected and found to meet its published specifications when it was shipped from the factory.

The **Model sc100 Controller/sc1000 Controller with the Inductive Conductivity Sensor** has been tested and is certified as indicated to the following instrumentation standards:

Product Safety

UL 61010A-1 (ETL Listing # 65454)
CSA C22.2 No. 1010.1 (ETLc Certification # 65454)
Certified by Hach Co. to EN 61010-1 Amds. 1 & 2 (IEC1010-1) per 73/23/EEC, supporting test records by Intertek Testing Services.

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

Section 9   Contact

HACH LANGE GmbH

Willstätterstraße 11
D-40549 Düsseldorf
Tel. +49 (0) 211- 52 88 - 0
Fax +49 (0) 211- 52 88 - 143
info@hach-lange.de
www.hach-lange.de

HACH LANGE LTD
Pacific Way
Salford
Manchester, M50 1DL
Tel. +44 (0)161 8 72 14 87
Fax +44 (0)161 8 48 73 24
info@hach-lange.co.uk
www.hach-lange.co.uk

**HACH LANGE
HACH SAS**
33, Rue du Ballon
F-93165 Noisy Le Grand
Tél. +33 (0)1 48 15 68 70
Fax +33 (0)1 48 15 80 00
info@hach-lange.fr
www.hach-lange.fr

**DR. BRUNO LANGE
GES. MBH**
Industriestraße 12
A-3200 Obergrafendorf
Tel. +43 (0) 2747 - 74 12
Fax +43 (0) 2747 - 42 18
info@hach-lange.at
www.hach-lange.de

DR. BRUNO LANGE AG

Juchstrasse 1
CH-8604 Hegnau
Tel. +41 (0)44- 9 45 66 10
Fax +41 (0)44- 9 45 66 76
info@hach-lange.ch
www.hach-lange.ch

HACH LANGE SA

Motstraat 54
B-2800 Mechelen
Tél. +32 (0)15 42 35 00
Fax +32 (0)15 41 61 20
info@hach-lange.be
www.hach-lange.be

DR. LANGE NEDERLAND B.V.
Laan van Westroijen 2a
NL-4003 AZ Tiel
Tel. +31(0)3 44 63 11 30
Fax +31(0)3 44 63 11 50
info@hach-lange.nl
www.hach-lange.nl

HACH LANGE AB
Vinthundsvägen159A
SE-128 62 SKÖNDAL
Tel. +46 (0)8 7 98 05 00
Fax +46 (0)8 7 98 05 30
info@hach-lange.se
www.hach-lange.se

HACH LANGE A/S
Åkandevej 21
DK-2700 Brønshøj
Tel. +45 36 77 29 11
Fax +45 36 77 49 11
info@hach-lange.dk
www.hach-lange.dk

HACH LANGE S.L.U.
C/Araba 45, Apdo. 220
E-20800 Zarautz/Guipúzcoa
Tel. +34 9 43 89 43 79
Fax +34 9 43 13 02 41
info@hach-lange.es
www.hach-lange.es

HACH LANGE SP.ZO.O.
ul. Opolska 143 a
PL-52-013 Wroclaw
Tel. +48 71 3 42 10-81
Fax +48 71 3 42 10-79
info@hach-lange.pl
www.hach-lange.pl

HACH LANGE S.R.L.
Via Riccione, 14
I-20156 Milano
Tel. +39 02 39 23 14-1
Fax +39 02 39 23 14-39
info@hach-lange.it
www.hach-lange.it

HACH LANGE S.R.O.
Lešanská 2a/1176
CZ-141 00 Praha 4
Tel. +420 272 12 45 45
Fax +420 272 12 45 46
info@hach-lange.cz
www.hach-lange.cz

HACH LANGE S.R.O.
Sabinovská 10
SK-821 02 Bratislava
Tel. +421 2 4820 9091
Fax +421 2 4820 9093
info@hach-lange.sk
www.hach-lange.sk

HACH LANGE LDA
Rua dos Malhões,
Edif. D. Pedro I
P-2770-071 Paço D'Arcos
Tel. +351 210 00 1750
Fax +351 210 00 8140
info@hach-lange.pt
www.hach-lange.pt

Appendix A Modbus Register Information

Table 9 Sensor Modbus Registers

Group Name	Tag Name	Register #	Data Type	Length	R/W	Description
Tags	SensorMeasTag	40001	Integer	1	R	Sensor Measurement Tag
Measurements	DOMeas	40002	Float	2	R	DO 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	TempUnits	40015	Integer	1	R/W	Temperature Units—C or F
Configuration	Filter	40016	Integer	1	R/W	Sensor Filter
Configuration	TempElementType	40017	Integer	1	R/W	Temperature Element Type
Tags	TempUserValueTag	40018	Integer	1	R	Temperature User Value Tag
Configuration	TempUserDegCValue	40019	Float	2	R/W	Temperature User Value
Configuration	PressureUnits	40021	Integer	1	R/W	Pressure Units
Configuration	SalinityUnits	40022	Integer	1	R/W	Salinity Units
Tags	PressureTag	40023	Integer	1	R	Pressure Tag
Configuration	Pressure	40024	Float	2	R/W	Pressure
Tags	SalinityTag	40026	Integer	1	R	Salinity Units
Configuration	Salinity	40027	Float	2	R/W	Salinity
Configuration	MeasUnits	40029	Integer	1	R/W	Measurement Units
Calibration	OutputMode	40030	Integer	1	R/W	Output Mode
Calibration	CalLeave	40031	Integer	1	R/W	Cal Leave Mode
Calibration	CalAbort	40032	Integer	1	R/W	Cal Abort Mode
Tags	CalEditValueTag	40033	Integer	1	R	Cal Edit Value Tag
Calibration	CalEditDOValue	40034	Float	2	R/W	Cal Edit Value
Diagnostics	SoftwareVersion	40036	String	6	R	Software Version
Diagnostics	SerialNumber	40042	String	6	R	Serial Number
Diagnostics	CalQValue	40048	Float	2	R	DO Cal Q Value
Calibration	CalCode	40050	Integer	1	R	Cal Code
Configuration	SensorLogInterval	40051	Integer	1	R/W	Sensor Data Log Interval
Configuration	TempLogInterval	40052	Integer	1	R/W	Temperature Data Log Interval
Diagnostics	DOmV	40053	Float	2	R	DO mV
Diagnostics	ProdDate	40055	Date	2	R/W	Production Date
Diagnostics	LastCalDate	40057	Date	2	R	Last Calibration Date
Diagnostics	SensorDays	40059	Integer	1	R	Sensor Run\ning Days
Configuration	RejectFrequency	40060	Integer	1	R/W	Reject Frequency
Diagnostics	DeviceDriver	40061	String	5	R	Device Driver
Configuration	CalWarningDays	40066	Integer	1	R/W	Calibration Warning Days
Configuration	SensorWarningDays	40067	Integer	1	R/W	Sensor Warning Days
Tags	SensorMeasTag	40001	Integer	1	R	Sensor Measurement Tag
Measurements	DOMeas	40002	Float	2	R	DO Measurement
Tags	TempMeasTag	40004	Integer	1	R	Temperature Measurement Tag

<div align="center">**Table 9 Sensor Modbus Registers (continued)**</div>

Group Name	Tag Name	Register #	Data Type	Length	R/W	Description
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	TempUnits	40015	Integer	1	R/W	Temperature Units—C or F
Configuration	Filter	40016	Integer	1	R/W	Sensor Filter
Configuration	TempElementType	40017	Integer	1	R/W	Temperature Element Type
Tags	TempUserValueTag	40018	Integer	1	R	Temperature User Value Tag
Configuration	TempUserDegCValue	40019	Float	2	R/W	Temperature User Value
Configuration	PressureUnits	40021	Integer	1	R/W	Pressure Units
Configuration	SalinityUnits	40022	Integer	1	R/W	Salinity Units
Tags	PressureTag	40023	Integer	1	R	Pressure Tag
Configuration	Pressure	40024	Float	2	R/W	Pressure
Tags	SalinityTag	40026	Integer	1	R	Salinity Units
Configuration	Salinity	40027	Float	2	R/W	Salinity
Configuration	MeasUnits	40029	Integer	1	R/W	Measurement Units
Calibration	OutputMode	40030	Integer	1	R/W	Output Mode
Calibration	CalLeave	40031	Integer	1	R/W	Cal Leave Mode
Calibration	CalAbort	40032	Integer	1	R/W	Cal Abort Mode
Tags	CalEditValueTag	40033	Integer	1	R	Cal Edit Value Tag
Calibration	CalEditDOValue	40034	Float	2	R/W	Cal Edit Value
Diagnostics	SoftwareVersion	40036	String	6	R	Software Version
Diagnostics	SerialNumber	40042	String	6	R	Serial Number
Diagnostics	CalQValue	40048	Float	2	R	DO Cal Q Value
Calibration	CalCode	40050	Integer	1	R	Cal Code
Configuration	SensorLogInterval	40051	Integer	1	R/W	Sensor Data Log Interval
Configuration	TempLogInterval	40052	Integer	1	R/W	Temperature Data Log Interval
Diagnostics	DOmV	40053	Float	2	R	DO mV
Diagnostics	ProdDate	40055	Date	2	R/W	Production Date
Diagnostics	LastCalDate	40057	Date	2	R	Last Calibration Date
Diagnostics	SensorDays	40059	Integer	1	R	Sensor Run\ning Days
Configuration	RejectFrequency	40060	Integer	1	R/W	Reject Frequency
Diagnostics	DeviceDriver	40061	String	5	R	Device Driver
Configuration	CalWarningDays	40066	Integer	1	R/W	Calibration Warning Days
Configuration	SensorWarningDays	40067	Integer	1	R/W	Sensor Warning Days
Tags	SensorMeasTag	40001	Integer	1	R	Sensor Measurement Tag
Measurements	DOMeas	40002	Float	2	R	DO Measurement

Index

Index