

Process Instrumentation: Process Instruments

Process Instruments



*American Recovery and
Reinvestment Act (ARRA)
For additional information,
visit: www.hach.com/arra*

See Inside!

Many new products, including:

- **NEW!** Reagentless Free and Total Chlorine Sensors, see page 405.
- **NEW!** Dissolved Oxygen Sensor for Power Plants, see page 413.
- **NEW!** Real-time Analysis of Distribution Water, see page 419.
- **NEW!** Continuous Oil-In-Water Monitoring, see page 431.
- **NEW!** Ozone Sensor for Bottled Water, see page 435.
- **NEW!** Suspended Solids Measurement for All Applications, see page 455.
- **NEW!** Low-Maintenance Online TOC Monitoring in Difficult Samples, see page 458.



Be Right™

Alkalinity: APA 6000™ Analyzer

Reliable, accurate, continuous measurement of alkalinity.



- Completely automated—analyzer auto-calibrates; set-and-forget operation frees time for other tasks
- Reduced sample volume minimizes reagent use and allows instrument to run up to 30 days in clean water applications before maintenance and reagent replenishment
- Constant protection—fast, accurate response minimizes process excursions
- Accurate alkalinity determinations to 500 mg/L as CaCO₃
- Readout selectable as total or phenolphthalein
- Two-stream operation—optionally monitor two separate sample streams; the system completes one measurement every eight minutes (requires sample sequencing kit)

Alkalinity, a measure of a sample's acid neutralizing capacity, is an important factor in a wide variety of applications, from drinking water and beverages to boiler/cooling water and wastewater treatment, as well as many types of manufacturing and chemical production. Hach's APA 6000 Alkalinity Process Analyzer provides accurate, continuous monitoring of alkalinity, allowing precise control of your process.

Primary Applications

- Drinking Water
- Wastewater
- Pure Water/Power
- Industrial Water
- Food and Beverage

Specifications*

Range 1 to 500 mg/L as CaCO ₃ total alkalinity; 5 to 250 mg/L as CaCO ₃ phenolphthalein alkalinity	Case NEMA-4X(indoor)/IEC 529 (IP66) with provision for air purge. Reagent enclosure is drip-proof
Accuracy Better than ± 5% of reading or ± 1.0 mg/L, whichever is greater	Drain Gravity, air break or vent recommended
Repeatability Better than 3% of reading or ± 0.6 mg/L, whichever is greater	Sample Flow Rate 100-2000 mL/min maximum
Response Time Less than 10 minutes for 90% response to setup change at instrument sample fitting	Sample Filter Inlet 1/4" OD NPT male or female
Cycle Time 8 minutes	Sample Pressure 0.03-2.04 bar (0.5 to 30 psi)
Calibration Cycle 60 minutes	Drain Fitting 1/4" OD NPT barbed hose fitting
Sample Temperature Range 5 to 50 °C	Certification NRTL certified to UL and CSA standards and CE approved
Analog Output Two 4-20 mA outputs suitable for recorders or PID control. Output span programmable over any portion of the 1 to 500 mg/L range (130 Vac isolation from earth ground)	Dimensions 522 x 627 x 526 mm (21 x 25 x 21")
Relay Outputs Two SPDT relays with contacts rated for 5A resistive load at 230 Vac. Additional relays available through optional Signal Output Module.	Data Communications Distance Maximum node-to-node distance is 400 m (1312'). Maximum total wire length is 500 m (1640')
Power Requirements 95-240 V, 50/60 Hz ± 2 Hz	Mounting Wall, bench and panel
	Weight 25.5 kg (56 lbs)

**Subject to change without notice.*

Each analyzer includes an installation kit, one month's supply of reagents, a maintenance kit, a sample conditioning kit, an illustrated manual, and a quick reference card. Power cords must be ordered separately.

Prod. No.	Description
5100010	APA 6000 Alkalinity Analyzer with built-in AquaTrend®

ACCESSORIES

6001000	Alkalinity Reagent Set
6001100	Alkalinity Standards Set
<i>NOTE: both sets are required for operation.</i>	
5133900	APA 6000 Micro Filter System, 115 V
5133901	APA 6000 Micro Filter System, 230 V
4630600	Power cord kit, 120 Vac
4630800	Power cord kit, 240 Vac
6200900	Sample Sequencing Kit



For more information, visit www.hach.com

See page 132 for reagents, test kits, and accessories measuring alkalinity in the lab or field.



Ammonia: APA 6000™ Analyzer

Accurate low-range ammonia readings.

- Auto calibration, priming and cleaning
- Minimal sample, reagent and standard consumption
- Graphical or numerical display of data/trends

Less Maintenance, More Value.

Outstanding accuracy, quick response, and reliable performance make the APA 6000 the ideal choice for applications requiring precise control of treatment processes. Featuring a compact, space-saving design, the analyzer automatically primes, cleans, and calibrates critical components without operator intervention. Easy to install and easy to maintain, these rugged analyzers include a controlled reagent dispersion system that decreases sample size, reduces reagent consumption, and minimizes waste disposal.

Each analyzer includes an installation kit, one month's supply of reagents, a maintenance kit, a sample conditioning kit, an illustrated manual, and a quick reference card. Power cords must be ordered separately.

Prod. No.	Description
5501710	APA 6000 Low Range Ammonia Analyzer 0.02 to 2.0 mg/L, with built-in AquaTrend®

ACCESSORIES

6001400	Ammonia Reagent Set
6001500	Ammonia Standards Set
<i>NOTE: both sets are required for operation.</i>	
5133900	APA 6000 Micro Filter System, 115 V
5133901	APA 6000 Micro Filter System, 230 V
4630600	Power cord kit, 120 Vac
4630800	Power cord kit, 240 Vac
6200900	Sample Sequencing Kit



For more information, call to request Literature #3953, or visit www.hach.com



Process Instruments

Primary Applications

- Drinking Water
- Wastewater
- Industrial Water

Specifications*

Range

0.02 to 2.0 NH₃ as N

Data Storage

Stores up to 30 days of data in AquaTrend® Interface

Calibration Cycle

Set up to automatically calibrate daily; user-defined schedule available

Sample Temperature Range

5 to 50°C

Relay Output

2 relays, SPDT, unpowered

Recorder/Controller Output

Two built-in 4 to 20 mA outputs; output span programmable over any portion of the analyzer's range

Alarms

14 programmable

Recorders

14 programmable

PID Control

Includes 4 user-defined PID control loops

Sample Requirements

Optionally capable of analyzing up to two sample streams (requires sample sequencing kit)

**Subject to change without notice.*

Ammonia/Monochloramine: APA 6000™ Analyzer

See Monochloramine on page 428.

See pages 134-135 for reagents, test kits, and accessories for measuring ammonia in the lab or field.

Find it here... Buy it today on www.hach.com
U.S. customers only.



Ammonia: AMTAX™ sc Analyzer

Wide measurement range for a variety of wastewater applications.



- 5-minute response time, including sample preparation
- Easy installation at the measurement point or inhouse
- Plug-and-play with the sc100 or sc1000 controllers
- Low maintenance
- Optional Filterprobe sc available for insitu membrane filtration



NEW! Indoor version of AMTAX sc is now available.

Primary Applications

- Wastewater
- Industrial Water

AMTAX SC AMMONIA ANALYZER WITH FILTERPROBE

Prod. No.	Description
9008700	AMTAX sc Ammonia Analyzer 0.02 to 5 mg/L, 115 Vac, includes filtration probe with 5m heated hose
9008800	AMTAX sc Ammonia Analyzer same as 9008700 with 10m heated hose
6157200	AMTAX sc Ammonia Analyzer 0.05 to 20 mg/L, 115 Vac; includes filtration probe with 5 m heated hose
6157300	AMTAX sc Ammonia Analyzer same as above with 10m heated hose
6157800	AMTAX sc Ammonia Analyzer 1 to 100 mg/L, 115 Vac; includes filtration probe with 5 m heated hose
6157900	AMTAX sc Ammonia Analyzer same as above with 10m heated hose
6158400	AMTAX sc Ammonia Analyzer 10 to 1000 mg/L, 115 Vac; includes filtration probe with 5 m heated hose
6158500	AMTAX sc Ammonia Analyzer same as above with 10m heated hose

CONTROLLER

This sensor requires a Hach sc100 (with power box) or sc1000 Digital Controller. See pages 388-393 for details.

MOUNTING ACCESSORIES

Prod. No.	Description
LZY285	Rail Mounting Kit for AMTAX sc analyzer with sc1000 controller
LZY286	Stand Mounting Kit for AMTAX sc analyzer with sc1000 controller
LZY287	Stand Mounting Kit for AMTAX sc analyzer without sc1000 controller
LZX414.00.50000	Rim Mounting Kit for Filterprobe sc
LZX414.00.60000	Rail Mounting Kit for Filterprobe sc

For two-channel or indoor version of the AMTAX sc Ammonia Analyzer, please contact your Hach representative or call 1-800-227-4224.

For more information, call to request Literature #2487, or visit www.hach.com

Specifications*

Measurement Method

GSE (Gas Sensitive Electrode) with screw-on membrane cap

	Range 1	Range 2	Range 3	Range 4
Measurement Range (NH ₄ -N)	0.02 to 5 mg/L	0.05 to 20 mg/L	1 to 100 mg/L	10 to 1000 mg/L
Lower Detection Limit	0.02 mg/L	0.05 mg/L	1 mg/L	10 mg/L
Accuracy	≤1 mg/L: 3% + 0.02 mg/L >1mg/L: 5% + 0.02 mg/L	3% ±0.05 mg/L	3% ±1.0 mg/L	4.5% ±10 mg/L
Reproducibility	3% + 0.02 mg/L	2% ±0.05 mg/L	2% ±1.0 mg/L	2% ±10 mg/L

AMTAX sc ANALYZER

Response time (T90)

Less than 5 minutes, including sample preparation with Filterprobe

Measurement Interval

5 to 120 minutes, adjustable

Outputs

Relay, current outputs, and bus interface via sc100 (with power box) or sc1000 Multi-parameter Universal Controller

Special Features

- ASA UV-resistant, lockable housing, rated to IP55
- Automatic cleaning and calibration
- Extensive self-diagnostics
- Optional 2-channel version for continuous sample preparation

Sample Preparation

Filterprobe sc (see specifications below) or continuous sample preparation (approximately 500 to

1000 mL/min) with FILTRAX, ultrafiltration, etc.

Filterprobe

Operation

- In-situ membrane filtration
- Filter modules are exchangeable
- Continuous self-cleaning with air bubbles
- Particles larger than 0.15 µm are separated from sample stream

Immersion Depth

3 m (9.8 ft.), maximum

Sample Flow Rate

3 m/s, maximum

Filtrate Flow Rate

5 mL/minute, minimum, 4 out of 5 minutes

*Subject to change without notice.

Ammonium: NH4D sc Sensor

An economical insitu sensor for the continuous trending of ammonium levels.

- Designed for use in aeration basins of municipal wastewater treatment plants with less than 30% industrial waste
- Insitu—no sample preparation
- Compact cartridge simplifies maintenance
- Optional automatic cleaning system

Principal of Operation:

A New Approach to ISE technology

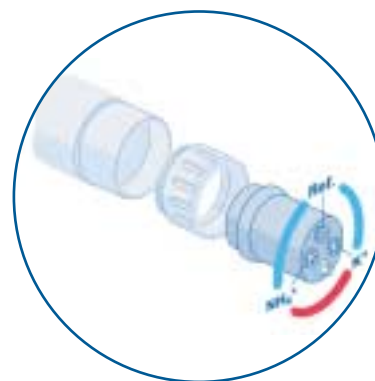
The Hach NH4D sc Ammonium Sensor uses an ion-selective electrode (ISE) to detect ammonium ions (NH_4^+) directly in the aeration basin as ammonium nitrogen ($\text{NH}_4\text{-N}$). A pHd (differential technology) reference system is used for superior stability. The most significant potential interference is from potassium ions (K^+) which is compensated through the use of an integrated potassium ISE to correct the ammonium value. Potential interferences are further reduced using CARTRICAL technology. CARTRICAL calibrates each electrode individually and calibrates all three electrodes to each other. A temperature sensor is also included to improve accuracy.

The Hach NH4D sc ammonium sensor is plug-and-play, ready for use with the Hach sc100 or sc1000 controllers.



Process Instruments

Exclusively from Hach, CARTRICAL™ technology calibrates each electrode individually and calibrates all three electrodes to each other. This results in reduced interferences and improved accuracy.



Primary Applications

- Municipal Wastewater

Prod. No.	Description
LXV437.99.00002	NH4D sc Ammonium Sensor includes 10 m (32.8 ft.) integral cable and a calibrated sensor cartridge

MOUNTING KITS

6184900	Rail Mount Kit
LZX914.99.12400	Chain Mount Kit

CONTROLLER

This sensor requires a Hach sc100 or sc1000 Digital Controller. See pages 388-393 for details.

ACCESSORIES

LZY331	Cleaning Unit
6860000	High Output Air Blast Cleaning Compressor, 115 Vac
6860100	High Output Air Blast Cleaning Compressor, 230 Vac

REPLACEMENT PARTS

6188400	Calibrated Sensor Cartridge
6188300	Test Cartridge

Specifications*

Measurement Method Ion-selective electrodes for ammonium and potassium with pHd reference system and temperature sensor	Calibration Sensor cartridge, calibrated (sensor code contains factory calibration in code form). Entry of sensor code calibrates the sensor. No standard solutions needed <i>Recommended:</i> 1- or 2-point inline matrix correction adapts sensor to the wastewater matrix
Range 0.2 to 1000 mg/L $\text{NH}_4\text{-N}$	Certifications CE approved
Accuracy 5% of measured value ± 0.2 mg/L (with standard solution)	Sensor Construction 316 stainless steel with Ryton® ends
Detection Limit 0.2 mg/L	Dimensions 48 x 361 mm (1.9 x 14.2 in.)
Response Time Less than 2 minutes (T90)	Cable Length Standard: 10 m (33 ft.) Optional Extensions: 7.6 m (25 ft.), 15.2 m (50 ft.), or 30.5 m (100 ft.) Maximum Total Length: 100 m (328 ft.)
Operating Temperature -20 to 45°C (-4 to 113°F)	Weight 1.3 kg (2.9 lbs.)
Sample Temperature 0 to 40°C (32 to 104°F)	
Sample pH 5 to 9	
Sensor Immersion Depth 0.3 to 3.0 m (1 to 10 ft.) maximum	
Sample Pressure 0.3 bar (4.4 psi) maximum	
Storage Temperature Sensor: -20 to 60°C (-4 to 140°F) Sensor Cartridge: 5 to 40°C (41 to 104°F)	

*Subject to change without notice.

For more information, call to request Literature #2583, or visit www.hach.com

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Chlorine, Free/Total: CL17 Analyzer

Dependable, colorimetric DPD free and total chlorine analysis.

**EPA
COMPLIANT**



- Provides unattended operation for up to 30 days.
- Leverages Hach's proprietary DPD formulation that minimizes interferences due to water hardness or minerals
- EPA compliant according to 40 CFR140.74

Accurate Results

The Hach CL17 Chlorine Analyzer uses colorimetric DPD chemistry to monitor water continuously for free or total residual chlorine which is the same method (Standard Method 4500-Cl G) as used for grab samples. This analysis method is not affected by changes in sample pH, temperature, chlorine concentration (within the measurement range), pressure or flow, thus offering more accuracy than other methods in the market today.

Simple, Predictable Maintenance

Monthly routine maintenance for the CL17 can be performed in 15 minutes and includes changing reagents and cleaning the colorimetric cell. No special tools are required. Under typical use, the CL17 will operate unattended for 30 days.

Re-Calibration Not Necessary

Calibration of the CL17 with a chlorine standard or against a reference analysis is possible; however, it is neither necessary nor recommended due to its factory-established embedded calibration curve.

Primary Applications

- Drinking Water
- Municipal Wastewater
- Pure Water/Power
- Industrial Water

Analyzers include a one-month supply of reagents, installation and maintenance kits, and an instruction manual. Power cord must be ordered separately.

Prod. No.	Description
5440001	CL17 Free Residual Chlorine Analyzer
5440002	CL17 Total Residual Chlorine Analyzer

ACCESSORIES

5449000	Calibration Verification Kit
2556900	Reagent Set, Chlorine, Free
2557000	Reagent Set, Chlorine, Total

View the Groundwater Rule Compliance Video at: www.hach.com/videos

Prod. No.	Description
5444300	Maintenance Kit Contains reagent tubing, reagent caps and fittings to be replaced annually. Pump module tubing to be replaced at three to six-month intervals.
5444301	Maintenance Kit with pre-assembled tubing
5448800	Power cord kit with strain relief, 120 Vac
5448900	Power cord kit with strain relief, 240 Vac

For more information, call to request Literature #1626, or visit www.hach.com

Chlorine Analyzer Selection Guide

	CL17 Analyzer Colorimetric Method (Free / Total Chlorine)	CLF10 sc Analyzer Amperometric Method (Free Chlorine)	CLT10 sc Analyzer Amperometric Method (Total Chlorine)
Range	0-5 mg/L	0-10 mg/L	0-10 mg/L
Accuracy	±5% or 0.035 mg/L whichever is greater	±3% at a pH<7.2 (±0.2 pH unit) [†] ±10% at a pH<8.5: [†]	±10% at a pH<8.5: [†]
Limit of Detection (LOD)	35 ppb	25 ppb	25 ppb
Response Time	Batch analysis, 150 seconds	Continuous, T ₉₀ = 140 seconds	Continuous, T ₉₀ = 100 seconds
Reagent Replacement	Monthly	NA	NA
Membrane/Electrolyte Replacement	NA	3-6 months	3-6 months
Potential pH, Flow, Temperature Influence	No	Yes	Yes
Recognized Interferences	MnO ₂	O ₃ , Chloramines	O ₃ , ClO ₂
Appropriate Applications (Clean Water)	All static and dynamic applications [‡]	Static applications—final discharge and distribution system, dynamic applications—process control	Static applications—final discharge and distribution system, dynamic applications—process control

[†]Of the reference test (DPD recommended).

[‡]Dynamic conditions include changing pH, flow, temperature and chlorine concentration.



Chlorine, Free/Total: CLF10 sc & CLT10 sc

Hach's answer to reagentless amperometric chlorine measurement.

- Compatible with Hach's "Plug and Play" Digital Controllers
- EPA compliant according to Method 334.0

**EPA
COMPLIANT**

Measure with Confidence

With intelligent instrument alarms, Hach's amperometric analyzers give you confidence in your chlorine measurement accuracy. Monitoring pH along side chlorine allows the user to leverage Hach's exclusive calibration monitoring algorithm which alerts the user when the deviation in the measurements is higher than expected. Additionally, the CLF10sc and CLT10sc analyzers have flow and temperature alarms allowing for quick resolution of issues regarding these parameters.

Real-time Process Control

The CLF10sc and CLT10sc chlorine analyzers provide real-time process control of disinfection systems because the sensor is immersed in the sample providing continuous readings.

No Reagent Replacement, No Waste Stream

Chlorine measurement with an amperometric sensor does not require routine reagents, eliminating the need for reagent replacement and waste stream management.

NEW!



Process Instruments

Prod. No.	Description
CLF10 sc FREE CHLORINE SENSOR, sc100 CONTROLLER, AND SS PANEL	
2979200	w/ pH Differential Sensor
2979300	w/ pH Combination Sensor
2979400	Grab Sample Only

Prod. No.	Description
CLT10 sc TOTAL CHLORINE SENSOR, sc100 CONTROLLER, AND SS PANEL	
2979800	w/ pH Differential Sensor
2979900	w/ pH Combination Sensor
2980000	Grab Sample Only

Metric sizing available for all configurations.

Primary Applications

- Drinking Water
- Pure Water/Power
- Industrial Water

Specifications*

Total Chlorine	Sample Temperature
Limit Of Quantitation (LOQ) 75 ppb (0.075 ppm)	0 to 45°C (33 to 113°F)
Repeatability/Precision 25 ppb or 3%, whichever is greater	Flow 30-50 L/hr (40 L/hr – optimal)
Free Chlorine	For additional specifications, see Chlorine Analyzer Selection Guide on the previous page.
Limit Of Quantitation (LOQ) 130 ppb (0.13 ppm)	
Repeatability/Precision 40 ppb or 3%, whichever is greater	

*Subject to change without notice.

For more information, call to request
Literature #2679 or visit www.hach.com

Coming soon, Pocket Colorimeter II Kit and methods for Method 334.0 compliance.
Visit: www.hach.com/Method334

Find it here... Buy it today on www.hach.com
U.S. customers only.



Chlorine Dioxide: 9187 sc Analyzer



Note: sc100 shown with optional mounting panel.

Primary Applications

- Drinking Water
- Wastewater
- Pure Water/Power
- Industrial Water

Specifications*

Range

10 ppb to 2 ppm (0.010 mg/L - 2 mg/L)

Accuracy

±5% or ±10 ppb ClO₂ whichever is greater

Cycle Time

90% in T<90sec

*Subject to change without notice.

Ideal for drinking water plants, industrial rinsing, and cooling towers.

- All-inclusive, pre-assembled panel reduces installation expenses
- Integral temperature sensor provides more accurate readings
- Includes 2 years of typical maintenance parts, reduces operating costs



Optional acidification (for cleaning) and intermittent flow accessories link in series so they only take up one sensor port in the controller.

Prod. No.	Description
-----------	-------------

COMPLETE ANALYZERS

- | | |
|----------------|--|
| 6043400 | 9187 sc Chlorine Dioxide Sensor Preassembled panel including ClO ₂ probe with integral temperature and flow control, sc100 controller, and mounting panel for sc100 |
| 6043401 | Same as 6043400 but with MODBUS® RS485 output |
| 6043002 | Same as 6043400 but with MODBUS® RS232 output |

SENSOR ONLY

- | | |
|------------------------|---------------------------------|
| LXV434.99.00001 | 9187 sc Chlorine Dioxide Sensor |
|------------------------|---------------------------------|

CONTROLLERS ONLY

This sensor requires a Hach sc100 or sc1000 Digital Controller. See pages 388-393 for details.

ACCESSORIES

- | | |
|---------------|--|
| LZY051 | 9180 sc Acidification Unit
Also used for cleaning |
| LZY052 | 9180 sc Intermittent Flow |

For more information, call to request Literature #2408, or visit www.hach.com

See page 148 for reagents, test kits, and accessories for measuring chlorine dioxide in the lab or field.



Conductivity, Contacting Sensors

Ultimate accuracy from ultra-pure to high conductivity applications.

High Performance Design

These sensors are manufactured using high quality, rugged materials for demanding applications including ultra-pure water, clean-in-place (CIP), and boiler/condensate monitoring. Each sensor is tested to determine its unique, absolute four-digit cell constant. Simply key in this constant (Hach's easy DRY-CAL™ method) when configuring the analyzer to ensure the highest possible measuring accuracy. Also, each sensor has a Pt 1000 RTD temperature element built into its tip for exceptionally fast response to changes in temperature with $\pm 0.1^\circ\text{C}$ accuracy.

Resistivity and Conductivity Measurement Capability

These enhanced performance sensors measure from theoretically pure water ($0.057\ \mu\text{S}/\text{cm}$ or $18.2\ \text{M}\Omega$) up to $200,000\ \mu\text{S}/\text{cm}$.

Versatile Mounting Styles

Compression Fitting Sensors—

Feature titanium electrodes and a compression fitting for universal installation with up to 4 inches (102 mm) insertion depth. The 1/2-inch or 3/4-inch male NPT compression fittings are offered in Kynar® (PVDF) or 316 stainless steel. A longer version of this sensor is available for use with a 316 stainless steel ball valve hardware assembly to insert/retract the sensor from the process without stopping the flow. The longer version can also be used for insertion through a compression fitting. Maximum insertion depth is 7 inches (178 mm).

Non-Metallic General Purpose Sensors—

Have graphite electrodes and 3/4-inch male NPT threaded Ryton® bodies. Mount into a standard 3/4-inch pipe tee, 1-1/2-inch Hach union hardware (for 10 Cell Constant sensor only), or fasten onto the end of a pipe.

High Pressure and High Temperature Sensors—

Are designed for monitoring boiler water and condensate in return lines. They have 316 stainless steel electrodes and threaded bodies (3/4-inch male NPT). They can be fastened into a boiler wall using a 3/4-inch weldolet or mounted into a process line using a standard 3/4-inch stainless pipe tee.

Sanitary Clean in Place (CIP) Style Sensors—

Have 316 stainless steel electrodes and an integral 1-1/2-inch or 2-inch flange. These sensors can be installed using standard sanitary mounting hardware.



Enhanced performance designs for Ultra-pure Water, Sanitary (CIP), Boiler/Condensate and General Purpose applications.

See next page for ordering information.

For more information, call to request
Literature #2468, or visit www.hach.com

Primary Applications

- Pure Water/Power
- Industrial Water

General Specifications*

Cell Constants and Measuring Ranges

Sensor Cell Constant	Absolute Range ($\mu\text{S}/\text{cm}$)	Practical Range ($\mu\text{S}/\text{cm}$)	Resistivity (Mohm)
0.05	0-100	0-100	0.002-20
0.5	0-1,000	1-1,000	0.001-20
1	0-2,000	10-2,000	not applicable
5	0-20,000	50-20,000	not applicable
10	0-200,000	200-200,000	not applicable

Temperature Range

-20 to 200°C (-4 to 392°F)

Accuracy

$\pm 2\%$ of reading above $200\ \mu\text{S}/\text{cm}$

Response Time

90% of reading within 30 seconds of step change

Pressure Range

0-300 psi (20.7 BAR)

Sensitivity

$\pm 0.5\%$ of reading

Repeatability

$\pm 0.5\%$ of reading

*Specifications dependent on specific sensor and mounting.

See pages 24-47 for information on Hach laboratory and field conductivity instruments.

Find it here... Buy it today on www.hach.com
U.S. customers only.



Conductivity, Contacting Sensors

CONTROLLER REQUIRED

For information about Hach digital and analog controllers, see pages 388-398.

Prod. No.

3422 sc DIGITAL COMPRESSION FITTING SENSORS

Sensors are supplied with 23 ft. integral cable.

	<i>Cell Constant</i>	<i>Compression Fitting Style</i>
D3422A1	0.05	1/2-inch NPT Kynar® (PVDF)
D3422A2	0.05	1/2-inch NPT 316 stainless steel
D3422B3	0.5	3/4-inch NPT Kynar® (PVDF)
D3422C3	1.0	3/4-inch NPT Kynar® (PVDF)
D3422D3	5.0	3/4-inch NPT Kynar® (PVDF)
D3422E3	10	3/4-inch NPT Kynar® (PVDF)

3422 ANALOG COMPRESSION FITTING SENSORS

Sensors are supplied with 20 ft. integral cable.

	<i>Cell Constant</i>	<i>Compression Fitting Style</i>
3422A1A	0.05	1/2-inch NPT Kynar® (PVDF)
3422A2A	0.05	1/2-inch NPT 316 stainless steel
3422B3A	0.5	3/4-inch NPT Kynar® (PVDF)
3422C3A	1.0	3/4-inch NPT Kynar® (PVDF)
3422D3A	5.0	3/4-inch NPT Kynar® (PVDF)
3422E3A	10	3/4-inch NPT Kynar® (PVDF)

3433 sc DIGITAL NON-METALLIC, GENERAL PURPOSE SENSORS

Sensors are supplied with 23 ft. integral cable.

	<i>Cell Constant</i>
D3433B8	0.5
D3433E8	10

3433 ANALOG NON-METALLIC, GENERAL PURPOSE SENSORS

Sensors are supplied with 20 ft. integral cable.

	<i>Cell Constant</i>
3433B8A	0.5
3433E8A	10

3444 sc DIGITAL BOILER/CONDENSATE STYLE SENSORS

Sensors are supplied with 23 ft. integral cable.

	<i>Cell Constant</i>
D3444B8	0.5
D3444D8	5.0

3444 ANALOG BOILER/CONDENSATE STYLE SENSORS

Sensors are supplied with 23 ft. integral cable.

	<i>Cell Constant</i>
3444B8A	0.5
3444D8A	5.0

3455 sc DIGITAL SANITARY (CIP) FLANGE STYLE SENSORS

Sensors are supplied with 23 ft. integral cable.

	<i>Cell Constant</i>	<i>Installation Style</i>
D3455A6	0.05	Sanitary (CIP) 1-1/2-inch flange
D3455C7	1.0	Sanitary (CIP) 2-inch flange
D3455E7	10	Sanitary (CIP) 2-inch flange

3455 ANALOG SANITARY (CIP) FLANGE STYLE SENSORS

Sensors are supplied with 20 ft. integral cable.

	<i>Cell Constant</i>	<i>Installation Style</i>
3455A6A	0.05	Sanitary (CIP) 1-1/2 inch flange
3455C7A	1.0	Sanitary (CIP) 2 inch flange
3455E7A	10	Sanitary (CIP) 2 inch flange

Prod. No.

DIGITAL GATEWAY

6120700 Use the Digital Gateway to connect analog Hach 3400-series conductivity sensors to a Hach digital controller.

ACCESSORIES FOR ALL 3400-SERIES CONTACTING CONDUCTIVITY SENSORS

Cables

Digital cables are used only with digital sensors or gateways when connecting to a digital controller.

6122400 Digital Extension Cable, 1 m (3.3 ft.)
5796000 Digital Extension Cable, 7.7 m (25 ft.)
5796100 Digital Extension Cable, 15 m (50 ft.)
5796200 Digital Extension Cable, 31 m (100 ft.)

Analog cables are used only with analog sensors, junction box, and controller. Maximum recommended analog interconnect cable length is 300 ft.

1W1100 Analog Interconnect Cable, order per foot

Digital Termination Box

Used with digital extension cables when the desired cable length between the digital sensor/digital gateway and digital controller is between 100 m (328 ft.) and 1000 m (3280 ft.).

5867000 Digital Termination Box

Analog Junction Box

Used with analog interconnect cable when the desired cable length between analog sensor and analog controller is greater than the standard length of sensor cable. Each junction box includes terminal strip and gasket.

60A2053 Junction Box, Surface-mount, aluminum (includes mounting hardware)

60A9944 Junction Box, Pipe-mount, PVC (for 1/2-inch diameter pipe, includes mounting hardware)

60G2052 Junction Box, Pipe-mount, PVC (for 1-inch diameter pipe, includes mounting hardware)

76A4010-001 Junction Box, NEMA 4X (no mounting hardware included)

CONDUCTIVITY REFERENCE SOLUTIONS

Conductivity reference solutions are available in increments of 100 µS/cm. Please specify the desired conductivity value when placing your order. Choose part number that encompasses your desired conductivity value.

	<i>Description</i>	<i>Volume</i>
25M3A2000-119	100-1000 µS/cm	1 liter
25M3A2050-119	1000-2000 µS/cm	1 liter
25M3A2100-119	2000-150,000 µS/cm	1 liter
25M3A2200-119	200,000-300,000 µS/cm	1 liter

Sensors with Class I Division II safety classification are available—please contact your Hach representative.

For complete specifications, fittings and mounting hardware, download Literature #2468 from www.hach.com/ProcessConductivitySensors

See pages 24-47 for information on Hach laboratory and field conductivity instruments.

Innovative technology eliminates polarization and electrode coating problems in harsh environments.

Wide Measuring Range

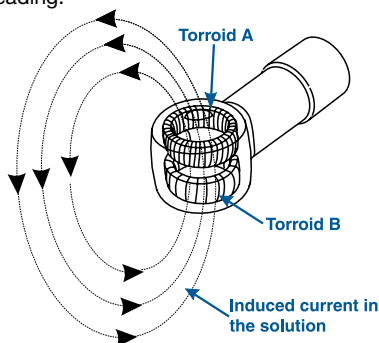
Hach's Inductive Conductivity Sensors measure from 200 to 2,000,000 microSiemens/cm. A built-in Pt 1000 RTD compensates for changes in process temperature.

Low-maintenance Design

The inductive sensor design eliminates polarization and electrode coating problems that commonly affect conventional contacting electrode-type conductivity sensors.

Principal of Operation

Inductive conductivity sensors induce a low current in a closed loop of solution, then measure the magnitude of this current to determine the solution's conductivity. The conductivity analyzer drives Torroid A, inducing an alternating current in the solution. This current signal flows in a closed loop through the sensor bore and surrounding solution. Torroid B senses the magnitude of the induced current which is proportional to the conductance of the solution. The analyzer processes this signal and displays the corresponding reading.



Versatile Mounting Styles

Sensors can be installed using a choice of four mounting styles—immersion, insertion, union, and sanitary.



The innovative technology of Hach's Inductive Conductivity Sensors eliminates polarization and electrode coating problems in harsh environments. Available in sanitary (CIP) flange style and convertible styles in PFA Teflon®, polypropylene, PEEK®, and PVDF.

See next page for ordering information.

Wetted Materials

	Polypropylene	PVDF	PEEK®	Teflon®
Calcium Chloride		■	■	■
Hydrochloric Acid		■		■
Hydrofluoric Acid		■		■
Nitric Acid				■
Phosphoric Acid		■	■	■
Potassium Hydroxide	■		■	■
Seawater	■	■	■	■
Sodium Hydroxide	■		■	■
Sulfuric Acid				■
Water	■	■	■	■

NOTE: Compatibilities are valid for temperatures up to 115°C. For other applications or conditions, please contact Hach Technical Support.

For more information, visit
www.hach.com/ProcessConductivitySensors

Primary Applications

- Pure Water/Power
- Industrial Water

General Specifications*

Measuring Range

200 – 2,000,000 µS/cm

Sample Temperature Range*

Polypropylene: -10 to 100°C

PVDF: -10 to 120°C

PEEK and PFA Teflon:
-10 to 200°C

Maximum Flow Rate

10 ft. (3 m) per second

Pressure Range

Up to 200 psig at 150°C (302°F); limited only by sensor body material and mounting hardware

Accuracy

±0.01% of reading, all ranges

*Limited only by sensor body material and mounting hardware. See product data sheet for details.

See pages 24-47 for information on Hach laboratory and field conductivity instruments.

Find it here... Buy it today on www.hach.com
U.S. customers only.



Conductivity, Inductive Sensors

CONTROLLER REQUIRED

For information about Hach digital and analog controllers, see pages 388-398.

Prod. No.

3700 sc DIGITAL INDUCTIVE CONDUCTIVITY SENSORS

All digital inductive sensors come complete with standard sensor cable length of 6 m (20 ft.), digital gateway, and a 1 m (3.3 ft.) digital extension cable.

Choice of body styles:

- *Convertible – 2-inch NPT, designed for tee, other flow through, insertion, and pipe mountings for immersion.*
- *Sanitary (CIP)* –2-inch flange, special cap, and EPDM compound gasket. Conforms to provisions of 3-A Sanitary Standards.*



	Body Style	Body Material
D3705E2T	Sanitary	Polypropylene
D3706E2T	Sanitary	PVDF
D3708E2T	Sanitary	PFA Teflon
D3725E2T	Convertible	Polypropylene
D3726E2T	Convertible	PVDF
D3727E2T	Convertible	PEEK
D3728E2T	Convertible	PFA Teflon

*Sanitary style not available in PEEK.

DIGITAL GATEWAY

6120800 Use the Digital Gateway to connect analog Hach 3700 inductive conductivity sensors to a Hach digital controller.

3700 ANALOG INDUCTIVE CONDUCTIVITY SENSORS

All analog sensors come complete with standard sensor cable length of 6 m (20 ft.).

Choice of body styles:

- *Convertible – 2-inch NPT, designed for tee, other flow through, insertion, and pipe mountings for immersion.*
- *Sanitary (CIP)* –2-inch flange, special cap, and EPDM compound gasket. Conforms to provisions of 3-A Sanitary Standards.*



	Body Style	Body Material
3705E2T	Sanitary	Polypropylene
3706E2T	Sanitary	PVDF
3708E2T	Sanitary	PFA Teflon
3725E2T	Convertible	Polypropylene
3726E2T	Convertible	PVDF
3727E2T	Convertible	PEEK
3728E2T	Convertible	PFA Teflon

*Sanitary style not available in PEEK.

Prod. No.

ACCESSORIES

Cables

Digital cables are used only with digital sensors or gateways when connecting to a digital controller.

6122400	Digital Extension Cable, 1 m (3.2 ft.)
5796000	Digital Extension Cable, 7.7 m (25 ft.)
5796100	Digital Extension Cable, 15 m (50 ft.)
5796200	Digital Extension Cable, 31 m (100 ft.)

Analog cables are used only with analog sensors, junction box, and controller.

1W1100	Analog Interconnect Cable (order per foot)
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Digital Termination Box

Used with digital extension cables when the desired cable length between the digital sensor/digital gateway and digital controller is between 100 m (328 ft) and 1000 m (3280 ft).

5867000	Digital Termination Box
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Analog Junction Box

Used with analog interconnect cable when the desired cable length between analog sensor and analog controller is greater than the standard length of sensor cable. Each junction box includes terminal strip and gasket.

60A2053	Junction Box, Surface-mount, aluminum (includes mounting hardware)
60A9944	Junction Box, Pipe-mount, PVC for 1/2-inch diameter pipe (includes mounting hardware)
60G2052	Junction Box, Pipe-mount, PVC for 1-inch diameter pipe (includes mounting hardware)
76A4010-001	Junction Box, NEMA 4X (no mounting hardware included)

CONDUCTIVITY REFERENCE SOLUTIONS

Conductivity reference solutions are available in increments of 100 µS/cm. Please specify the desired conductivity value when placing your order. Choose part number that encompasses your desired conductivity value.

	Description	Volume
25M3A2000-119	100-1000 µS/cm	1 liter
25M3A2050-119	1000-2000 µS/cm	1 liter
25M3A2100-119	2000-150,000 µS/cm	1 liter
25M3A2200-119	200,000-300,000 µS/cm	1 liter

Sensors with Class I Division II safety classification are available—please contact your Hach representative.

Sanitary, Union, Immersion and Insertion mounts available in 316 Stainless steel, CPVC and PVDF.
Download product data sheet (Lit. #2465) from www.hach.com/ProcessConductivitySensors

See pages 24-47 for information on Hach laboratory and field conductivity instruments.

Copper: APA 6000™ Analyzer

Process Instruments

Affordable colorimetric low-range copper analysis.

- Available in two ranges:
low range (0.05 to 2.00 mg/L) and
high range (1.0 to 10 mg/L)
- Continuous operation up to 30 days unattended
- Self-calibration, self-diagnostics

Reliable and Continuous Copper Monitoring

The APA 6000 Copper Analyzer is an ideal choice for full-time security and long-term economy. Using the cuprethol colorimetric method, the APA 6000 assesses dissolved copper with lab accuracy—every four minutes, 24 hours a day.

Automatic 2-Stream Analysis

The Hach APA 6000 Copper Analyzer can optionally monitor up to two separate sample streams with an additional sample sequencing kit.

Applications:

The high-range model (1.0 to 10.0 mg/L as Cu^{2+}) is ideal for monitoring effluent streams in metal finishing operations, and printed circuit board and IC manufacturing.

The low-range model (0.05 to 2.00 mg/L as Cu^{2+}) may be used to monitor PCB/IC manufacturing effluent. It is also well-suited for process control in many copper-sensitive manufacturing processes.

Each analyzer includes an installation kit, one month's supply of reagents, a maintenance kit, a sample conditioning kit, an illustrated manual, and a quick reference card. Power cords must be ordered separately.

Prod. No.	Description
5100610	APA 6000 Low Range Copper Analyzer, 0.05 to 2.0 mg/L, with AquaTrend®
5100510	APA 6000 High Range Copper Analyzer, 1.0 to 10.0 mg/L, with AquaTrend®

ACCESSORIES

Low-Range Copper NOTE: both sets are required for operation.

6001600	Copper Reagent Set
6001700	Low-Range Copper Standards Set

High-Range Copper NOTE: both sets are required for operation.

6001600	Copper Reagent Set
6001800	High-Range Copper Standards Set
5133900	APA 6000 Micro Filter System, 115 V
5133901	APA 6000 Micro Filter System, 230 V
4630600	Power cord kit, 120 Vac
4630800	Power cord kit, 240 Vac
6200900	Sample Sequencing Kit



For more information, visit www.hach.com



Primary Applications

- Industrial Water

Specifications*

Ranges Low-range: 0.05 to 2.0 mg/L as Cu^{2+} High-range: 1.0 to 10.0 mg/L as Cu^{2+}	Alarms Two SPDT alarm relays included; total of up to 14 programmable alarm relays (with optional Signal Output Modules)
Accuracy Low-range: $\pm 5\%$ or ± 0.03 mg/L, whichever is greater High-range: $\pm 5\%$ or ± 0.05 mg/L, whichever is greater	Outputs Two 4-20 mA outputs included; total of up to 14 programmable 4-20 mA outputs (with optional Signal Output and Power Supply Modules)
Resolution 0.01 ppm	Network Connectivity AquaTrend™ network, using the Lonworks® protocol
Repeatability $\pm 3\%$ of reading or ± 0.03 mg/L, whichever is greater	Compliance UL, CSA and EIC safety standards, FCC and certification, European RFI standards, European EMI standards
Analysis Method Colorimetric, cuprethol	Power Requirements 95-240 Vac, 50/60 Hz
Cycle Time 4.0 minutes (avg.)	Enclosure NEMA 4X (indoor) and IEC 529 (IP66), ABS plastic, with provision for air purge; panel-, benchtop- or wall-mountable (brackets included)
Display Displays data for copper (Cu^{2+}) in numeric and graphic format	Physical Dimensions 21 in. tall, 25 in. wide, 21 in. deep (522 x 627 x 527 mm)
Sample Flow 100 to 2000 mL/min. max.	Weight 56 lbs. (25.5 kg)
Sample Temperature 5 to 50°C, 95% RH non-condensing	
Inlet Pressure 2.5 to 100 psig at basic water conditioning filter; 0.5 to 30 psig at sample inlet block	
Calibration Cycle User-selectable, from twice per day to weekly; approx. 35 min. per cycle	
Grab Sample Temperature: 5 to 50°C Volume: 100 mL minimum; filtered to 22 μm or better	

**Subject to change without notice.*

See page 154 for reagents, test kits, and accessories for measuring copper in the lab or field.

Find it here... Buy it today on www.hach.com
U.S. customers only.



Data Management: MOD I/O

High performance network I/O module at an affordable price.



- MODBUS® protocol ensures compatibility with virtually all PLC/SCADA systems
- Supports baud rates up to 38.4K Baud, 32 times faster than other competing networks
- Simplifies wiring, cuts cabling costs
- Cost-effective solutions for an analog-to-digital communication system

MOD I/O Interface Module

Using the universal MODBUS® protocol, the MOD I/O provides a digital link that eliminates the disadvantages of analog data transmission—with a simple two-wire connection.

MODBUS® RS-485 I/O

The MODBUS RS-485 I/O series is a high-performance line of networked I/O modules. These units feature universal input/output ranges and an intelligent microcontroller to provide extreme flexibility and powerful monitoring and control capabilities. Select from a variety of analog and discrete I/O models to meet your application requirements.

To ensure unsurpassed performance, these I/O modules employ advanced microcontroller technology. Isolated input, output, power, and network circuits increase noise/transient immunity and prevent ground loops. Status LEDs provide diagnostic feedback.

ProcessLink™ / OPC Datalogger replaces your chart recorder.

Hach's OPC Datalogger offers a powerful and flexible alternative for anyone who is not using a SCADA/HMI package. The OPC Datalogger is included with the MOD I/O OPC Software.

ProcessLink™ automatically locates and identifies all Hach sensors. Use the powerful set-up wizard to connect directly to your SCADA system in only a few minutes. No strings to parse. No commands to decipher. In other words, no programming required.

Total MOD I/O support—call the network experts anytime.

Clear and thorough documentation simplifies installation, daily operation, and troubleshooting. When you need help, our network experts are ready to assist you.

MODBUS® is a registered trademark of Modicon/Schneider Electric Corporation.

MOD I/O MODBUS Interface Modules

Hach MOD I/O MODBUS Interface units are supplied with a power supply, RS-232 cable, and a detailed manual.

Prod. No.	Description
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MOD I/O GATEWAY	
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5710000	MOD I/O Interface, 115 Vac
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MOD I/O SOFTWARE	
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5711100	MOD I/O OPC Software
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MOD I/O ACCESSORIES	
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5711300	8 Serial Port, RS-232 Expansion Card
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5710600	RS-232 to RS-485 MOD I/O Adaptor
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Prod. No.	Description
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MODBUS RS-485 I/O MODULES	
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5439600	Analog Current Loop Module, 4 current loop inputs, 4 digital outputs
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5439700	Analog Voltage Module, 4 analog voltage inputs, 4 digital outputs
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5439800	Analog Current Output Module, 4 analog current outputs, 4 digital outputs
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COMMUNICATION CONVERTERS	
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5737800	Converter Kit, RS-232 to RS-485, 230 Vac
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5920400	USB, RS-485 Converter Kit
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5866600	ProcessLink™
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For more information, visit www.hach.com

Dissolved Oxygen: K1100 Sensor

The first maintenance-free optical oxygen sensor for power plants.

- Only 1 calibration per year
- No membranes = 2 minutes of annual maintenance
- Compatible with ORBISPHERE 28 mm flow chamber for a low cost retrofit

Principle of Operation

An active fluorescent spot is excited with blue light and a red luminescent light is detected from the spot. Increased oxygen in the sample decreases the time taken for the spot's fluorescence to decay and this correlates directly to the oxygen concentration in the sample.

Prod. No.	Description
PRE-CONFIGURED SYSTEMS	
K1100-KTO-W-IMP	Kit containing K1100-S00 sensor, 410K/W1C00000 controller, 32510.03 3 m cable, 32001.011 1/4" flow chamber
K1100-KTO-W-MET	Kit containing K1100-S00 sensor, 410K/W1C00000 controller, 32510.03 3 m cable, 32001.010 6 mm flow chamber
K1100-KTO-W	Kit containing K1100-S00 sensor, 410K/W1C00000 controller, 32510.03 3 m cable
K1100-KTO-P	Kit containing K1100-S00 sensor, 410K/P1C00000 controller, 32510.03 3 m cable
K1100-KTO-P-IMP	Kit containing K1100-S00 sensor, 410K/P1C00000 controller, 32510.03 3 m cable, 32001.011 1/4" flow chamber
K1100-KTO-P-MET	Kit containing K1100-S00 sensor, 410K/P1C00000 controller, 32510.03 3 m cable, 32001.010 6 mm flow chamber

These pre-configured kits also exist in panel version (K1100-KTO-P-IMP, K1100-KTO-P-MET, K1100-KTO-P).

CONTROLLERS AND SENSOR

410K/W1C00000	Hach ORBISPHERE 410 Controller (Wall Mount)
410K/P1C00000	Hach ORBISPHERE 410 Controller (Panel Mount)
K1100-S00	Hach ORBISPHERE K1100 Luminescent Dissolved Oxygen Sensor compatible with ORBISPHERE flow chambers

ACCESSORIES

32510.05	Sensor Cable; 3 m (9.8 ft.), 5 m (16.4 ft.), 10 m (32.8 ft.)
32001.011	Flow chamber in stainless steel (316) with 1/4" fittings. Supplied with EPDM O-rings
32001.010	Flow chamber in stainless steel (316) with 6mm fittings. Supplied with EPDM O-rings

For more information, call to request Literature #2477, or visit www.hach.com

NEW!



Primary Applications

- Pure Water/Power

Specifications*

Range

0 to 2000 ppb (dissolved O₂)

Repeatability

±0.4 ppb or 1%, whichever is greater

Reproducibility

±0.8 ppb or 2%, whichever is greater

Accuracy

±0.8 ppb or 2%, whichever is greater

Limit of Detection (LOD)

0.6 ppb, minimum

Response Time (90%)

< 10 s (gas phase)

< 30 s (in water)

Display Resolution

0.1 ppb

Calibration

Single point zero calibration

Calibration Sample

Standard 99.999% nitrogen (quality 50) or equivalent oxygen free gas

Sample Temperature

-5 to 50°C (23 to 122°F)

Sample Pressure

1 to 20 bar abs (14.5 to 290 psia)

Storage Temperature

-5 to 100°C (23 to 212°F)

**Subject to change without notice.*

Process Instruments

See page 157 for reagents, test kits, and accessories for measuring dissolved oxygen in the lab or field.

Find it here... Buy it today on www.hach.com

U.S. customers only.



Dissolved Oxygen: Hach LDO® Probe

Breakthrough luminescent technology.



- No membranes to replace
- No calibration for one year
- Reduced cleaning frequency and simple maintenance
- 99% accuracy
- Plug-and-play with sc100 Digital and sc1000 Digital Controllers
- No polarization time (no electrodes)
- No poisoning from H₂S, heavy metals, and other wastewater chemicals
- Three-year probe warranty
- One-year sensor warranty

**EPA
COMPLIANT**

The EPA has recommended Hach LDO® Method 10360 for compliance monitoring.

Hach's breakthrough LDO technology has been approved in numerous states across the nation for measuring and reporting dissolved oxygen.

Visit www.waterqualitymeters.com for more information and to learn if you are in an approved state.



See pages 24-47 for information on Hach laboratory and field LDO instruments.