

Hach Orbisphere G1100 Luminescent Dissolved Oxygen (LDO) Sensor

Features and Benefits

Operator Independent Accuracy and Reliability

The Hach Orbisphere G1100 Luminescent Dissolved Oxygen (LDO) Sensor offers a new way of monitoring dissolved oxygen in high purity water applications. It uses a dry sensor with no membrane. No electrolyte or chemicals are needed for operation. The sensor only needs an adjustment of the zero point. The on-line calibration is programmable to meet operating requirements.

Minimal Operator Time Required

Designed to reduce maintenance requirements and complexity to a minimum, the G1100 LDO sensor is operator independent with a fully automatic calibration method. Service requirements are limited to 5 minutes every 18 months to replace the active spot of the sensor.

Confidence in Results

Manual and automatic calibration modes are fully traceable. Real-time diagnostics includes notification of service due, need for calibration sample replacement, calibration operation or configuration failure, and sensor or system failure.

Simple Calibration

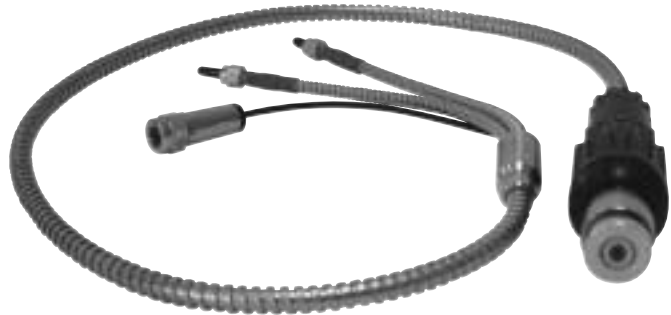
Calibration of the G1100 LDO sensor is made by exposing the luminescent spot to pure nitrogen. The advantage of this method is the ability to use certified and traceable gas standards. In the range of 0 to 600 $\mu\text{g}/\text{kg O}_2$, calibration is needed approximately quarterly. A standard calibration gas bottle will last about three years. Calibration can be launched manually or programmed to run automatically at defined intervals. After calibration, the instrument verifies the signal is within an acceptable range and stable.

Diagnostics and Alarms

Use the G1100 LDO sensor with the Hach Orbisphere 410 Transmitter. Diagnostics features of the transmitter include:

- Notification that a sensor service is due for optimal preventative maintenance planning.
- Notification that the calibration sample needs replacement.
- Notification of potential auto-calibration or auto-verification failure.
- Notification of system or sensor failure.

All diagnostic information together with user programmable measurement alarms can be assigned to one of three available relays or to one of three smart analog outputs.



The Hach Orbisphere G1100 Luminescent Dissolved Oxygen (LDO) Sensor is the first luminescent sensor to provide trace oxygen monitoring in pure water processes where ppb level monitoring is needed. It features traceable fully automatic in-situ calibration and low cost of ownership—downtime is reduced to 5 minutes annual service. A dry sensor means there is no electrolyte, no chemicals, and no membrane.

PW

IW

Industry Applications and Measurement Range

This on-line process analyzer is designed for use in power generation plants running oxygenated treatment (OT), all volatile treatment (AVT) chemistry, or other industrial applications requiring effective oxygen monitoring, such as process water in the semiconductor industry.

The system can measure up to 20 ppm. It has been optimized to measure in the 0 to 600 ppb range. In the 0 to 600 ppb range the system measures one point every second. Above 600 ppb the system measures one point per minute to limit the ageing of the luminescent spot.

Communication and Data Management

Real time data is available through standard 4-20 mA analog outputs, RS485, Profibus DP, or Ethernet. Any stored information, including historical data, calibration reports, user log book, and system configuration can be retrieved with RS485, Ethernet, USB-client, and USB-host (USB memory stick).

Specifications*

Measuring Range

0 to 20,000 ppb

Repeatability

±1 ppb + 2% in the 0 to 600 ppb range

Reproducibility

±2 ppb + 2.5% in the 0 to 600 ppb range

Detection Limit

2 ppb

Response Time

30 seconds (t = 90%)

Resolution (display)

0.1 ppb

Calibration

Fully automatic user programmable single point zero calibration

Calibration Sample

Standard 99.999% nitrogen (quality 50) gas bottles with 5/8-in. x 18 (C10) connection.

Verification

Fully automatic user programmable single point zero verification

Ambient Temperature

5 to 50°C (41 to 122°F)

Ambient Relative Humidity

0 to 95%, non-condensing

Sample Temperature

5 to 45°C (41 to 113°F) [sensor resistant to temperature from -5 to 100°C (23 to 212°F)]

Sample Pressure

1 to 4 bar abs (14.5 to 58 psig)

Sample Flow Rate

20 to 200 mL/min

Sample Connection

6 mm (1/4-in.) tubing

Power Supply

Universal 85 to 264 Vac (50/60 Hz, 25 VA)
or 10 to 36 Vdc (25 W)

Certifications

Electromagnetic compatibility standards:
EN61326:1997 /A1:1998 /A2:2001 /A3:2003
Safety standard: EN61010-1: 2001 Directive 73/23/EEC

Display

Monochrome STN 320 x 240 pixels with LED backlight

User Interface

Touch-screen panel: displays concentration, trend graph, diagnostics, alarm status, historical data

Password protection: five levels of authorized access to configuration and data management

Analog outputs

3 Smart 0/4 – 20 mA (500 Ohms), programmable as linear or tri-linear, configurable to send diagnostics or alarm information

Relay Outputs

3 measurement alarm relays (2A/30 Vac or 0.5A/50 Vdc) configurable to send diagnostics information

1 system alarm relay (2A/30 Vac or 0.5A/50 Vdc)

Digital Communication

RS485

Profibus DP (optional)

Data Retrieval

Ethernet

USB-client to download data from a computer

USB-host to download data with a USB memory stick

Data Storage

Rolling buffer or store once mode for up to 1000 measurements and 1000 operator actions

Holds calibration records for the last 10 calibrations

Accessories

2 years spare parts kit

Active spot

Spare sensor

Tool kit

Pressure reducer for calibration gas bottle

Materials

Wall/pipe mount: stainless steel, IP65

Panel mount: aluminum, IP65

Dimensions

Wall/pipe mount transmitter:

220 x 229 x 151 mm (8.6 x 8.9 x 5.6 in.)

Panel mount transmitter:

250 x 156 x 256 mm (9.8 x 6.1 x 10.0 in.)

Sensor module: 120 x 200 mm (4.7 x 7.8 in.)

Weight

Wall/pipe mount transmitter: 3.8 kg (8.4 lbs.)

Panel mount transmitter: 2.9 kg (6.4 lbs.)

G1100 sensor: 0.5 kg (1.1 lbs.)

G1100-F flow chamber: 0.8 kg (1.8 lbs.)

1 L calibration gas bottle (incl. valve): 0.7 kg (1.5 lbs.)

*Specifications subject to change without notice.

Principle of Operation

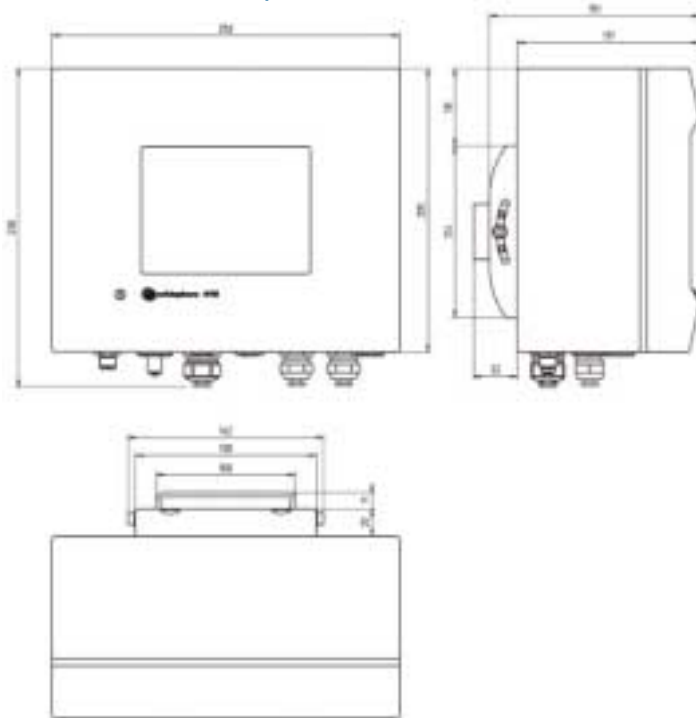
The Hach Orbisphere G1100 Luminescent Dissolved Oxygen (LDO) Sensor works on the principle of luminescence. An active fluorescent spot is excited with blue light and red luminescent light is detected. The presence of oxygen changes the decay time of the red luminescent light. With the appropriate calibration curve, the decay time is transformed into an oxygen partial pressure value.

Engineering Specifications

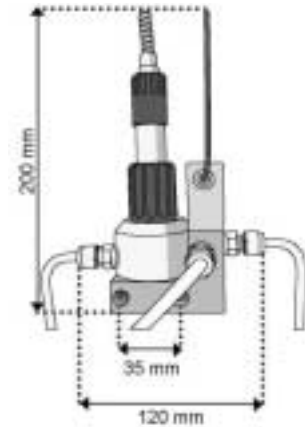
1. The sensor shall continuously measure the concentration of dissolved oxygen in water.
2. The measurement technology shall be via luminescence.
3. The measuring range shall be from 0 to 20,000 ppb O₂.
4. The minimum detection limit shall be 0 ppb \pm 2 ppb O₂.
5. The repeatability shall \pm 1 ppb \pm 2% in the 0 to 600 ppb range.
6. The reproducibility shall \pm 2 ppb \pm 2.5% in the 0 to 600 ppb range.
7. The response time shall be approximately 30 seconds.
8. The flow rate of sample shall be 5 to 50 L/hour.
9. The transmitter enclosure shall be rated at IP66.
10. The analyzer shall be model Orbisphere G1100 Luminescent Dissolved Oxygen (LDO) Sensor.

Dimensions

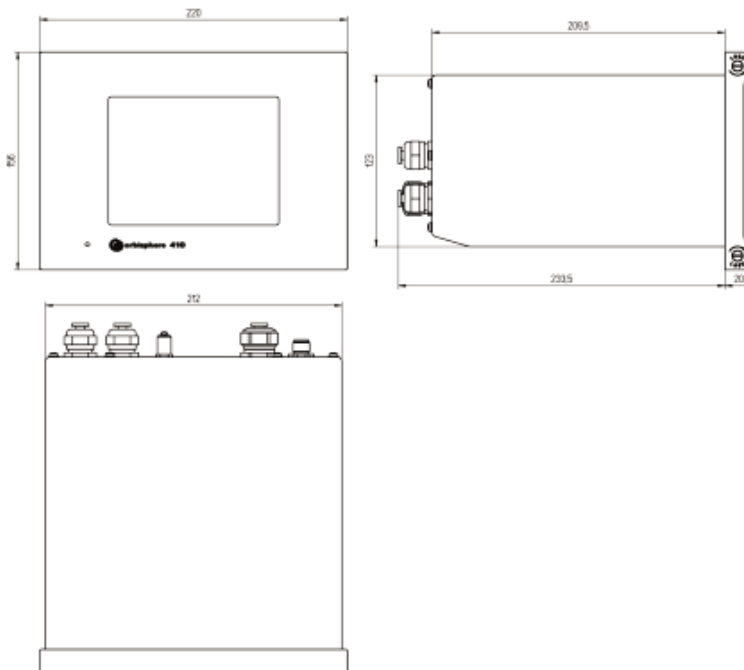
Wall/Pipe Mount Transmitter



Sensor



Panel Mount Transmitter



Ordering Information

41G1-W400	Hach Orbisphere Luminescent Oxygen Analyzer, wall/pipe mount <i>System includes the following:</i>
410/G/W1C00000	410 Oxygen (Luminescent G sensor) instrument, wall mount
G1100-300	Luminescent Oxygen Sensor, for pure water applications, with 3 meter cable
G1100-F4	Complete Flow Chamber, for G1100 sensors, 1/4-in. fittings
33015	Pressure Reducer, for calibration gas bottles with 0.1-L/min flow, 5/8-in. x 18 connection, 70 bar maximum
33021	Spare Parts Kit, 2 years, for G1100 sensors and flow-chambers
33022	Tool Kit, for G1100 sensors

41G1-P400 Hach Orbisphere Luminescent Oxygen Analyzer, panel mount
System is same as above, but with panel mount instrument:

410/G/P1C00000 410 Oxygen (Luminescent G sensor) instrument, panel mount

All analyzers are equipped with 1/4-in. sample inlet, 85 to 264 Vac, 3 x 0/4-20 mA analog output, and RS485.

Accessories

32963	Wall Mount Kit
32964	Panel Mount Kit
32972	Pipe Mount Kit, for wall instrument
32959	Converter, RS232/RS-485, battery powered (batteries not included)
32973	PROFIBUS-DP Upgrade Kit, includes board and software key
32534.03	PROFIBUS-DP Cable, including SUB-D 9 female connector, 3 m
32534.MM	PROFIBUS-DP Cable, including SUB-D 9 female connector, (MM indicates length greater than 3 m)

Spare Parts

32965	Locking Key, for wall instruments
32970	Cap, to protect USB connector
32966	Power Supply Connector, 85 to 260 Vac
32975	Power Supply Connector, 10 to 30 Vdc
32531.03	Ethernet Cable, including connectors, 3 m
32531.10	Ethernet Cable, including connectors, 10 m
32531.20	Ethernet Cable, including connectors, 20 m
32533.03	USB Client Cable, including connectors, 3 m
G1100-F6	Complete Flow Chamber, for G1100 sensors, 6-mm fittings

Calibration Gas Bottles Suppliers

N₂ gas bottle, quality 99.999%. Min. 20 liters recommended, but max 70 bars. The regulator included with the G1100 LDO system is a 5/8" x 18 thread. Use non-refillable, disposable cylinders.

Calgaz

Air Liquide
821 Chesapeake Drive
Cambridge, MD 21613
800-638-1197 www.calgaz.com
Model 6D Cylinder; request 99.999% N₂
Dimensions = 14x3.25"
Wt. = Approx 3 lbs.
Contents = 58 Liters of gas at 1000 psig

In Canada Call:
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47 Glendonwynne Road Toronto, ON
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In the interest of improving and updating its equipment, Hach Company reserves the right to alter specifications to equipment at any time.

At Hach, it's about learning from our customers and providing the right answers. It's more than ensuring the quality of water—it's about ensuring the quality of life. When it comes to the things that touch our lives...

Keep it pure.

Make it simple.

Be right.

For current price information, technical support, and ordering assistance, contact the Hach office or distributor serving your area.

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www.hach-lange.com



Be Right™

Hach Orbisphere K1100 Luminescent Dissolved Oxygen Sensor with Orbisphere 410 Controller



*The K1100 is virtually maintenance-free
requiring only one calibration and
two minutes of maintenance per year.*

Luminescent Dissolved Oxygen

PW

IW

Features and Benefits

One Calibration Per Year

One zero point calibration per year is all that is needed with the K1100 sensor. Traditional electrochemical (EC) sensors display significant drift after only a few months, demanding regular re-calibration and substantial operator time. Due to its luminescent technology, the K1100 sensor is designed for minimal drift, resulting in it being the most stable sensor with the longest calibration interval in the industry.

No Membranes = Two Minutes of Maintenance

With no membranes to replace and no electrolyte solution to replenish, the K1100 is virtually maintenance-free requiring only two minutes of maintenance per year. Sensor accuracy is unaffected by process changes or low flow events with no polarization time, eliminating unnecessary operator interventions. In addition, corrosive or hazardous chemicals are not required, making the annual task faster, easier and safer without reducing measurement precision.

Low Cost Retrofit

The complete system consists of a 410 Controller, a flow chamber, and the K1100 Luminescent Dissolved Oxygen Sensor. The sensor is compatible with Hach Orbisphere 28 mm flow chambers previously used with EC sensors, eliminating the need for engineering changes to weld, add, and test new connections—an ideal retrofit. The installation is fast and easy and does not require special preparation. The plug-and-play sensor is immediately ready for measurement.

A New Level of Confidence

The K1100 optical sensor is the first to use luminescent measurement technology to measure low level oxygen in power plants. Since 1978, when the first patent on EC sensors was granted, Hach Orbisphere sensors have set the industry standard for oxygen measurement by delivering confidence to every water chemistry manager. The new K1100 maintains this tradition and offers significant operating and cost benefits.

DW = drinking water WW = wastewater municipal PW = pure water / power
IW = industrial water E = environmental C = collections FB = food and beverage



Be Right™

Specifications*

Orbisphere K1100 Luminescent Dissolved Oxygen Sensor

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)

Orbisphere 410 Controller

Enclosures

Wall (pipe) mount, stainless steel, IP65,
NEMA 4X

Panel mount, aluminum, IP65

Certifications

Electromagnetic compatibility standards:
EN61326:1997 /A1:1998 /A2:2001
/A3:2003

Safety standard: EN61010-1: 2001
Directive 73/23/EEC

Safety rating ETL, conforming to
UL 61010-1 and CSA 22.2 No. 61010-1

Display

Monochrome STN 320 x 240 pixels with
LED backlight

Analog Outputs

3 smart 0/4 – 20 mA (500 ohms),
programmable as linear or tri-linear,
configurable to send diagnostics or
alarm information

Relays

3 measurement alarm relays
(2A-30 Vac or 0.5A-50 Vdc), configurable
to send diagnostics information

1 system alarm relay
(2A-30 Vac or 0.5A-50 Vdc)

Digital Communication

RS485
Profibus DP (optional)
Ethernet
USB-client to download data and from a
computer
USB-host to download data with a USB
memory stick

Data Storage

Rolling buffer or store once mode for up
to 1000 measurements and 1000
operator actions

Holds calibration records for the last
10 calibrations

User Interface

Touch-screen panel displays
concentration, trend graph, diagnostics,
alarm status, historical data

Password Protection

5 levels of authorized access to
configuration and data management

Operating Temperature

-5 to 50°C (23 to 122°F)

Relative Humidity

0 to 95%, non-condensing

Power

Universal 85-264 Vac @ 50/60 Hz,
25 VA; 10-36 Vdc, 25 W

Dimensions

Wall (pipe) mount transmitter (h x w x d):
230.5 mm x 250 mm x 160 mm
(9.31 x 9.84 x 6.30 in.)

Panel mount transmitter (h x w x d):
156 mm x 220 mm x 250 mm
(6.14 x 8.86 x 9.84 in.)

K1100 28 mm sensor:
48 mm x 144.1 mm (1.89 x 5.67 in.)

Weight

Wall (pipe) mount transmitter:
3.8 kg (8.4 lbs.)

Panel mount transmitter:
2.9 kg (6.4 lbs.)

K1100 28 mm sensor:
0.7 kg (1.6 lbs.)

*Specifications subject to change without notice.

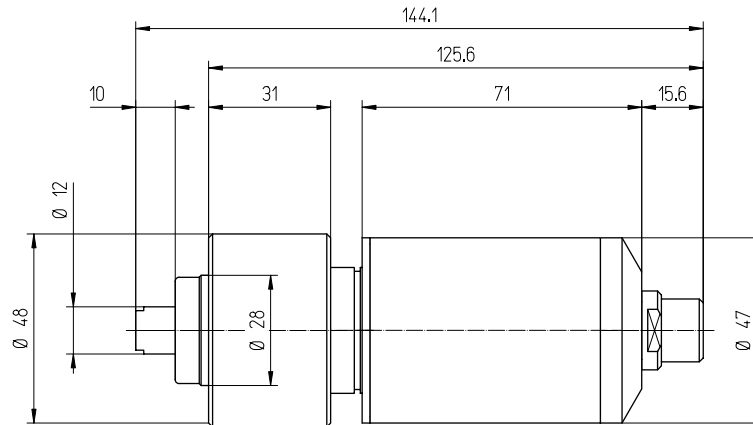
Engineering Specifications

- The sensor shall continuously measure the concentration of oxygen (O₂) in de-aerated water.
- The measurement technology shall be luminescent measurement technology.
- The measuring range shall be from 0 to 2000 ppb O₂.
- The minimum detection limit shall be 0.6 ppb O₂.
- The accuracy shall be ±0.8 ppb or 2% of the measured value, whichever is greater.
- The response time (90%) shall be less than 10 seconds for gas phase and less than 30 seconds for water process.
- The calibration method for the sensor shall be gas phase calibration.
- The calibration frequency should be of 12 months or better with a measurement interval of 2 seconds.
- The sensor shall be model Orbisphere K1100 Luminescent Dissolved Oxygen Sensor manufactured by Hach Company.

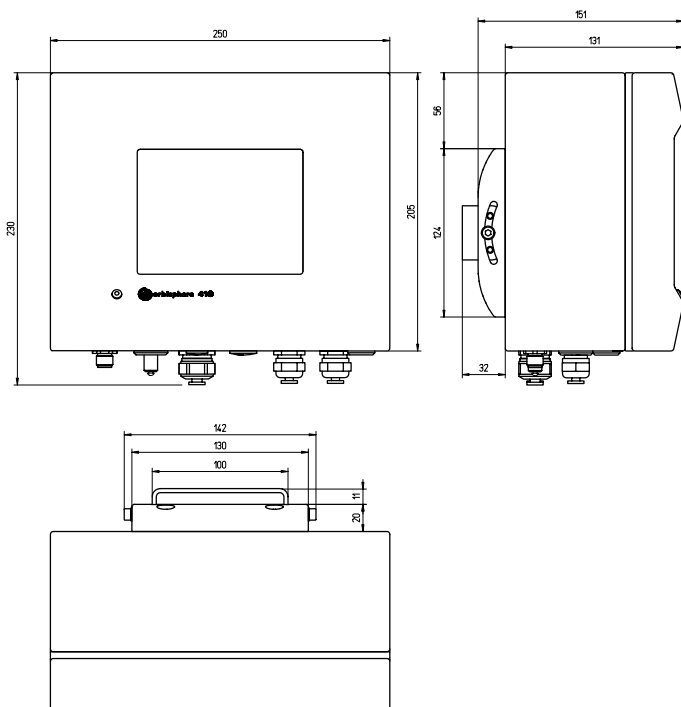
Dimensions

Dimensions in millimeters.

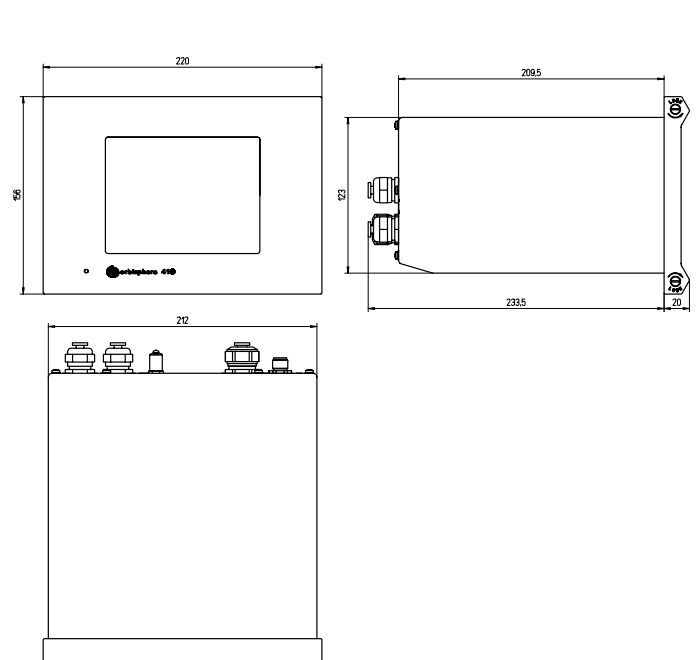
Sensor



Controller (Wall / Pipe Mount)



Controller (Panel Mount)



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.

Ordering Information

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

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 5 m (16.4 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

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