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 µg/kg O₂, 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.

**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, Profieldus 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*

<table>
<thead>
<tr>
<th>Specification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Measuring Range</strong></td>
<td>0 to 20,000 ppb</td>
</tr>
<tr>
<td><strong>Repeatability</strong></td>
<td>±1 ppb + 2% in the 0 to 600 ppb range</td>
</tr>
<tr>
<td><strong>Reproducibility</strong></td>
<td>±2 ppb + 2.5% in the 0 to 600 ppb range</td>
</tr>
<tr>
<td><strong>Detection Limit</strong></td>
<td>2 ppb</td>
</tr>
<tr>
<td><strong>Response Time</strong></td>
<td>30 seconds (t = 90%)</td>
</tr>
<tr>
<td><strong>Resolution (display)</strong></td>
<td>0.1 ppb</td>
</tr>
<tr>
<td><strong>Calibration</strong></td>
<td>Fully automatic user programmable single point zero calibration</td>
</tr>
<tr>
<td><strong>Calibration Sample</strong></td>
<td>Standard 99.999% nitrogen (quality 50) gas bottles with 5/8-in. x 18 (C10) connection.</td>
</tr>
<tr>
<td><strong>Verification</strong></td>
<td>Fully automatic user programmable single point zero verification</td>
</tr>
<tr>
<td><strong>Ambient Temperature</strong></td>
<td>5 to 50°C (41 to 122°F)</td>
</tr>
<tr>
<td><strong>Ambient Relative Humidity</strong></td>
<td>0 to 95%, non-condensing</td>
</tr>
<tr>
<td><strong>Sample Temperature</strong></td>
<td>5 to 45°C (41 to 113°F) [sensor resistant to temperature from -5 to 100°C (23 to 212°F)]</td>
</tr>
<tr>
<td><strong>Sample Pressure</strong></td>
<td>1 to 4 bar abs (14.5 to 58 psig)</td>
</tr>
<tr>
<td><strong>Sample Flow Rate</strong></td>
<td>20 to 200 mL/min</td>
</tr>
<tr>
<td><strong>Sample Connection</strong></td>
<td>6 mm (1/4-in.) tubing</td>
</tr>
<tr>
<td><strong>Power Supply</strong></td>
<td>Universal 85 to 264 Vac (50/6 0Hz, 25 VA) or 10 to 36 Vdc (25 W)</td>
</tr>
</tbody>
</table>

**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.

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**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 \(O_2\).
4. The minimum detection limit shall be 0 ppb \(\pm 2\) ppb \(O_2\).
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**
- **Panel Mount Transmitter**
- **Sensor**
## Ordering Information

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>41G1-W400</td>
<td>Hach Orbisphere Luminescent Oxygen Analyzer, wall/pipe mount</td>
</tr>
<tr>
<td>410/G/W1C00000</td>
<td>410 Oxygen (Luminescent G sensor) instrument, wall mount</td>
</tr>
<tr>
<td>G1100-300</td>
<td>Luminescent Oxygen Sensor, for pure water applications, with 3 meter cable</td>
</tr>
<tr>
<td>G1100-F4</td>
<td>Complete Flow Chamber, for G1100 sensors, 1/4-in. fittings</td>
</tr>
<tr>
<td>33015</td>
<td>Pressure Reducer, for calibration gas bottles with 0.1-L/min flow, 5/8-in.</td>
</tr>
<tr>
<td>33021</td>
<td>Spare Parts Kit, 2 years, for G1100 sensors and flow-chambers</td>
</tr>
<tr>
<td>33022</td>
<td>Tool Kit, for G1100 sensors</td>
</tr>
</tbody>
</table>

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

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>410/G/P1C00000</td>
<td>410 Oxygen (Luminescent G sensor) instrument, panel mount</td>
</tr>
</tbody>
</table>

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

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

### Spare Parts

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

### Calibration Gas Bottles Suppliers

\[ \text{N}_2 \text{ gas bottle, quality } 99.999\%. \text{ Min. 20 liters recommended, but max 70 bars.} \]

The regulator included with the G1100 LDO system is a 5/8" x 18 thread. Use non-refillable, disposable cylinders.

## Calgaz

### Air Liquide

- 821 Chesapeaks Drive
- Cambridge, MD 21613
- 800-638-1197 www.calgaz.com

**Model 6D Cylinder**
- request 99.999% \( \text{N}_2 \)
- Dimensions = 14x3.25"
- Wt. = Approx 3 lbs.
- Contents = 58 Liters of gas at 1000 psig

In Canada Call:
- Pegram Technologies Inc.
- 47 Glendonwyne Road Toronto, ON M6P 3E5
- (416) 766-9171 sales@pegram.ca

In Europe, the Middle East, and Mediterranean Africa, contact:

- HACH LANGE GmbH
- Willstätterstraße 11
- D-40549 Düsseldorf
- GERMANY
- Tel: +49 (0) 211 5288-0
- Fax: +49 (0) 211 5288-143
- E-mail: info@hach-lange.de
- www.hach-lange.com
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.
## Specifications

### Orbisphere K1100
**Luminescent Dissolved Oxygen Sensor**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Range</strong></td>
<td>0 to 2000 ppb (dissolved O(_2))</td>
</tr>
<tr>
<td><strong>Repeatability</strong></td>
<td>±0.4 ppb or 1%, whichever is greater</td>
</tr>
<tr>
<td><strong>Reproducibility</strong></td>
<td>±0.8 ppb or 2%, whichever is greater</td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>±0.8 ppb or 2%, whichever is greater</td>
</tr>
<tr>
<td><strong>Limit of Detection (LOD)</strong></td>
<td>0.6 ppb, minimum</td>
</tr>
<tr>
<td><strong>Response Time (90%)</strong></td>
<td>&lt; 10 s (gas phase)</td>
</tr>
<tr>
<td></td>
<td>&lt; 30 s (in water)</td>
</tr>
<tr>
<td><strong>Display Resolution</strong></td>
<td>0.1 ppb</td>
</tr>
<tr>
<td><strong>Calibration</strong></td>
<td>Single point zero calibration</td>
</tr>
<tr>
<td><strong>Calibration Sample</strong></td>
<td>Standard 99.999% nitrogen (quality 50) or equivalent oxygen free gas</td>
</tr>
<tr>
<td><strong>Sample Temperature</strong></td>
<td>-5 to 50°C (23 to 122°F)</td>
</tr>
<tr>
<td><strong>Sample Pressure</strong></td>
<td>1 to 20 bar abs (14.5 to 290 psia)</td>
</tr>
<tr>
<td><strong>Storage Temperature</strong></td>
<td>-5 to 100°C (23 to 212°F)</td>
</tr>
</tbody>
</table>

### Orbisphere 410 Controller

**Enclosures**
- Wall (pipe) mount, stainless steel, IP65, NEMA 4X
- Panel mount, aluminum, IP65

**Certifications**
- 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)

**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

### 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 8.66 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.)

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**Engineering Specifications**

1. The sensor shall continuously measure the concentration of oxygen (O\(_2\)) in de-aerated water.
2. The measurement technology shall be luminescent measurement technology.
3. The measuring range shall be from 0 to 2000 ppb O\(_2\).
4. The minimum detection limit shall be 0.6 ppb O\(_2\).
5. The accuracy shall be ±0.8 ppb or 2% of the measured value, whichever is greater.
6. The response time (90%) shall be less than 10 seconds for gas phase and less than 30 seconds for water process.
7. The calibration method for the sensor shall be gas phase calibration.
8. The calibration frequency should be of 12 months or better with a measurement interval of 2 seconds.

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*Specifications subject to change without notice.*
**Dimensions**

Dimensions in millimeters.

**Sensor**

![Sensor Diagram]

**Controller (Wall / Pipe Mount)**

![Controller (Wall / Pipe Mount) Diagram]

**Controller (Panel Mount)**

![Controller (Panel Mount) Diagram]

**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

In Canada Call:
Pegram Technologies Inc.
47 Glendonwynne Road Toronto, ON
M6P 3E5
(416) 766-9171  sales@pegram.ca

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.

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U.S.A.
Telephone: 800-227-4224
Fax: 970-669-2932
E-mail: orders@hach.com
www.hach.com

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Loveland, Colorado 80539-0389
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