

ORBISPHERE K1200 LUMINESCENT DISSOLVED OXYGEN SENSOR FOR NUCLEAR APPLICATIONS

Applications

- Nuclear Power



511 Monochannel System (O₂)

511 Bichannel System (O₂ & H₂)

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

The Orbisphere K1200 optical sensor in combination with the Orbisphere 511 controller offers a new way of monitoring oxygen in power plants. With the 511 dual-channel Orbisphere Controller, oxygen and hydrogen can also be monitored in parallel. Orbisphere sensors set the industry standards for oxygen measurement by offering peace of mind to every water chemist. One calibration and two minutes of maintenance per year helps maintain the ALARA principles.

One calibration per year

One zero point calibration per year is all that is needed with the K1200 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 K1200 sensor is designed for minimal drift, resulting in it being the most stable sensor with the longest calibration interval in the nuclear industry.

No membranes = two minutes of maintenance

With no membranes to replace and no electrolyte solution to replenish, the K1200 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 radioactive zones. 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 Controller, a flow chamber, the K1200 Luminescent Dissolved Oxygen Sensor and a 312xx Hydrogen Sensor for parallel measurement. The sensor is compatible with Hach Orbisphere 28 mm flow chambers, eliminating the need for engineering changes. The installation is fast and easy and does not require special preparation.

A new level of confidence

The K1200 optical sensor is the first to use luminescent measurement technology to measure low level oxygen in nuclear 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 K1200 maintains this tradition in the nuclear industry and offers significant operating and cost benefits.

Technical Data*

K1200 (Low Level Sensor)

Range	0 to 2000 ppb dissolved O ₂ (DO)
Temperature Range	Accurate from -5 to 50 °C (23 to 122 °F) Resistant to temperature from -5 to 100 °C (23 to 212 °F)
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
Lower Limit of Detection (LOD)	0.6 ppb
Response Time	(90%) <10 s (gas phase); <30 s (liquid phase)
Display Resolution	0.1 ppb
Calibration	Single point zero calibration with standard 99.999% nitrogen (quality 5.0) or equivalent oxygen free gas
Sample Pressure	1 to 20 bar absolute (14.5 to 290 psi)

K1200 (High Level Sensor)

Range	0 to 40 ppm dissolved O ₂ (DO)
Temperature Range	Accurate from -5 to 50 °C (23 to 122 °F) Resistant to temperature from -5 to 100 °C (23 to 212 °F)
Repeatability	± 0.015 ppm or 2 % whichever is greater
Reproducibility	± 0.02 ppm or 3 % whichever is greater
Accuracy	± 0.02 ppm or 3 % whichever is greater
Lower Limit of Detection (LOD)	0.015 ppm
Response Time	(90%) <10 s (gas phase); <50 s (liquid phase)
Display Resolution	0.1 ppb
Calibration	Two points at cap replacement (zero and air), one during use (air)
Sample Pressure	1 to 20 bar absolute (14.5 to 290 psi)
Radiation Resistance Level	Sensor body + cap (SS 316L): >>10 MGy LDO Spot (Silicone): 10 kGy O-Ring (MVQ): 0.4 to 0.5 MGy It is advised to replace the active spot annually.

Orbisphere 511 Controller

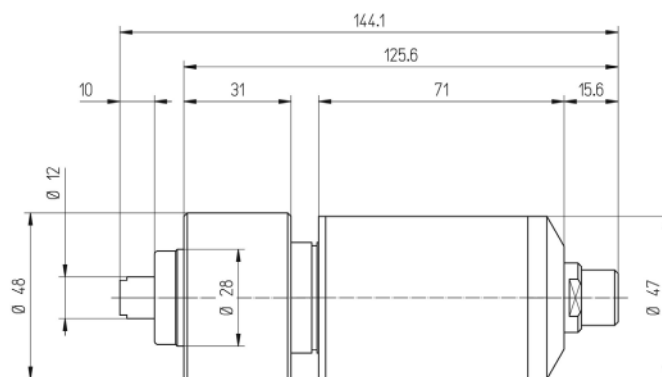
Enclosure Construction	Wall (pipe) mount: stainless steel Panel mount: aluminum
Enclosure Rating	Wall (pipe) mount: IP65, NEMA 4x Panel mount: IP65
Compliance Certifications	EMC: EN61326-1:2006 CE: EN61010-1:2010 ETL, conforming to UL 61010-1 and CSA 22.2 No. 61010-1
Display	Color TFT touchscreen display
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 to 30 VAC or 0.5 A to 50 VDC); configurable to send diagnostics information 1 system alarm relay (2 A to 30 VAC or 0.5 A - 50 VDC)
Communication	RS485 Profibus DP Ethernet USB-host to download data with a USB memory stick
Data Storage	Rolling buffer or store once mode for up to 10000 measurements and 1000 operator actions Holds calibration records for last 50 calibrations
User Interface	Touch screen panel displays: concentration, trend graph, diagnostics, alarm status, historical data
Dimensions (H x W x D)	Wall dimensions: 230.5 mm x 250 mm x 160 mm (9.1 in x 9.8 in x 6.3 in) Panel dimensions: 156 mm x 220 mm x 253.5 mm (6.14 in x 8.86 in x 9.84 in)
Power	Universal 100/240 VAC @ 50/60 Hz, 25 VA 10-36 VDC, 25 W

*Subject to change without notice.

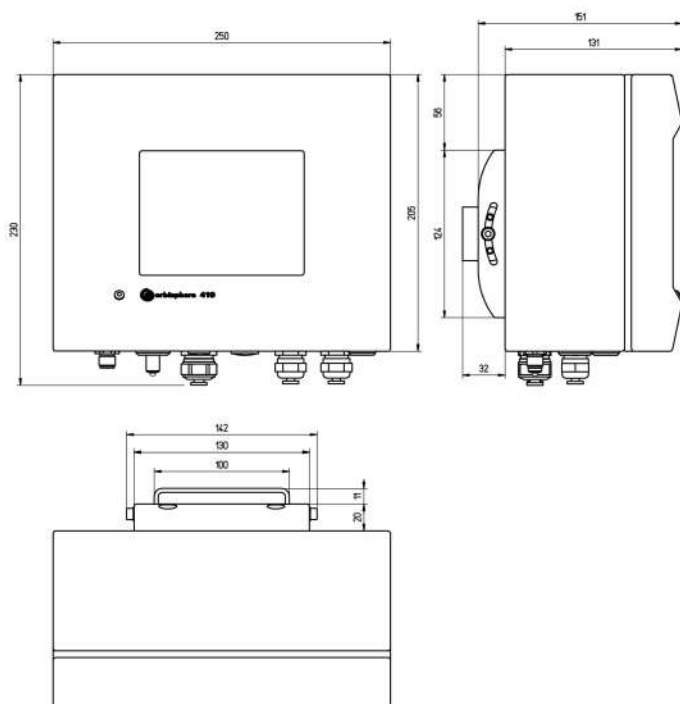
Dimensions

In millimeters.

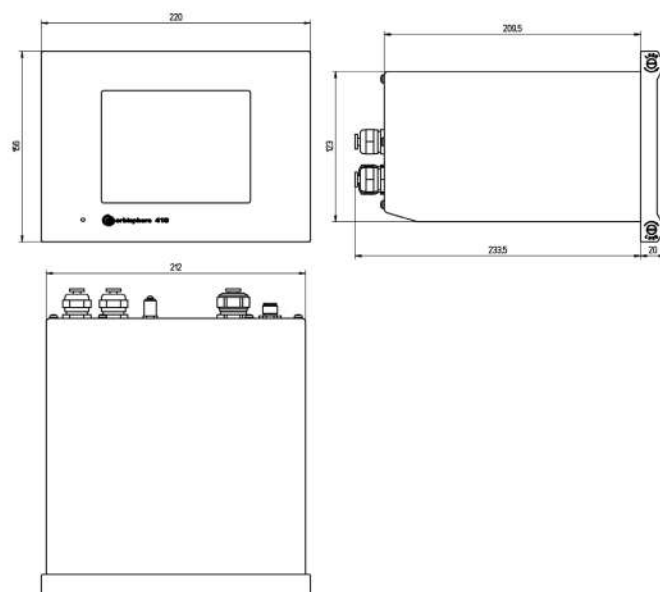
Sensor



Controller (Wall / Pipe Mount)



Controller (Panel Mount)



Order Information

Controllers and sensors for monochannel system for oxygen measurement only

511K00/W1C10000	Hach Orbisphere 511 Controller (Wall Mount)
511K00/P1C10000	Hach Orbisphere 511 Controller (Panel Mount)
K1200-S00	Luminescent oxygen sensor for nuclear applications, 0 - 2000 ppb, with 28 mm Orbisphere fitting
K1200-S00H	Luminescent oxygen sensor for nuclear applications, 0 - 40 ppm, with 28 mm Orbisphere fitting

Controllers and sensors for bichannel system for oxygen and hydrogen measurement only

511FK0/W1C1P0N0	Hach Orbisphere 511 Controller for O ₂ (LDO) and H ₂ (TC) measurement (Wall Mount)
511FK0/P1C1P0N0	Hach Orbisphere 511 Controller for O ₂ (LDO) and H ₂ (TC) measurement (Panel Mount)
31250GP	Standard hydrogen TC sensor with nitrogen purge and protection cap (20 bar)
K1200-S00	Luminescent oxygen sensor for nuclear applications, 0 - 2000 ppb, with 28 mm Orbisphere fitting
K1200-S00H	Luminescent oxygen sensor for nuclear applications, 0 - 40 ppm, with 28 mm Orbisphere fitting

Pre-configured systems:

DGK511FK-W1123	Kit containing K1200-S00 sensor, 31250 hydrogen TC sensor, 511FK0/W1C1P0N0 controller, 3 m cable
DGK511FK-P1123	Kit containing K1200-S00 sensor, 31250 hydrogen TC sensor, 511FK0/P1C1P0N0 controller, 3 m cable

Accessories

K1200-L	Replacement luminescent spot for low range nuclear sensors (0 - 2000 ppb)
K1200-H	Replacement luminescent spot for high range nuclear sensors (0 - 40 ppm)
32001.011	Flow chamber in stainless steel (316) with ¼" fittings. Supplied with EPDM O-rings.
32001.010	Flow chamber in stainless steel (316) with 6 mm fittings. Supplied with EPDM O-rings.
32002.010	Multi parameter flow chamber in stainless steel with 6 mm fittings. Supplied with EPDM O-rings.
32002.011	Multi-parameter flow chamber in stainless steel with ¼" fittings. Supplied with EPDM O-rings.
28117GP	Pressure sensor, 0 to 5 bar absolute (for gas phase applications)
32547.05	External pressure sensor cable, 5 m (16.4 ft.)
32510.05	Sensor cable to connect M/K-type sensors, 5 m (16.4 ft.)
32505.05	Sensor cable to connect 31xxx and x1100 EC type sensors, 5 m (16.4 ft.)
32739	Maintenance Kit for high pressure hydrogen TC sensor. Includes membranes 29561A, membrane holding ring 29228.01, kit 29082, and tools for sensor maintenance.
32741	Maintenance Kit for hydrogen TC sensors with 29108 protection cap. Includes membranes 2952A, membrane holding ring 29228.01, kit 29082, and tools for sensor maintenance.

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