INFORMATION
PROCESS ANALYSIS
LUMINESCENT OXYGEN SENSOR
ORBISPHERE K1100

Optical sensor technology for power industry

ORBISPHERE K1100 luminescent oxygen sensor

HACH LANGE

UNITED FOR WATER QUALITY

Oxygen monitoring in power plants

The ORBISPHERE K1100 optical sensor together with the ORBISPHERE 410 controller offers a new way of monitoring oxygen in power plants. ORBISPHERE sensors set the industry standards for oxygen measurement by offering “peace of mind” to users. The ORBISPHERE K1100 maintains this tradition and offers significant operating and cost benefits.

- **Optical technology eliminates membrane and electrolyte to minimise maintenance**
- **Fast response and annual calibration**
- **Accuracy in ppb oxygen measurement for effective process control**

Optical technology eliminates membrane and electrolyte

The absence of membrane and electrolyte means that the sensor accuracy is unaffected by process changes such as changes in flow. Maintenance and operating costs are significantly reduced. The sensor has been designed to ensure mechanical robustness to extend operational lifetime and optimise its total cost of ownership.

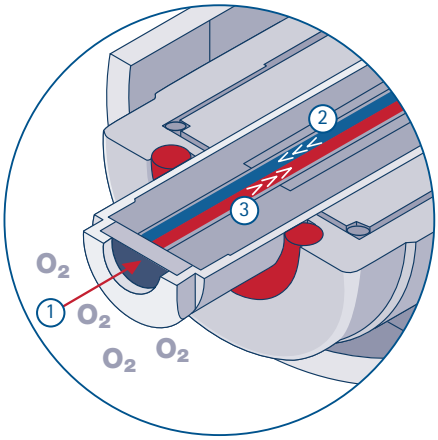
2 second measurement frequency

The quick response time comes from the ORBISPHERE K1100 two second measurement frequency. Capable of measuring accurately at this frequency over a 12 month period. With no calibration required, the K1100 surpasses other optical and electrochemical sensors that display significant drift after only a few months in the same conditions. This optical sensor is designed for minimal drift, resulting in it being the most stable sensor with the longest calibration intervals achievable in the market. This is possible by its long-life spot and optimised controller software.

Maintenance intervention is limited to 2 minutes and a zero point calibration, offering significant cost benefits compared with traditional electrochemical sensors and other luminescent sensors. Using gas phase calibration means chemicals are not required, and therefore the task is easier and safer without reducing measurement precision.

Accuracy in ppb oxygen measurement

This sensor has an unbeatable precision of 0.8 ppb and a limit of detection of 0.6 ppb. Such accurate measurement readings are essential to control low oxygen levels in AVT power plants. This also allows operators to minimise system maintenance whilst being reassured of the oxygen reading accuracy.



Oxygen interacts with the active luminescent sensor

1. Active luminescent spot
2. Blue light (excitation)
3. Red light (detection)

Optical sensor technology

The ORBISPHERE K1100 sensor uses luminescent measurement technology. An active fluorescent spot is excited with blue light and a red luminescent light is detected. The presence of oxygen changes the rate of fluorescence decay and this directly relates to the oxygen partial pressure value.

The complete system

The complete system consists of an ORBISPHERE 410 controller, a flow chamber, and the ORBISPHERE K1100 luminescent sensor. The sensor is compatible with 28 mm insertion devices and flow chambers, therefore minimising retrofit costs.

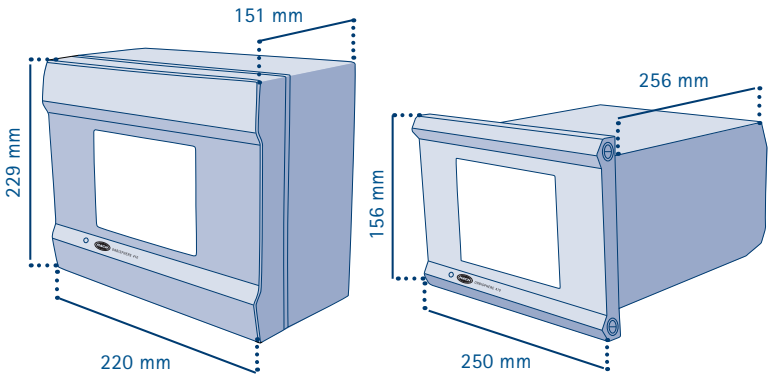
The installation is fast and easy and does not require special preparation. The “plug and play” sensor is immediately ready for measurement.

Diagnostics

The ORBISPHERE 410 controller offers diagnostic features that informs users when a sensor service or calibration is due. This supports optimal preventative maintenance planning. It also notifies users of a system or sensor failure.

All diagnostic information as well as user programmable measurement alarms can be assigned to 1 of the 3 available relays or to 1 of the 3 smart analogue outputs.

Controlling oxygen levels with the ORBISPHERE K1100 and 410 controller



ORBISPHERE 410 instruments are available in two versions.

Wall and pipe version: mounting is facilitated by use of simple to attach brackets that allow adjustment of the instrument to afford optimum screen viewing angle. Panel mount version: "quick and easy" mounting from the front of the panel using concealed screws.

Technical data

Sample	Temperature	Measurement from -5 to 50°C / 23 to 122°F Sensor resistant to temperature from -5 to 100°C / 23 to 212°F	
	Pressure	1 to 20 bar abs (14,5 to 290 psia)	
K1100 Sensor	Range	0 to 2,000 ppb (dissolved)	
	Repeatability	±0.4 ppb or 1%, whichever the greater	
	Reproducibility	±0.8 ppb or 2%, whichever the greater	
	Accuracy	±0.8 ppb or 2%, whichever the greater	
	Limit of detection	(LOD) Down to 0,6 ppb	
	Response time	(90%) <10 s (gas phase); <30 s in water	
	Flow requirement	20 to 200 ml/min (recommended: 100 ml/min)	
	Display resolution	0.1 ppb	
	Calibration	Single point zero calibration	
	Calibration sample	Standard 99.999% Nitrogen (quality 50), or equivalent oxygen free gas	
410 Controller	Enclosures	Wall (pipe) mounting, stainless steel, IP 65, Nema 4×	Panel mounting, aluminium, IP 65
	Certifications	Electromagnetic compatibility standards: EN61326:1997/ A1:1998 / A2:2001 / A3:2003 Safety rating ETL, conforming to UL 61010-1 and CSA 22.2 No. 61010-1 Safety standard: EN61010-1: 2001 Directive 73/23/EEC	
	Display	Monochrome STN 320 × 240 pixels with LED backlight	
	Analogue 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 (1 A – 30 V AC or 0.5 A – 50 V DC) per channel 1 instrument alarm relay (1 A – 30 V AC or 0.5 A – 50 V DC)	
	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 1,000 measurements and 1,000 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: five levels of authorised access to confi guration and data management	
Accessories		Active spots, spare sensors, tool kit, portable calibration setup... ask your local HACH LANGE representative for more details on all available spare parts and accessories	
Installation	In process sensor installation devices	Flow chamber in stainless steel (316) or Delrin with ¼" or 6 mm fittings	
	Ambient temperature	-5 to 50°C (23 to 122°F)	
	Humidity	0 to 95% non-condensing relative humidity	
	Power supply	Universal 85-264 V AC @ 50/60 Hz, 25 VA; 10–36 V DC, 25 W	
Weights	Transmitter	Wall (pipe) mount	3.8 kg
		Panel mount	2.9 kg
	Sensor	K1100 28 mm	0.74 kg
	Calibration	Device (excl. calibration gas)	0.7 kg

Ordering information

410 K / W1C00000	ORBISPHERE 410 Controller (wall mount)	
K1100-S00	ORBISPHERE K1100 28 mm Luminescent Oxygen Sensor compatible with ORBISPHERE insertion devices	
Accessories	32510.05	Sensor cable (5 m)
	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 6mm fittings. Supplied with EPDM O-rings

Pre-configured system information

K1100-KTO-W-IMP	Kit containing K1100-S00 sensor, 410K/W1C00000 controller, 32510.03 3 m cable, 32001.011 ¼" 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

These pre-configured kits also exist in panel version (K1100-KTO-P-IMP, K1100-KTO-P-MET, K1100-KTO-P).
Please discuss your specific needs with a HACH LANGE representative. This data is subject to change without notice.

HACH LANGE GMBH
Willstaetterstrasse 11
D-40549 Duesseldorf
Tel. +49 (0)211 5288-0
Fax +49 (0)211 5288-143
info@hach-lange.de
www.hach-lange.com

DOC063.52.30143.Jul10