User manual for the OLC/OLCT100 detector Explosimeter, toxic gas and oxygen detector

(P/N : NPO100GB rev C)

OLDHAM
An Industrial Scientific Company

INDUSTRIAL SCIENTIFIC

All of the information that is provided in this document is accurate to the best of our knowledge.

As a result of continuous research and development, the specifications of this product may be changed without prior notice.

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Contents

Thank you for choosing this OLDHAM instrument.

All of the necessary actions have been taken in order to ensure your complete satisfaction with this equipment.

It is important that you read this entire manual carefully and thoroughly.

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- INDUSTRIAL SCIENTIFIC OLDHAM shall not be held responsible for any damage to the equipment or for any physical injury or death resulting in whole or in part from the inappropriate use, installation, or storage of the equipment, which is the result of not complying with the instructions and warnings, and/or with the standards and regulations in force.

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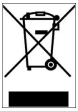
Guarantee

- Under normal conditions of use and on return to the factory, parts and workmanship are guaranteed for 3 years, excluding such consumables as sensors, filters, etc.

Destruction of the equipment



European Union (and EEA) only. This symbol indicates that, in conformity with directive DEEE (2002/96/CE) and according to local regulations, this product may not be discarded together with household waste.

It must be disposed of in a collection area that is set aside for this purpose, for example at a site that is officially designated for the recycling of electrical and electronic equipment (EEE) or a point of exchange for authorized products in the event of the acquisition of a new product of the same type as before.

Chapter 1 | Presentation

Purpose

This range of sensors is designed to detect a particular gas depending on the type of sensor used.

Operating principle

The measurement sensor converts the target gas into voltage or current. This electrical parameter is:

- either conducted directly via a connecting cable to a dedicated central measurement unit (as with the OLC100 explosimeter) that operates on the principle of the Wheatstone bridge. Such a measurement unit is available in the OLDHAM range.
- or amplified, corrected for temperature, linearised, and converted to a 4-20 mA signal (as for the OLCT100) and conducted via a connecting cable to a centralized unit (measurement unit or industrial automation system).

Composition of the detector

A detector comprises the following elements:

Id.	Description
1.	Company label
2.	Cover
3.	PCB protector (for OLCT version).
4.	PCB.
5.	Cable gland inlet.
6.	Enclosure.
7.	Sensor block.
8.	Nozzle.
9.	Ground connection.
10.	LEL sensor (high temperature).

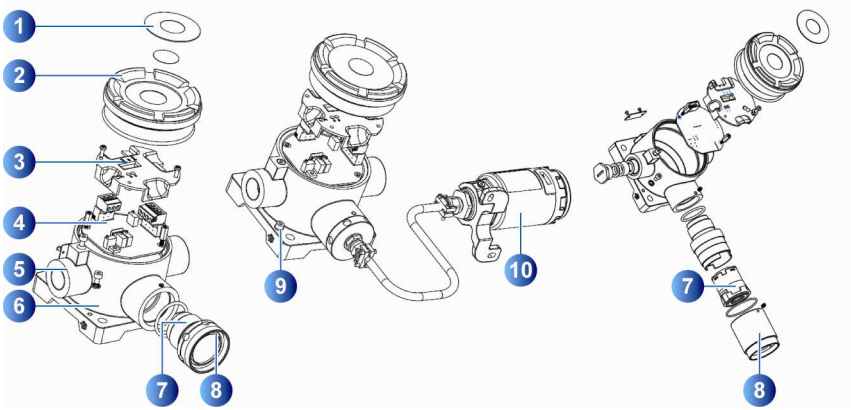
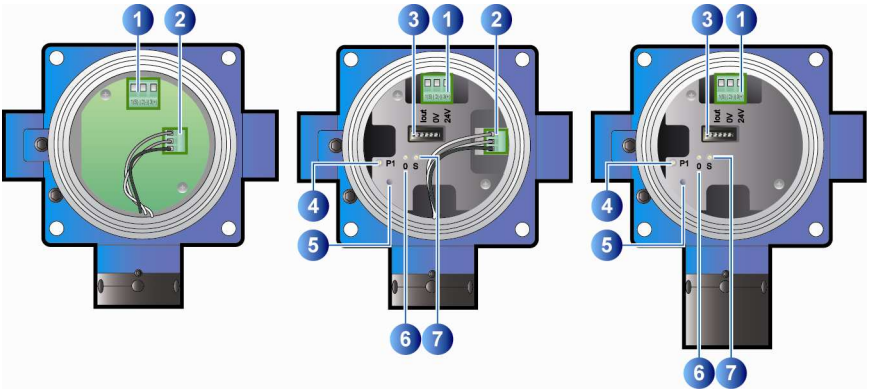


Figure 1 : component parts of an OLCT100 detector.

Internal elements

The following elements are internally accessible to the user:

Id.	Description
1.	Terminal for the cable being connected to the central unit (measurement unit, automation).
2.	Sensor block connector.
3.	Calibration ribbon connector.
4.	4 mA adjustment.
5.	Push button access for 4 mA adjustment.
6.	Zeroing.
7.	Sensitivity adjustment.



OLC100 detector *OLCT100 explosimeter* *OLCT100 detector for toxic gases*

006

Figure 2 : internal view of the detectors.

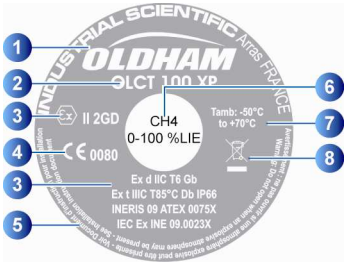
Identifiers

The enclosure has two identifier labels, as described below:

Company label

This in turn groups the detector features together:

Id.	Description
1.	Manufacturer's name
2.	Type of product
3.	ATEX- IECEx Marking
4.	CE symbol and the number of the organisation that provided the OLDHAM production quality certification (INERIS)
5.	Warning.
6.	Type of gas detected and range of measurement
7.	Maximum ATEX certification temperature (excluding metrological performance)
8.	Recycling symbol



008

Figure 3 : Company label.

Side label

This label shows the following :

Id.	Description
1.	Thread diameter and pitch for cable inlet
2.	Detector reference number, less sensor (P/N)
3.	Detector serial number (S/N)

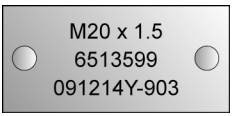


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Figure 4 : side label.

Chapter 2 | Ranges

OLC100 and OLCT100 ranges

The OLC100 range is reserved for the detection of explosive vapor by using a Wheatstone bridge sensor.

The OLCT100 range of detectors is provided with an amplifier producing a 2 or 3 wire 4-20 mA analog output. These are transmitter detectors and, therefore, the letter "T".

	OLC100
Enclosure	Explosion proof
Detection of explosive gases	Yes
Detection of toxic gases	No
Detection of oxygen	No
Detection of CO_2	No
Output	3 voltage wires

Table 1 : OLC100 description.

OLCT100 range (Transmitter type)

	OLCT100XP	OLCT100XP-IR	OLCT100IS	OLCT100HT
Features	Explosionproof	Explosionproof	Intrinsically safe (1)	Explosionproof (2)
Detection of explosive gases	Catalytic sensor (VQ1 or AP 4F) or semi-conductor	Infrared sensor		Catalytic sensor high temperature
Detection of toxic gases	Electrochemical sensor Or SC		Electrochemical sensor	
Detection of oxygen	Electrochemical sensor		Electrochemical sensor	
Detection of CO_2		Infrared sensor		
4-20 mA output	2 wires for EC 3 wires for SC 3 wires for LEL	3 wires	2 wires	3 wires

(1) Mandatory Zener diode in the line
(2) Sensor movable up to 5, 10, or 15 meters using a high temperature cable..
EC : electrochemical sensor..
SC : semi-conductor sensor.
LEL : explosimeter
AP : poison resistant

Table 2 : comparison of OLCT100 series detectors

Chapter 3 | Installation

It is recommended that the guides relating to the installation, use, and maintenance of flammable gas and oxygen detectors (standard EN/IEC 60079-29-2) and toxic gas detectors (standard EN 45544-4) should be clearly understood.

Installation shall be in accordance with the standards in force, classification of the zone, and in conformity with standards EN/IEC 60079-14 and EN/IEC 61241-14, the editions in force, or with other national and/or local standards.

Necessary equipment

- Complete detector assembly
- Requisite connector cable
- Multimeter (intrinsically safe, if necessary)
- Tools
- Fixing hardware

Regulations and conditions of use

- The installation should meet all the regulations currently in force for installations in explosive atmospheres, in particular the standards IEC/EN 60079-14 and IEC/EN 60079-17 (whichever editions are in force) or in accordance with other national standards.
- Generally speaking, the ambient temperature, supply voltage, and power that are mentioned in this document relate to explosion safety. **This has nothing to do with the operating temperatures of the detector.**

- The instrument is authorized for use in zones 1, 2, 21, and 22 at ambient temperatures varying from -50℃ to + 70℃.
- The detector sensor in the transmitter should always be in contact with the ambient air. Therefore:
  - Do not cover the detector.
  - Do not paint the detector.
  - Avoid dust.

Electrical power supply

Type of detector	Supply (V DC)	Maximum current (mA)	Power consumed (mW)
OLCT100 XP HT	15,5 to 32	110	1705
OLCT100 XP LEL	15,5 to 3,2	100	1550
OLCT100 XP IR	15,5 to 32	60	930
OLCT100 XP EC	10 to 32	23,5	235
OLCT100 XP SC	15,5 to 32	100	1550
OLC100	By Oldham central unit	340	(1)

(1) Depends on the central measurement unit.

Transfer curve

The curve shown gives the transmitter output current as a function of the gas concentration. If the user connects the transmitter to a unit other than one that is provided by ISC Oldham, they should be certain that the transfer curve is fully compatible with the input characteristics of their equipment to ensure the proper interpretation of the information provided by the transmitter. Similarly, the unit should provide sufficient voltage to compensate for any voltage drop in the cable.

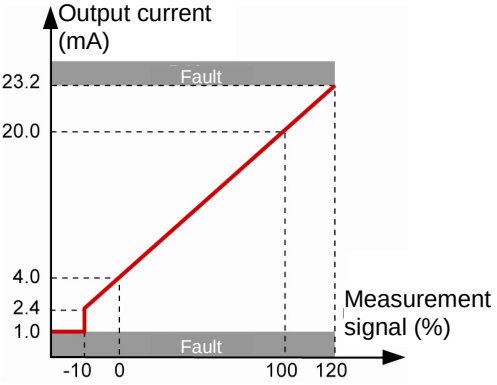


Figure 5: transfer curve for a 4-20 Ma detector

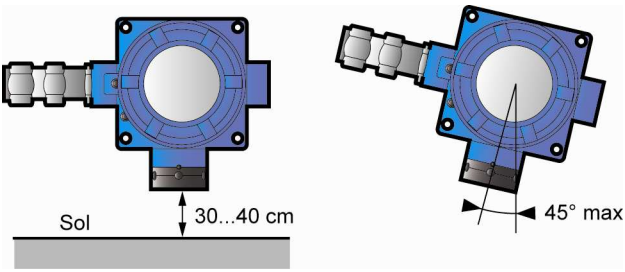
Location of the detector

Depending on the density of the gas to be detected or the application, the detector shall be positioned at the ground level, or on the ceiling at the same height as the airflow, or near to the air extraction ducts. Heavy gases may be detected at the ground level, while light gases will be found at ceiling height. Gas densities are provided on page 30.

Detector positioning

The detector shall be installed with the detector sensor pointing downwards.

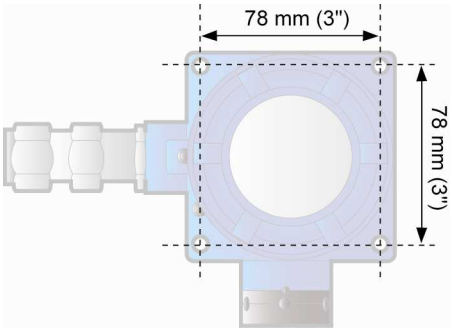
For explosive gas detectors only, any tilt of more than 45° from the vertical will lead to an inaccurate measurement.



014

Figure 6 : sensor pointing downwards (left) and maximum tilt angle for an explosimeter (right).

Fixture of the enclosure shall be secured with 4 x M6 screws and the appropriate plugs for the supporting material



016

Figure 7 : fixing template for the enclosure.

A special holder is available for mounting the detector on the ceiling (see section on accessories. In the OLCT100 HT version, only the OLC20 HT removable detector head can be used at temperatures from -20°C to + 200°C.

Only the OLCT100 HT enclosure can be used in ambient temperatures from -40°C to + 70°C.

The high temperature cable between the OLCT100 HT enclosure and the OLC20 HT head is integral with the instrument and is not user-replaceable.

The cable should be protected mechanically

Connector cable

The detector shall be connected to the central unit (measurement and automation unit) by a shielded instrumentation cable, armored if necessary. The choice of cable will be dictated by the particular requirements of the installation, distance, and type of detector (see table below).

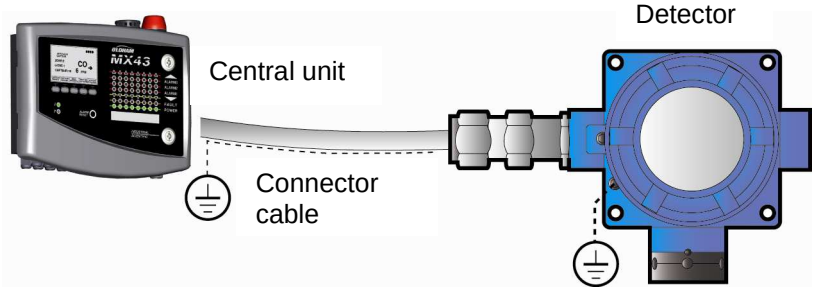


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Figure 8: the cable connecting the detector to the central unit should be chosen with care.

018

Type of detector	Type of sensor	Maximum length (km) for cable of cross-section as indicated			Maximum load resistance for 4-20 Ma
		0,5 mm²	0,9 mm²	1,5 mm²	
Upstream line voltage (Vcc)		24	24	24	
OLCT100 XP	Catalytic or semiconductor	0,8	1,4	2,4	250
OLCT100 XP (1)	Electrochemical	<4	<4	<4	
OLCT100 XP-IR	Infra-red	1,4	2,6	4,4	250
OLCT100 IS (2)	Electrochemical	1,8	3,3	<4	
OLCT100 HT	Catalytic, high temperature	0,8	1,4	2,4	250

(1) for resistance calculations, the assumed load is 120 Ω for 4-20 Ma.

(2) for resistance calculations, the assumed load is 120 Ω for 4-20 Ma, and a 300 Ω Zener blocking diode.

Warning: all wiring should meet the installation standards and should be described in a system document for SI installations

The cable must have a braided screen to reduce the influence of electrical and radio-frequency interference. A cable such as AFNOR M 87-202 01-IT-09-EG-FA (Nexans) may be used. It shall be selected according to the type of detector and in accordance with the table shown hereinabove. Below are further examples of suitable cables:

Non ATEX zone: CNOMO FRN05 VC4V5-F

ATEX zone: GEUELYON (U 1000RHC1)

ATEX zone: GVCSTV RH (U 1000)

ATEX zone: xx-xx-09/15- EG-SF or EG-FA or EG-PF (U 300 compatible with M87202)

The maximum permissible length will depend on the cross-section of the cable conductors (see table) and on the minimum supply voltage.

Cable connection

Switch off line power supply

On the central unit:

1. Inhibit any installation alarms to avoid unexpected triggering during operation.
2. In accordance with the manufacturer's instructions, switch off the power to the module in order to be connected to the detector.

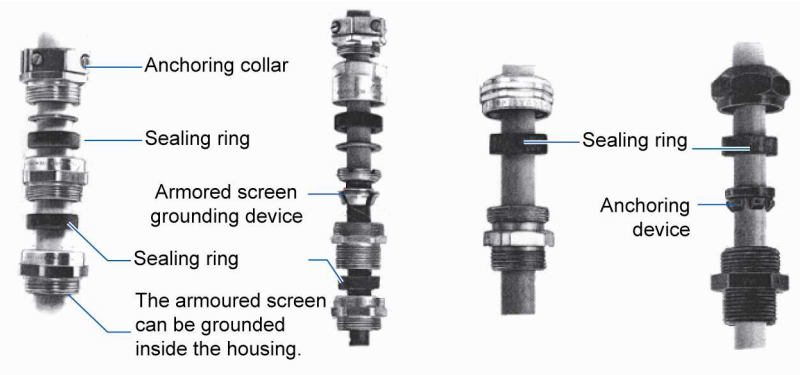
Cable preparation

The cable shall be taken from the central unit (measurement and automation) to the point of measurement (see Figure 8). The passage, support, and protection of the cable shall be according to best practice

Cable passage

It is essential that the instructions provided by the manufacturer of the compression gland are followed and the braided screen is correctly connected.

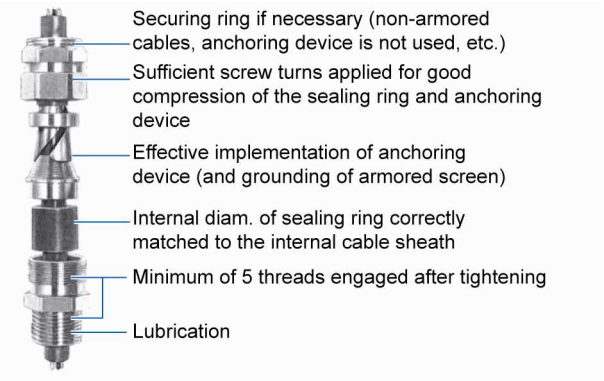
Armored cable ***Unarmored cable***



Note : *If the instructions so indicate, the cable may be anchored either inside the housing, or outside of it, and next to the cable gland*

052

Figure 9 : example of connection of armored and unarmored cable.



054

Figure 10 : implementation of a cable entry type of "simple compression.

Cable connection

The connection of the cable between the detector and central unit should be made with the power off. The site should be at equal potential

Connect the cable to the detector side before connecting the central unit side.

After the wiring has been completed, connect the cable screen to the ground terminal of the central unit.

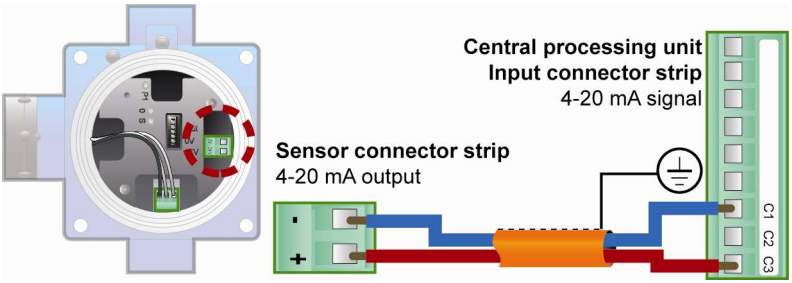


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Figure 11 : connections for a 2-wire 4-20 Ma detector.

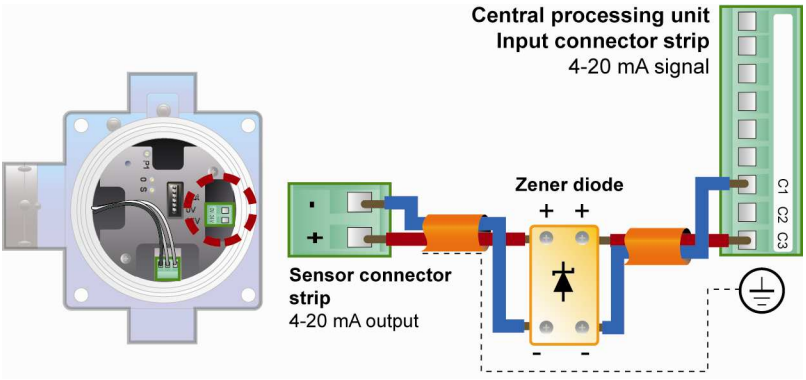

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Figure 12 : connections for an intrinsically safe, 2-wire 4-20 Ma detector with a Zener diode.

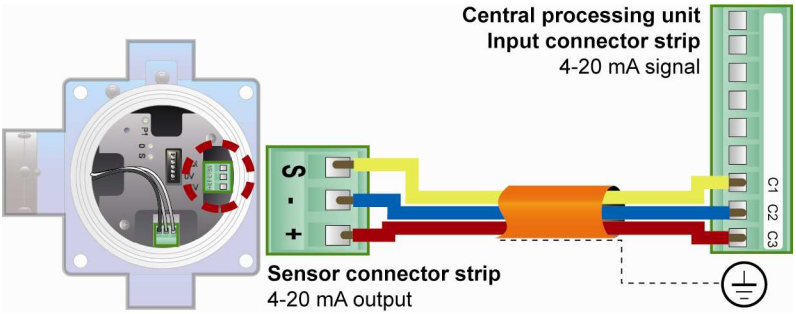

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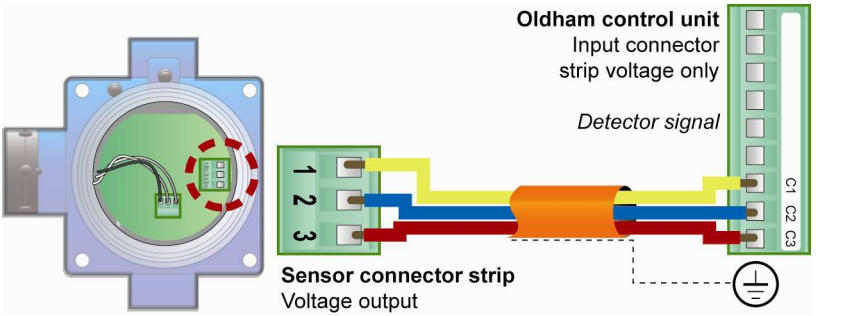
Figure 13 : connections for a 3-wire 4-20 Ma detector.

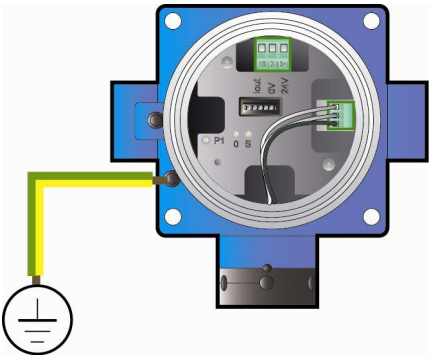


026

Figure 14 : connections for a 3-wire OLC100 type detector

Connecting the enclosure to ground

Connect the enclosure ground terminal to earth according to the regulations. This ground connection may, however, be taken from the terminal on the screw fixing the PCB to the inside of the housing.



028

Figure 15 : Ground connection terminal.

Closing the cover

Before connecting the cable to the terminal on the central unit, it is essential that the cover is completely closed.

Scope of use

The gas detector sensors have certain limitations; it is essential to fully □ecognize these limitations (see chapter 10).

Presence of specific components

- Vapour from silicone or sulphur-containing components can affect the catalytic gas detector sensors and thereby distort the measurements. If the sensors have been exposed to these types of compounds, an inspection or calibration will become necessary.
- High concentrations of organic solvents (e.g. alcohols, aromatic solvents, etc.) or exposure to quantities of gas greater than the specified range of measurement can damage the electrochemical sensors. Inspection or calibration is then recommended.
- In the presence of high concentrations of carbon dioxide (CO_2 > 1% vol.), the oxygen-measuring electrochemical sensors can slightly overestimate the concentration of oxygen (0.1 to 0.5% O_2 overestimate).

Operation under low oxygen levels

- If an electrochemical detector sensor is used in an atmosphere comprising less than 1% oxygen for over one hour, the measurement may be an underestimate.
- If a semiconductor detector sensor is used in an atmosphere comprising less than 10% oxygen, the measurement may be an underestimate.
- If a semiconductor detector sensor is used in an atmosphere comprising less than 18% oxygen, the measurement may be an underestimate.

Chapter 4 | Calibration

The tasks described in this chapter are reserved for authorised trained personnel only, since these tasks are liable to affect detection reliability

This procedure describes:

- 4 mA calibration for 4-20 mA detectors;
- zero adjustment;
- Sensitivity adjustment.

Necessary equipment

- Multimeter (ranges 0-30 mA and 0-2 V), intrinsically safe if necessary.
- Bottle of pure air.
- Bottle of standard gas, of suitable concentration for the measurement range (between 30 and 70% of the measurement range).

Commissioning

Prior checks

Check the following points:

- Wiring completed.
- Detector housing grounded.
- Connection made between the connector cable braided screen and central unit ground.
- Integrity of the mechanical mounting (fixings, cable gland, and cover) ensured.

Powering up detector

1. Inhibit any installation alarms to avoid unexpected triggering during the operation.

2. Connect power to the detector line in accordance with the manufacturer's instructions.

Stabilization time

After mounting, it is essential to allow the detector temperature to stabilize. In addition, after turning the power on, certain sensors require a further pre-heating time. Any adjustment before the time indicated will result in an incorrect measurement, which may in turn compromise the safety of the goods and personnel. The total waiting time is summarised below:

- Explosimeter: 2 hours.
- Oxygen detector: 1 hour.
- Electrochemical detector: 1 hour, excluding
  - NO (nitrogen monoxide): 12 hours.
  - HCl (hydrogen chloride): 24 hours.
  - ETO (ethylene oxide): 24-36 hours.
- Semiconductor sensor: 4 hours.
- Infra-red detector: 2 hour.

Opening the cover

This stage is necessary for the 4 mA check, zeroing, and calibration of the detector. Unscrew the lid of the enclosure by using a tool positioned like a cross.

Since the calibration or disconnection of the cable can only be carried out with the cover removed, certain safety functions cannot be guaranteed. All the necessary steps should be taken before opening the lid of the enclosure if it is installed in an ATEX zone, in particular:

- **A fire permit from the appropriate department.**
- **Continuous use of a portable explosimeter.**
- **Use of an intrinsically safe multimeter.**
- **Reduction to an absolute minimum of the time involved.**

This observation does not concern intrinsically safe versions that are used in an ATEX gas zone (see chapter XI).

Calibrating the OLC100

The cover of the detector remains closed, with any adjustments being carried out at the central measuring unit.

For an explosimeter, it is recommended that the detector should be calibrated by using the gas to be detected. If the user would like to calibrate the detector with a gas other than that detected and programmed in the factory, reference should be made to the table on page 30 by using the recommended gas and corresponding coefficient.

Zeroing

Proceed as follows :

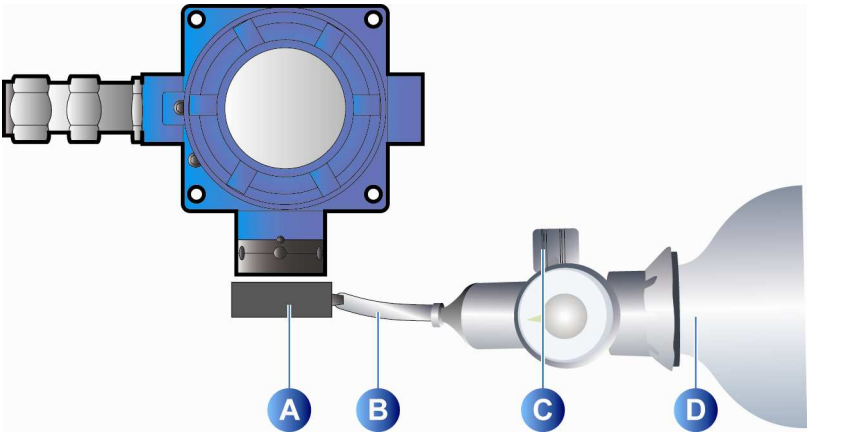


Figure 16 : Zeroing (OLC100).

1. Inhibit any alarm signals on the central unit.
2. Place the calibration shroud onto the detector head (Figure 16, "A").
3. Connect the calibrator shroud to the pure air bottle "D" using a flexible hose "B".
4. Open the valve on the pure air bottle (flow rate 30 to 60 litres/hr) "C".
5. After the measurement has stabilised (approx. 2 minutes), read the display of the central measuring unit.

   A displayed figure of "0.0" corresponds to 0% gas.
6. If a different value is displayed, adjust the "0" on the measuring unit to correct the value until a reading of exactly 0.0% is obtained.
7. Close the valve "C" on the bottle. Remove the calibration shroud "B" if no sensitivity control is necessary.

8. Reset any alarm signals on the central unit.

Adjustment of gas sensitivity

This procedure takes place after the zeroing stage:

1. Inhibit any alarm signals on the central unit.
2. Place the calibration shroud on the detector head (Figure 17, "A").
3. Connect the calibration shroud to the standard gas bottle "D" by using a flexible hose "B".
4. Open the valve on the standard gas bottle "C" (flow rate 30 to 60 litres/hr).
5. After the measurement has stabilized (approx. 2 minutes), read the display of the central measuring unit.
6. Adjust "S" on the measuring unit in order to display the desired value.
7. Close valve "C" on the bottle and remove the calibration shroud "A".

8 . Walt for the measured signal to return to zero and reset the alarm signals on the central unit.

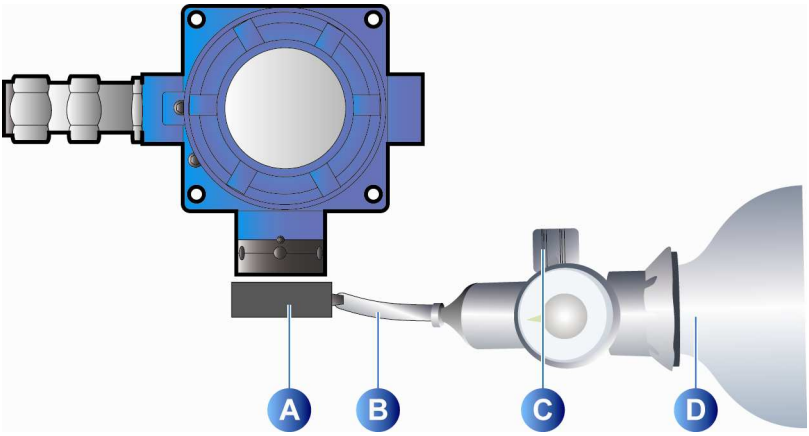
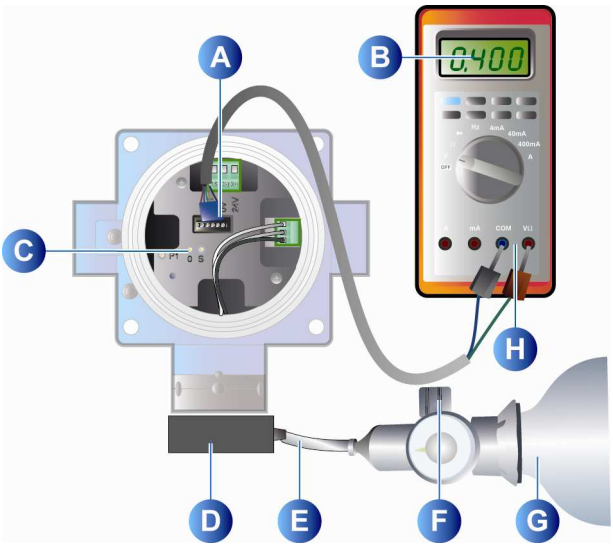


Figure 17 : Sensitivity adjustment (OLC100).

Calibrating the OLCT100

Zeroing (OLCT100)

Proceed as follows:



038

Figure 18 : Zeroing (OLCT100).

Inhibit any alarm signals on the central unit.

2. Insert the blue and green plugs on the measurement lead into the + and - multimeter sockets, respectively (0-2 V range or similar) (Figure 18, "H")
3. Insert the measurement lead plug into connector "A".
4. Place the calibration shroud on the detector head ("D").
5. Connect the calibration shroud to the pure air bottle "G" by using a flexible hose "E".
6. Open the valve "F" on the pure air bottle (flow rate 30 to 60 litres/hr).
7. After the measurement has stabilized (approx. 2 minutes), read the value on the multimeter "B".

   A measurement of 0.4 V corresponds to 4 mA, i.e. 0% gas.

   Note: for the oxygen detector, inject pure nitrogen instead of air.

8. If a different value is displayed, adjust the "0" control ("C") in order to correct the value until 0.4 V is exactly displayed.
9. Close the valve "F" on the bottle. Remove calibration ribbon cable "A", calibration pipe "D", and close the detector again if no sensitivity control is necessary.
10. Reset any alarm signals on the central unit.

Sensitivity adjustment (OLCT100)

For an explosimeter, it is recommended that the detector should be calibrated by using the gas to be detected. If the user would like to calibrate the detector with a gas other than that detected and programmed in the factory, reference should be made to the table on page 30 by using the recommended gas and corresponding coefficient.

This procedure enables the measurement to be adjusted corresponding to x% gas. Proceed as follows

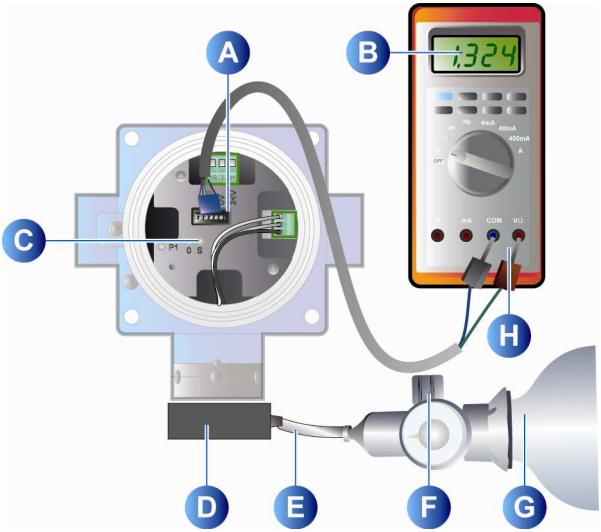


Figure 19 : sensitivity adjustment (OLCT100).

1. Inhibit any alarm signals on the central unit.
2. Insert the blue and green plugs on the measurement lead into the + and - multimeter sockets, respectively (0-2 V range or similar) (Figure 19, "H").
3. Insert the measurement lead into connector "A".
4. Place the calibration shroud on the detector head ("D").

5. Connect the calibration shroud to the standard gas bottle "G" by using a flexible hose "E".

   A stainless steel pressure gauge and Teflon tube must be used for toxic gases and Freons.

   Note: for an oxygen detector, use a bottle of pure air or roughly 19% oxygen.

6. Open the valve "F" on the standard gas bottle (flow rate 30 to 60 litres/hr).

7. After the measurement has stabilized (approx. 2 minutes), read the value on the multimeter.

   Use the following formula to determine the voltage value that is to be displayed:

   $$\text{Voltage displayed (mV)} = 4\text{ mA} + \frac{(16\text{ mA} \times \text{bottle concentration})}{\text{Sensor range}}$$

   For example, for a range of 1000 ppm CO with a standard gas bottle of 300 ppm, the voltage displayed will be:

   $$\text{Voltage displayed (mV)} = 4\text{ mA} + \frac{(16\text{ mA} \times 300)}{1000} = 8.8\text{ mV}$$

8. If a different value is displayed, adjust the "S" control ("C") to correct the value until an exact value of the standard gas is displayed.

9. Close the valve "F" on the bottle. Remove measurement cable "A", calibrate shroud "D", and close the detector again.

10. Wait for the measured signal to return to zero and reset the alarm signals on the central unit.

Calibration coefficients of explosive gases for catalytic detectors
Where an anti-poison 4F type sensor is used (only available for OLCT100), the coefficients are as follows:

Table 3 : Calibration coefficients of explosive gases for catalytic detectors with a 4F sensor.

Gas	Chemical Formula	LEL %	LSE %	Vapor density	CH_4 Coeff	H_2 Coeff	Butane Coeff
Acetone	C_3H_6O	2,15	13,0	2,1	2,24		1,1
Acetylene	C_2H_2	1,5	100	0,9	1,22	1,1	
2-Butanone	C_4H_8O	1,8	11,5	2,5	2,46		1,2
Ethylene	C_2H_4	2,7	34,0	0,98	1,47		
Natural gas	CH_4	5,0	15,0	0,55	1,05		

Cells with a gray background: gases recommended for calibrating the detector

Table 4 : Calibration coefficients of explosive gases for catalytic detectors

Gas name	Molecular Formula	LEL (%)	UEL (%)	Flash point (°C)	Vapor density	Coefficient Calibration gas CH4 (methane)	Coefficient Calibration gas H2 (Hydrogen)	Coefficient - Calibration gas C4H10 (Butane)	Coefficient - Calibration gas C5H12 (Pentane)
Acetone	C3H6O	2,15	13,00	-18	2,1	1,65	1,20	0,90	0,80
Acetylene	C2H2	1,50	100	-18	0,9	2,35	1,75	1,25	1,15
Ammoniac	NH3	15,00	30,20	< -100	0,6	0,90	0,65	0,50	0,45
Butane	C4H10	1,50	8,50	-60	2,0	1,90	1,50	1,00	0,90
Ethane	C2H6	3,00	15,50	135	1,0	1,50	1,10	0,80	0,75
Ethanol	C2H6O	3,30	19,00	13	1,6	2,15	1,70	1,30	1,00
Gasoline Lead free	/	1,10	~6,0	21	3 à 4	1,80	1,35	1,00	0,90
Ethylene (Ethene)	C2H4	2,70	34,00	- 135	1,0	1,65	1,20	0,90	0,80
LPG	Prop+But	1,65	~9,0	< -50	1,9	1,65	1,20	0,90	0,80
Diesel	Mélange	0,60	~6,0	55	> 4	3,20	2,60	1,70	1,55
Natural Gas	CH4	5,00	15,00	-188	0,6	1,05	0,75	0,60	0,55
Heptane	C7H16	1,10	6,70	-4	3,5	2,20	1,80	1,20	1,05
Hexane	C6H14	1,20	7,40	-23	3,0	2,10	1,70	1,15	1,05
Hydrogen	H2	4,00	75,60	-	0,069	1,25	1,00	0,70	0,60
Methane	CH4	5,00	15,00	-188	0,55	1,00	0,75	0,55	0,50
Nonane	C9H20	0,70	5,60	31	4,4	4,00	3.20	2.65	2.10
Octane	C8H18	1,00	6,00	12	3,9	2,70	2,00	1,45	1,30
Pentane	C5H12	1,40	8,00	-49	2,5	2,10	1,70	1,15	1,00
Propane	C3H8	2,00	9,5	-104	1,6	1.55	1,10	0.85	0,75
Propylene (Propene)	C3H6	2,00	11,70	-107,8	1,5	1,65	1,20	0,90	0,80
Styrene (Vinyl	C8H8	1.1	8,00	31	3.6	6,30	5,30	3,50	3,00

Benzene)									
Toluene	C7H8	1,20	7	5	3,1	4,00	2,95	2,15	1,90
Xylene	C8H10	1,00	7,60	25	3,7	4,00	2,90	2,15	1,90

Cells with a gray background: gases recommended for calibrating the detector

***Example** (first line of table)*
Calibration of an "acetone" detector with a standard gas comprising 1% volume butane

Value to be displayed:

$$\frac{1\ \%(\text{injected butane})}{1{,}5\ \%\ (\text{LEL butane})} \times 100 \times 0.95\ (\text{coefficient butane/acetone}) = 63\ \%\ \text{LEL}$$

Note:

- LEL values vary according to the source.
- Coefficients are accurate to ± 15%.

Chapter 5 | Preventive maintenance

Periodic checks enable the equipment and installation to remain in conformity and ensure reliable detection. This chapter describes what preventative action should be taken and at what intervals. Inspection and maintenance are carried out in accordance with standards in force EN60079-17 or IEC 60079-17, with whatever editions are in force or with other national standards.

Frequency of maintenance

Gas detectors are safety devices. OLDHAM recommends the regular testing of fixed gas detection installations. This type of test consists of injecting the standard gas into the detector at a sufficient concentration to activate the pre-set alarms. It is to be understood that this test is in no way a replacement for a detector calibration.

The frequency of gas tests depends on the industrial application where the detector is in use. Frequent inspections should be made in the months following the commissioning of the installation, and should then become more widely spaced provided that no significant deviation is observed. The interval between tests should not exceed 3 months. If a detector should fail to react in contact with the gas, calibration is essential. The frequency of calibrations shall be appropriate according to the results of the tests (humidity, temperature, dust, etc.); however, it must not exceed one year.

The general manager should put safety procedures in place on-site. INDUSTRIAL SCIENTIFIC cannot be held responsible for their enforcement.

To attain SIL capability level 1 in accordance with European standard EN 50402, *Requirements relating to the safety operation of fixed gas detection systems*, the maintenance interval for explosive gas detectors must be no more than 6 months. To obtain SIL capability level 2, the maintenance interval must be no more than 3 months

Actions

Periodic maintenance comprises the following actions:

- Removal of dust from the sensor's protective housing, using only a dry cloth. No water or solvents should be used. Severely dusty heads or sensors should be replaced immediately.
- For use in dusty explosive atmospheres, the user should undertake full and regular cleaning to avoid the build-up of dust. The maximum permissible thickness of a dust layer must be less than 5 mm.
- Replacement of screws: if the screws on the fire-proof part "d" of the body need to be replaced, screws of equal quality or better than A4.70 should be used.
- Zero inspection with pure air.
- Gas sensitivity inspection and possible adjustment, as per chapter IV.

Chapter 6 | Maintenance

Maintenance primarily comprises changing any sensors that no longer meet their initial metrological characteristics.

Since they are liable to affect detection reliability, the tasks described in this chapter are reserved for authorized trained personnel only.

Inspection and maintenance shall be carried out in accordance with standards EN60079-17 or IEC 60079-17, with whatever editions are in force or with other national standards.

The 4 mA level is factory-set. This value cannot be changed or adjusted. This check does not concern explosimeter OLC100. First follow the instructions *Opening the cover*.

Checking the current generator

Although this setting is made in the factory, it is possible that the transmitter and central unit may have to be matched. In this case, proceed as follows

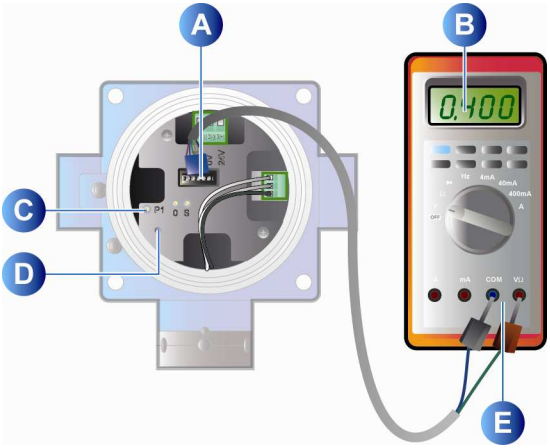


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Figure 20 : checking the current generator

1. Insert the blue and green plugs on the measurement lead into the + and – multimeter sockets, respectively (0-2 VDC range or similar).
2. Insert the measurement lead plug into connector "A".
3. Use a small screwdriver to press the 4 mA adjust button "D".

   The instrument then sends a 4 mA signal down the line.
4. On the central unit (measurement and automation), check that the measurement displayed corresponds to 0% of the measurement scale.
5. If some different value is displayed, keep pressing the button and adjust P1 ("C").
6. Release the push-button "D". Remove the measurement lead when adjustment is complete.

Possible errors

The table below summarizes the various possible detector errors:

OLC100 explosimeter

Observed fault	Possible cause	Action
Zero setting not possible	Sensor	Change sensor
	Cable	Check cable
	Main unit detector module	Check module
Sensitivity adjustment not possible	Sensor	Change sensor
	Connector cable	Check cable
	Inappropriate standard gas	Check standard gas concentration
High concentration of explosive gases	Déréglage	Zero setting
		Calibration

OLCT100 Detector

Observed fault	Possible cause	Action
Line current 0 mA	Connector cable	Check cable
	Power supply	Check voltage
	PCB	Change PCB
0 mA < Line current < 1mA	Sensor	Change sensor
	PCB	Change PCB
	Line resistance too high	Check cable
	Power supply	Check voltage
Zero setting not possible	Sensor	Change sensor
	PCB	Change PCB
Sensitivity adjustment not possible	Sensor	Change sensor
	PCB	Change PCB
High concentration	Settings disturbed	Zero setting
		Calibration

030

Replacing sensor block

Standard Version

First follow the instructions in the section *Opening the cover*

The sensor block encloses the actual detector sensor itself. A sensor block can only be associated with a defined detector. A guide pin ensures that the sensor block goes together correctly

Figure 21 : The sensor block (the black component) fits in the cover of the head.

Follow the procedure below :

- Inhibit any alarm signals on the central unit.
- Switch off the supply to the detector.
- For a catalytic sensor, first remove the PCB connector.
- Loosen the locking screw on the detector head and unscrew the head.
- Withdraw the (catalytic) detector head or the defective sensor block (OLCT100).
- Replace the worn-out sensor with an identical part.
- Screw the detector head back on again and tighten the locking screws.
- Re-establish the supply to the detector from the central unit.
- Adjust the settings for the new detector (see Chapter 4, page 3).
- Close the detector cover.
- Reset any alarm signals on the central unit.

High temperature version

Proceed as follows for the high temperature version.

- Inhibit any alarm signals on the central unit.
- Switch off the supply to the detector.
- Loosen the maintenance screw (Figure 20, "B") on the detector head cover and remove it.
- Replace the defective detector head and replace the maintenance screw "B" on the detector head cover. Disconnect the high temperature cable from terminal block "A" on the detector head. Connect the high temperature cable to terminal block "A".

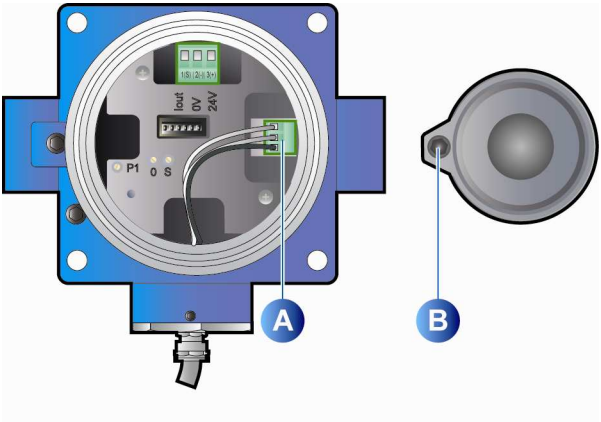

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Figure 22 : OLC100HT – elements specific to changing the high temperature sensor.

Screw the detector head back on again and tighten the locking screws.

- Re-establish the supply to the detector from the central unit.
- Adjust the settings for the new detector (see 0, on page 22).
- Close the detector cover.
- Reset any alarm signals on the central unit .

Calibration kit

Description

The kit generally comes with the following contents:

Id.	Description
A.	Shroud for introducing the gas (optional) to be attached onto the detector to be calibrated.
B.	Plastic tube (Rylsan®). A Teflon® tube should be used for corrosive gases.
C	Pressure release and flow regulator.
D.	Pressure gauge showing the internal bottle pressure.
E.	Bottle containing standard gas or pure air.

Concentration of the standard gas should be between 30 and 70% of the detector's scale of measurement.

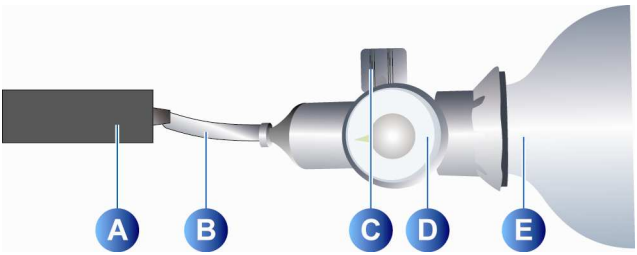

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Figure 23 : calibration kit.

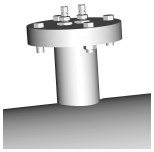
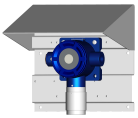
Use

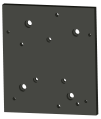
Proceed as follows:

1. Connect the tube (Figure , rep. B) to the cap (Figure , rep. A) and to the pressure release outlet.
2. Position the cap on the detector head of the detector being examined.
3. Gradually turn the knurled knob on the flow regulator (Figure , rep. C) ") clockwise to obtain a flow of 30 to 60 l/hr.
4. Carry out the calibration only after the measurement has stabilized
5. Once calibration has finished, turn the knurled knob of the flow regulator (Figure , rep. C) anti-clockwise and remove the cap (Figure , rep. A) from the detector head of the detector being examined.

Chapter 7 |Accessories

Accessory	Utilization	Illustration	Reference
Calibration cup	Facilitates the injection of standard gas into the measurement sensor Effect on measurement: measurement similar to that for natural diffusion Effect on response time: none	 204	6331141
PTFE remote sampling cup	Enables measurement in *bypass* mode Effect on measurement: no effect if calibration is carried out under the same conditions (shroud, flow rate) Effect on response time: none	 200	6327910
Splash-guard kit	Protects the detector against splashes Effect on measurement: no effect. Effect on response time: response time for natural diffusion can increase for certain gases. Contact us for details.	 202	6329004
Remote calibration cup	Enables the detection of ambient gases simultaneously with a standard gas injection pipe. Effect on measurement: no effect. Effect on response time: negligible.	 214	6327911

Accessory	Utilization	Illustration	Reference
PTFE water barrier	Protects the gas inlet from dust and splashing Effect on measurement: no effect, but cannot be used for detecting O_3, HCL, HF, or CL_2. Effect on response time: response time increased (contact us for heavy gases of a density greater than 3 and at low concentrations < 10 ppm	 216	6335975
Universal Pitot tube	Enables the measurement of a gas passing through a sheath Requires the use of the gas circulation head Effect on measurement: no effect. Effect on response time: negligible.	 224	6793322
Mounting kit	Enables a detector to be fixed to the ceiling. Effect on measurement: no effect. Effect on response time: no effect.	 218	6322420
Sunshield	Protects any detector mounted on the outside of a building. Effect on measurement: no effect. Effect on response time: negligible.	 222	6123716
Wall mounting gas collector	Allows the sensor to detect more quickly the gas. (Wall mounting) Effect on measurement: no effect. Effect on response time: response time can increase up to 10%.		6331169

Accessory	Utilization	Illustration	Reference
Ceiling gas collector	Allows the sensor to detect more quickly the gas. (Ceiling) Effect on measurement: no effect. Effect on response time: response time can increase up to 10%.		6331168
Humidifier kit	Used for the calibration of the semi-conductor transmitters		
Tools kit	Tool kit for maintenance		6147879
Replacement adaptater kit	Enables the detector to be attached to the same place without having to drill more holes.	 220	6793718

Cable gland

Purpose	Reference
M20 compression gland kit for non-armored cable Material: stainless	6343493
M20 compression gland kit for non-armored cable Material: Nickel-plated brass (not recommended for use with ammonia or acetylene)	6343499
M20 compression gland kit for armored cable Material: stainless	6343489
M20 nickel-plated brass compression gland kit for armored cable Material: Nickel-plated brass (not recommended for use with ammonia or acetylene)	6343495

Chapter 8 | Spare parts

List of spares for the various detectors

Id.	Reference	Description
	6 314 010	Explo. Sensor 0-100% LIE CFC100 VQ1 for OLC100
	6 314 042	Infra-red sensor 0-100% LIE CH_4 for OLCT100
	6 314 043	Infra-red sensor 0-5% vol. CO_2 for OLCT100
	6 314 016	Electrochemical sensor 0-30% O_2 for OLCT100
	6 314 017	Electrochemical sensor 0-100 ppm, 0-500 ppm and 0-1000 ppm CO for OLCT100
	6 314 018	Electrochemical sensor 0-30.0 ppm, 0-100 ppm H_2S for OLCT100
	6 314 019	Electrochemical sensor 0-1000 ppm H_2S for OLCT100
	6 314 020	Electrochemical sensor 0-100 ppm, 0-300 ppm and 0-1000 ppm NO for OLCT100
	6 314 021	Electrochemical sensor 0-10.0 ppm and 0-30.0 ppm NO_2 for OLCT100
	6 314 022	Electrochemical sensor 0-10.0 ppm, 0-30.0 ppm and 0-100 ppm SO_2 for OLCT100
	6 314 025	Electrochemical sensor 0-10.0 ppm Cl_2 for OLCT100
	6 314 023	Electrochemical sensor 0-2000 ppm H_2 for OLCT100
	6 314 026	Electrochemical sensor 0-30.0 ppm, 0-100 ppm HCl for OLCT100
	6 314 028	Electrochemical sensor 0-10.0 ppm and 0-30.3 ppm HCN for OLCT100
	6 314 029	Electrochemical sensor 0-100 ppm NH_3 for OLCT100
	6 314 030	Electrochemical sensor 0-1000 ppm NH_3 for OLCT100
	6 314 031	Electrochemical sensor 0-5000 ppm NH_3 for OLCT100
	6 314 033	Electrochemical sensor 0-1.00 ppm PH_3 for OLCT100
	6 314 035	Electrochemical sensor 0-3.00 ppm ClO_2 for OLCT100
	6 314 024	Electrochemical sensor 0-30.0 ppm ETO for OLCT100
	6 314 032	Electrochemical sensor 0-1.00 ppm AsH_3 for OLCT100
	6 314 027	Electrochemical sensor 0-50.0 ppm SiH_4 for OLCT100
	6 314 034	Electrochemical sensor 0-1.00 ppm $COCl_2$ for OLCT100
	6 314 036	Semiconductor sensor for methyl and methylene chloride for OLCT100

Id.	Reference	Description
	6 314 037	Semiconductor sensor for R12, R22, R123 and FX56 freons for OLCT100
	6 314 038	Semiconductor sensor for R134a, R142b, R11, R23, R141b, R143a, R404a, R507, R410a, R32, R227, R407c and R408a freons for OLCT100
	6 314 039	Semiconductor sensor for ethanol, toluene, isopropanol, 2-butanone and xylene for OLCT100
	6 451 626	OLC100 Board
	6 451 646	OLCT100 IR Board
	6 451 621	OLCT100 SC Board
	6 451 594	OLCT100 explo. Board
	6 451 623	OLCT100 toxic Board
	6 451 649	Usual EC OLCT100 Board
	6 451 648	OLCT100 02 card

Chapter 9 | Declaration of EC conformity

The page below reproduces the EC declaration of conformity for the OLCT100 and OLC100 family of detectors

OLDHAM
Gas Monitoring Solutions
INDUSTRIAL SCIENTIFIC

Manufacturer Declaration of Conformity

CE

ATMOSPHÈRES EXPLOSIVES 94/9/CE SAQ Approuvé — INERIS — 94/9/EC QAS Approved — EXPLOSIVE ATMOSPHERES

The Company **Industrial Scientific OLDHAM**, ZI Est 62000 Arras France, declares that the following new material intended for use in Explosive Atmospheres, complies with the requirements of the following European Directives:

Gas Detectors series OLC/OLCT100

I) The European Directive ATEX 94/9/CE of 23/03/94: Explosive Atmospheres

N° of EC Type Examination certificate: **INERIS 09ATEX0075X**

Harmonized European Standards: EN 60079 - 0 - 1 - 11 - 31
EN 61241 - 0 - 1 - 11

OLC100 OLCT100 XP – OLCT100 XP-IR	Ex II 2 GD Ex d IIC T6 Gb	Tamb : - 50°C +70°C Ex t IIIC T85°C Db IP66
OLCT100 IS	Ex II 2 GD Ex ia IIC T4	Tamb : - 50°C à +70°C. Ex iaD 21 T135°C IP66

N° of the Production Quality Assurance Notification of the Arras factory: INERIS 00ATEXQ403

Issued by the Notified Body n°0080: INERIS, rue Taffanel, 60550 Verneuil en Halatte, France.

II) The European Directive EMC 2004/108/EC of 15/12/2004: Electromagnetic compatibility

Harmonized European Standards: EN 50270

Functional Safety: Reliability Data

Under normal conditions of use, the reliability data are the following:

Type de gas	Sensing Principle	SIL Capability	λ_{DU}	PFD_{AVG}	Test Interval	SFF
Combustibles	Catalytic (C1000)	SIL 2	$2{,}19\ 10^{-6}$	$2{,}39\ 10^{-3}$	3 months	60% à 90%
Combustibles & CO2	Infrared	SIL 2	$0{,}13\ 10^{-6}$	$0.35\ 10^{-3}$	12 months	60% à 90%
Oxygen	Electrochemical	SIL 2	$0{,}74\ 10^{-6}$	$0.81\ 10^{-3}$	3 months	60% à 90%
CO	Electrochemical	SIL 2	$1{,}09\ 10^{-6}$	$1{,}19\ 10^{-3}$	3 months	60% à 90%
H2S	Electrochemical	SIL 2	$2{,}98\ 10^{-6}$	$3{,}26\ 10^{-3}$	3 months	60% à 90%
NH3	Electrochemical	SIL 2	$4{,}48\ 10^{-6}$	$4{,}91\ 10^{-3}$	3 months	60% à 90%

Note: The failure rates are only valid on the real lifetime of the sensitive elements (limited time, about 3 to 5 years). Beyond that, due to ageing of the measuring cells, the rate is not significant any more.

CE/ATEX128 Eng rev b

Arras, 15 April 2010

ATEX Authorized Representative

Lionel Witrant

Program Manager

AFAQ ISO 9001 VERSION 2000

Industrial Scientific Oldham:
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Chapter 10 | Technical specifications

Dimensional characteristics

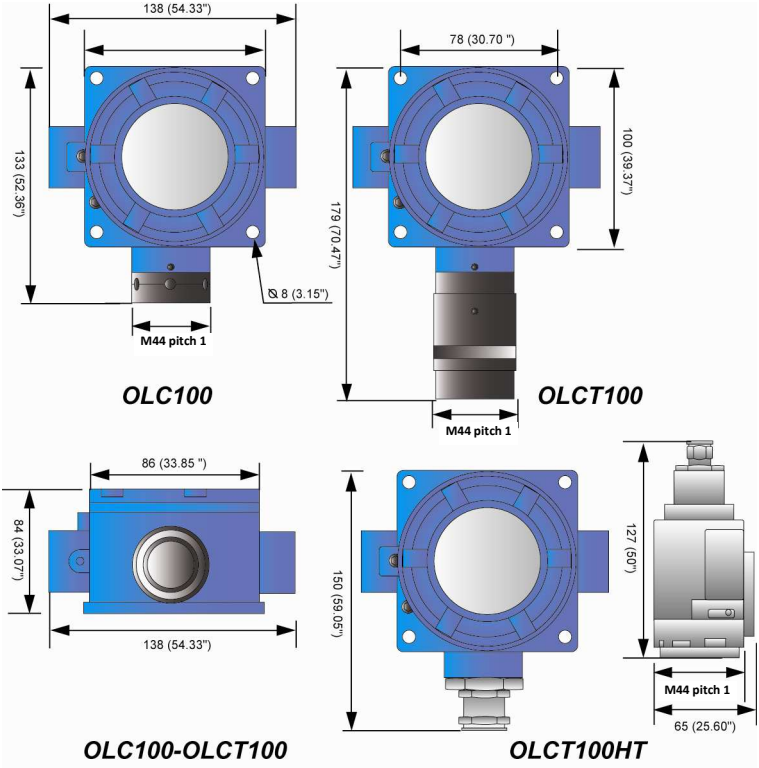

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Figure 24 : dimensional characteristics of the detectors.

General Specifications

Supply voltage at the detector terminals:	➢ OLC100: 340 mA (current supply). ➢ OLCT100 XP HT: 15.5 V to 32 V. ➢ OLCT100 XP LEL: 15.5 V to 32 V. ➢ OLCT100 XP IR: 13.5 V to 32 V. ➢ OLCT100 XP EC: 10 V to 32 V. ➢ OLCT100 XP SC: 15.5 V to 32 V.
Average consumption:	➢ OLC100: 340 mA. ➢ OLCT100 XP HT: 100 mA. ➢ OLCT100 XP LEL: 110 mA. ➢ OLCT100 XP IR: 60 mA. ➢ OLCT100 XP EC: 23.5 mA. ➢ OLCT100 XP SC: 100 mA.
Output current (signal):	➢ Current source encoded from 0 to 23 mA (non isolated) ➢ Linear 4 to 20 mA current reserved for measurement ➢ 0 mA: electronic fault or no power supply ➢ < 1 mA: fault. ➢ 2 mA: Initialization mode ➢ Current greater than 23 mA: off-scale.
Type of cable	➢ Explosimeter: screened, 3 live wires ➢ HT Explosimeter: screened, 3 live wires ➢ Electrochemical detector: screened, 2 live wires ➢ Infra-red detector: screened, 3 live wires ➢ Semiconductor detector: screened, 3 live wires
Cable inlet:	M20 or ¾ NPT.
Maximum diameter of cable entering the detector:	12 mm.
Electromagnetic compatibility:	Conforms to EN50270.
International Protection rating	IP66.
Explosive atmospheres:	Conforms to European Directive ATEX 94/9/CE (see attached Declaration) and to IEC Ex schedule for fire-proof detectors. SIL 2 in accordance with EN50402/EN61508. Metrological performance in accordance with EN 50054 and EN 50057 (harmonized standards applied: 61779-1 :2000 and 61779-4 :2000).

Weight :	➢ OLC100: 0.950 kg. ➢ OLCT100 XP HT: 1.8 kg. ➢ OLCT100 XP LEL: 1.0 kg. ➢ OLCT100 XP IR: 1.1 kg. ➢ OLCT100 XP EC: 1.1 kg. ➢ OLCT100 XP SC: 1.1 kg.
Materials:	Epoxy painted aluminum Optional 316 stainless

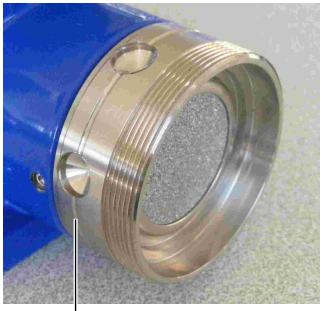
Catalytic head (OLCT100 XP)

Common characteristics

➢ Measurement range	0–100% LEL
➢ Measurement principle:	catalytic filaments
➢ Accuracy:	see table below
➢ Temperature range:	see table below
➢ Relative humidity:	0 to 95% RH (non-condensing relative humidity)
➢ Pressure:	atmospheric ± 10%
➢ Response time:	T_{50} = 6 seconds. T_{90} = 15 seconds for Methane
➢ Lifetime (typical)	48 months
➢ Storage conditions:	-50 to 70°C, 20 to 60% RH, 1 bar ± 10%, 6 months maximum
➢ Warm-up time (max)	2 hours to first switching on power

Specific characteristics

Type of sensors	Accuracy	Operating temperature range
Anti-poison sensor 4F (unmarked sensor)	1% LIE between 0- 70 %LIE 2% of the measurement between 71 and 100% LIE	-20 to +70°C
VQ1 sensor (sensor with identifying mark)	1% LIE between 0- 70 %LIE OLCT100 : 2% of the measurement between 71 and 100% LIE OLC 100 : 5% of the measurement between 71 and 100 % LIE	-40 to +70°C
VQ1 sensor, high temperature assembly	1% LIE between 0-70%LIE 2% of the measurement between 71 and 100% LIE	-20 to +200°C



Mark on sensor VQ1

4F poison resistant sensor

Figure 25 : mark on VQ1 sensor.

Toximetric heads (OLCT100 XP and OLCT100 IS)

Common characteristics

Measurement principle:	Electrochemical sensor
Pressure:	Atmospheric ± 10%

Specific characteristics (table 1/2)

Type of gas		Measurement range (ppm)	XP Version	IS Version	Temperature range °C	% RH
AsH_3	Arsine	1,00		■	-20 to +40	20 - 90
Cl_2	Chlorine	10,0		■	-20 to +40	10 - 90
ClO_2	Chlorine dioxide	3,00		■	-20 to +40	10 - 90
CO	Carbon monoxide	100	■	■	-20 to +50	15 - 90
		300	■	■		
		1000	■	■		
$COCl_2$	Phosgene	1,00		■	-20 to +40	15 - 90
ETO	Ethylene oxide	30,0		■	-20 to +50	15 - 90
H_2	Hydrogen	2000	■	■	-20 to +50	15 - 90
H_2S	Hydrogen sulphide	30,0	■	■	-40 to +50	15 - 90
		100	■	■		
		1000	■	■		
HCl	Hydrochloride acid	30,0		■	-20 to +40	15 - 95
		100		■		

Type of gas		Measurement range (ppm)	XP Version	IS Version	Temperature range℃	% RH
NH_3	Ammonia	100	■	■	-20 to +40	15 - 90
		1000	■	■		
		5000	■	■		
NO	Nitrogen monoxide	100	■	■	-20 to +50	15 - 90
		300	■	■		
		1000	■	■		
NO_2	Nitrogen dioxide	10,0		■	-20 to+ 50	15 - 90
		30,0		■		
O_2	Oxygen	0-30% vol	■	■	-20 to +50	15 - 90
PH_3	Phosphine	1,00		■	-20 to +40	20 - 90
SiH_4	Silane	50,0		■	-20 to +40	20 - 95
SO_2	Sulfur dioxide	10,0		■	-20 to +50	15 - 90
		30,0		■		
		100		■		

Specific characteristics (table 2/2)

Type of gas	Accuracy (ppm)	Life (months)	Response time T_{50} / T_{90} (s)	Storage conditions	Warm-up time max (h)
AsH_3	+/- 0,05	18	30/120	(1)	1
Cl_2	+/- 0,4	24	10/60	(1)	1
ClO_2	+/- 0,3	24	20/120	(1)	1
CO	+/- 3 (range 0-100)	36	15/40	(1)	1
$COCl_2$	+/- 0,05	12	60/180	(2)	1
ETO	+/- 1	36	50/240	(1)	24
H_2	+/-5 %	24	30/50	(1)	1
H_2S	+/- 1,5 (range 0-30)	36	15/30	(1)	1
HCl	+/- 0,4 (range 0-10)	24	30/150	(1)	24
NH_3	+/- 5	24	25/70	(1)	1
	+/- 20		20/60		
	+/-150 or 10%		60/180		
NO	+/- 2 (range 100)	36	10/30	(1)	1

Type of gas	Accuracy (ppm)	Life (months)	Response time T_{50} / T_{90} (s)	Storage conditions	Warm-up time max (h)
NO_2	+/- 0,8	24	30/60	(1)	12
O_2	0,4 % vol (15 to 22 % O_2)	28	6-15	(1)	Aucun (3)
PH_3	+/- 0,05	18	30/120	(1)	1
SiH_4	+/- 1	18	25/120	(1)	1
SO_2	+/- 0,7 (range 0-10)	36	15/45	(1)	1

(1) *4 – 20 °C*
20 – 60 % RH
1 bar ± 10 %
6 months maximum

(2) *4 – 20 °C*
20 – 60 % RH
1 bar ± 10 %
3 months maximum

(3) *If cartridge is mounted in the transmitter*

Semiconductor heads (OLCT100 XP)

Common characteristics

Measurement principle:	semiconductor
Temperature range:	-20°C to +60°C
Relative humidity:	20 to 95% RH (non-condensing relative humidity)
Pressure:	atmospheric ± 10%
Lifetime (typical):	36 months
Storage conditions:	-20 to 50 □, 20 to 60% RH, 1 bar ± 10%, 6 months maximum
Warm-up time (max):	4 hours to first switching on power

Type of gas		Measurement range	Accuracy	T_{50} / T_{90} (s)
Methyl chloride	CH_3Cl	500 ppm	+/- 15% (from 20 to 70% FS)	25/50
Methylene chloride	CH_2Cl_2	500 ppm		
Freon R12		1 %vol	+/- 15% (from 20 to 70% FS)	25 / 50
Freon R22		2000 ppm		
Freon R123		2000 ppm		
FX56		2000 ppm		
Freon R134 a		2000 ppm	+/- 15% (from 20 to 70% FS)	25 / 50
Freon R142 b		2000 ppm		
Freon R11		1 % vol		
			+/- 15% (from 20 to	

Type of gas	Measurement range	Accuracy	T_{50} / T_{90} (s)
Freon R23	1 % vol	70% FS)	
Freon R141 b	2000 ppm		25 / 50
Freon R143 a	2000 ppm		
Freon R404 a	2000 ppm		
Freon R507	2000 ppm		
Freon R410 a	1000 ppm		
Freon R32	1000 ppm		
Freon R227	1 % vol		
Freon R407 c	1000 ppm		
Freon 408 a	4000 ppm		
Ethanol	500 ppm	+/- 15% (from 20 to 70% FS)	25 / 50
Toluene	500 ppm		
Isopropanol	500 ppm		
2-butanone (MEK)	500 ppm		
Xylene	500 ppm		

Infrared head (OLCT100 XP-IR)

Measurement range:	0–100% LEL (explosive gases)
	0–5% CO_2 (carbon dioxide)
Measurement principle:	Infra-red absorption
Accuracy:	- CO_2 version: +/- 3% of full-scale at mid-scale (20℃)
	- LEL version: +/- 5% of full-scale at mid-scale (20℃)
Temperature range:	-25 to +55 ℃
Relative humidity:	0 to 95 % RH (non-condensing relative humidity)
Pressure:	Partial pressure measurement (the measurement changes with pressure)
Response time:	- CO_2 version: T_{50} → 11 s and T_{90} → 30 s
	- LEL version: T_{50} → 11 s and T_{90} →30 s
Lifetime (typical):	48 months
Storage conditions:	4–20℃ 10–60% RH 1 bar ± 10% 6 months maximum
Warm-up time (max):	2 hours to first switching on power

Chapter 11 |Specific instructions for use in explosive atmospheres and operational safety

General comments

OLC/OLCT 100 conforms to the requirements of European Directive ATEX 94/9/CE relating to explosive Dust and Gas atmospheres. On account of their metrological performance as tested by the accredited organization INERIS (in process), the OLC/OLCT 100 transmitter detectors intended for the measurement of explosive gases are classed as safety devices in the sense of the European Directive and may, therefore, contribute to limiting the risks of explosion.

The information given in the following sections should be respected and taken into account by the manager of the site where the equipment is installed. As far as the aim of improving the health and safety of workers who are exposed to the risks of explosive atmospheres is concerned, refer to European Directive ATEX 1999/92/CE.

OLC/OLCT 100 detectors also conform to the requirements of the IEC international certification scheme relating to explosive Dust and Gas atmospheres.

Two modes of protection can be used:

- The mode of protection using fire-proof housing "d" for gaseous explosive atmospheres, or housing "tb" for explosive dust atmospheres.
- The intrinsically safe "ia" mode of protection for gaseous explosive atmospheres, or "id" for explosive dust atmospheres.

Metrological performance for the detection of flammable gases

Standard C1000 OLC/OLCT100 filament version detectors conform to IEC / EN 60079-29-1 standards, *Suitability requirements for the operation of flammable gas detectors*, category 0 to 100% LIE Group II, reference gas 0-100% LIE Methane and Propane.

These detectors are classed as safety devices according to ATEX 94/9/CE Directive and may, therefore, contribute to limiting the risks of explosion. For this to be so, they must be connected to Oldham type MX15, MX32, MX42A, MX48, MX43, MX52 or MX62 detection units, or otherwise connected to measurement units with 4-20 mA inputs conforming to section 1.5 of Annex II of Atex Directive 94/9/CE and compatible with their characteristics (see transfer curve).

Cable inlets

These shall be of a type certified for use in explosive atmospheres. They shall be protected to (or better than) IP66 and shall be installed in accordance with standard ICE/EN 60079-14 (whatever edition is in force), and possibly in accordance with further requirements related to the local or national regulations.

The cables should be capable of use at a temperature equal to or greater than 80°C.

Threaded joints

The threaded joints on the OLC(T)100 may be lubricated to maintain fire-proof protection. Only non-hardening lubricants or non-corrosive agents having no volatile solvents may be used. Warning: silicone based lubricants are strictly forbidden, since they contaminate the OLC(T)100 detector elements.

Operational safety

The detector is certified by INERIS (in process) to be in conformity with the requirements of standard EN 50402 for SIL capability 1 and 2 for the CH_4 and HC versions. Applicable since 2005, this standard is concerned with electrical apparatuses for the detection and measurement of oxygen or toxic or flammable gases or vapors, and defines the requirements relating to the safety function of fixed gas detection systems.

The detector has been developed in conformity with standard EN/CEI 61508.

The safety function of the OLC/OLCT100 detector is the detection of flammable gases using catalytic technology and a 4-20 mA current output proportional to the gas concentration expressed as a percentage of LIE, respectively from 0 to 100% LIE. In the event of failure, the current will assume a fall-back value less than or equal to 1 mA or greater than or equal to 23 mA.

The safety function is no longer valid:

- After power has been switched on, while the measurement sensor is stabilizing and during start-up tests, the output current shall be in maintenance mode (2 mA).
- When the push button is pressed (forcing the current to 4 mA), the output current will be frozen at 4 mA.

Reliability data

These data are based on feedback from experience in the field. The analysis of the information recorded during maintenance by our technical team has enabled us to determine the following Probabilities of Failure on Demand under normal conditions of use:

Type of gas	Measurement principle	SIL Capability	λ_{DU}	PFD_{AVG}	Test period	SFF
LEL	Catalytic(C1000)	SIL 2	$2{,}19\ 10^{-6}$	$2{,}39\ 10^{-3}$	3 months	60% to 90%
LEL CO2	Infrared	SIL 2	$0{,}13\ 10^{-6}$	$0.35\ 10^{-3}$	12 months	60% to 90%
Oxygen	Electrochemical	SIL 2	$0{,}74\ 10^{-6}$	$0.81\ 10^{-3}$	3 months	60% to 90%
CO	Electrochemical	SIL 2	$1{,}09\ 10^{-6}$	$1{,}19\ 10^{-3}$	3 months	60% to 90%
H2S	Electrochemical	SIL 2	$2{,}98\ 10^{-6}$	$3{,}26\ 10^{-3}$	3 months	60% to 90%
NH3	Electrochemical	SIL 2	$4{,}48\ 10^{-6}$	$4{,}91\ 10^{-3}$	3 months	60% to 90%

Detector in intrinsically safe "ia" protective mode: Special use conditions

The detector must be powered by an intrinsically safe source.

The detector input characteristics on the J3 power plot are:

Ui = 28V, Ii = 93.3 mA, Ci = 39.2 nF, Li = 0

Ci = 2.39 µF with Ui = 10.5V, Ci = 4.32µF with Ui = 8.6V

The detector may be opened in a gaseous explosive zone (dusty non-explosive) only to change the sensor block or for maintenance or to connect a compatible intrinsically safe voltmeter with the following characteristics:

- Certified for use in explosive atmospheres (Group IIc), no generator of current or voltage
- Ui max <= 28V; Ii max <= 93.3 mA
- Li ≤ 3.5 mH
- Ci ≤ 44 nF under 28V ; Ci ≤ 20 nF under 10.5 V ; Ci ≤ 0.88 µF under 8.6V

Annexe | Ordering information

Gas List

Please find below the list of gases that the OLC/OLCT100 detector can detect.

Gas number	Gas
001	Methane 0-100 % LEL
002	Methane 0-100% LEL (4.4% vol)
003	Hydrogen 0-100% LEL
004	Butane 0-100% LEL
005	Propane 0-100% LEL
006	Ammonia 0-100% LEL
007	Ethyl acetate 0-100% LEL
008	Butyl Acetate 0-100% LEL
009	Methyl acetate methyle 0-100% LEL
010	Acetone 0-100% LEL
011	Acetonitrile 0-100% LEL
012	Acetylene 0-100% LEL
013	Acrylic acid 0-100% LEL
014	Acrolein 0-100% LEL
015	Butyl acrylate 0-100% LEL
016	Ethyl avrylate 0-100% LEL
017	Acrylonitrile 0-100% LEL
018	Benzene 0-100% LEL
019	1.3-Butadiene 0-100% LEL
020	Butanol (isobutanol) 0-100% LEL
021	2-Butanone 0-100% LEL
022	Cumene 0-100% LEL
023	Cyclohexane 0-100% LEL
024	Cyclohexanone 0-100% LEL
025	Dimethylether 0-100% LEL
026	Dodecane 0-100% LEL
027	Ethane 0-100% LEL
028	Ethanol 0-100% LEL
029	Ether (diethylether) 0-100% LEL
030	Ethylene 0-100% LEL
031	Formaldehyde 0-100% LEL
032	LPG 0-100% LEL
033	Diesel 0-100% LEL
034	Natural gas 0-100% LEL

Gas number	Gas
035	Heptane 0-100 % LEL
036	Hexane 0-100% LEL
038	Isobutane 0-100% LEL
039	Isobutene 0-100% LEL
040	Isopropanol 0-100% LEL
041	Kerosene (JP4) 0-100% LEL
042	Methalcrylate methyl 0-100% LEL
043	Methanol 0-100% LEL
044	Methylamine 0-100% LEL
045	Naphta 0-100% LEL
046	Naphtalene 0-100% LEL
047	Nonane 0-100% LEL
048	Octane 0-100% LEL
049	Ethylene Oxide (epoxyethane) 0-100% LEL
050	Propylene Oxide (Epoxypropane) 0-100% LEL
051	Pentane 0-100% LEL
052	Propylene 0-100% LEL
054	Styrene 0-100% LEL
055	Super SP95 0-100% LEL
056	Toluene 0-100% LEL
057	Triethylamine 0-100% LEL
058	White spirit 0-100% LEL
059	Xylene 0-100% LEL
060	Methane 0-100% volume
061	Hydrogen 0-100% volume
062	Helium 0-100% volume
063	SF6 0-100% volume
200	Oxygen O2 (electrochemical) 0-30% vol
203	CO, 0-100 ppm
204	CO, 0-300 ppm
205	CO, 0-1,000 ppm
213	H2S, 0-30 ppm
214	H2S, 0-100 ppm
215	H2S, 0-1,000 ppm
216	NO, 0-100 ppm
217	NO, 0-300 ppm
218	NO, 0-1,000 ppm
219	NO2, 0-10 ppm
220	NO2, 0-30 ppm
221	SO2, 0-10 ppm
222	SO2, 0-30 ppm

Gas number	Gas
223	SO2, 0-100 ppm
224	Cl2, 0-10 ppm
225	H2, 0-2,000 ppm
227	HCl, 0-30 ppm
228	HCl, 0-100 ppm
229	HCN, 0-10 ppm
230	HCN, 0-30 ppm
231	NH3, 0-100 ppm
232	NH3, 0-1,000 ppm
233	NH3, 0-5,000 ppm
235	ClO2, 0-3 ppm
239	CO2, 0-5% non linearized
240	CO2, 0-10 % volume
242	PH3, 0-1 ppm
243	AsH3, 0-1 ppm
500	R12, 0-1% volume
501	R22, 0-2,000 ppm
502	R134A, 0-2,000 ppm
503	R141, 0-2,000 ppm
504	R142B, 0-2,000 ppm
505	R11, 0-1% volume
506	R23, 0-1% volume
507	Dichloromethane, 0-500 ppm
508	Chloromethane (Methylchloride), 0-500 ppm
509	R123, 0-2,000 ppm
510	FX56, 0-2,000 ppm
511	R143A, 0-2,000 ppm
512	R404A, 0-2,000 ppm
513	R507, 0-2,000 ppm
514	R410A, 0-1,000 ppm
515	R32, 0-1,000 ppm
516	R227, 0-1% volume
517	R407C, 0-1,000 ppm
518	R408A, 0-4,000 ppm
656	Ethanol, 0-500 ppm
657	Toluene, 0- 500 ppm
658	Isopropanol, 0-500 ppm
659	2-Butanone (MEk), 0-500 ppm
660	Xylene, 0-500 ppm

To know you part number, please follow these instructions:

The reference is broken down as follows:

OLCT100-XPIR-001-1

OLCT 100 XP IR Transmitter, 0-100% LEL CH_4, ATEX, M20 cable entry

Range:	Type:	Gas:	Approval and entry of cable range:
OLC100 OLCT100 OLCT100 HT5* OLCT100 HT10* OLCT100 HT15*	XP IS XPIR	Codified from 1 to 999, includes gas and detection range	1 - ATEX and M20 cable entry 3 - ATEX and $^3/_4$ NPT cable entry CSA approvals are pending.

*Sensor movable up to 5, 10, or 15 meters using a high temperature cable

Garanty

1 Plus Points

To respond quickly and efficiently to your consultancy needs or order tracking throughout the world via our customer service department.
To respond as rapidly as possible to all questions of a technical nature.

2 Quality

To assure you of the best quality of our products and service in conformity with the international standards and directives in force.

3 Inspection and Reliability

To provide you with reliable equipment. The quality of our production is an essential condition for this reliability. This is guaranteed by virtue of very strict checks that are carried out when raw materials come in, both during the course of and at the end of manufacture (all equipment that is sent out is configured to your individual requirements).

4 Commissioning

If required, to commission your equipment by our Ism-ATEX qualified specialists.

5 Training

To provide detailed training programs.

6 Project department

Our team will investigate all gas and flame detection projects via on-site investigations or from drawings. We can suggest pre-project studies, design, installation and maintenance of safety systems in ATEX or non-ATEX zones with full respect of all standards in force.

7 Maintenance contract

To suggest rolling maintenance contracts tailored to your needs in order to guarantee you maximum safety:

- One or more annual visits, including consumables
- Renewable by agreement
- Including adjustment of fixed or portable gas detectors, and inspection of control systems.

8 On-site repair

To rapidly send our Service Technicians to you. This is possible on account of our hubs in France and abroad.

9 Factory repair

To deal with any problem that cannot be resolved on-site by dispatching the equipment back to the factory. Teams of technicians will work on repairing your equipment as quickly as possible, thereby reducing the time spent out of commission to a minimum. Cost efficient replacement solutions are available if equipment is deemed not repairable.
For all After Sales Service in France, contact us by email at servicecenter@oldhamgas.com
Or by telephone at + 33 (0)3 21 60 80 80. For locations near you, please visit us at indsci.com and click on the Oldham Division.

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