

# Sensigas<sup>®</sup>

## Oxygen detectors

ATEX II 2G Ex d IIC T6 Gb certified

### URS20SE



11...28Vdc power supply.

Electrochemical cell sensor designed for the detection of oxygen (O<sub>2</sub>).

Up to three alarm thresholds plus sensing element fail.

LED on sensing element body to indicate operating status.

Automatic countdown of sensor life.

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#### Use

The URS20SE detectors are used to detect the presence of oxygen (O<sub>2</sub>), in areas classified as Zone 1.

An **Oxygen excess** forms if it leaks in hospitals, laboratories, welding centres and, more in general, where oxygen is stored.

**Oxygen deficiency** is an indirect measurement of the presence of other explosive or asphyxiant gases that deplete the oxygen in the air.

URS20SE sensors can be used in stand-alone mode with 4...20mA output or with an optional voltage-free contact relay card having the following four digital outputs:

Pre-alarm, 1<sup>st</sup> alarm threshold, 2<sup>nd</sup> alarm threshold, sensor fail.

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#### Operation

If there is an oxygen leak or an absence of oxygen, the detector compares the measured concentration value with the threshold limit setpoints and energises the associated relays. Information on the measured concentration value is always at the 4...20mA output.

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#### Ordering

To order, simply state the part number: **URS20SE**.

For special versions, on request, please contact Customer Service.

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## Technical characteristics

Type of sensor	Electrochemical cell	
Detectable Gas	O <sub>2</sub> excess	O <sub>2</sub> deficiency
Power supply	11 ÷ 28Vdc	
Max power consumption	2.5W	
Measuring range	0...30% O <sub>2</sub>	
Precision	± 2,5% of full scale range (in air)	
Repeatability	± 2,5% of full scale range	
Measurement resolution	0.1% O <sub>2</sub>	
Microprocessor resolution	1024 points (10 bit)	
Digital filter system	Kalman Filter	
Watchdog	Internal	
Warm-up time	< 2m	
Stabilization time	< 2m	
Response time	< 10s (T20), < 45s (T90)	
Average Sensor life (in air)	120 weeks	
Sensor type settings (O <sub>2</sub> excess or deficiency)	S1.7 DIP switch OFF (O <sub>2</sub> excess)	S1.7 DIP switch ON (O <sub>2</sub> deficiency)
Threshold limit settings (S1.8 = OFF, default):		
Pre-alarm	23% O <sub>2</sub>	19% O <sub>2</sub>
1 <sup>st</sup> threshold alarm	25% O <sub>2</sub>	17% O <sub>2</sub>
2 <sup>nd</sup> threshold alarm	27% O <sub>2</sub>	15% O <sub>2</sub>
Threshold limit settings (S1.8 = ON):		
Pre-alarm	22% O <sub>2</sub>	20% O <sub>2</sub>
1 <sup>st</sup> threshold alarm	23% O <sub>2</sub>	19% O <sub>2</sub>
2 <sup>nd</sup> threshold alarm	24% O <sub>2</sub>	18% O <sub>2</sub>
4...20mA Output		
Proportional mode (default)	- 4mA = 0% O <sub>2</sub> - 20mA = 30% O <sub>2</sub>	
Consumption mode (applications at 1 or 2 thresholds)	- 0mA = no alarm - 10mA = 1 <sup>st</sup> threshold alarm - 20mA = 2 <sup>nd</sup> threshold alarm	
4...20mA Output reference selection:	by jumper selectable polarity	
4...20mA output load resistor	- up to 200Ω at 12Vdc power supply - 200Ω ÷ 700Ω at 24Vdc power supply	
Operating Temperature	-20 ÷ 50 °C	
Storage Temperature	-20 ÷ 70 °C	
Relative Humidity (without condensing)		
- Operation	15 ÷ 90 %RH	
- Storage	45 ÷ 75 %RH	
Operating pressure (KPa)	80 ÷ 110	
Air speed (m/s)	≤ 6	
Visual warnings	Red LED visible with detector energized	
Dimensions and weight	See dedicated section	
<u>Options &amp; Accessories</u>		
Card with 4 SPDT relays <b>UZR20.4</b>	See threshold limit settings	
NO or NC contacts available, jumper selectable		
Maximum relay capacity:	50mA at 24Vac/dc, 100mA at 12Vac/dc	
Relay operating mode:	- direct: relay ON when an event is detected - reverse: relay ON when no event is detected	
<b>TUL40..</b> Gas calibration kit	See installation and commissioning chapter	
<b>TUS40</b> Handheld terminal for service and maintenance	See installation and commissioning chapter	
<b>CRG40</b> Gas collecting cone	See dedicated data sheet	
<b>PAP40</b> Powerful jets protection	See dedicated data sheet	
ATEX markings	 1370  II 2G Ex d IIC T6 Gb	
	BVI 07 ATEX 0032 + Ext 02/14 -20°C ≤ T <sub>A</sub> ≤ +50°C	

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## Sensors lifetime

Sensor average lifetime (see technical characteristics) is referred to a typical usage in a pollution-free environment. Presence of a high concentration of pollutants can shorten the lifetime of the sensing element.

Once the detection system starts up, it has to be supplied with energy during all the lifetime of its sensors.

Seasonal use of the detection system is not recommended.

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## Installation

### Oxygen excess

Since oxygen weighs more or less the same as air, unless there is forced or natural air circulation, it tends to spread at the point of the leak.

So, the excess oxygen detectors must be installed near any likely leakage points, in order to detect the excess oxygen as quickly as possible.

### Oxygen deficiency

Detection of oxygen deficiency has the purpose of indirectly detecting the presence of other gases that deplete the oxygen in the air, therefore causing asphyxiation problems, for example.

In this case, the detectors must be located at the breathing height of the occupants in the premises.

Take into consideration the following specific installation guidelines, as well as the above instructions, for location of the detectors.

The detectors must be installed:

1. where accidental gas leakages are possible
  2. at least 1.5m away from heat sources or from vent holes
  3. not in spaces where ventilation is poor and where gas pockets may form
  4. away from hindrances to natural gas flow
  5. away from equipment that may leak gas during normal operations
  6. in environments with a temperature range of -20°C to 50°C and relative humidity below 90% (non-condensing)
  7. Disconnect equipment from the power supply when mounting and dismantling detectors.
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## Special recommendations

### **CAUTION: safety is guaranteed only if cover is screwed on tight.**

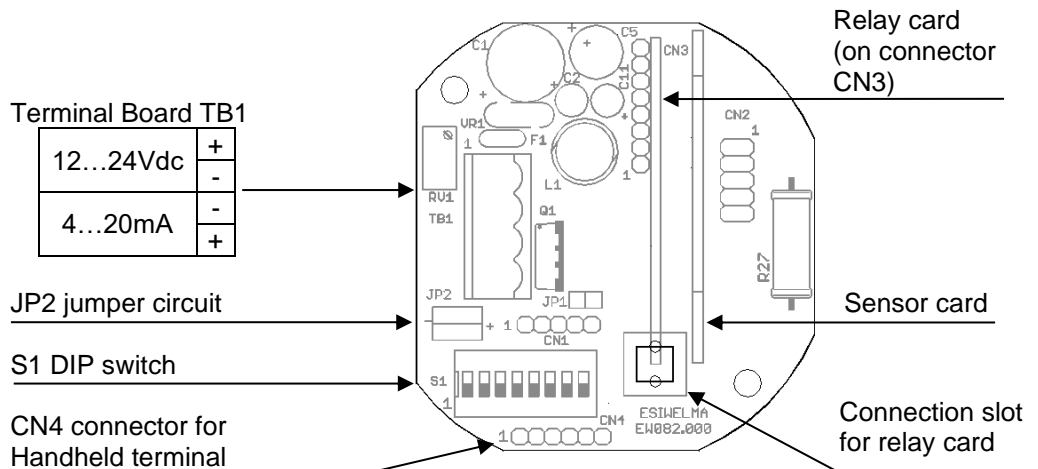
- Tighten the cover clockwise, and when it is screwed on, make sure that there is no more than 0.5 mm between housing and cover. This guarantees that it is screwed on tight. Remember to tighten the hexagon locking grub screw that fits into the end of the cover.
  - Ensure compliance with the words << DO NOT OPEN WHEN ENERGISED >>, clearly indicated on the cover. Alternatively, make the area safe before opening the sensor cover.
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## Electrical Installation

**CAUTION:** Make the area safe and make sure that the device power supply is off before cabling and configuration operations.

Install the sensor in compliance with EN 60079-14.  
ATEX certified 1" NPT cable glands are used for cable entry, in compliance with standards EN 60079-0 and EN 60079-1 (Ex d protection mode).  
Ground the sensor using the internal grounding system.

### Terminal board and electrical connections



### Cabling:

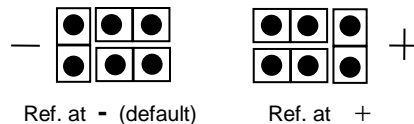
Depending on the connecting distance, use at least 3-core cable, min. diameter 0.75mm<sup>2</sup> up to 100m, 1mm<sup>2</sup> up to 200m, 1.5mm<sup>2</sup> up to 500m.  
Use shielded cable where there is a risk of electromagnetic interference.  
If a relay card is used, use multi-core cable suitable for the number of connections.  
Make sure that the cable sheath is no larger than the diameter of the cable gland.

### Configuration:

Default settings of the sensor are shown in the "Technical Specifications" chapter.  
In order to change the default settings, switch off the power supply, input the new settings at the JP2 jumper circuit or at the S1 DIP switch as shown in the diagram, then power-up again; in particular:

#### 4...20mA Output reference selection:

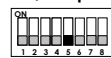
The default setting for the 4-20mA signal is the negative power signal. Output reference selection should be made by JP2 triple of jumpers; to change this setting, operator has to move **JP2** jumpers as shown in the figure:



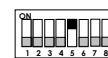
**Caution:** if the default settings are changed, the connections on the **TB1** terminal board will be inverted.

#### 4...20mA signal operating mode configuration:

To set the operating mode of the 4...20mA signal, it is necessary to use the 5th selector of the DIP switch at **S1**; in particular:



Proportional



Threshold mode

#### Setting threshold limit values:

To set the threshold limit values of the optional relay card, or of the threshold operating mode of the 4...20mA signal, it is necessary to use the last selector of the DIP switch at **S1** (ignore the first four selectors); in particular, the thresholds, given in percentage of O<sub>2</sub>, will be:

	O <sub>2</sub> excess	O <sub>2</sub> deficiency
(S1.8 = OFF, default):		
Pre-alarm	23% O <sub>2</sub>	19% O <sub>2</sub>
1 <sup>st</sup> threshold alarm	25% O <sub>2</sub>	17% O <sub>2</sub>
2 <sup>nd</sup> threshold alarm	27% O <sub>2</sub>	15% O <sub>2</sub>
(S1.8 = ON):		
Pre-alarm	22% O <sub>2</sub>	20% O <sub>2</sub>
1 <sup>st</sup> threshold alarm	23% O <sub>2</sub>	19% O <sub>2</sub>
2 <sup>nd</sup> threshold alarm	24% O <sub>2</sub>	18% O <sub>2</sub>

**Mechanical installation of the optional relay card**

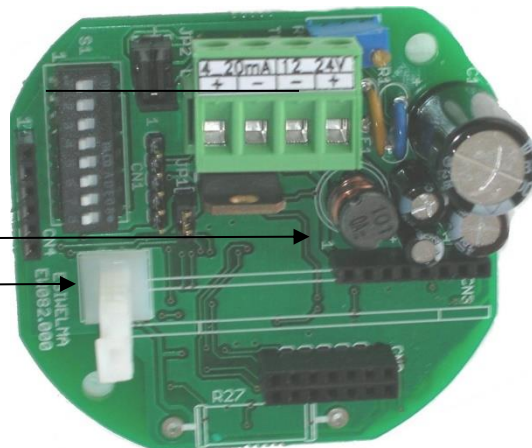
The control card can be expanded with a relay card inserted into a dedicated connector **CN3** with four SPDT relays that will be activated under the following conditions: pre-alarm, 1<sup>st</sup> threshold alarm 2<sup>nd</sup> threshold alarm and sensor fail, and relative LED alerts.

To install the card, follow the instructions below:

**Step 1:**

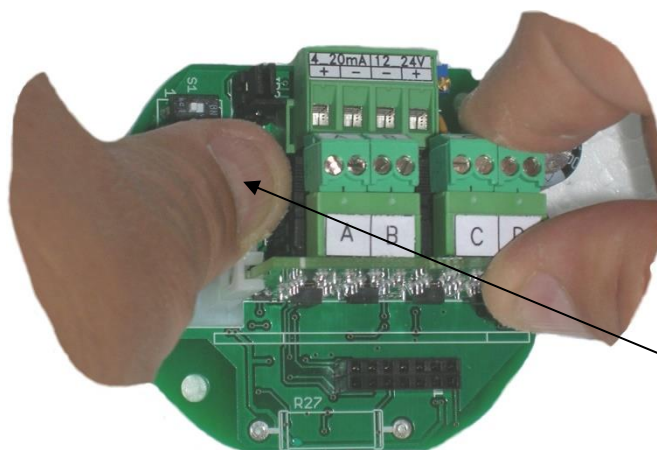
Insert the connection slot provided with the relay card into the control card, making sure the flexible tab is towards the main terminal board. Find CN3 connector.

CN3 connector  
 Connection slot (flexible tab)



**Step 2:**

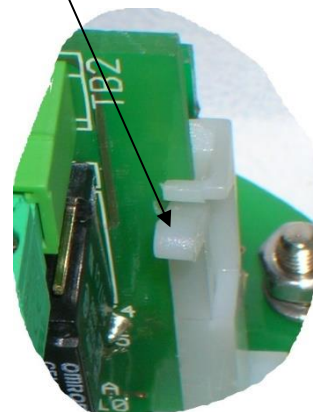
Fit the relay card snugly and pull the flexible tab of the connection slot towards the main terminal board.



Flexible tab

**Step 3:**

Check the position of the card. Make sure that all the card pins fit into the CN3 connector and push slightly upwards to check that the flexible tab on the connection slot keeps the card in place.



<b>EsiWelma srl</b>			NNNN
TYPE URS20SE		ITALY	PPPP
<del>Vmax: 28 Vdc Pmax: 3,2 W</del>		BVI AA ATEX CCCC	
<del>12V 100mA (2.5 W A)</del>		-20 ≤ Ta ≤ +50 °C	
	II 2G Ex d IIC T6		

**Step 4:**

Tick the check box with a permanent marker to indicate the presence of the relay card in the device

## Electrical installation of the optional relay card

### Selecting the type of contact on the terminal board:

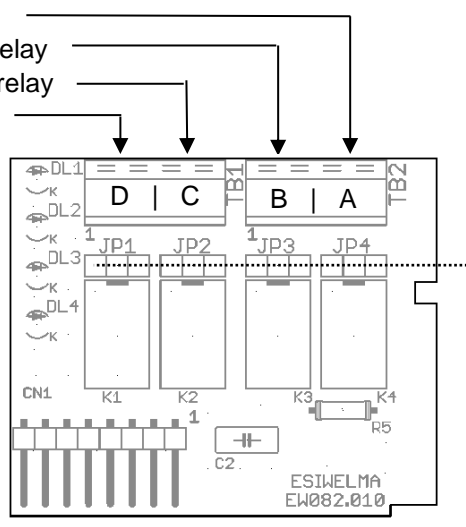
After mechanically installing the relay card, it is necessary to configure it electrically, selecting the relay operating mode and the type of contact desired on the terminal board (NC or NO).

A pair of extractable terminals is available for each relay; the type of contact (NC or NO) to be associated with them can be selected using the **JP1...JP4** jumpers.

NC or NO contact of pre-alarm relay  
 NC or NO contact of 1<sup>st</sup> THRESHOLD relay  
 NC or NO contact of 2<sup>nd</sup> THRESHOLD relay  
 NC or NO contact of FAIL relay

DL1 (yellow), Sensor FAIL  
 DL2 (red), 2<sup>nd</sup> alarm THRESHOLD  
 DL3 (red), 1<sup>st</sup> alarm THRESHOLD  
 DL4 (red), Pre-alarm

Selecting the terminal contact:



### Configuring the relay operating mode:

To set the operating mode of the relays: for direct (relay energized by event) or reverse (relay energized with no event), it is necessary to use the 6th selector of the DIP switch at **S1**; in particular:



direct operating mode



reverse operating mode

## Checklist after mechanical and electrical installation

The sensors are factory calibrated so they normally do not require any other calibration once installed. Still, after installation, an operational check of the sensors is recommended.

The detector will enter a 2-minute warm-up phase after power-up.

After this time, the sensor will switch to normal operating mode, but it will take about 2 hours before it reaches top performance level.

When the detector is operating, a gas response check should be carried out using the **TUL40..** gas calibration kit. This kit contains:

- 1 calibration gas cylinder: 4% of O<sub>2</sub>; (see kit part numbers on the specific technical data sheet)
- pressure valve and flow regulator
- sensor body adapter
- about 2 metres of hose between cylinder and adapter.

During the test, check the output current, the status of the LED outside the enclosure on the sensor body and, if present, the status of the LEDs on the relay card before closing the housing.

The LED on the sensor body and the 4...20mA output have the following operating meaning:

Sensor status	4...20mA Output	Status LED on sensor body
WARM-UP	2mA	Flashing at 2Hz frequency
OPERATING	4...20mA	1 flash about every 10 sec.
PRE-ALARM	0,10,20mA for threshold applications	2 flashes about every 5 sec.
1 <sup>st</sup> ALARM THRESHOLD		3 flashes about every 5 sec.
2 <sup>nd</sup> ALARM THRESHOLD		4 flashes about every 5 sec.
SENSOR FAIL	22mA	Steady

Since the sensor scale is between 0.....30% O<sub>2</sub>, in air (20.9% O<sub>2</sub>) the 4.....20mA

**Checklist after mechanical and electrical installation (continued)**

output must be set between 14 and 16mA (theoretic value 15.1mA).

Use the calibration kit to apply the gas mixture at 4% of CO<sub>2</sub>, making sure the 4...20mA output is between 5 and 7mA (theoretic value 6.1mA); the status LED and the pre-alarm, 1<sup>st</sup> and 2<sup>nd</sup> alarm threshold relays on the optional relay card switch on according to the thresholds and the alarm mode settings.

**Maintenance**

A sensor functional test should be carried out every three-six months.

**Routine**

Routine maintenance involves repeating the same tests as set forth in “checklist after mechanical and electrical installation”.

**Corrective**

If any abnormalities are found during routine sensor maintenance, return the sensor concerned to the supplier / installer, who in turn will send it back to the manufacturer.

Sensors may need to be re-calibrated, using the **TUL40..** calibration kit and the **TUS40-20** handheld terminal, which must be connected to the sensor via the communication interface integrated in the cable (on the connector **CN4**).

For the re-calibration procedure, see the instructions supplied with the handheld terminal.

**Decommissioning**

Remove power from the detector, disconnect all wiring and conduits and dismount the housing from all the blocking systems.

**Warranty**

Warranty on EsiWelma products is valid for 12 months from installation date and no longer than 24 months from manufacturing date on the product. Installation data, stamp and signature on the data sheet filled in by the installer will be considered proof for warranty.

A copy of the warranty data sheet must be sent when returning the product under warranty.

**Accessories**

- UZR20.4** Four-relay card
- TUL40..** Gas calibration Kit
- TUS40** Handheld terminal
- CRG40** Gas collecting cone
- PAP40** Powerful jets protection

**Dimensions and weight**

Dimensions (HxWxD): 164x100x82mm.

Weight: 0.8Kg

