EsiWelma®
a Navim Group Company

Sensigas®

Gas detectors
Carbon dioxide (CO_2)

IP65 protection degree

URD20SI

11…28Vdc power supply.

Nondispersive infrared (NDIR) sensor designed for the detection of carbon dioxide (CO_2).

Up to three alarm thresholds plus sensing element fail.

LED on sensing element body to indicate operating status.

Automatic countdown of sensor life.

Use

The URD20SI detectors are used to detect the presence of carbon dioxide (CO_2), in non-classified areas.

It detects carbon dioxide leaks or emissions in industrial environments, hospitals, fermentation plants, greenhouses, stables and, more in general, where carbon dioxide is stored, generated or produced.

URD20SI 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, 1st alarm threshold, 2nd alarm threshold, Sensor fail.

Operation

If there is a gas leakage, 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.

Ordering

To order, simply state the part number: **URD20SI**.

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

Technical characteristics

Type of sensor	NDIR (nondispersive infrared)
Detectable Gas	Carbon dioxide (CO_2)
Power supply	11÷28Vdc
Max power consumption	3.2W
Measuring range	0...20.000 ppm
Precision	± 5% full scale, ± 10% readout
Repeatability	± 5% full scale, ± 10% readout
Measurement resolution	20 ppm
Microprocessor resolution	1024 points (10 bit)
Digital filter system	Kalman Filter
Watchdog	Internal
Warm-up time	< 2m
Stabilization time	< 2m
Response time	< 25s (T90)
Average Sensor life (in air)	255 weeks
4...20mA Output	
Proportional mode (default)	- 4mA = 0 ppm - 20mA = 20000 ppm
Consumption mode (applications at 1 or 2 thresholds)	- 0mA = no alarm - 10mA = 1st threshold alarm - 20mA = 2nd 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 on the sensor body
Dimensions and weight	See dedicated section
Options & Accessories	
Card with 4 SPDT relays **UZR20.4** NO or NC contacts available, jumper selectable	See threshold limit settings
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
TUL40.. Gas calibration kit	See installation and commissioning chapter
TUS40 Handheld terminal for service and maintenance	See installation and commissioning chapter
CRG40 Gas collecting cone	See dedicated data sheet
PAP40 Powerful jets protection	See dedicated data sheet

CE Conformity	
EMC Directives / Standards	Electromagnetic Compatibility Directive 2014/30/EU / EN50270 / EN 61326-1
LVD Directives / Standards	Not applicable

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.

Installation

The relative density of carbon dioxide is about one and a half times that of air, so it tends to collect at floor level in closed, unventilated environments.

Therefore, the sensor must be installed about 30 cm above the floor level.

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.

Environmental compatibility and disposal

This product has been designed and constructed using materials and processes that take into account the environmental issue. Refer to the following notes for disposal of the product at the end of its working life, or when it is replaced:

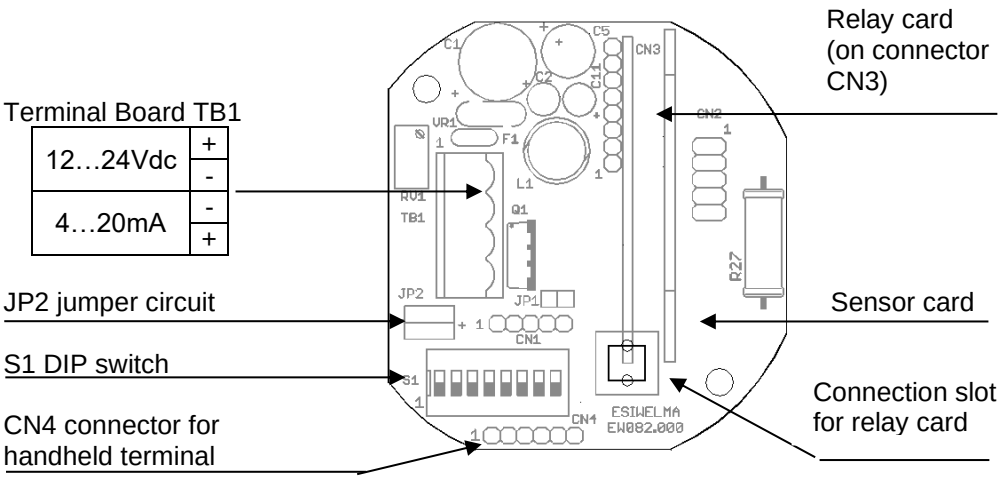
- for disposal purposes, this product is classified as an electric and electronic device: do not dispose of it with normal household waste, in particular as regards the printed circuit
- comply with all local laws in force
- as far as possible reuse basic materials to keep environmental impact to a minimum
- use local depots and waste recycling companies, or contact the supplier or manufacturer to return used products or to ask for information on environmental compatibility and waste disposal
- the product packaging can be reused. Keep it for future use or to return the product to the supplier

Electrical Installation

<u>CAUTION:</u> 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 laws in force.
1“ NPT cable glands are used for cable entry.
Ground the sensor using the internal grounding system.

Terminal board and electrical connections



Cabling:

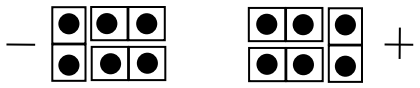
Depending on the connecting distance, use at least 3-core cable, min. diameter 0.75mm^{2}up to 100m, 1mm^2 up to 200m, 1.5mm^2 up to 500m.
Use shielded cable where there is a risk of electromagnetic interference.
If a relay card is used, use multi-core cable suitable for the number of connections.
Make 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:



Ref. at **-** (default) Ref. at +

<u>Caution:</u> 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

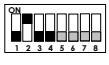
Setting threshold limit values:

(*) When the first four selectors of the DIP switch are in OFF position, the threshold limit values can only be set by the **TUS40**handheld terminal.
If this is selected without using the handheld terminal, the detector will automatically set the default threshold limit values. To set the detector with the handheld terminal, see the dedicated instruction manual.

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 first four selectors of the DIP switch at **S1**; in particular, the thresholds, given in full scale percentage, will be:


CUSTOM (*)

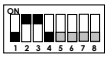

3, 5, 10%

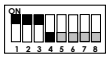

5, 10, 15%

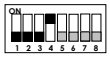

5, 10, 20%

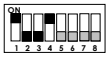

10, 15, 25%

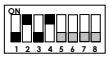

10, 15, 30%

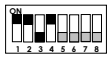

10, 20, 40% (DEFAULT)


10, 25, 35%


15, 25, 40%


15, 30, 45%


25, 35, 50%


20, 40, 60%


20, 40, 80%

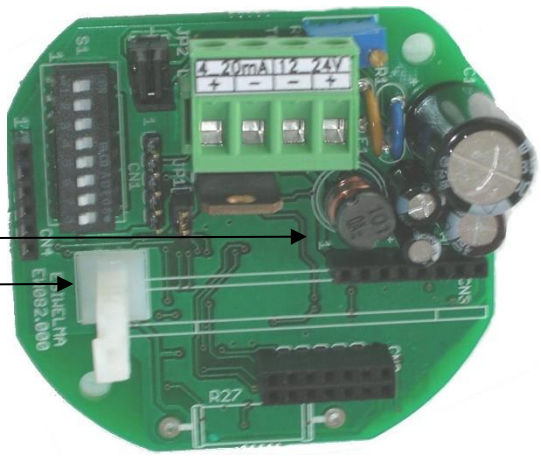


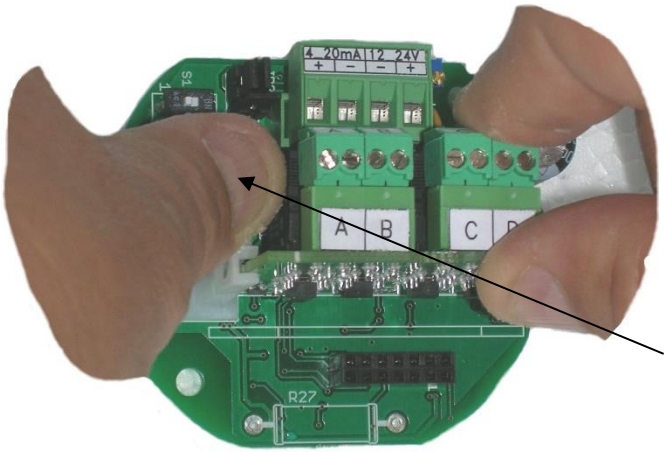

----------Future implementations----------

Mechanical installation of the optional relay card

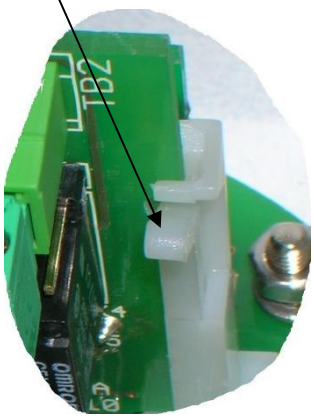
The control card can be expanded with a relay card inserted into a dedicated connector **CN3** with four SPDT relays that will be activated under the following conditions: pre-alarm, 1st threshold alarm 2nd threshold alarm and sensor fail, and relative LED alerts.
To install the card, follow the instructions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





Step 2:
Fit the relay card snugly and pull the flexible tab of the connection slot towards the main terminal board.



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.

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

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).

Selecting the type of contact on the terminal board:

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.

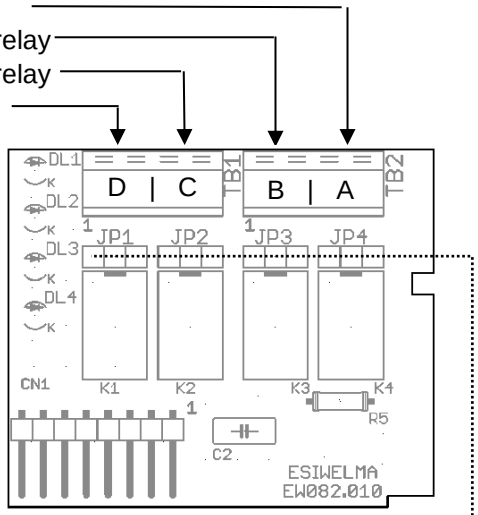
NC or NO contact of pre-alarm relay
NC or NO contact of 1nd THRESHOLD relay
NC or NO contact of 2nd THRESHOLD relay
NC or NO contact of FAIL relay

DL1 (yellow), Sensor FAIL

DL2 (red), 2nd alarm THRESHOLD

DL3 (red), 1st alarm THRESHOLD

DL4 (red), Pre-alarm



Selecting the terminal contact:

NC NO

Configuring the relay operating mode:

To set the operating mode of the relays: for direct (relay energised by event) or reverse (relay energised 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:

- 2 calibration gas cylinder: 1 x 5000ppm of CO_2; 1 x Pure Nitrogen (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 *0,10,20mA for threshold applications*	1 flash about every 10 sec.
PRE-ALARM		2 flashes about every 5 sec.
1st ALARM THRESHOLD		3 flashes about every 5 sec.
2nd ALARM THRESHOLD		4 flashes about every 5 sec.
SENSOR FAIL	22mA	Steady

Checklist after mechanical and electrical installation *(continued)*

Use the calibration kit to apply the gas mixture at 5000ppm of CO_2, making sure that the 4...20mA output is between 7 and 9mA (theoretic value 8mA), and that the status LED and the pre-alarm, 1st and 2nd alarm threshold on the optional relay card switch on according to the threshold settings.
Use the Pure Nitrogen gas cylinder to check the zero calibration.

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..** gas calibration kit and the **TUS40** 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

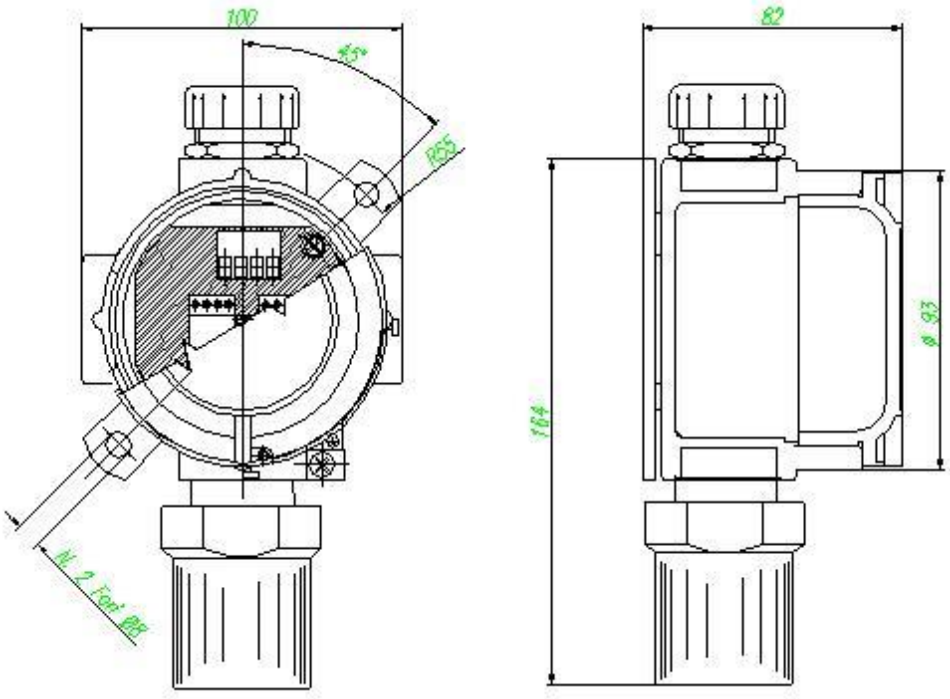
Warranty on EsiWelma products is valid for 12 months from installation date and no longer than 24 months from manufacturing date on the product. Installation data, stamp and signature on the data sheet filled in by the installer will be considered proof for warranty.
A copy of the warranty data sheet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



Installation data

To be filled in by Installer		*Installer's stamp and signature*
Installation site:		
Product order number:		
Part Number:	Manufacturing date:	
Installation date:	Replacement date:	

Routine checks

To be filled in by Installer / Service Personnel	*Signature*

Remarks

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Due to our policy of continuous product improvement, specifications are subject to change without notice.