

SELECTIVE DOMESTIC MICROPROCESSOR - BASED GAS DETECTORS WITH SOLENOID OUTPUT

RGS 148 - 248 Eng.



- Conform to standards :
 - CEI EN 50194 & CEI EN 50244 for combustible gases
 - CEI EN 50291 & CEI EN 50292 for carbon monoxide (CO)
- Supplied with internal sensor for methane or for LPG
- Option of connecting 1 or 2 remote sensors for methane, LPG or CO
- Low-voltage pulsed output for control ERA ... solenoid valve
- LEDs for power, pre-alarm, alarm and sensor fault
- Power supply: 230 V~; IP 42 protection



1. APPLICATION

RGS gas detectors are designed to guarantee the safe use, in non-industrial premises, of domestic gas appliances such as: hobs, ovens, wall boiler.

They are able to monitor, by means of the internal sensor and one or two optional remote sensors, the concentration in the air of the commonest combustible gases: methane, LPG-propane.

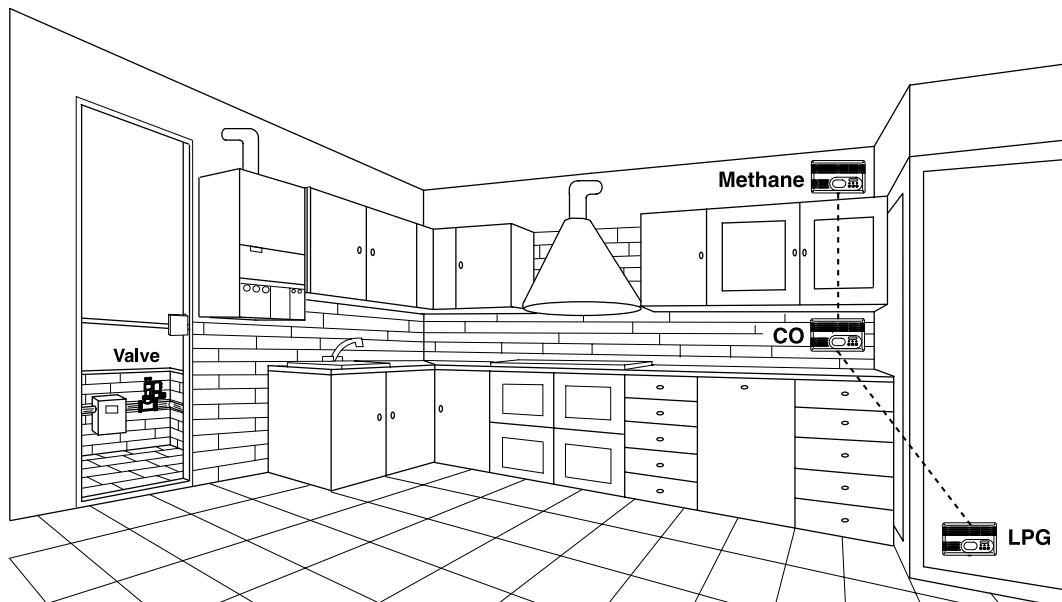
By means of a remote sensor they can also control the concentration of carbon monoxide (CO).

Code	Internal sensor	Alarm threshold	Pre-alarm threshold	Suitable external sensors	Connectible external sensors
RGS 148.15	Methane	0.80 %	0.50 %	ERA 015 (1/2")	SRS 158/258/358
RGS 148.20	Methane	0.80 %	0.50 %	ERA 020 (3/4")	SRS 158/258/358
RGS 148.25	Methane	0.80 %	0.50 %	ERA 025 (1")	SRS 158/258/358
RGS 248.15	LPG (Propane)	0.35 %	0.20 %	ERA 015 (1/2")	SRS 158/258/358
RGS 248.20	LPG (Propane)	0.35 %	0.20 %	ERA 020 (3/4")	SRS 158/258/358
RGS 248.25	LPG (Propane)	0.35 %	0.20 %	ERA 025 (1")	SRS 158/258/358

REMOTE SENSORS

Code	Gas	Power supply	Protection	Maximum connection length	
				4x1mm ²	4x1.5mm ²
SRS 158	Methane	230 Volt~	IP 42	50 m	75 m
SRS 258	LPG (Propane)	230 Volt~	IP 42	50 m	75 m
SRS 358	Carbon monoxide (CO)	230 Volt~	IP 42	50 m	75 m

2. TYPICAL INSTALLATION



3. TECHNICAL DATA

Detector RGS ..48

Power supply	230 V ~ ± 10%
Frequency	50...60 Hz
Consumption	2,5 VA
Protection	IP 42
Electromagnetic compatibility	EEC 93/68
Ambient temperature :	
Operating	0...40 °C
Storage	- 20...+ 60 °C
Permitted ambient humidity	Class F DIN 40040
Weight	250 g
Pulse output	20...30 V- / 20...30 ms
Acoustic alarm	85 db / 1 metre
Time for stabilisation sensors	120 seconds
Sensing element:	
- methane (RGS 148, SRS 158)	semiconductor (Figaro TGS 2611-B00)
- LPG-propane (RGS 248, SRS 258)	semiconductor (Figaro TGS 2610-B00)
- CO (carbon monoxide) (SRS 358)	electrochemical cell (Sixth-Sense ECO-Sure/2e)

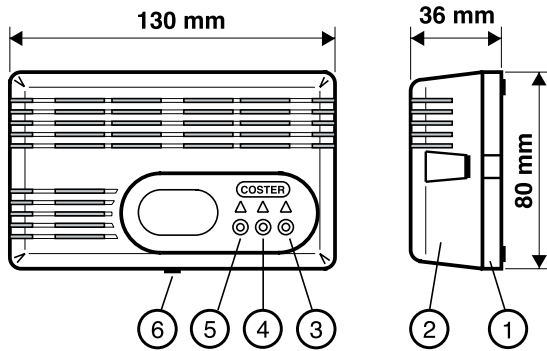
Alarm and pre-alarm thresholds:

- methane alarm	0.80 % (8,000 ppm)
- methane pre-alarm	60% of alarm threshold
- LPG-propane alarm	0.35 % (3,500 ppm)
- LPG-propane pre-alarm	60% of alarm threshold
- CO (carbon monoxide) alarm	"threshold + time"
	< 50 ppm: no alarm
	50...100 ppm: 60 minutes
	100...300 ppm: 10 minutes
	> 300 ppm: of alarm threshold
-CO (carbon monoxide) pre-alarm	time between exceeding threshold and alarm

ERA 0... solenoid valve

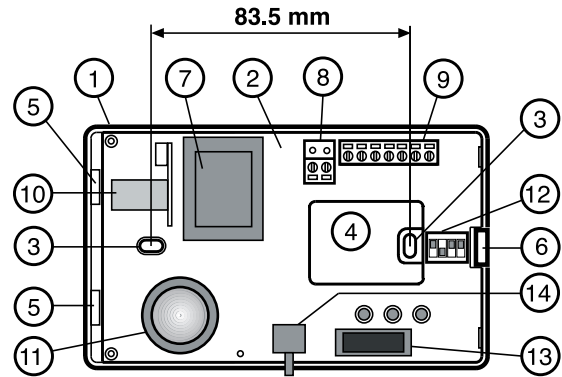
Trial pressure	240 mbar
Maximum working pressure	200 mbar
Body	OT58 brass
Plug	OT58 brass
Gasket	Viton O-Ring
Plug gasket	rubber
Protection	IP 54

4. OVERALL DIMENSIONS DETECTOR



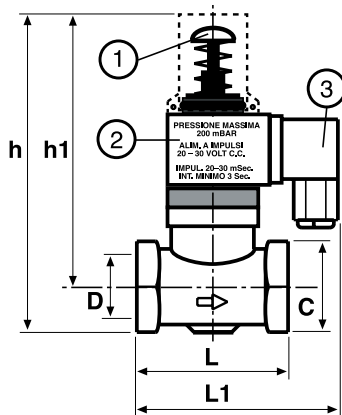
- 1 - Base
- 2 - Cover
- 3 - LED sensor fault
- 4 - LED alarm and pre-alarm
- 5 - Power LED
- 6 - TEST button

5. DETECTOR BASE



- 1 - Base
- 2 - Printed circuit
- 3 - Holes for fixing screws
- 4 - Knockout for cables
- 5 - Cover fixing elements
- 6 - Cover locking tongue
- 7 - Trasformator
- 8 - Power terminal block
- 9 - Terminal block for remote sensors and control valve
- 10 - Internal gas sensor
- 11 - Acoustic alarm
- 12 - Programmer
- 13 - Microprocessor
- 14 - TEST button

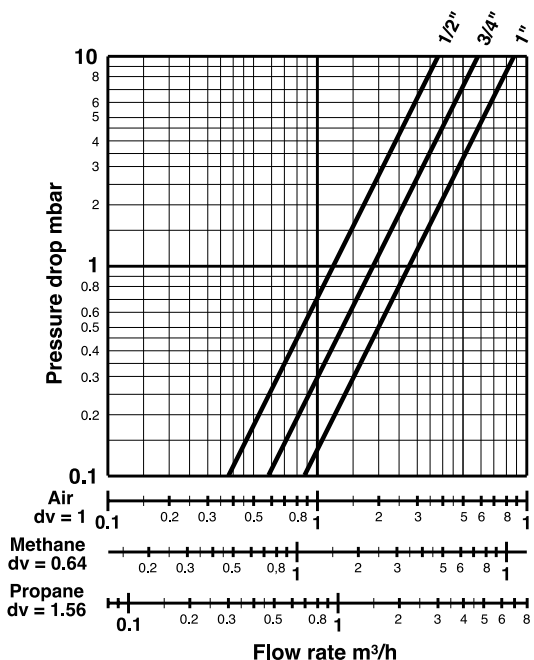
6. OVERALL DIMENSIONS SOLENOID VALVE



- 1 - Valve reset
- 2 - Coil
- 3 - Connector

Type	L mm	L1 mm	h mm	h1 mm	C mm	D inches
ERA 015	56	79	114	98	28	1/2"
ERA 020	56	79	116	100	32	3/4"
ERA 025	62	83	122	100	40	1"

7. SOLENOID VALVE PRESSURE DROP



8. CONSTRUCTION

8.1 Detector RGS ..48

The detector comprises:

- base (4.1) in shockproof plastic, with two holes at a standard distance (5.3) which permit mounting on a wall or on a standard flush-mounting pattress and with the knockout (5.4) for the passage of the electric cables.
- printed circuit (5.2) manufactured according to CEI standards, on which fitted the terminal block for the electric connections (5.8 and 5.9) the gas sensor (5.10), the acoustic alarm (5.11), the TEST button (4.6, 5.14) , the microprocessor (5.13) and the programmer (5.12).
- protective cover (4.2) in shock-proof plastic, which is secured by by means of two fixing elements (5.5) on the left and by a locking tongue (5.6) sited on the right.

8.2 Solenoid valve ERA 0..

The ERA solenoid valve is of the normally-open type with manual re-set. The body is OT58 brass with female threaded gas unions. On the valve body is screwed the release mechanism including the plug with a thrust spring. A Viton O-Ring provides protection from the outside, while the gas block is constructed with a rubber plate that closes the throughport of the valve.

The release mechanism is mounted perpendicularly to the plug and is operated by a coil with direct current at a very low voltage.

9. INSTALLATION

The gas detector must be installed in the space in which any gas escape is most likely e.g. the kitchen with its hobs, oven, wall boiler.

If the appliances used are to be found in several rooms, it is possible to connect one or two remote sensors to the detector (which already has an internal sensor) in order to guarantee a complete control of all the spaces concerned.

The correct siting of the components of the gas-detecting system is essential for ensuring its correct operation and accordingly to guarantee the safety of the spaces controlled and of the persons in them. For this reason you advised to have your system installed by a qualified installer.

9.1 Detector and remote sensors

The siting of the detector and of any remote sensors depend on the type of gas and, in particular, on the concentration in air of the gas that has to be controlled:

- **Methane** (a gas lighter than air that tends to move upwards). Position: at a distance of 10...50 centimetres from the ceiling and, in any event, above the door or the highest window.
- **LPG-Propane** (a gas heavier than air that tends to move downwards). Position: at a distance of 10...30 centimetres from the floor,
- **CO-Carbon monoxide** (a gas with a density similar to that of air and which therefore tends to diffuse uniformly). Position: at a height of 150... 200 centimetres from the floor.

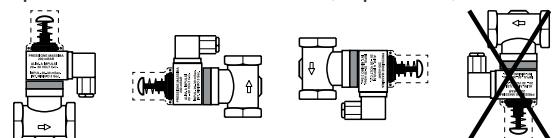
Moreover, to ensure correct operation and to avoid false alarms due to the casual and momentary presence of gas, the detector and the sensors **must NOT** be positioned:

- at a distance less than 1...2 meters from gas boilers or water-heaters,
- at a distance less than 2...3 meters from gas hobs and ovens in the kitchen (also to avoid contamination of the sensor by fats and kitchen vapours,
- in the open,
- in enclosed spaces (e.g. behind curtains, in a corner or in a wardrobe),
- directly above or below a sink,
- near to doors or windows,
- near to air extractors,
- in places where temperature and humidity could be outside the limits given under 3. TECHNICAL DATA,
- in places where dust or dirt could block the sensor and so render it ineffective,
- in places where air movement can be restricted by furniture,
- in places subject to water spashing, especially for detectors sited near the floor,
- in places where it would be very difficult to re-set the device manually and to make periodic checks.

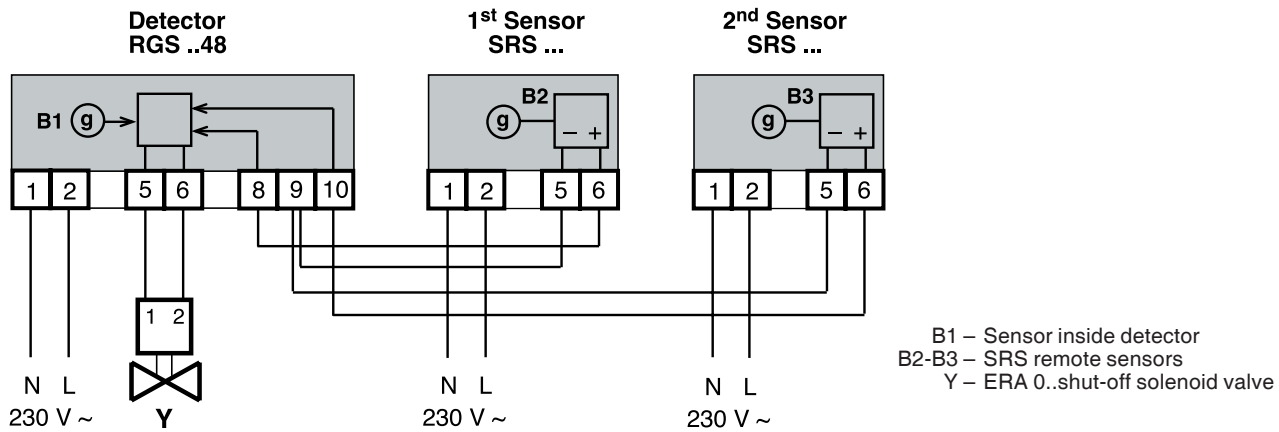
9.2 Shut-off solenoid valve

This must be installed on the gas supply pipe, observing the following precautions:

- possibly in a space different from that monitored.
- in an easily-accessible place (especially for valves which have to be re-set manually).
- if installed outside, it must be protected from the weather.
- in plants with external tanks of LPG-propane it must be installed downstream of the pressure reduction valve (30...40 mbar).
- in plants with cylinders, it must be installed downstream of the pressure reduction valve and, if possible, connected directly to this by means of a screwed union.
- it can be installed in any position except that with the union for the electric cables pointing upwards.



10. WIRING DIAGRAM



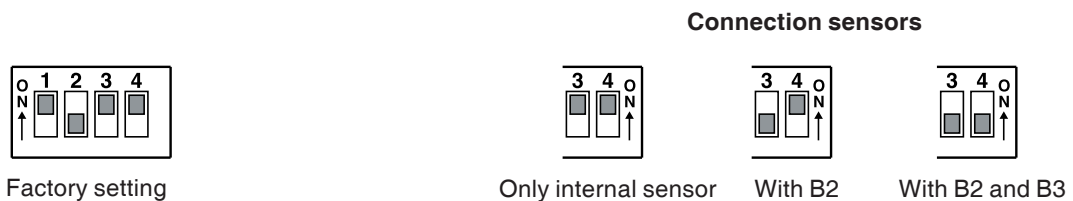
11. ELECTRICAL CONNECTIONS

The power line for the remote sensors can be the same as that of the detector or taken separately from another point in the distribution network.

IMPORTANT : the detection system must always be in operation, so the electric power for the detector and the remote sensors must be taken directly from the mains supply, without the interposition of switches or other devices that could inadvertently render it inactive.
For the electrical connections the following cables should be used:

- For the electrical connections the following cables should be used :
- 1.5 mm² for power and for the valve control circuit,
 - for the remote sensors :
 - 1 mm² for distances up to 50 meters,
 - 1.5 mm² for distances up to 75 meters.

12. PROGRAMMER



If the programmer is not adapted to the actual situation of the sensors, the detector will not signal the fault status with the yellow LED for sensor fault (4.3)

13. OPERATION

13.1 Switching on

As soon as it is powered, the detector does not acquire alarms, and so does not signal, for the first two minutes of operation. This time is necessary for the sensors to become stabilised so that their readings can be considered correct and trustworthy. During this period the green LED (4.5) which indicates the presence of power, flashes intermittently. At the end of the stabilisation period the green LED remains lit and the detector is ready for gas monitoring.

13.2 Pre-alarm and alarm

The internal sensor and any remote sensors monitor the concentration of gas in the air:

- should the reading by any of the sensors exceed the pre-alarm threshold, the red LED (4.4) of the detector starts to flash.
- if the alarm threshold is also exceeded, the red LED lights and stays lit and, with a maximum delay of 30 seconds (which serves to avoid false alarms due to the temporary presence of gas), the detector switches on the internal acoustic alarm and closes the gas shut-off valve.

13.3 Pre-alarm threshold and alarm for combustible gases

For the combustible gases, methane and LPG-propane, the alarm threshold must not be greater than a concentration equal to 20% of the LEL (lower explosive limit = volumetric ratio in air of combustible gas or vapour, below which an explosive mixture is not formed) of the gas to be controlled (regulation UNI CEI EN 50194, point 4.3.3).

For the gases under consideration we have the following values:

Type of Gas	LEL	soglia massima (20 % del LIE)	soglia di allarme stabilita dal rivelatore
Methane	5% (50,000ppm)	1% (10,000 ppm)	0.80% (8.000 ppm)
LPG-propane	2.1% (21,000 ppm)	0.42% (4,200 ppm)	0.35% (3.500 ppm)

The threshold for activating the pre-alarm is established at a value equal to 60% of the alarm threshold.

13.4 Pre-alarm and alarm for carbon monoxide (CO)

Carbon monoxide (CO) can be monitored by connecting to the detector the SRC 358 remote sensor.

The danger from this gas does not derive from its inflammability or explosiveness, but from its high toxicity.

Moreover, this danger depends, not only on the concentration of gas in the air but also on the length of time a person has been exposed to an atmosphere with CO present.

For this reason, it is possible to identify several intervention modes by the detector, that is:

- concentration < 0.005% (50 ppm): the safety of the persons present is assured for an indeterminate time and so the detector does not intervene,
- concentration 0.005... 0.01% (50...100 ppm): within this concentration range, for 60 minutes the sensor and the detector signal a "Pre-alarm" state; then, after this period, pass to the "Alarm" state,
- concentration 0.01...0.03% (100...300 ppm): within this concentration range, for 10 minutes, the sensor and the detector, signal a "Pre-alarm" state; then, after this period, pass to the "Alarm" state,
- concentration > 0.03% (300 ppm): the safety of the persons present is not guaranteed. The sensor and the detector immediately signal the "Alarm" state

The concentration values and the times taken into consideration by the sensor and, consequently, by the detector, are established leaving a large safety margin to ensure the safety of the people present.

The action of the sensor is of the "dynamic" type: if the concentration changes from one range to another, the time count increases or diminishes as a consequence, thereby modifying the response of the detector. In particular, if the concentration of CO should fall below 0.005% (50 ppm) for more than one minute, the sensor returns to the "Normal" condition, and so cancelling all the times counted up to that moment. As a consequence, the detector will exit the pre-alarm state, and from the alarm state while the solenoid valve, if it has closed, will have to be opened by hand..

13.5 Sensor fault

The detector can signal the possibility that any one of the sensors, internal or external, is defective.

- if the internal sensor has a fault, on the detector facia the yellow LED flashes.
- if one of the remote sensor has a fault, both the yellow LED on the detector and the yellow LED of the defective sensor flash.

Warning: in the event that a "sensor fault" LED lights, ask for help from technical assistance..

13.6 Output control

The closure control of the solenoid valve is not an electromechanical switch but an electronic pulse. The control pulse is repeated every 20 seconds for the whole period of the alarm status. If the gas concentration returns below the alarm level, the solenoid valve control pulses also cease. However, the gas supply remains shut off because the solenoid valve is of the manual re-set type and so the intervention of the user is required to re-start normal operation.

14. PERIODIC MAINTENANCE

To ensure that the detector continues to operate correctly, it is necessary to check its operation at least once every three or four months in accordance with the instructions in the following paragraphs. At least once a year you should have the system checked by a specialist engineer.

14.1 Check detector

Keep pressed the TEST button (4.6 and 5.14) for about five seconds until the detector enters the pre-alarm condition and then that of alarm. Check that:

- the red LED lights and stays lit for presence alarm.
- the internal acoustic alarm sounds.
- the solenoid valve closure signal works.

Release the button:

- after about 5 seconds the alarm ceases and the detector returns to its normal operating condition.
- the solenoid valve, having manual re-set, has to be re-opened by pressing the reset lever by hand.

14.2 Checking remote sensor

Check that they are powered (the green LED should be lit) and that the internal sensor is working (the yellow LED should be out)..

14.3 Ciclo di vita dell'elemento sensibile

On the cover of the sensor can be seen a plate showing the repair date of the sensor. After this date the life cycle of the sensing element is finished and so it must be replaced with a new one. It is necessary to calibrate the new sensing element and to make a complete overhaul of the sensor. These operations must be carried out in the workshops of the manufacturers.

15. WARNING: IN THE EVENT OF ALARM

Combustible gases (methane, LPG-propane)

First of all, remember that most people are able to note the presence of combustible gas (methane and LPG-propane) in the air, even at concentrations below the alarm level established for the detector, and so this situation does certainly not indicate that the detector is faulty and does not necessarily indicate a danger situation.

CO-Monossido di Carbon monoxide (CO)

Carbon monoxide (CO) is produced by the incomplete combustion of any device that has to use, for the combustion, the oxygen present in the air of the space where it is installed. **It is absolutely without odour and therefore it is impossible to notice its presence: this makes it extremely dangerous.** Only a suitable gas detector can detect its presence.

For the above reasons, and since it is not possible to know instinctively which gas has created a dangerous situation if the gas detector alarm sounds, do as follows:

- turn off all open flames, and put out cigarettes, cigars, pipes, etc.
- turn off all gas appliances.
- do not operate electric switches since these could cause sparks.
- do not use the telephone in the spaces where gas is present.
- for methane, close the central gas supply valve; whilst for LPG-propane close the cylinder or the storage tank.
- **open the windows and doors to ventilate all the spaces.**

If the cause of the alarm is discovered and securely eliminated, the valve can be re-set and the supply of gas re-started.

In the event that the reason for the gas escape is not clear, immediately inform the emergency service of the gas supply company.

Amendment to data sheet

Date	Revision No.	Page	Section	Amendment description
22.12.05 MZ		4	9.WIRING DIAGRAM	Amendment on WIRING DIAGRAM
25.11.08 MZ	01	5	11.4 Pre-alarm and alarm thresholds for carbon monoxide (CO)	Adjust CO concentration value

**Head Office & Sales**

Via San G.B. De La Salle, 4/a Tel. +39 022722121
20132 - Milano Fax +39 022593645
Orders Fax +39 0227221239

Reg. Off. Central & Southern

Via S. Longanesi, 14 Tel. +39 065573330
00146 - Roma Fax +39 065566517

Shipping

Via Gen. Treboldi, 190/192 Tel. +39 0364773200
25048 - Edolo (BS) Tel. +39 0364773202

E-mail: info@coster.euWeb: www.coster.eu

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