

# INSTALLATION & MAINTENANCE

## INDUSTRIAL GAS LEAK DETECTORS 144 x 144

- RFG 751 for 1 sensor ;
- RFG 752 for 2 sensors ;
- RFG 753 for 3 sensors ;



### CONSTRUCTION

RFG 75 detectors are constructed in a 144 x 144 case meeting DIN standard 43700 (fig. 1). The case (fig. 1.1) is in shockproof plastic material and contains, on its base, the two terminal blocks into which are inserted the connecting tabs of the printed circuit. The electronic part is constructed according to Italian Electrotechnical Committee (CEI) standards and consists of a single unit, comprising the printed circuit and controls facia, which is inserted into the case using slight pressure. The cover (fig. 1.2), in transparent plastic material, can be hinged to left or right side of case. RFG 75 is suitable for wall or panel mounting.

### INSTALLATION

They must be sited in dry premises with a temperature not above 35 °C and as far as possible from water leakages or sprays. If sited in premises classified as dangerous, they must be installed inside a cabinet constructed according the regulations in force for the type of danger involved.

- Using the handles provided, withdraw the electronic part from its case.
- Mount the case :
  - If on a wall, using the slots (fig. 1.6) provided on the base.
  - If in a panel, use the angle brackets (fig. 1.4) supplied.
- Open the knockouts (fig. 1.5) for the passage of the electric leads.
- Make the electrical connections strictly in accordance with the wiring diagram (fig. 5) and in observance of the safety regulations in force.

- If you wish to invert the direction in which the cover opens
- Open the cover
  - With a small screwdriver push the two little hinge pins (fig. 1.3) outwards.
  - With a pair of pliers pull them out completely from their housings and insert them in the housings on the opposite side without forcing them in fully.
  - Close the cover 180° and push the two little hinge pins right down so that they enter into the holes of the cover.

### Monitoring sensors

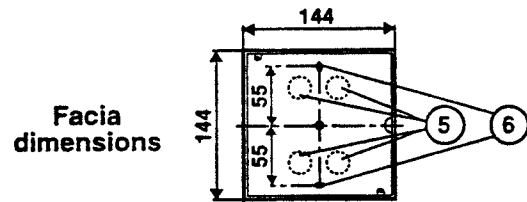
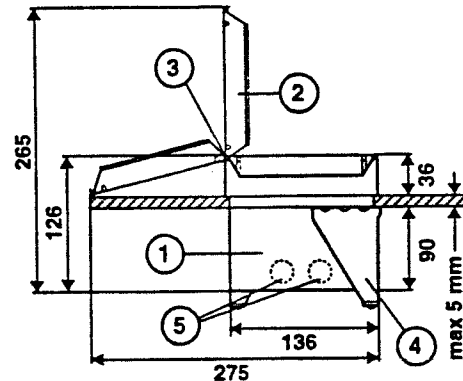
The exact siting of the sensors is essential for their correct functioning and depends on the type of gas to be monitored and its density in respect of air :

- Methane - natural gas (Light) : 10 to 50 cm. from ceiling**
- LPG (heavy) : 10 to 50 cm. from floor**
- Carbon monoxide : 150 to 200 cm. from floor**

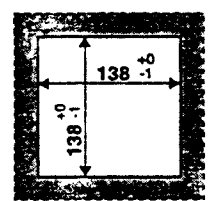
It is advisable to position the sensors at a certain distance from gas appliances in order to avoid unnecessary alarms :

### OVERALL DIMENSIONS

fig. 5



Cutout for panel mounting



- 1 - Case
- 2 - Cover
- 3 - Cover hinge pins
- 4 - Angle brackets for panel mounting
- 5 - Knockouts for cables
- 6 - Slots for wall mounting

- Boilers and calorifiers : 1 to 2 m**
- Cookers : 2 to 3 m**

### Gas shut-off valve

This must be installed on gas supply pipe, if possible outside premises monitored, in an easily accessible place protected from the weather.

In LPG installations with external tank it must be installed downstream of low pressure reducing valve (30 to 40 mbar).

### GAS MONITORING SENSORS

| Code      | Description                    | Gas                | Sensing element | Protection | Data sheet |
|-----------|--------------------------------|--------------------|-----------------|------------|------------|
| SGC 300/M | Sensor in non-industrial case  | methane (nat. gas) | TGS 842         | IP 30      | N 810      |
| SGC 300/P | Sensor in non-industrial case  | propane, LPG       | TGS 813         | IP 30      | N 810      |
| SGC 301   | Sensor in non-industrial case  | carbon monoxide    | TGS 812         | IP 30      | N 810      |
| SGR 300/M | Sensor in industrial-type case | methane (nat. gas) | TGS 842         | IP 44      | N 820      |
| SGR 300/P | Sensor in industrial-type case | propane, LPG       | TGS 813         | IP 44      | N 820      |
| SGR 301   | Sensor in industrial-type case | carbon monoxide    | TGS 812         | IP 44      | N 820      |
| SAR 300/M | Sensor in explosion-proof case | methane (nat. gas) | TGS 842         | EExd       | N 830      |
| SAR 300/P | Sensor in explosion-proof case | propane, LPG       | TGS 813         | EExd       | N 830      |
| SAR 301   | Sensor in explosion-proof case | carbon monoxide    | TGS 812         | EExd       | N 830      |



**COMMISSIONING AND TESTING**

- Using the handles provided, withdraw the electronic part from its case.
- Position switches 3 and 4 of the internal programmer (fig. 3) according to the type of alarm management chosen :
  - With Latching Alarm : Once the alarm has been acquired, it remains even when the gas concentration returns below the threshold level; to re-start normal functioning, press the reset key (fig. 2.4).
  - To be used for the operation of a solenoid valve without manual reset.
  - Without Latching Alarm : When the gas concentration returns below the threshold level, normal functioning re-starts automatically.
  - To be used to operate solenoid valves with manual reset or for control of aeration fans.
- Position switches 5,6,7 and 8 of internal programmer (fig. 3) according to number of sensors connected.
- Position the internal links (fig. 4) according to mode of using output relays :
  - Relays normally not energised :
    - Internal links (fig. 4) positioned on D ;
    - Under normal conditions (detector powered and not in alarm) the relays are not energised with contacts 6-7 and 9-10 closed and 5-7 and 8-10 open.
    - In alarm state the relays are energised with contacts 6-7 and 9-10 open and 5-7 and 8-10 closed.
  - Relays normally energised (BSI 7348 requirement) :
    - Internal links (fig. 4) positioned on S ;
    - Under normal conditions (detector powered and not in alarm) the relays are energised with contacts 6-7 and 9-10 open and 5-7 and 8-10 closed.
    - In alarm state the relays are not energised with contacts 6-7 and 9-10 closed and 5-7 and 8-10 open.
- Replace the electronic part in its case.
- Power the detector (230 V ac = terminals 2-3 or 12 V dc = terminals 19-20). LED (fig. 2.1) lights up.
- Detector does not signal alarms for a period of about two minutes so as to give time to monitoring sensors to become stabilised. At the end of this period the lighting up of the "Ready" LED (fig. 2.2) indicates that the detector is ready to signal the alarm.
- Test that the monitoring sensors are working by simulating the presence of gas : release gas from a cigarette lighter near the sensors for at least one minute. The detector, after having received a signal that the alarm threshold has been exceeded, should cause the "Sensor alarm" LED (fig. 2.8) corresponding to the sensor concerned, to light up. After the alarm delay period (fig. 2.6) has elapsed, the detector should :
  - activate the internal alarm buzzer and cause the alarm LED (fig. 2.3) to flash.
  - activate the "Operational" relay to operate the gas shut-off valve or aeration fan.
  - activate the "External alarm" relay to operate any remote alarm used.
 The switch on the facia (fig. 2.5) permits excluding the internal alarm buzzer and the external alarm.
- If the detector has been programmed "with Latching Alarm", in order to re-start normal functioning press "Reset" key (fig. 2.4).

**SETTING**

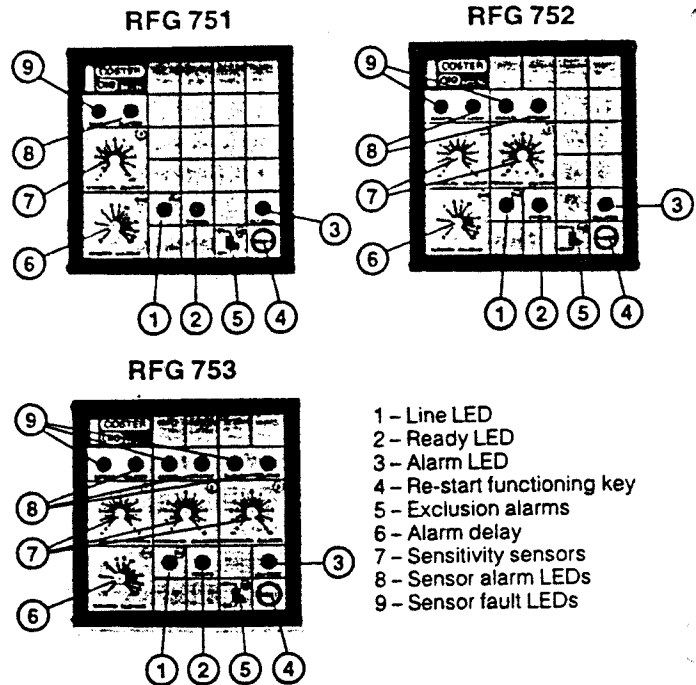
**Monitoring methane (natural gas) and propane-LPG**

The alarm thresholds of each sensor are adjustable by means of the "Alarm sensitivity" potentiometers (fig. 2.7) so that they can be adapted to special requirements or to the characteristics of the premises to be monitored.

| Sensitivity | methane (nat. gas)<br>% (ppm) | propane-LPG<br>% (ppm) |
|-------------|-------------------------------|------------------------|
| - 5         | 0.8 (8,000)                   | 0.35 (3,500)           |
| 0           | 0.52 (5,200)                  | 0.2 (2,000)            |
| + 5         | 0.25 (2,500)                  | 0.06 (600)             |

**FACIAS**

fig. 2



In the condition of low sensitivity (- 5) the alarm threshold corresponds to about 16 % LEL (lower explosive limit). The regulations require that the alarm threshold is below 25 % LEL. LEL methane (nat. gas) = 5 % (50,000 ppm); LEL propane = 2.1 % (21,000 ppm).

Accordingly, in event of a gas escape, RFG 75. detectors permit intervening under conditions of maximum safety.

**Carbon monoxide monitoring**

The danger of carbon monoxide does not derive from its flammability but from its high toxicity for humans and this depends on concentration level and time of exposure to the gas.

| Concentration    | Time     | Effects          |
|------------------|----------|------------------|
| 0.01 % (100 ppm) |          | Irrelevant       |
| 0.03 % (300 ppm) | 60 min.  | Lethargy         |
| 0.05 % (500 ppm) | 90 min.  | Headache, nausea |
| 0.06 % (600 ppm) | 90 min.  | Loss of senses   |
| 0.07 % (700 ppm) | 120 min. | Coma, death      |

You must use the alarm threshold with sensitivity at - 5, equal to a concentration of 0.05 % (500 ppm) of carbon monoxide in air.

**Alarm delay**

In order to ensure that unusual and transient ambiental conditions do not set off the alarm unnecessarily, RFG 75. detectors delay their intervention with respect to the signals from sensors. This delay can be adjusted (5 to 30 seconds) by means of the potentiometer (fig. 2.6) on facia.

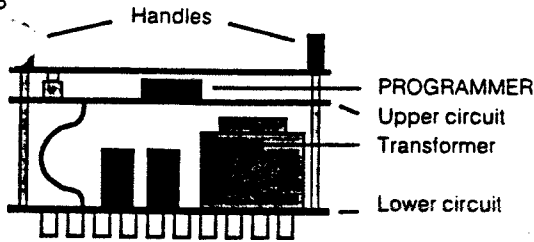
**SELF-DIAGNOSIS**

In event of a fault in a sensor, or of a sensor having been connected incorrectly, RFG 75. detectors signal the anomalous situation by means of the "Sensor fault" (fig. 2.9) and "Sensor alarm" (fig. 2.8) LEDs.

| TYPE OF FAULT                          | LED   |       |
|--|-------|-------|
|  | Fault | Alarm |
| Self-heating element of sensor broken  | *     |       |
| No connection to terminal 1 of sensor  | *     |       |
| No connection to terminal 2 of sensor  |       | *     |
| No connection to terminal 3 of sensor  | *     | *     |
| Connections 1 and 2 of sensor inverted | *     |       |
| Connections 1 and 3 of sensor inverted | *     | *     |
| Connections 2 and 3 of sensor inverted | *     | *     |

# PROGRAMMER

fig. 3



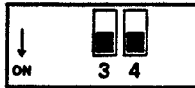
### Factory setting



### Latching Alarm



Without Latching Alarm



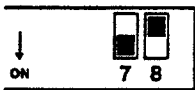
With Latching Alarm

### Sensor connections

#### RFG 752

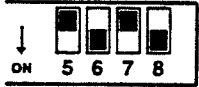


With B1 only



With B1 and B2

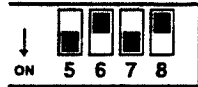
#### RFG 753



With B1 only



With B1 and B2



With B1, B2 and B3

If programmer is not adapted to actual situation of sensors, detector goes into alarm and signals fault for sensors not connected

## PERIODICAL MAINTENANCE

To ensure that the detector continues to function over time you should carry out a test at least every three or four months.

- Simulate presence of gas : release gas from a cigarette lighter near one of the monitoring sensors for at least one minute.
- When the gas concentration reaches the alarm threshold, the detector should cause the "Sensor alarm" LED corresponding to the sensor concerned, to light up. At the end of the alarm delay period the detector should :
  - activate the internal alarm buzzer and cause the alarm LED to flash;
  - activate the operational relay to operate the closure of the gas shut-off valve or switch on an aeration fan.
- Re-start normal functioning :
  - If detector is programmed "with Latching Alarm", press reset key.
  - If detector is programmed "without Latching Alarm", and operates a valve with manual reset, reset valve by hand.
- Using the same procedure, test any other monitoring sensors used

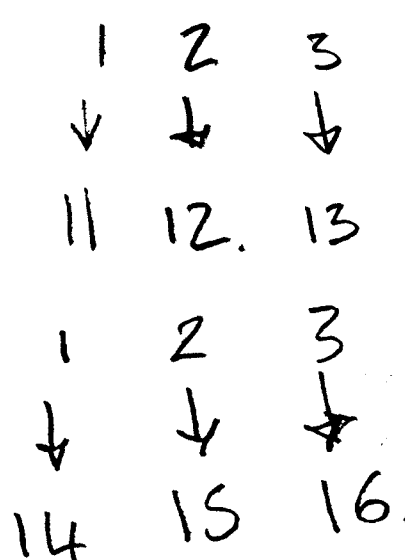
The sensing elements of the monitoring sensors have an average life of 10 years.

At the end of this period it is advisable to send the monitoring sensors to Coster T.E. for a complete check.

## TECHNICAL DATA

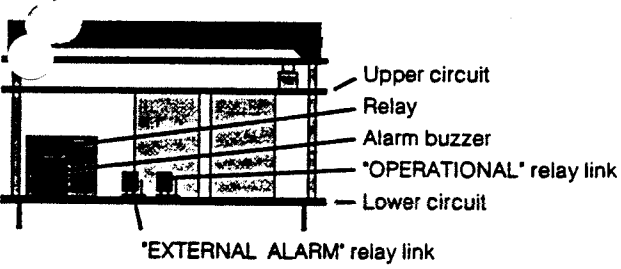
|                               |   |
|-------------------------------|---|
| Power supply                  | 230 V ac or 12 V dc.                    |
| Consumption                   | 5 VA                                    |
| Electromagnetic compatibility | EEC 93/68                               |
| Output relay:                 |   |
| - type                        | airtight with inert gas                 |
| - contacts                    | SPDT voltage-free                       |
| - maximum switched voltage    | 250 V ac                                |
| - maximum switched current    | 5 (1) A                                 |
| Audible alarm                 | 95 db                                   |
| Suitable monitoring sensors   |   |
| - methane (natural gas)       | SGC/SGR/SAR 300/M                       |
| - propane - LPG               | SGC/SGR/SAR 300/P                       |
| - carbon monoxide             | SGC/SGR/SAR 301                         |
| Adjustable alarm threshold :  |   |
| - methane (natural gas)       | 0.8 % (8,000 ppm) to 0.25 % (2,500 ppm) |
| - propane - LPG               | 0.35 % (3,500 ppm) to 0.06 % (600 ppm)  |
| - carbon monoxide             | 0.05 % (500ppm) + 0.005 % (50 ppm)      |
| Adjustment alarm delay        | 5 to 30 seconds                         |
| Ambient temperature :         |   |
| - operation                   | 0 to +45 °C                             |
| - storage                     | - 25 to +60 °C                          |
| Relative ambient humidity     | class F (DIN 40040)                     |
| Protection                    | IP 44                                   |
| Weight                        | 1.4 kg                                  |
| Dimensions                    | 144x144x126mm                           |

*Meth*



## RELAY LINKS

fig. 4



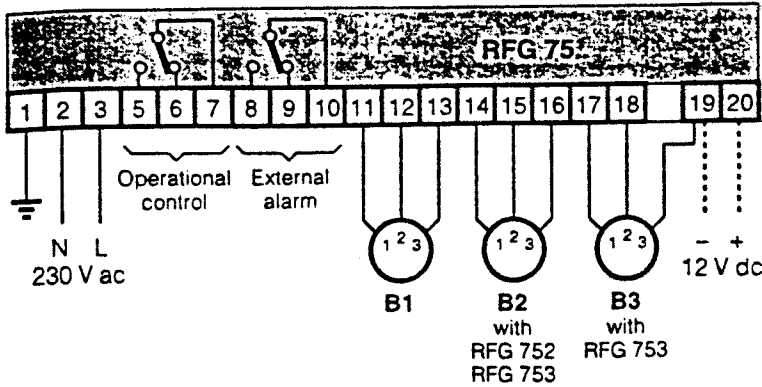
- S - Relay normally energised
- D - Relay normally not energised



WIRING DIAGRAMS

fig. 6

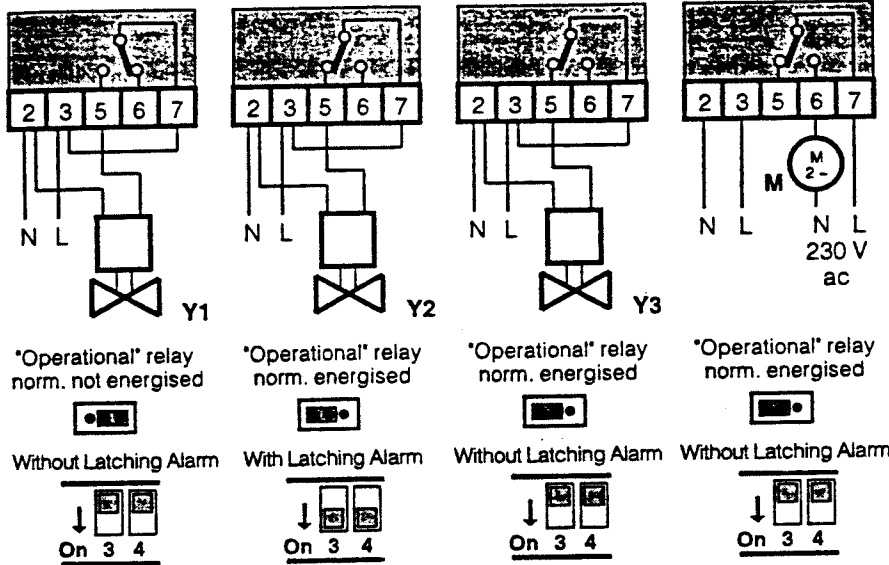
General layout



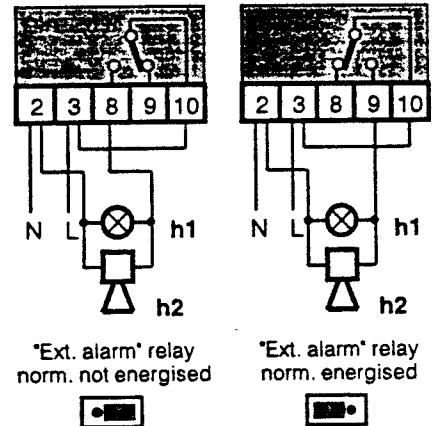
All diagrams are with power at 220/240 V ac.  
Relay contacts of General Layout are shown in condition of detector not powered.  
Relay contacts of Example diagrams are shown in condition of detector powered and not in alarm

- B1-2-3 - Monitoring sensors
- h1-2 - External alarms
- M - Aeration fan
- Y1 - Solenoid valve N.O. with reset
- Y2 - Solenoid valve N.C.
- Y3 - Solenoid valve N.C. with reset

Example of "Operational" controls



Examples "External alarms"



ELECTRICAL INSTALLATION

RFG 75. detectors can be powered by 230 V ac (terminals 2 and 3) or by 12 V dc (terminals 19 and 20). **It is not possible to use the two voltages at the same time.**  
If one of monitoring sensors scheduled to be used is not connected, the setting of switches 5,6,7 and 8 of internal programmer (fig. 3) must be changed.

The minimum cross section of cables for connecting sensors depends on length of the cables:  
**Up to 50 metres : 1 mm<sup>2</sup>**  
**Up to 70 metres : 1.5 mm<sup>2</sup>**  
In any event the safety regulations in force at the time of making the installation must be strictly observed.



20132 Milano Head Office & Sales  
via San G.B. De La Salle 4/a Tel. 02/2593641 - 2 - 3 - 4  
Telefax. 02/2593645

25048 Edolo (BS) Factory  
via Gen. Treboldi 190/192 Tel. 0364/71480 - 71988  
Telefax. 0364/72615

