

INDUSTRIAL GAS LEAK DETECTORS

RFG 751 - 752 - 753 Eng.



- Constructed in DIN 144 x 144 case with IP 44 protection
- Power supply 220 / 240 V ac or 12 V dc
- One SPDT "Operational" output relay
- One SPDT "External alarm" output relay
- Adjustable alarm threshold ; maximum value below 25 % LEL
- Adjustable delay switching on alarm
- Alarm and sensor fault LEDs
- Option connecting from 1 to 3 sensors for monitoring methane (nat. gas), propane-LPG or carbon monoxide
- Construction and operation according to BSI 7348, EN 50054 and CEI-UNI / CIG 70028 regulations

APPLICATION

RFG 75 . detectors are designed to detect the presence of gas in industrial (laboratories, workshops, etc) or non-industrial (boiler houses, garages, etc) premises. They can monitor, with one, two or three sensors, the concentration in air of the most common types of combustible gas, or of carbon monoxide produced by incomplete combustion, according to type of sensor used.

By means of "Operational" relay output they can control a gas shut-off valve, an aeration fan, etc.
By means of "External alarm" relay output they can activate a remote alarm device.

MODELS

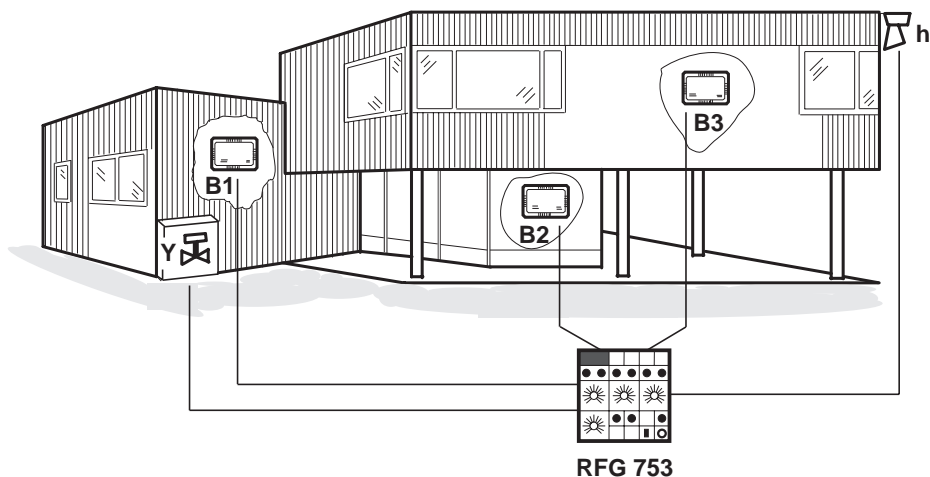
Code	Description	Ministry of Interior Certificates
RFG 751	Gas detector for 1 remote sensor	3704/552-10/41/44CR
RFG 752	Gas detector for 2 remote sensors	3704/552-11/41/44BR
RFG 753	Gas detector for 3 remote sensors	3704/552-8/41/44DR

GAS MONITORING SENSORS

Code	Description	Gas	Sensing elem.	Protection	Data sheet
SGC 300/M	Sensor in non-industrial case.	methane (natural 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 (natural 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 (natural 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

TYPICAL INSTALLATION

fig. 1



B1, B2, B3 – Monitoring sensors

Y – Gas shut-off valve

h – External alarm

OPERATION

The detector, when powered, does not activate alarms for a period of about two minutes so as to give time to monitoring sensors to become stabilised. At end of this period the "Ready" LED (fig. 2.2) lights up to indicate that detector is ready to signal alarm.

The monitoring sensors continuously analyse surrounding air and send to detector 0 to 5 V dc electrical signals proportional to gas concentration in air.

When concentration exceeds alarm threshold, signal corresponds to 2 V dc and detector immediately causes alarm sensor LED (fig. 2.8) corresponding to sensor concerned, to light up, and, after alarm delay period has expired, detector activates:

- Internal alarm buzzer and causes alarm LED (fig. 2.3) to flash.
 - "Operational" relay to operate gas shut-off valve or aeration fan.
 - "External alarm" relay to operate any remote alarm device used.
- The switch on facia (fig. 2.5) permits excluding internal audible alarm and external alarm.

MONITORING OF METHANE (NATURAL GAS) AND PROPANE-LPG

The alarm thresholds of each single sensor are adjustable by means of "Alarm sensitivity" potentiometers (fig. 2.7) so as to adapt them to special requirements or characteristics of premises to be monitored.

Sensitivity	methane (natural gas) % (ppm)	propane-LPG % (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)

In condition of low sensitivity (- 5) alarm threshold corresponds to about 16 % LEL (lower explosive limit). The regulations require that alarm threshold is 25 % below LEL.

LEL methane (natural 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 the 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 -5 sensitivity, equal to a concentration of 0.05 % (500 ppm) of carbon monoxide in air.

ALARM DELAY

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

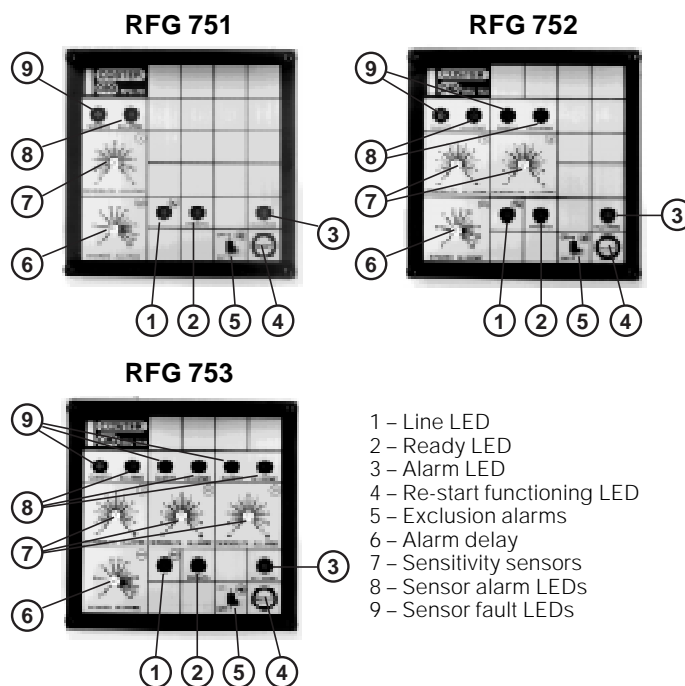
OUTPUT RELAY

The "Operational" and "External alarm" relays can be used in two different ways:

- Normally not energised : :
 - Internal links (fig. 4) positioned on R;
 - In normal condition (detector energised, not in alarm), relays are not energised with contacts 6-7 and 9-10 closed, 5-7 and 8-10 open.
 - In alarm condition, relays are energised with contacts 6-7 and 9-10 open and 5-7 and 8-10 closed.
- Normally energised (BSI 7348 requirement):
 - Internal links (fig. 4) positioned on L;
 - In normal condition (detector energised, not in alarm), relays are energised with contacts 6-7 and 9-10 open and 5-7 and 8-10 closed.
 - In alarm condition, relays are not energised, with contacts 6-7 and 9-10 closed and 5-7 and 8-10 open.

FACIAS

fig. 2



LATCHING ALARM AND RESETTING

When detector enters alarm state, if switches 3 and 4 of internal programmer (fig. 3) are in On position (with Latching Alarm), this alarm state remains even when gas concentration returns below threshold level; to re-start normal functioning, it is necessary to press "Reset" key (fig. 2.4). If switches 3 and 4 are in Off position (without Latching Alarm), when gas concentration returns below alarm threshold, normal functioning re-starts automatically.

SELF-DIAGNOSIS

In event of a fault in a sensor, or of a sensor having been connected incorrectly, detector indicates the anomalous situation by means "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	*	*

CONSTRUCTION

RFG 75 . detectors are constructed in a 144 x 144 case (fig. 5) according to DIN standard 43700.

The case is in shockproof plastic and contains, on its base, the two terminal blocks into which are inserted connecting tabs of printed circuit.

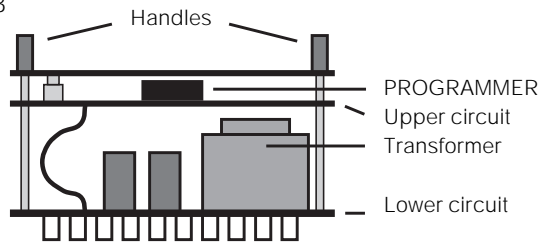
The electronic part is constructed according to Italian Electrotechnical Committee (CEI) standards and consists of a single unit, comprising printed circuit and controls facia, which is inserted into case using slight pressure.

The cover, in transparent plastic material, can be hinged on the left or right-hand side of the case.

RFG 75 . is suitable for wall or panel mounting.

PROGRAMMER

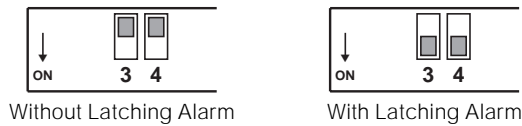
fig. 3



Factory setting

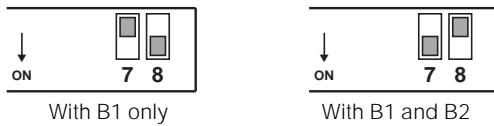


Latching Alarm

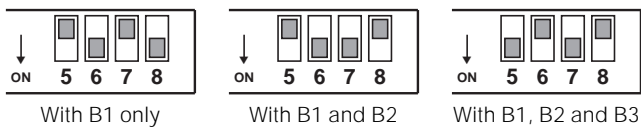


Sensor connections

RFG 752



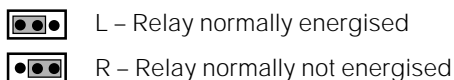
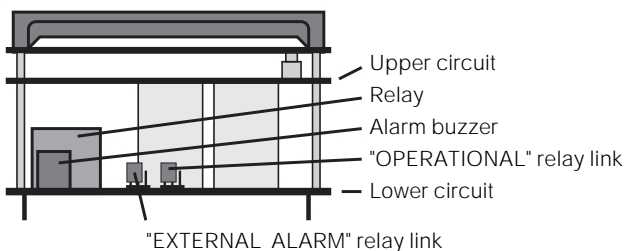
RFG 753



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

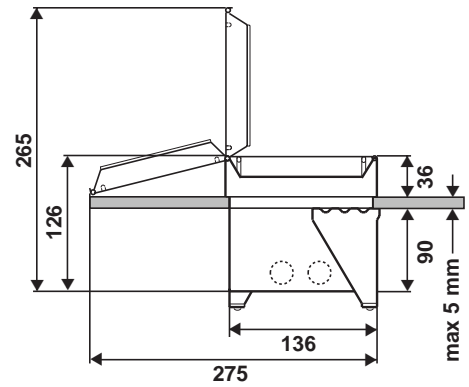
RELAY LINKS

fig. 4

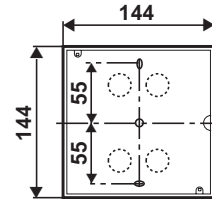


OVERALL DIMENSIONS

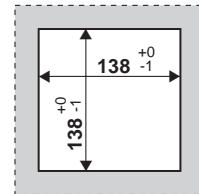
fig. 5



Facia dimensions



Cutout for panel mounting



INSTALLATION

RFG 75. DETECTORS

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

The electrical connections must be strictly in accordance with the wiring diagram (fig. 6) and in observance of the safety regulations in force.

MONITORING SENSORS

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

- methane (natural gas) (light) : 10 to 50 cm. dal soffitto**
- LPG (heavy) : 10 to 50 cm. from floor**
- Ossido di carbonio : 150 to 200 cm. from floor**

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

- Boilers and calorifier : 1 to 2 mt.**
- Cookers : 2 to 3 mt.**

GAS SHUT-OFF SOLENOID VALVE

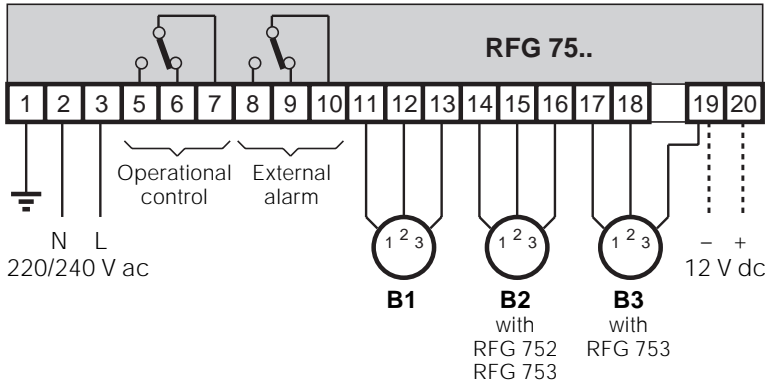
This must be installed on gas supply pipe, if possible **outside premises monitored, in an easily accessible place protected from the weather.**

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

WIRING DIAGRAMS

fig. 6

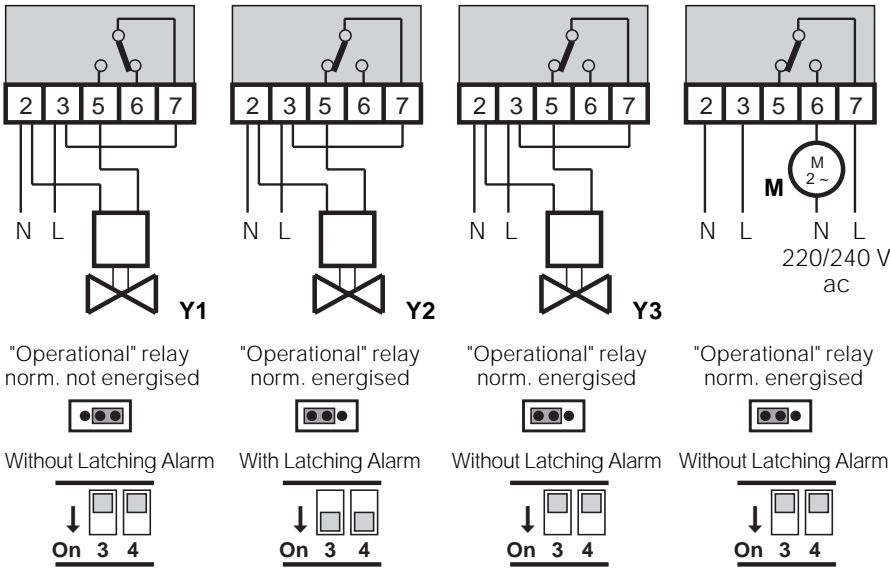
General layout



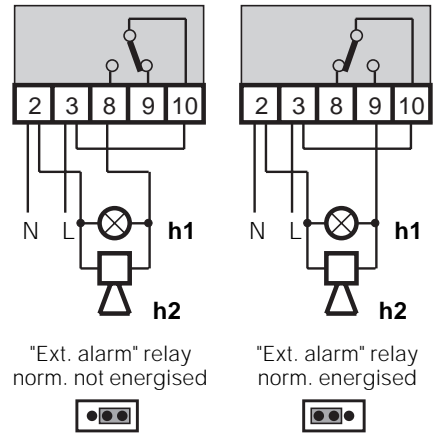
All diagrams are with power at 220/240 V ac.
Relay contacts of General Layout are shown in condition of detector not powered.
Relay contacts of Example diagrams are shown in condition of detector powered and not in alarm

- 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"



TECHNICAL DATA

Power supply	220/240 V ac or 12 V dc	Room humidity	class F (DIN 40040)
Consumption	5 VA	Protection	IP 44
Electromagnetic compatibility	EEC 93/68	Weight	1.4 kg
Outputs relay:		Dimensions	144x144x126 mm
– type	airtight with inert gas		
– contacts	SPDT voltage-free		
– maximum switched voltage	250 V ac		
– maximum switched current	5 (1) A		
Audible alarm	85 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 % (500 ppm)		
Adjustable alarm threshold	5 to 30 sec.		
Ambient temperature :			
– operation	0 to +45 °C		
– storage	-25 to +60 °C		

ELECTRICAL INSTALLATION

RFG 75 . detectors can be powered by 220 / 240 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 the monitoring sensors scheduled 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 mm²
Up to 75 metres : 1.5 mm²
In any event the safety regulations in force at time of making installation must be scrupulously observed.

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