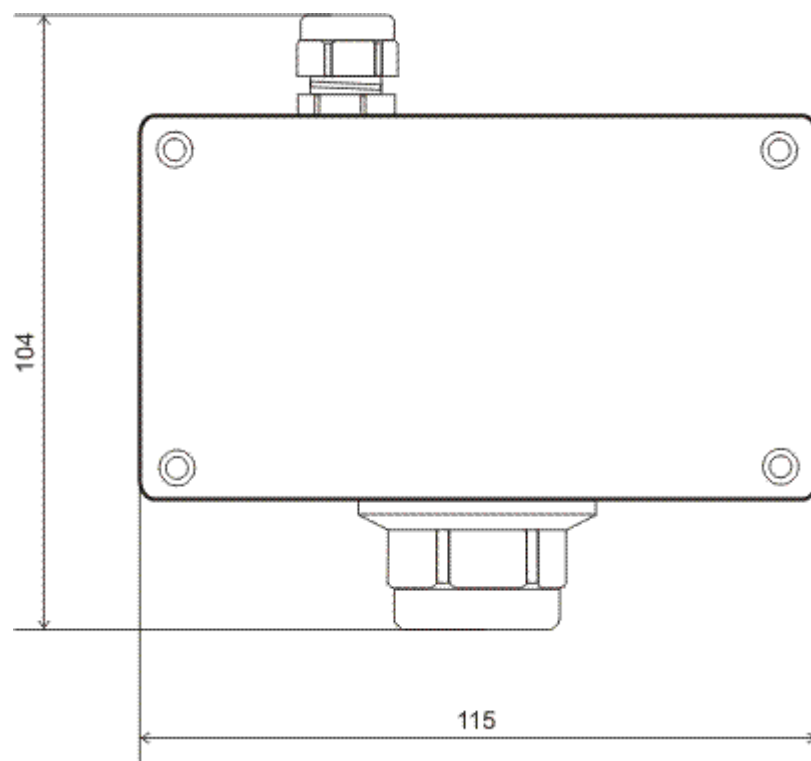


Technical Specifications and User Guide for GR31 Detector


GR31 detector is designed to detect flammable gases and vapours of flammable substances in indoor areas such as boiler rooms, technological businesses, spaces for rebuilding cars running on LPG with the ZONE 2 environment. For measuring the gas concentration, the detector uses a sensor working on the principle of infrared absorption. The signal from the sensor is evaluated in the detector electronics, which controls the outputs and indicator lights according to the state of the sensor.

GR31 detector works in non-centralized operation. The setting of the concentration limits is done by using the setting elements on the detector PCB. The output is then two-stage signal of exceeding (or not exceeding) the preset concentration level. When connected to the control system it is possible to use the current loop output that sends a signal according to the concentration level sensed by the sensor. When the preset concentration level is exceeded, it is indicated optically by indicator lights on the box lid.

GR31 detector can be used independently (for smaller spaces) or in a group setting comprising of several units in larger buildings. In a group setting the detectors can be connected to the parallel bus (see below), in which case the detector itself decides whether the concentration limit was exceeded. In this mode it cannot be electronically identified which detector caused the response. Another option is to connect each detector directly to the control system either through the logic two-stage inputs or through the current loop.



Technical Specifications

Detectable gas	flammable gases and vapors of explosive hydrocarbon materials - customer specified flammable gas (standard calibration - methane)
Signalling	two-stage (two outputs) + current loop
Outputs	open collector transistor (60 V / 0.3 A) passive 4-20 mA current loop
Current loop	passive two-wire, galvanically isolated from the power supply, operating range of 12-32 V
Warm-up time	1 minute
Default signalling level (other settings can be agreed upon with the customer)	20% LEL for stage II and 10% LEL for stage I
Maximum measuring range	up to about 50% LEL (by detected gas)
Response time	max. 30 sec
Supply voltage	12 - 33 V =
Power consumption	max. 0.8 W
Protection	 II 3G Ex d ic nA IIC T5 Gc
Protection	IP42 sensor / IP65 electronics
EMC	Type 1 according ČSN EN 50270:2007
Weight	about 250 g
Operating conditions	0 - 50 °C, 0 - 95% RH, pressure 90-110 kPa
Storage temperature	-25 - 60 °C/ non-condensing humidity
Dimensions without the bracket	115x104x50 mm
Detector connection	multicore (4) cable, diameter min. 5 mm; for a distance longer than 5 m use shielded cable conduit section 0,5 - 1,5 mm ²
Constructed according to	ČSN EN 60079-29-1, ČSN EN 60079-15, ČSN EN 60079-0

Function Description

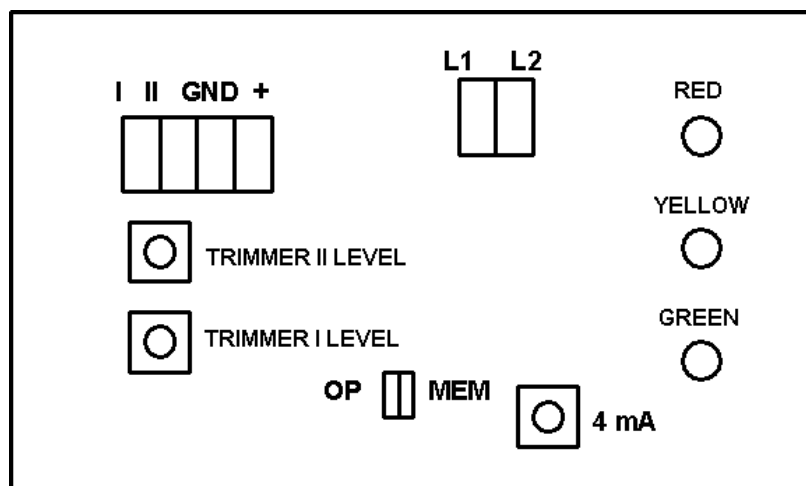
GR31 detector uses a sensor detecting the attenuation of infrared radiation in the hydrocarbon gas. This sensor is non-selective, it reacts in the presence of any flammable hydrocarbon substance in the air. Generally, the larger and more complex molecules induce a higher response. When manufactured, the detector is set to the desired concentration level of a specific gas.

After connecting the supply voltage, which is indicated by green indicator light, the sensor is not yet stabilized and the stabilization phase is only starting. During the stabilization phase (1 minute), the detector does not respond to the presence of any gas. This is indicated by flashing yellow indicator light.

After the sensor is stabilized, the yellow indicator light goes off and the detector is ready for operation. When the preset gas concentration emerges, the corresponding output (by setting the corresponding switches - see below) changes its status. Proper function is indicated by short OFF green indicator during 15 second period.

Detector Connection

The detector is connected into the detection system via conductors connected to a terminal on the circuit board. For the proper operation, the detector always requires connection to the supply voltage. When overvoltage is possible then protection against voltage above 36 V must be inserted. The outputs can be connected as needed.



Wire	Usage
+	Detector positive supply voltage. The detector power supply can be provided by an output voltage of a higher-level system or by a power supply source NZ23, NZ23-DIN. We recommend using a surge protector on the system power supply input.
GND	Common wire (ground). A wire with a reference potential for the power supply and output signals.
II	Stage two output. Switching at the concentration exceeding the trimmer II setting or at the sensor failure. The idle state (on/off) can be set by OP jumper.

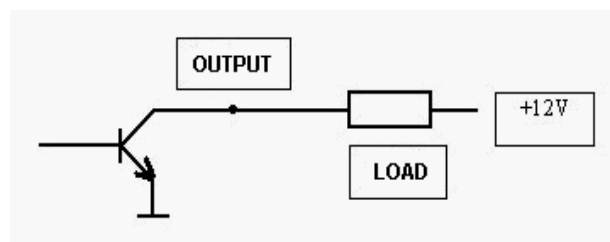
I	Stage one output. Switching at the concentration exceeding the trimmer I setting.
L1,L2	Output terminals of 4-20 mA current loop. The terminals are interchangeable.

Outputs Connection

Outputs II and I indicate exceeding of the preset concentration level II and I. Both outputs II and I are connected as open collector transistors, i.e. they switch on the load connected to + supply voltage.

The terminals are connected directly to the output transistor, there are no additional protective transistor circuits on the circuit board. When switching on e.g. inductive loads, it is necessary to use an external protective elements.

Example of connecting a resistive load with 12 V DC power supply:



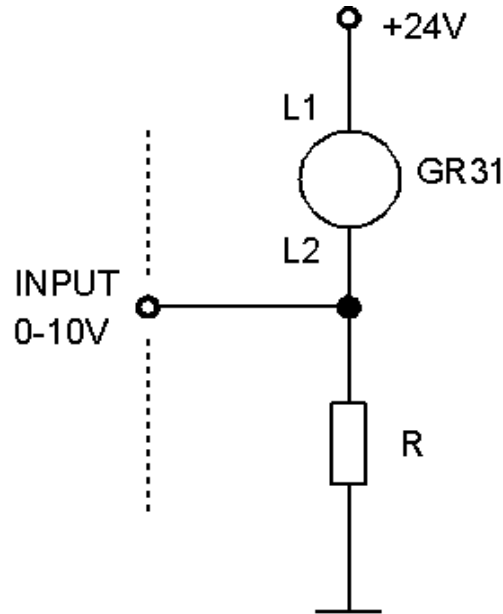
For output II, the circuit board contains a jumper (see below) that allows choosing the idle state of the output transistor.

OP jumper open	The output transistor is switched off when idle - the current is not conducted (the detector is without fault and the preset concentration level is not exceeded).
OP jumper short	The output transistor is switched on when idle - the current is conducted (the power supply and the detector are without fault and the preset concentration level is not exceeded).

During the stabilization phase after switching on the detector, none of the two outputs is active, i.e. they do not indicate the presence of gas in the air.

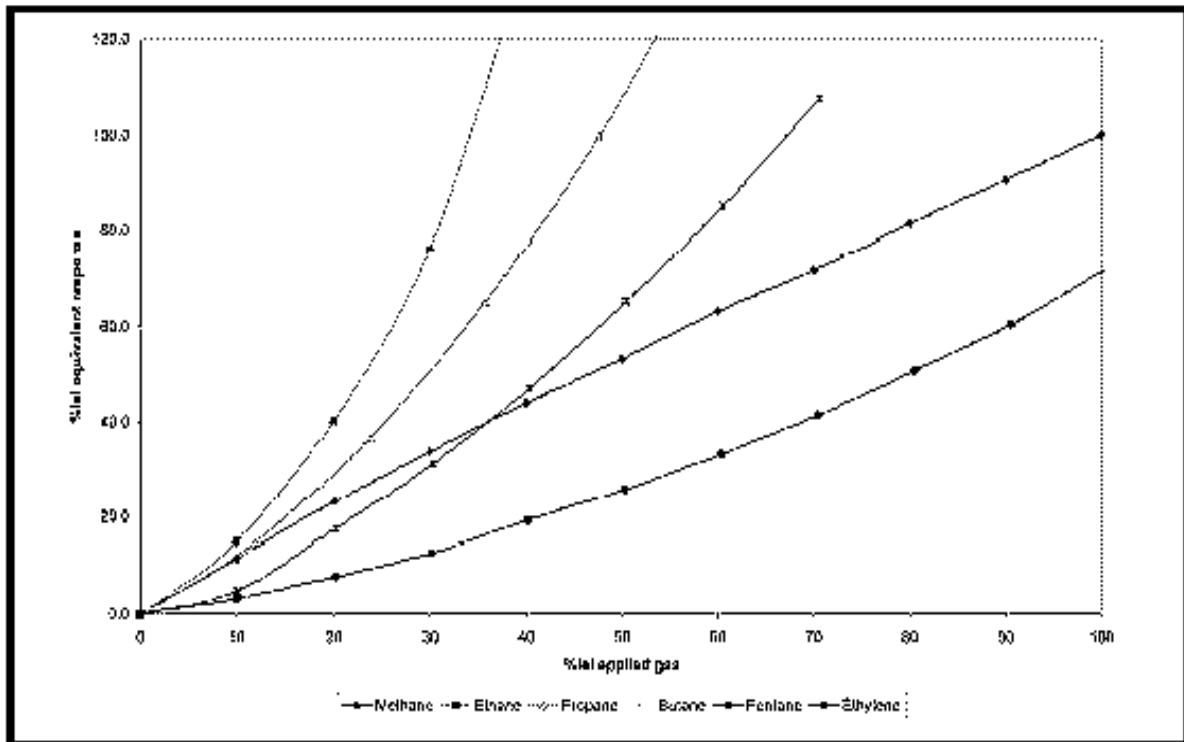
The signal from the sensor can be processed in the higher-level system and the exceeding of concentration level can be decided on another place. The analog output is represented by passive 4-20 mA current loop on the terminals L1 and L2. Both terminals are interchangeable, any of them can be positive. In idle mode a current of 4 mA passes through the terminals, and with increasing gas concentration the current increases. L1 and L2 terminals are galvanically isolated from the remaining detector terminals and create a passive current sensor. The terminals + and GND need to be connected to a supply voltage.

The sensor is connected to the system as a common two-wire 4-20 mA transmitter. It can be usually connected directly to a control system with inputs prepared for current sensors. In case the control system has only voltage inputs, a detector current loop can be used after adding suitable resistor to the circuit.



The resistance value of the resistor must be determined using Ohm's law. E.g. for voltage inputs 0-10 V a 500 Ohm resistor should be used (can be assembled in parallel with 2 pieces of 1 kOhm). When using the additional resistor, it is necessary to take account of the voltage drop across this resistor.

The output values of the loop current always have to be calibrated into the control system memory. The following figure shows a typical dependence of the output signal on the concentration of certain gases.



Operating and Signaling Elements

For operating the detector functions and signaling its state, the circuit board contains several controls.

Monitored Gas Concentration Setting

The monitored gas concentration level for each stage is set by a trimmer. Each stage has a separate trimmer. Turning the trimmer towards the terminal, a higher gas concentration can be set.

4 mA Current Loop Idle Mode Setting

By trimmer marked 4 mA, an idle mode value of the L1-L2 current loop can be set. When the ambient air is completely clean, the value of 4.00 mA for the current passing through the loop is set by a reference mA-meter.

Output II Setting

The output II switching transistor function can be regulated by two jumpers. The **OP** jumper determines the switching transistor idle state and its function was described above.

The **MEM** jumper allows setting the output II memory function. When the jumper is short, the output indicates the presence of gas even after the gas concentration falls below the set level. This can be cancelled only by switching off the supply voltage or removing the **MEM** jumper. If the jumper is open, the output monitors current status of exceeding or non-exceeding the concentration level. The memory status is indicated by flashing red indicator light in the ratio of 1:7.

Indicator Lights

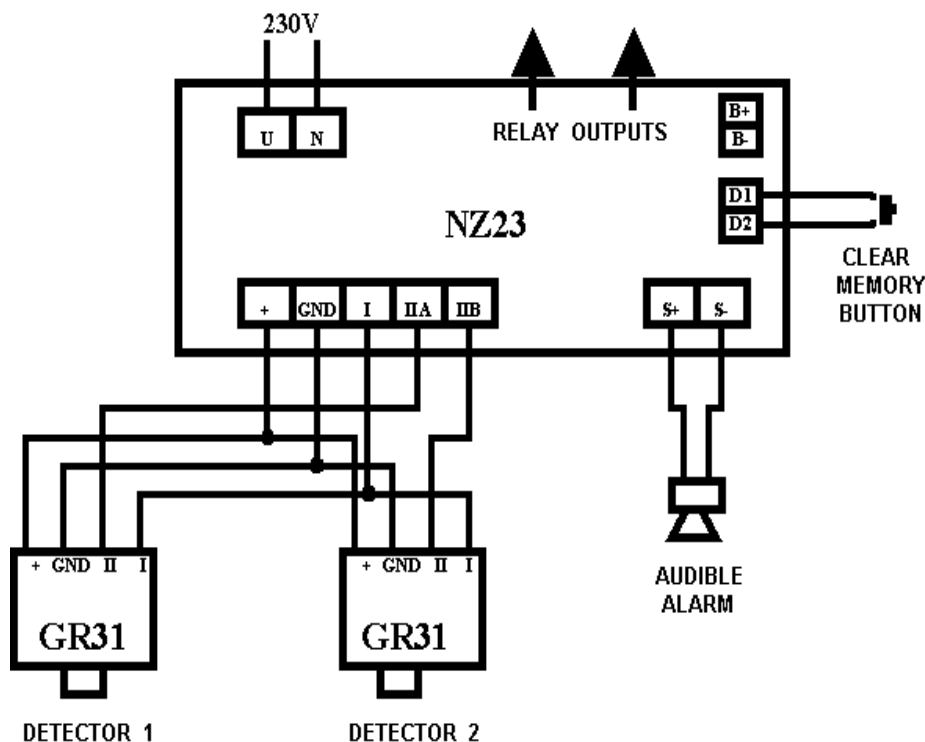
The detector status is optically indicated by means of three LEDs.

Green	The detector is activated and powered by supply voltage.
Yellow	Sensor stabilization or sensor failure
Red - flashing 1:1	First stage of exceeding the concentration level.
Red - on	Second stage of exceeding the concentration level or sensor failure.
Red - flashing 1:7	Second stage exceeded, but the concentration has already decreased (memory status)

Example of Installation

The following figure shows an example of a simple configuration for monitoring two different locations. Two detectors together with a power supply NZ23 are used. Three signal wires (+12 V, GND, I) are in a parallel connection. The detectors' outputs II are routed into separate power supply inputs. In this way each detector is provided with a separate indicator light in the power supply for indication of the second stage of exceeding the concentration level. In this configuration, it is recommended to set the second stage output signal for both, the power supply and the detectors, to the opposite polarity (switched on when idle).

The remaining terminals of the power supply NZ23 are connected in a standard way. The relay outputs can be used to control actuators according to the customer's needs.



Detector Location

When locating detectors in buildings, we recommend following EN 60079-29-2, which describes the "Guide for selection, installation, use and maintenance of apparatus for the detection and measurement of combustible gases or oxygen."

Usage Limitations

GR31 detector is designed to detect the occurrence of flammable gas in the standard atmosphere. A correct detection is not guaranteed at high or very low pressure and at the presence of other chemicals in the air. E.g. the presence of hydrogen sulfide affects the sensor lifetime. Possible applications in this environment must be consulted with the manufacturer.

The operation especially in an environment with heavy hydrocarbon substances vaporization (eg. oil mist) into the monitored atmosphere can lead to a vapour deposition in the sensor and therefore to a significant shortening of the sensor lifetime.

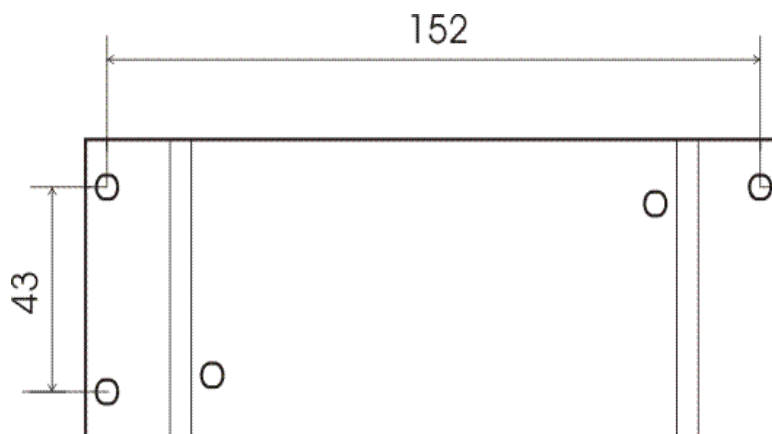
GR31 detector needs to be protected against direct ultraviolet (UV) radiation during operation and storage. It is necessary to insert a shielding barrier between the detector and the source of UV radiation (e.g. natural source - the sun; or artificial sources such as some fluorescent or discharge

lamps), preferably made of metallic material so that the radiation does not hit the detector.

It is necessary to count on extended reaction time in dusty environment in case of the dust presence on the detector sensor surface.

Detector Accessories

- ampoule with test substance
- metal mounting bracket (see figure below)



Servis

Any repairs or technical assistance can be provided at:

J.T.O. System, s.r.o., 1. máje 823, 756 61 Rožnov pod Radhoštěm, tel. +420 571 843 343



If the device is taken out of service, it must be disposed in environmentally friendly way - i.e. brought to the designated collection point for disposal of electronic waste.

