GJD-02C & GJD-04C
Instruction and maintenance manual

geopal SYSTEM A/S® · Skelstedet 10B · DK-2950 Vedbæk · tel. +45 45670600 · www.geopal.dk

A12060 ISO9001:2000 DBI reg.no. 233.301 03 ATEX Q133996

Contents

1 Safety

IMPORTANT:

- Please read this user's manual carefully before the GJD-02C/GJD-04C is put into operation.
- To ensure a safe installation of the gas alarm monitor, it is important that the installation is carried out only by qualified personnel, familiar with the relevant national and international legislation, directives and standards applicable to the area of use.
- Always make sure that the supply voltage corresponds with the voltage indicated on the product label.
- This product conforms to EMC Directive 89/336/EEC and the Low Voltage Directive 73/23/EEC including amendments by the CE marking Directive 93/68/EEC.
- Avoid electrostatic charging. Clean with damp cloth only.

2 Declaration of conformity

As manufacturer,

Geopal System A/S
Skelstedet 10 B
DK-2950 Vedbæk
Denmark

hereby declare that the product:

Type: GJD-02C
Name: Gas alarm monitor

is in conformity with the following directives and standards:

Low Voltage Directive 73/23/EEC and later amendments

EN 60204

EMC directive 89/336/EEC and later amendments

EN 61326
EN 50081-1
EN 50082-2

This declaration is issued in compliance with article 10, subclause 1 of the EMC directive. For specification of the acceptable EMC performance level, refer to the electrical specifications for the module.

Vedbæk, 30 June 2003

Christian Møller
Manufacturer's signature

As manufacturer,

Geopal System A/S
Skelstedet 10 B
DK-2950 Vedbæk
Denmark

hereby declare that the product:

Type: GJD-04C
Name: Gas alarm monitor

is in conformity with the following directives and standards:

Low Voltage Directive 73/23/EEC and later amendments

EN 60204

EMC directive 89/336/EEC and later amendments

EN 61326
EN 50081-1
EN 50082-2

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Vedbæk, 30 June 2003

Christian Møller
Manufacturer's signature

3 System description

3.1 Alarm monitors

Gas alarm monitor type GJD-02C is used where only one detection point is required, i.e. one gas detector.

Alarm monitor GJD-02C dimensions:
213 x 185 x 104.5 mm
(width x height x depth)

Gas alarm monitor type GJD-04C is used where two detection points are required, i.e. two gas detectors.

Alarm monitor GJD-04C dimensions:
257 x 217 x 132.5 mm
(width x height x depth)

The purpose of the alarm monitor is to receive and evaluate the signals from the detector(s), perform the necessary signal processing and give gas warning and gas alarm. In the following text gas warning and gas alarm will be called low alarm level (A1) and high alarm level (A2) respectively.

External functions such as ventilation systems, electromagnetic valves, disconnection of power supply etc. in case of gas leakage are controlled through the alarm monitor relay circuit.

The alarm monitor is normally set for manual reset of alarm mode but can easily be modified to automatic reset instead.

The alarm monitor consists of a detector circuit processing the signal from the detector(s) and a power supply providing the correct operating current to the detector circuit and the detector(s).

The alarm monitor contains relay circuits for low alarm level, high alarm level and fault and is built into a solid plastic cabinet with a transparent front cover with degree of protection IP54.

3.2 Detectors

The gas detector type GJ-C is approved by the Danish Institute of Fire and Security Technology (DIFT) and is suitable for use in unclassified industrial areas.

The detector can be fitted with a variety of sensors depending on the gas or vapour to be detected.

M20 cable gland

Detector GJ-C for use in unclassified non-hazardous areas.

GJ-C dimensions:
80 x 150 x 58 mm
(width x height x depth)

The gas detector type GJ-EX is approved by the Danish Institute of Fire and Security Technology (DIFT) and is an explosion-proof and solidly manufactured detector for use in EX classified areas, industrial areas classified as explosive or otherwise aggressive environments.

The detector can be fitted with a variety of sensors depending on the gas or vapour to be detected.

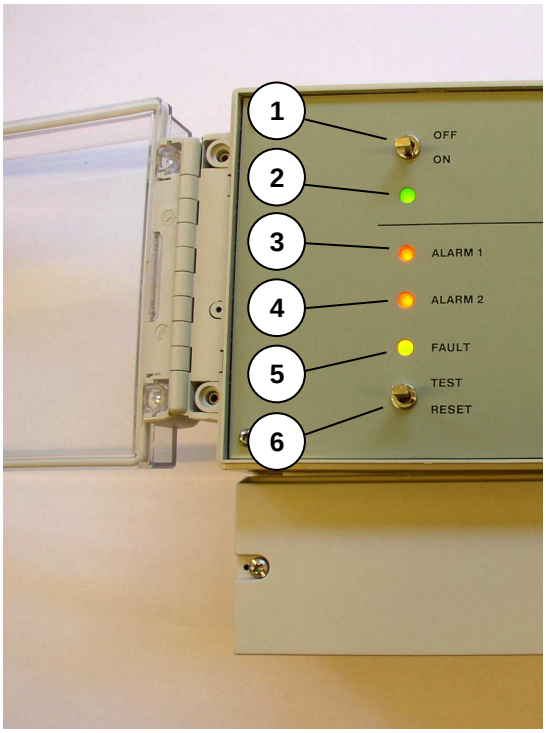
M25 cable gland

Detector GJ-EX for use in zone 1 hazardous areas.
UL DEMKO 03 ATEX 130741X
Ex II 2G EEx de IIC T5

GJ-EX dimensions:
85 x 180 x 80 mm
(width x height x depth)

4 System function

4.1 Front plate overview



1. On/off switch
2. Operation indicator
3. Low alarm level indicator (A1)
4. High alarm level indicator (A2)
5. Fault indicator
6. Test/reset switch

4.2 System function when connecting

If the switch (1) is in ON position when power is connected, the monitor may go into fault mode, thus activating both the yellow fault LED (5) marked FAULT and the internal buzzer. This often happens as a result of the sensor being initially cold. After a few minutes the fault condition can be reset by depressing switch (6) marked RESET.

If the switch (1) is in OFF position when power is connected, the yellow LED (5) will light to remind the operator that the monitor should be switched on.

4.3 Operating mode

When the switch (1) is in ON position, the green LED (2) will light and the system is in operating mode.

4.4 Alarm mode A1 (low alarm level)

At gas concentrations corresponding to the set value for alarm 1, the alarm monitor will go into alarm mode indicated by the red alarm indicator LED (3) marked ALARM 1. The alarm 1 relay is activated and the internal buzzer sounds.

4.5 Alarm mode A2 (high alarm level)

At gas concentrations corresponding to the set value for alarm 2, the alarm monitor will go into alarm mode indicated by the red alarm indicator LED (4) marked ALARM 2. The alarm 2 relay is activated and the internal buzzer sounds.

4.6 Fault mode

Unlike the alarm relays, the fault relay is constantly closed (activated) during operation. This makes it possible to receive an alarm in case of a power failure.

If the alarm monitor is switched off on the front plate, the yellow LED (5) marked FAULT will light and the fault relay is deactivated.

If the alarm monitor is switched off as a result of an external power failure, the yellow LED (5) marked FAULT will not light but the fault relay is deactivated.

If the sensor element is ruined or if the detector cable is disconnected, the alarm monitor will go into normal fault mode. The yellow alarm indicator LED (5) marked FAULT will light, the fault relay is deactivated and the internal buzzer sounds.

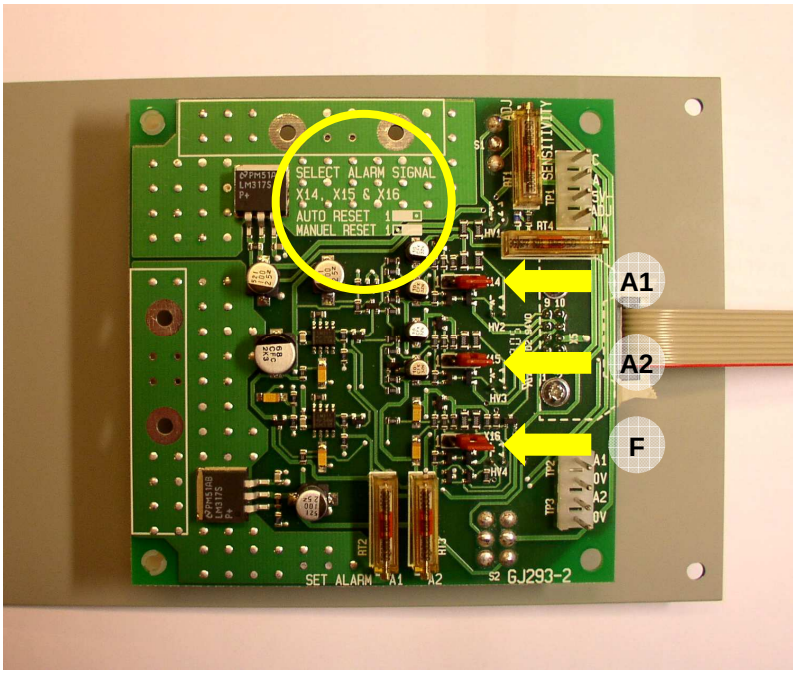
4.7 Reset of alarm mode

When the gas concentration has decreased to a level below the set alarm limits, the alarm monitor can be reset by depressing the switch (6) marked RESET. Fault mode can not be reset until the fault has been corrected.

4.8 Automatic reset

On delivery the alarm monitor is set to manual reset function. This applies to all alarm circuits: A1 (alarm 1), A2 (alarm 2) and F (fault). If desired, the alarm circuits can be set individually to automatic reset function.

This is achieved as follows: Remove the four screws that secure the front panel of the alarm monitor and lift up the panel, thereby gaining access to the circuit board mounted on the reverse side of the front panel. On the back of the circuit board are three jumpers marked X14 (A1), X15 (A2) and X16 (F). When a jumper is placed on pins 1-2, the alarm function is changed to automatic reset for the circuit in question.



The alarm function settings can easily be changed.

4.9 Test function

Switch (6) allows an electrical test of the system. When the switch is toggled to the position marked TEST, the alarm circuits are activated. After testing, reset is done as previously described by depressing the same switch.

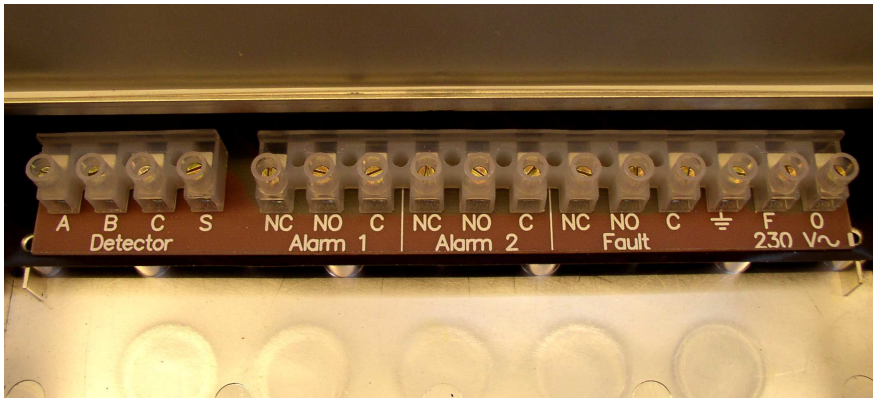
5 Installation instruction

5.1 Detector

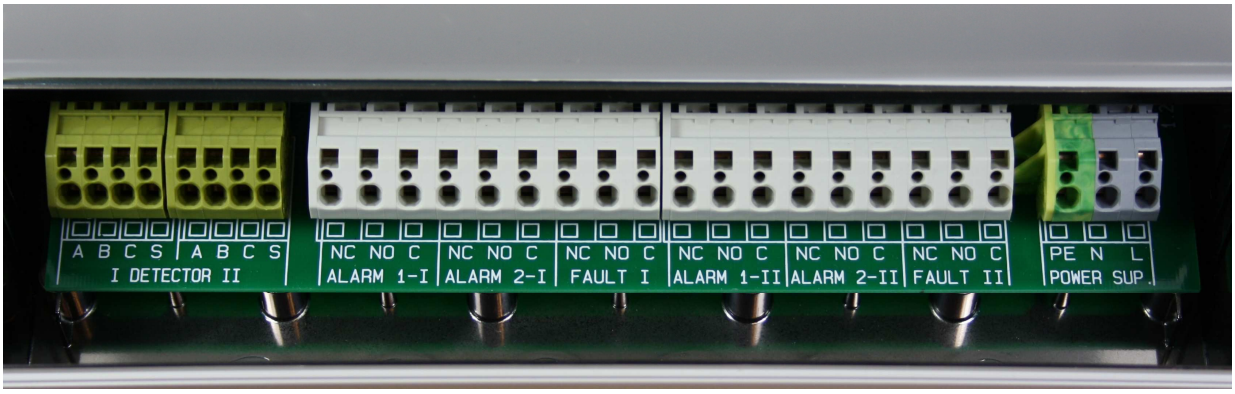
The detector should be installed in places where gas leakages may occur or near exhaust systems so that air will be drawn past the detector.

Depending on the gas density the detector should be placed high or low. With heavy gases the detector may have to be placed as low as 10-15 cm above the floor level depending on the air movements in the area.

The detector is to be connected to the alarm monitor through a 3x1.0 mm² (min. conductor size) shielded plastic insulated installation cable. The terminals marked A, B and C in the detector tag block are to be connected to the identically marked terminals in the alarm monitor and the shield is connected to the terminal marked S.



The GJD-02C terminal blocks.



The GJD-04C terminal blocks.

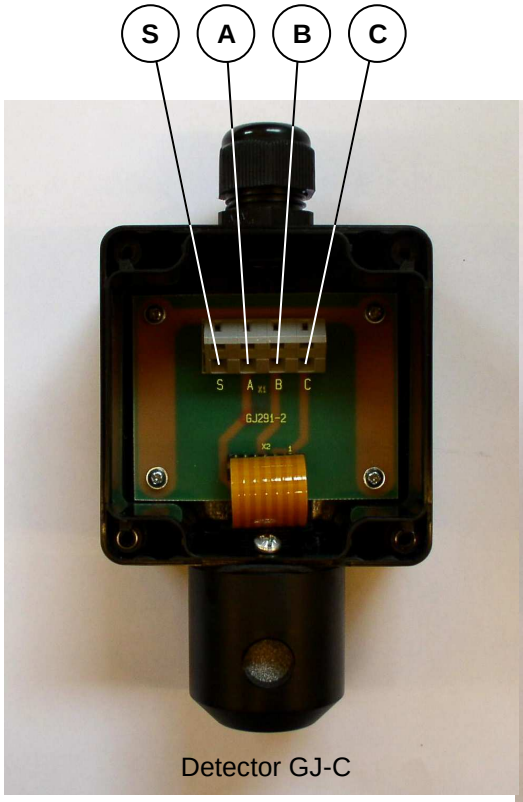
If the installation forces the lengths of the detector cables to exceed 50 meters, it may be necessary to adjust the detector voltage to prevent any voltage loss. This is described in section 6.7.

The detector must always face the sensor element downward, i.e. cable outlet upward.

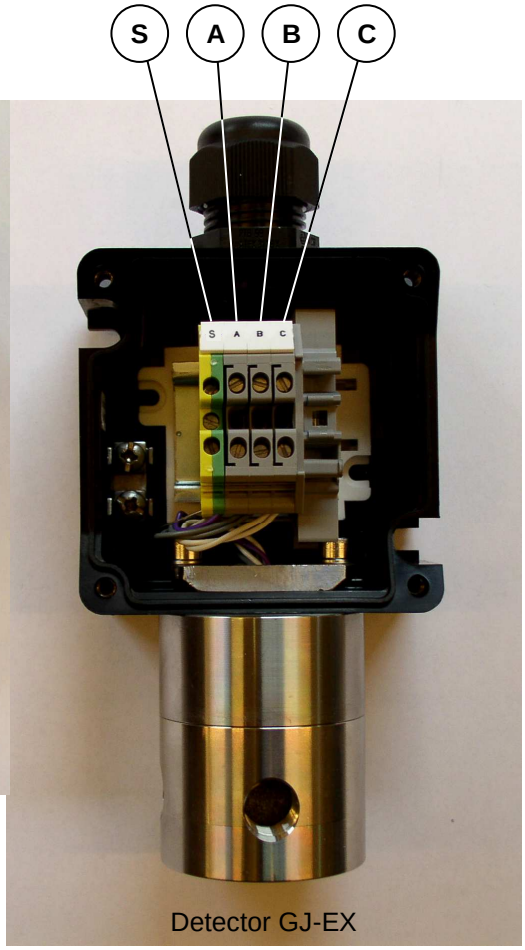
If mounted in a low place, the detector should be covered by a steel bar or a similar protective arrangement to prevent it from being run into by trucks or carts.

The detector must never be covered by boxes, cans or other obstacles hindering the air movements in the room in reaching the detector.

The detector should always, as far as possible, be placed in such a way that it is conveniently accessible for service and calibration.



Detector GJ-C



Detector GJ-EX

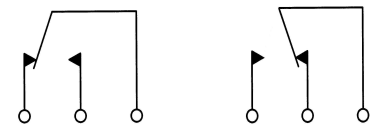
The detector terminal blocks.

5.2 Relay contacts

The terminals in the alarm monitor tag block marked ALARM 1, ALARM 2 and FAULT are potential-free relay contacts for alarm 1, alarm 2 and fault. The designations NC, NO and C are to be understood as below:

NC : Normally closed (break switch)
NO : Normally open (connect switch)
C : Common (relay switch)

Max. load: 250 V AC, 10 A.



Alarm relays Fault relay

Relay contacts shown in normal operation

5.3 Power supply

A source of 230V AC / 110V AC / 24V DC / 12V DC is connected to the alarm monitor terminals marked correspondingly. The actual supply to your monitor is specified on the box label and on the data sheet.

5.4 Before use

On delivery, the GJ-C detector can be fitted with a protective tape and plug. The purpose of this is to prevent the sensor element from being affected by smoke, gases, vapours, dust etc. during construction and installation work as this may harm the sensor and result in alarm malfunction.

Do not remove the protective tape and plug before use.

5.5 Final post-installation test

The alarm functions are blocked for the first 30 seconds after switching on the system. Subsequently, all system functions should be tested according to the instructions. When all functions have been tested and found ok, the system is ready for operation.

6 Calibration

6.1 Calibration overview

All sensor elements will change slightly over time for various reasons: the harshness of the installation environment, the frequency of gas exposures etc. Eventually, natural wear and tear will also affect the sensitivity.

The purpose of the calibration is to ensure that the gas alarm system will set off the alarm at the specified gas concentrations. On delivery the gas alarm system is calibrated as agreed with the customer. During later calibrations, only the sensitivity of the sensor element is adjusted. The alarm level voltages initially set for alarm 1 and alarm 2 will need no further adjusting unless new alarm levels are required (see section 6.6).

A new sensor element should be allowed a few days of operation to settle in to its environment. Therefore, the calibration should not be carried out until the system has been switched on for at least ten days.

As a reference for the alarm levels, a test gas corresponding to the high alarm level should be used. A test gas corresponding to the low alarm level is not required for calibration but may be useful as a means of checking the alarms.

Geopal System can deliver a wide selection of test gases.

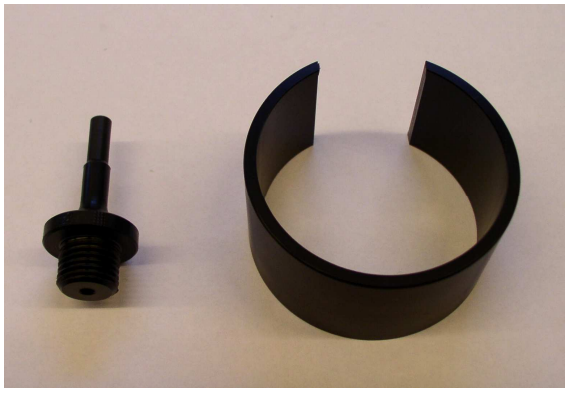
6.2 Calibration equipment

For calibration of the gas alarm system a high alarm level test gas must be procured along with a valve with flow meter for the gas cylinder.

Valve with flowmeter fits the Geopal test gas cans.

To conveniently feed the gas to the detector a suitable length of plastic hose and a hose connector for detector type GJ-C or a hose connector set for detector type GJ-EX is required. For the voltage measurements a digital voltmeter will be suitable.

Hose connector for use when calibrating detector GJ-C.



Hose connector set for detector GJ-EX also includes a calibration ring.

6.3 Applying test gas to the detectors

The gas detector type GJ-C is provided with a threaded hole (1/4” pipe thread) in the bottom of the sensor housing, while the GJ-EX detector has four threaded holes in the bottom detector part. The holes are intended to facilitate the inflow of test gas during calibration.

On detector GJ-C the test gas is led to the hole at the bottom via the hose connector. This way the test gas is forced in through the bottom hole and out of the two side holes in the sensor housing.

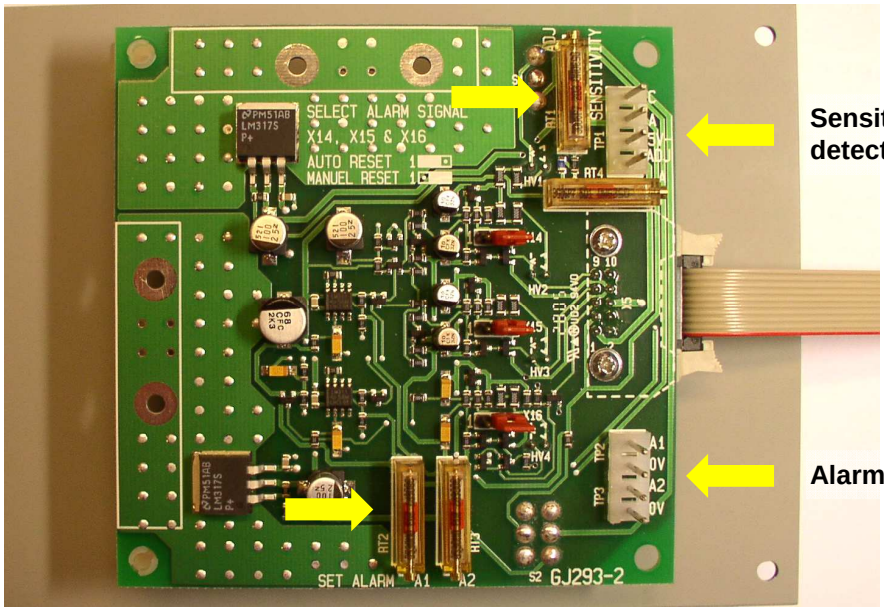
On detector GJ-EX the test gas is led to one of the four side holes. The remaining three holes are covered with a calibration ring which is slid over the holes. This way the test gas is forced in through one of the side holes and out of the bottom hole.

This method makes it possible to use a moderate amount of gas for the calibration. A flow of about 200 ml per minute will normally be sufficient. With a flow of 200 ml per minute 10 liters of test gas will allow approx. 50 minutes of gas flow.

Detector GJ-C (left) and detector GJ-EX prepared for calibration.

6.4 Dismounting the front panel

Before the calibration can be carried out, the screws securing the alarm monitor front panel must be removed. The front panel can now be lifted and turned over to make the potentiometers and the measuring terminals accessible.



The potentiometers and measuring terminals are easily accessible on the circuit board.

6.5 Sensitivity adjustment

Typically, the alarm voltage is set at approx. 2.5-3.5 V at the high gas concentration. The exact voltage settings for the alarm levels are shown in the alarm system data sheet or can be supplied from Geopal System.

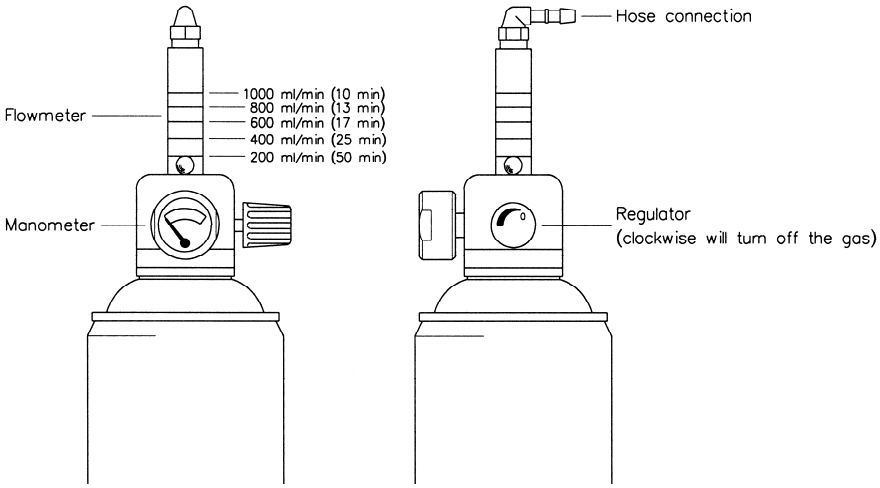
Gas	LEL (%)	GV (ppm)	Alarm 1	Alarm 2
Methane	X		10	25
			2.2 V	3.0 V

Example: excerpt from a data sheet showing the alarm levels and corresponding voltages.

Connect a measuring instrument to the test terminals marked A (0V) and C (sensor output). Attach the hose connector to the threaded hole in the detector (and attach the calibration ring, if relevant). Fitted with the valve and flow meter, the test gas cylinder can be joined to the hose connector via the plastic hose. The test gas should now be introduced into the detector with a suitable flow rate as described above.

When the test gas reaches the sensor, the measured voltage will start increasing. Wait for a few moments till the voltage has started to stabilize, then adjust the potentiometer marked ADJ SENSITIVITY (RT1) to a voltage corresponding to the voltage shown in the data sheet, e.g. 3.0 V. The ratio between the alarm circuit voltages will remain unchanged by this, and there is no need to make further adjustments.

Dismantle the hose connector, gas cylinder and measuring instrument.



The Geopal test gas cans are easy to use for calibration.

6.6 Adjusting the alarm levels

The alarm level voltages are set on delivery and adjusting them should always be avoided unless new alarm levels are required.

Adjusting the alarm levels for alarm 1 and alarm 2 is done by first connecting the measuring instrument between the terminals A2 and 0V.

Then adjust the potentiometer marked SET ALARM A2 (RT3). Set the voltage to the value corresponding to the voltage level for the high gas concentration, e.g. 3.0 V.

Next, connect the measuring instrument between the terminals A1 and 0V. Adjust the potentiometer marked SET ALARM A1 (RT2) corresponding to the voltage level for the low gas concentration, e.g. 2.2 V.

Please note that the figures in the above are only examples. Changing the alarm levels should only be done after consulting Geopal System first.

6.7 Adjusting the detector voltage

The sensor has a typical working voltage of 5.0 V. In some cases, due to installation obstructions or where the gas alarm system covers a large area, the detectors are connected through long cables out of necessity. This could lead to a loss of voltage resulting in a decrease in detector performance. As a rule, when the detector cable lengths exceed 50 meters, the detector voltage should be checked and adjusted if necessary. The detector voltage is measured at the detector tag block between the terminals marked A (0V) and B (detector voltage). It is recommended that an adjustment is made if the voltage is less than 4.8 V.

Connect the measuring instrument to the terminals 5V and ADJ (0V) and adjust the potentiometer marked RT4.

7 Maintenance

All sensors are affected to a greater or lesser extent by the environment in which the sensor/detector is located. Also, all technical equipment can go wrong for various reasons. Therefore we recommend a test of the system regularly. Once a month the following electrical test should be done: The switch (6) is toggled to the position marked TEST (see section 4.1), thus activating both alarm circuits. After testing, reset is done by depressing the same switch.

Under normal circumstances an annual calibration control is recommended. At exposed places a calibration control every six months is recommended. It is the responsibility of the system owner to see that the maintenance and calibration control is carried out.

8 Guarantee and disposal

8.1 Guarantee

Coverage

Geopal System A/S extends a 1-year guarantee, beginning with the date of sale to the end user. The guarantee period must be documented with the original invoice or receipt. The guarantee covers deficiencies arising from faulty material or manufacture.

The guarantee applies to gas alarm monitors type GJD-02C and GJD-04C that has been delivered to the primary end user.

Guarantee period

The guarantee period is determined from the date when the brand-new product is delivered to the end user. If the date of purchase cannot be documented, the guarantee period will begin with the date of production, which is indicated on any individual product.

Conditions of guarantee

When Geopal System A/S chooses not to repair the product, the guarantee does not cover the cost of labour related to installation of replacement products or components. The procurement of replacement products or parts does not extend the original guarantee period. Geopal System A/S reserves the right to offer an equivalent replacement product or component if the original is no longer available at the time of notification of defects.

Coverage under the guarantee requires that the end user can demonstrate that defects or damages did not, directly or indirectly, arise from:

a) incorrect installation, i.e. installation conflicting with the relevant instructions or, in the absence of such instructions, failing to meet generally acceptable standards of good craftsmanship,

b) installation outside recommended areas,

c) incorrect operation or improper treatment,

d) use of incompatible spare parts or accessories,

e) shipping, installing or other form of handling,

f) product modifications, or

g) other defects or damages not due to faults in materials or manufacture, as the above listing is not exhaustive.

Coverage under the guarantee is further conditional on the end user demonstrating that defects or damages did not, directly or indirectly, arise from lack of maintenance – or that faults, damages and defects could not have been avoided by the undertaking of maintenance as prescribed in the instructions and maintenance manual.

Notification of defects

In order to invoke this guarantee the end user must submit a written complaint (notification of defects) to Geopal System A/S, or to the dealer from whom the product was purchased, within the guarantee period – and within two months after the end user observed or ought to have observed the defect.

Geopal System A/S will subsequently decide whether the product is to be repaired or returned, or whether the purchase amount is to be refunded.

Repair under the guarantee.

Unless Geopal System A/S decides otherwise, the repair will be the responsibility of the end user. The guarantee covers free delivery of spare parts/materials needed by the end user to rectify the defect.

If the defect can only be remedied at considerable inconvenience to the end user, Geopal System A/S will further pay the cost of installing spare parts/materials, including labour related to the repair, plus cost of transportation or shipping of the product to and from the place of repair, when this has been agreed with Geopal System A/S.

The end user must undertake all practical measures and pay any related expenses to ensure that the product is made accessible for repair, following the directions given by Geopal System A/S, and must make tools available, if necessary.

Return policy

The return policy covers, at no extra charge, replacement of the old product with a new product of the same kind, type and quality. In the event that the product, at the time of notification of defects, is no longer being produced in exactly the same version, Geopal System A/S is entitled to replace the old product with an equivalent product.

Transportation/shipping to and from Geopal System A/S and/or dealer, as well as any dismounting and re-installation of the product, has to be arranged through Geopal System A/S, in which case Geopal System A/S will pay the related expenses.

Not covered by the guarantee

This guarantee does not cover any products other than those mentioned under “Coverage”, above. Regarding accessories, including preinstalled accessories, the end user is referred to any applicable conditions under the guarantee extended by the relevant producer. For other products by Geopal System A/S, including preinstalled products, these will be covered under the particular conditions stated in the guarantee policy, including definition of the guarantee period, cf. “Coverage”.

Geopal System A/S assumes no liability for consequential damages, such as loss of profit, nor any product liability beyond consequences of indispensable legal provisions.

Geopal System A/S assumes no liability for any loss directly or indirectly caused by circumstances beyond the control of Geopal System A/S, including strike, lockout, fire, war, acts of terrorism, blockades, picketing, import restrictions, political unrest, uncommon natural events, malicious damage, vandalism, or other instances of force majeure.

Geopal System A/S assumes no liability for products that are not produced by Geopal System A/S, even if such products may be sold or shown together with the products mentioned under “Coverage”.

8.2 Disposal of electric and electronic products

This product is in compliance with the requirements of marking mentioned in WEEE Directive 2002/96/EC. The attached label indicates that this electrical/electronic product is not to be disposed of along with household waste.

Product category:

With reference to Annex IA of the WEEE Directive, the product can be classified under category 9: ”Monitoring and control instruments”.

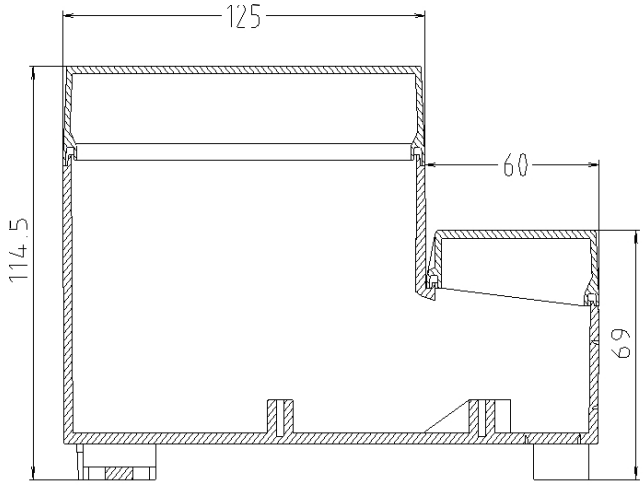
Not to be disposed of as household waste!

For further information regarding safe disposal of electrical or electronic waste, such as discardable equipment, parts or components, please contact your local Geopal dealer or agent. See the Geopal website indicated on the product.

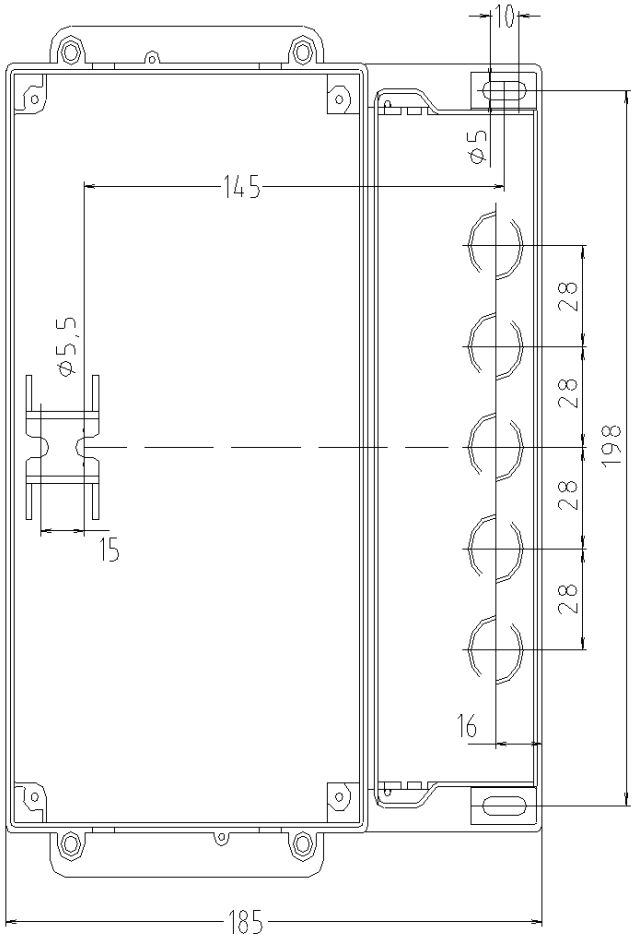
9 Technical specifications

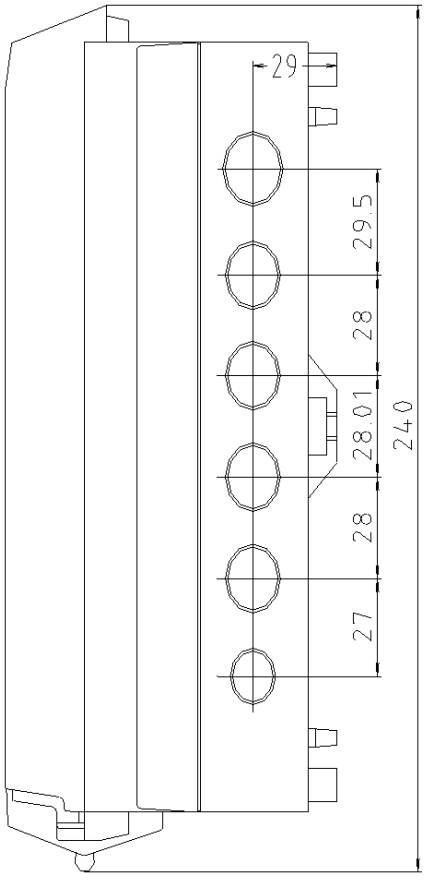
Model:	GJD-02C/GJD-04C
Supply voltage:	230 V AC, 110 V AC, 12 V DC, 24 V DC
Power consumption:	10 W/15 W
Available gases:	Methane, Propane, Butane, Hydrogen, Hexane, Benzene, Ethane, Ethylene, R-404A, R-407C, R-22, R-134A, Ammonia etc.
Detection range:	0-100 %LEL, 0-40,000 ppm
Response time to gases:	< 3 seconds
Calibration:	Calibrated to specific type of gas/refrigerant
Relay contacts:	Low and high alarm level and system error, max. load 250 V AC, 10 A
Cable between monitor and detector:	3-conductor 1 or 1.5 mm^2 shielded
Front panel:	Dull green, lacquered aluminium with lithographic print
Cabinet:	ABS/Polycarbonate
Indicators:	Green, red and yellow LED plus internal sound indicator
IP rating:	IP 65, DIN 40050
Weight:	1.3 kg/2.0 kg
Mechanical dimensions (W x H x D):	213 x 185 x 104.5 mm/257 x 217 x 132.5 mm
Operating temperature:	-10 to +50 °C
Certification:	EMC Emission: EN 50081-1: Generic Emission Standard, Part 1 EMC Immunity: EN 50082-2: Generic Immunity Standard, Part 2
Safety:	EN 61010-1 & IEC 1010-1, Safety requirements for electrical equipment for measurement, control and laboratory use

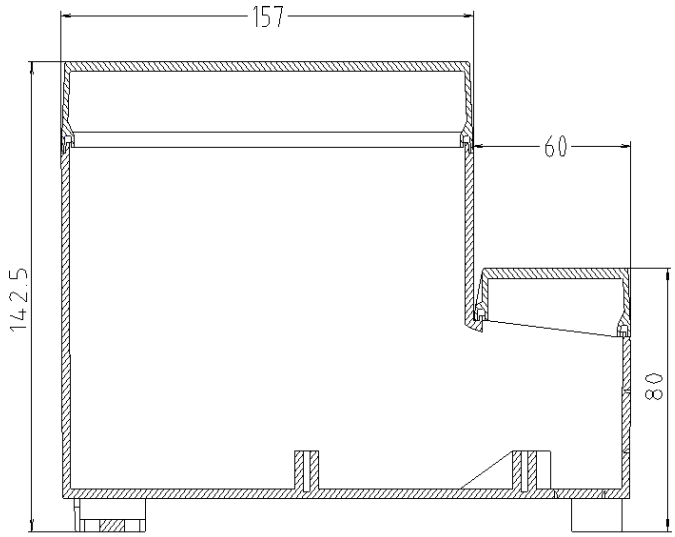
10 Dimensions



GJD-02C



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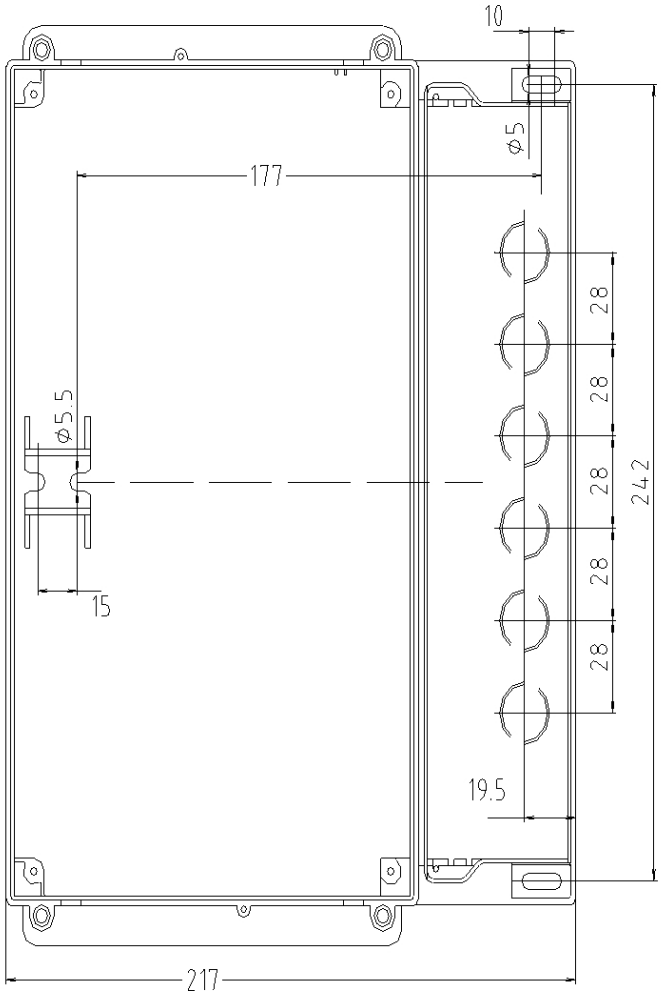
GJD-04C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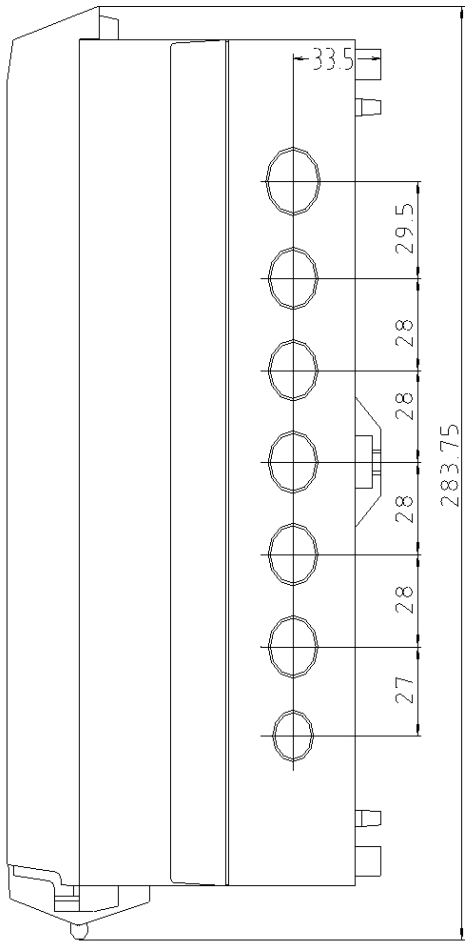
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11 Troubleshooting

Problem							
Green power LED does not light	Yellow fault LED lights	Red alarm 1 LED lights	Red alarm 2 LED lights	Red alarm 2 LED lights before alarm 1 LED	No alarm LED's light despite presence of gas		
1	2	3	4	5	6		Reasons/Remedies
○						a	Check that the power supply is properly connected to the alarm monitor (see section 5.3).
○						b	Check that the power switch is in on position (see section 4.1).
○						c	Check that the fuse in the power supply is properly installed and intact.
	○	○	○			d	Try resetting the alarm monitor by pressing the reset switch (see section 4.7).
	○					e	Check that the detector is properly connected to the alarm monitor (see section 5.1).
	○					f	Check that the detector cable is connected properly to the detector box (see section 5.1).
	○					g	Check that the sensor element is properly installed in the detector. This is done by loosening the bottom part of the detector.
	○					h	Measure the output from the detector between terminals A and C. If the voltage is less than approx. 100 mV the sensor should be replaced.
	○	○	○	○	○	i	Recalibrate the alarm monitor (see section 6).
	○	○	○	○	○	j	Replace the sensor element and recalibrate the alarm monitor (see section 6).
		○	○			k	Check for the possibility of an actual gas leakage in the room.
		○	○			l	Check for the presence of any gases in the room, since all sensors have a certain cross-sensitivity.
		○	○	○	○	m	Check that the alarm levels have not been maladjusted by accident (see section 6.6. Please bear in mind that the figures mentioned are only examples).
					○	n	Check that the alarm levels are not set at voltages too high to release the alarms at the current gas concentration.