

Detector GP-SA-2 Instruction and maintenance manual



geopal SYSTEM A/S®

Skelstedet 10 B, DK-2950 Vedbæk, Denmark, Tel.: +45 4567 0600,
www.geopal.dk



34498



DBI reg. No. 233.301



ITS11ATEXQ7268

Table of Contents

WARNING:.....	3
1 Declaration of conformity.....	4
2 Functions of the gas detector.....	5
2.1 Application.....	5
2.2 Construction.....	5
2.3 Alarm state A1 (low alarm level).....	6
2.5 Alarm state A2 (high alarm level).....	6
2.6 Fault state.....	6
2.7 Resetting the alarm state.....	6
2.8 Signal types on the alarm relays.....	7
3 Control units.....	8
3.1 Control circuit board.....	8
3.2 Operational state.....	9
3.3 Detector function on connection.....	9
4 Installation / Mounting.....	10
4.1 Deployment of the detector.....	10
4.2 Electrical connection.....	10
4.3 Electrical connections.....	11
4.4 Final testing after mounting.....	12
5 Use of the switch and test points.....	13
5.1 Setup and function.....	13
6 Fault state.....	14
6.1 Fault-finding.....	14
7 Adjustment and calibration.....	15
7.1 Calibration overview.....	15
7.2 Service interval.....	15
7.3 Calibration equipment.....	15
7.4 Test gas in aerosol cans.....	15
7.5 Zero calibration.....	16
7.6 Calibration using test gas.....	16
7.7 Adjustment of alarm levels.....	17
8 Warranty and disposal.....	18
8.1 Warranty.....	18
9 Disposal of electric and electronic products.....	21
10 Technical specifications.....	22
10.1 General specifications.....	22
10.2 Electrical connections.....	22
10.3 Regulatory requirements:.....	23
Appendix A. Positioning of components.....	24
Appendix B. Mounting measurements for Detector.....	25

Contents

TOC Safety instructions

IMPORTANT:

- Read this user manual carefully before using the GP-SA-2.
- To ensure correct installation of the GP-SA-2 it is important that the installation be carried out by qualified personnel familiar with the national and international legislation, directives and standards applicable to its field of application.
- Always check that the supply voltage complies with that given on the data plate.
- This product complies with directives 89/336/EC and 73/23/EC, amended by directive 93/68/EC (CE labelling).

IMPORTANT:

Carefully follow the instructions in section 4, "Installation / Mounting".

WARNING:

- Do not remove the lid in the presence of an explosive atmosphere.
- Be aware of electrostatic charges. Clean only using a damp cloth.

1 Declaration of conformity

The producer

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

declares that the following product:

Type: GP-SA-2
Name: Gas detector

complies with the following directives and standards:

The Low Voltage Directive (LVD) 73/23/EEC and subsequent amendments,

EN 60 204

The EMC Directive 2004/108/EEC and subsequent amendments

EN 61 326

EN 61 000-6-2

EN 61 000-6-3

This declaration has been made in compliance with Section 10, sub-section 1 of the EMC Directive. For specifications of the acceptable EMC level reference is made to the device's electrical specifications.

Vedbæk, Denmark, 1 November 2011


Christian Møller
Manufacturer's signature.

2 Functions of the gas detector

2.1 Application

The Geopal GP-SA-2 is a stand-alone gas detector which can be connected directly to existing control and monitoring systems.

The Geopal GP-SA-2 gas detector has been designed to detect a whole range of different gases and vapours. The detector constantly monitors the concentration of gases. The specific settings for individual detectors and their calibration are indicated in the accompanying data sheet and/or the detector's data plate.

2.2 Construction

The gas detector has two alarm levels, alarm 1 (low alarm or gas warning) and alarm 2 (high alarm). The desired alarm limits must be specified when ordering. The current setting is indicated on the detector's data sheet and/or data plate.

The detector can have analog outputs of 0-5 V, 1-5 V, 0-10 V, 2-10 V or 4-20 mA. The required output must be specified when ordering. The analog output can be freely adjusted between 0-5 V and 0-10 V. Changing the output from voltage to current requires that users either call a Geopal service technician or send the detector to us for reprogramming. The current setting is indicated on the detector's data sheet and/or data plate.

The detector has three voltage-free relay exits with C, NC, and NO and two relays for the low and high alarms respectively and a relay for faults. The relays can be used to control, for example, ventilation systems, magnetic valves, disconnection of the electricity supply, etc. (AC1 230 V AC / 8 A, AC15 230 V AC / 1.7 A).

The detector automatically defaults to resetting both the alarm and fault relays. However, it can be set to manual reset if required.

The detector is encapsulated in a tough plastic case compliant with encapsulation class IP65, DIN 40 050.

2.3 Alarm state A1 (low alarm level)

In the event of gas concentrations above the set value for alarm 1, the detector will enter alarm state A1, the red ALARM LOW (3) lamp will come on and relay K1 will be activated. Relay contact K1 can be set on the screw terminals to either open (at NC)* or close (at NO)*. (x)* = See Fig. 4.1 Page 8).

2.5 Alarm state A2 (high alarm level)

In the event of gas concentrations above the set value for alarm 2, the detector will enter alarm state A2, the red ALARM HIGH (4) lamp will come on and relay K2 will be activated. Alarm state A2 can only occur in continuation of alarm state A1. Relay contact K2 can be set on the screw terminals to either open (at NC)* or close (at NO)*. (x)* = See Fig. 4.1 Page 8).

2.6 Fault state

Unlike the alarm relays, the fault relay is always activated in the normal state. This function facilitates indication that the supply voltage has lapsed.

The detector will, for example, go into the fault state if a sensor is damaged or removed or if the detector is incorrectly calibrated. This is indicated by *deactivation* of relay K3. Relay contact K3 can be set on the screw terminals to either open (at NO)* or close (at NC)*. Please note that this is the opposite of the description of the alarm state because the fault relay is active.

In theory, any combination of alarm and fault state can occur. If, for example, the fault state indicates the calibration is required, the detector will still react in the event of a gas leak. If, on the other hand, the fault state is caused by a defective sensor, it goes without saying that the detector will not work properly. It is therefore important always to investigate the underlying reason for the fault state. (x)* = See Fig. 4.1 Page 8).

2.7 Resetting the alarm state

The alarm resets automatically when the gas concentration has fallen to 50% of the set alarm limit. The fault state cannot be reset until the fault that has occurred has been rectified. If manual reset is selected, the alarm can be reset as soon as the level falls below the set value.

2.8 Signal types on the alarm relays

It is possible individually to select NC (Normally Closed, i.e. break contact) or NO (Normally Open, i.e. make contact) on all the alarm relays.

This setting will result in the following functions of the detector's relays and LEDs:

Normal	Alarm 1	Alarm 2	Fault
Relay K1 broken A1-LOW off	Relay K1 made A1-LOW on	Relay K1 made A1-LOW on	Relay K1 broken A1-LOW off
Relay K2 broken A2-HIGH off	Relay K2 broken A2-HIGH off	Relay K2 made A1-HIGHN on	Relay K2 broken A2-HIGH off
Relay K3 made FAULT off	Relay K3 made FAULT off	Relay K3 made FAULT off	Relay K3 made FAULT off

A1-LOW = Low alarm A1

A2-HIGH = High alarm A2

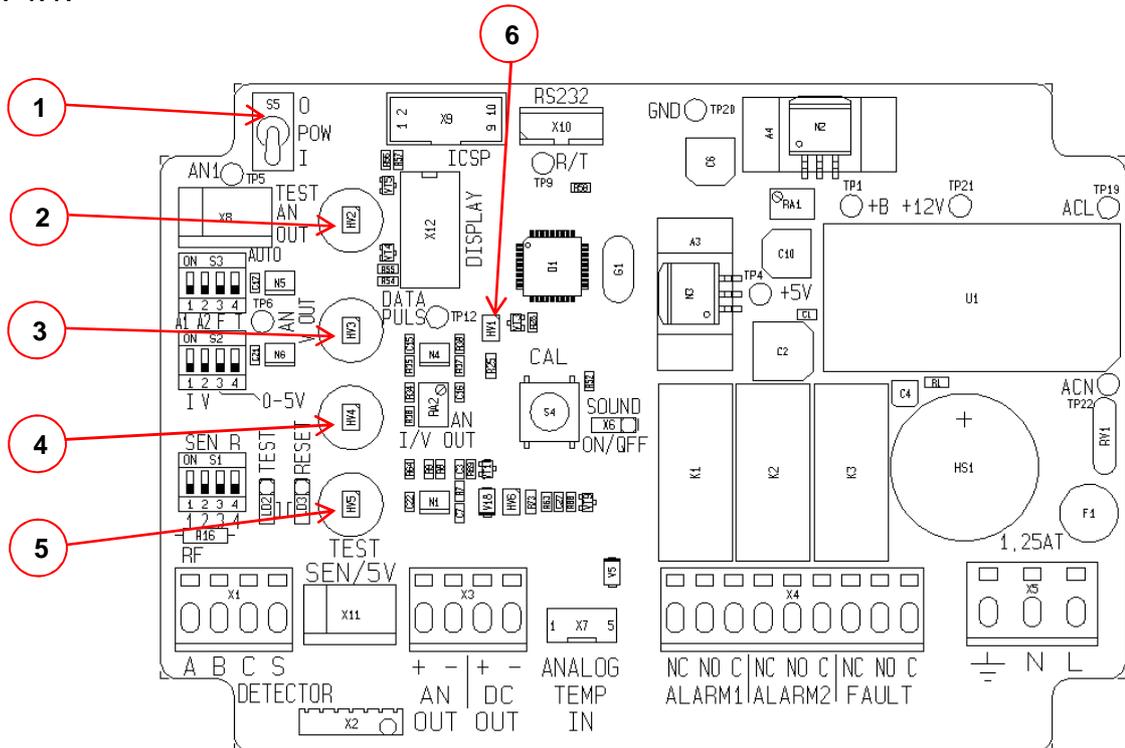
3 Control units

3.1 Control circuit board

Control of the detector is limited. Alarm signals are reset automatically when the state of the measurement area returns to normal. It is possible to reset/interrupt alarm transfers by removing the front panel and activating (1) the switch. The fault relay will, however, change to indicate that the alarm relays are disconnected.

1. On/standby switch (Pow)
2. Mains On
3. Alarm Low indicator
4. Alarm High indicator
5. Standby/Fault indicator
6. Status indicator (warming up & operating)

Fig. 4.1:



3.2 Operational state

When the switch (1)* is in the **I** position, the green Mains On LED (2)* lights up and the installation is in the operational state.

3.3 Detector function on connection

If the switch (1)* is in the **I** position when power is switched on, the detector will enter the warming-up period. This is shown by rapid blinking of the green status LED (6)*. During this period, both alarm outputs are blocked.

The warming-up state will automatically end after 1-5 minutes and the detector will be ready for operation.

If the switch (1)* is in the **O** position when power is switched on, the yellow fault indicator (5)*labelled Standby Fault will come on as a reminder that the switchboard must be switched on.

The fault relay contacts set will be activated, but the internal buzzer will not sound an alarm.

(x)* = See Fig. 4.1 Page 8).

4 Installation / Mounting

Installation and mounting must be carried out by qualified personnel.

4.1 Deployment of the detector

The detector is deployed in places where gas leaks may occur or in the vicinity of a ventilation installation so that the air can pass by the detector.

The position of the detector – high or low – depends on the density of the gas. If dense gases are involved it may be necessary to mount the detector as low as 15 cm above the floor, depending on air movements in the vicinity.

- The detector should be mounted so that the sensor element/nose points downwards when mounted outdoors or in locations cleaned using water, etc.
- If it is mounted close to the floor or ground, the detector should be protected by a steel guard or similar if it is likely to be hit by trucks or other work vehicles.
- The detector must never be covered by boxes, containers, etc. which may prevent the air circulating in the room reaching the detector.
- The detector should always be installed with a view to acceptable access for service and calibration.

4.2 Electrical connection

A supply voltage of nom. 110-240 V AC 50–60 Hz is connected to the screw terminals X5 ()*, (N)* and \ominus (L)*.

The output signal for 4-20 mA or 0.5-5 V/1-10 V is on the terminals "AN OUT".

The DC supply ("+5V" and "+12V") and the analog output are not galvanically isolated, so if a common GND is selected together with DC supply it must connect to terminal "AN OUT" and thus to common GND.

The relay outputs are on terminals X4, see the diagram below.

(x)* = See Fig. 4.1 Page 8).

4.3 Electrical connections

The numbering of the screw terminals is as indicated on the drawing below:

The diagram below provides an overall overview of the screw terminals:

X1-1	A: for optional connection to an external detector GND	A
X1-2	B: for optional connection to an external detector +5V	B
X1-3	C: for optional connection to an external detectorSIGN	C
X1-4	C: for optional connection to an external detector	S
X2	Internal sensor, Flex cable	GND/+5V/Sign
X3-1	Analog out (+)	V_{out} / I_{out} AN OUT +
X3-2	Analog out (+)	V_{out} / I_{out} AN OUT -
X3-3	12VDC out (+)	Vdc (+) DC OUT +
X3-4	12VDC out (GND)	Vdc (-) DC OUT -
X4-1	Relay out, Alarm 1	NC
X4-2	Relay out, Alarm 1	NO
X4-3	Relay out, Alarm 1	C
X4-4	Relay out, Alarm 2	NC
X4-5	Relay out, Alarm 2	NO
X4-6	Relay out, Alarm 2	C
X4-7	Relay out, FAULT	NC
X4-8	Relay out, FAULT	NO
X4-9	Relay out, FAULT	C
X5-1	Supply voltage () 	(Chassis)
X5-2	Supply voltage (110-240V/AC 50-60Hz)	N
X5-3	Supply voltage (110-240V/AC 50-60Hz)	L

5.4 Final testing after mounting

When the supply voltage is switched on, the green status lamp (6)* emits short, rapid blinks until the detector is ready for operation. The detector's alarm functions will be blocked for as long as this lasts.

When the green status lamp (6)* blinks regularly (1Hz) the detector is in operation. In the normal operational state, both red LEDs (3 & 4)* and the yellow LED (5)* will be off.

It will not normally be necessary to calibrate the detector after mounting as it has been calibrated and tested before delivery. If you wish to check whether the detector's analog outputs are active, or the relays' function correctly, the sensor can be activated by a test gas manufactured specially for the purpose.

(x)* = See Fig. 4.1 Page 8).

5 Use of the switch and test points.

5.1 Setup and function

The diagram below provides an overall overview of the switches & test points:

Bold text indicates a standard setting from Geopal.

Switches	Function	Electrical characteristics	Position
S1-1	SEN-R	1.0k Ω	ON / OFF
S1-2	SEN-R	2.2k Ω	ON / OFF
S1-3	SEN-R	4.7k Ω	ON / OFF
S1-4	SEN-R	200 Ω	ON / OFF
S2-1	Iout	4-20 mA (S2-2 OFF)	ON / OFF
S2-2	Vout	0-10 V (S2-1 OFF)	ON / OFF
S2-3	Vout	0-5 V (S2-2+S2-3 OFF)	ON / OFF
S3-1	Alarm 1	Auto / Man	ON / OFF
S3-2	Alarm 2	Auto / Man	ON / OFF
S3-3	Fault	Auto / Man	ON / OFF
S3-4	Test	Test Unit	ON / OFF
X6-1	SOUND	ON / OFF	X6=1-2
X6-2	SOUND	ON / OFF	X6=2-3
X8-1	MEASURING POINT	IOUT 0.54V=20mA	X8=1-2
X8-2	MEASURING POINT	IOUT 0.108V=4mA	X8=1-2
X8-3	MEASURING POINT	VOUT=1-10V	X8=3-4
X8-4	MEASURING POINT	VOUT=0.5-5V	X8=3-4
X10	RS232	SERVICE TERMINAL	X10
X11-1	TEST	SENS SIGN	X8=1-2
X11-2	TEST	GND	X11=1-2
X11-3	TEST	+5V	X11=3-4
X11-4	TEST	GND	X11=3-4

6 Fault state

6.1 Fault-finding

Problem						
Green operation LED not on	Yellow fault LED on	Red alarm 1 LED on	Red alarm 2 LED on	Red alarm 2 LED comes on before/without 1 LED	No alarm LED on despite presence of gas	
1	2	3	4	5	6	Causes/Remedial action
<input type="radio"/>						a Check that the power supply is correctly connected to the alarm centre (see section 5.3).
<input type="radio"/>	<input type="radio"/>					b Check that the toggle switch S5 on the base circuit board is set to "I" (see section 4.1).
<input type="radio"/>						c Check that the power supply fuse F1 is correctly inserted and intact.
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>			d Try to reset the alarm centre by disconnecting the power and reconnecting it.
	<input type="radio"/>					e Check that the detector is correctly connected to GP-SA-2 (X2).(Flex circuit in connector)
	<input type="radio"/>					f Check that the sensor element fits properly into its socket in the detector. To do this you must first remove the nose of the detector.
	<input type="radio"/>					g Measure the output of the detector between terminals A and C (+). If the voltage is lower than approximately 100 mV, the sensor should be replaced. (Can also be measured on X11-1 & -2)
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	h Calibrate the detector (see section 8).
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	i Replace the sensor element and calibrate the GP-SA-2 (see section 8).
		<input type="radio"/>	<input type="radio"/>			j Investigate the possibility that there actually may be gas in the room.
		<input type="radio"/>	<input type="radio"/>			k Investigate the possibility of other gases in the room since most sensors have a certain degree of cross-sensitivity.
		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	l Calibrate the GP-SA-2 (see sections 8.5 and 8.6).

7 Adjustment and calibration

This must only be performed by qualified personnel.

7.1 Calibration overview

When calibrating the gas detector, its measuring range is adjusted. This is done by performing a zero calibration (clean air) and a span calibration using test gas. The span point will typically be in the region of 25-50% of the measuring range. Gas types and concentrations for span calibration and alarm levels are given on the detector's data sheet. If in doubt, contact Geopal A/S.

7.2 Service interval

For optimum safety, the detector should be tested and calibrated once a year. This is actually a legal requirement for numerous types of installation. A complete calibration consists of a zero calibration followed by calibration with a test gas.

7.3 Calibration equipment

In order to calibrate the detector it is necessary to have a test gas container is equipped with a valve and flow meter, a suitable length of soft plastic tubing and a connecting piece to attach this to the detector.

Before calibration can be performed, the screws holding the cover of the detector in place must be removed. This can then be removed, providing access to the detector circuit board.

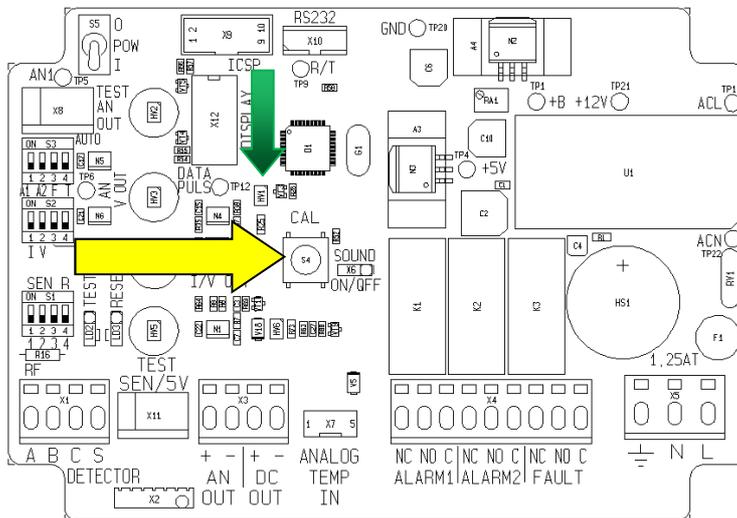
7.4 Test gas in aerosol cans

The detector is made with a threaded hole in the base of the sensor section (1/4" pipe thread). One purpose of this hole is to feed in test gas during calibration. The test gas can be fed in through the threaded hole in the base via the connecting piece. The gas is fed in through the base all and out of the two holes in the side of the sensor.

This procedure facilitates the use of a limited amount of gas for calibration. A flow of approximately 200 ml/minute is generally adequate. With a flow of some 200 ml/minute, 10 litres of test gas will be enough for around 50 minutes' gas flow.

7.5 Zero calibration

Zero calibration can only be performed when the sensor is in clean air. It is therefore necessary to ensure adequate ventilation around the detector before proceeding. If this is not possible, clean air can be fed to the sensor from an aerosol can during zero calibration. Then, press the YELLOW 'CAL' button for approximately 2 seconds until the green status light emits short blinks. Then wait for the green status lamp to blink regularly once again. Depending on the current zero voltage and any effects of the surrounding air, this can vary between a few seconds and several minutes.



7.6 Calibration using test gas

The pipe connector is screwed into the threaded hole in the base of the detector. The valve and flow meter are fitted to the aerosol can, after which this can be connected to the detector's connector using the plastic tubing. Test gas is fed into the detector at a suitable flow rate as described above. Then, press the YELLOW 'CAL' button for approximately 2 seconds until the green status light emits short blinks. Then wait for the green status allowed to bring regularly once again, after which the test gas flow is switched off and the detector reassembled.

7.7 Adjustment of alarm levels

The alarm levels 1 and 2 are adjusted by agreement on delivery. If changes to these levels are later required it will be necessary to call in a service technician from Geopal or to send the detector to us for the existing settings to be changed.

8 Warranty and disposal

8.1 Warranty

Warranty cover

Geopal System A/S provides the end user with a 1-year warranty beginning from the date of sale. The warranty period must be documented by means of the original invoice or receipt. The warranty covers defects attributable to the material and/or manufacturing faults.

The warranty applies to GP-SA-2 detectors delivered to the first end user.

Warranty period

The warranty period applies from the delivery of a brand new product to the end user.

If the date of purchase cannot be documented, the warranty period will start from the production date, which is stated on each product.

Scope of the warranty

The warranty does not cover labour costs in connection with the mounting of replacement products or components in cases when Geopal System A/S elects not to repair the product. The provision of replacement products or accessories does not extend the original warranty period. In the event that the original product is no longer accessible at the time the deficiencies reported, Geopal System A/S reserves the right to offer a similar replacement product or component.

Cover in compliance with the warranty requires the end-user to produce evidence of the fact that faults or damage is neither directly nor indirectly due to:

- a) Incorrect mounting, i.e. Mounting not in compliance with the mounting instructions or (in the absence of such instructions) at variance with sound craftsman-like practice.
- b) mounting outside recommended mounting areas,
- c) incorrect operation or misuse,
- d) the use of incompatible spare parts or accessories,
- e) transport, installation or other form of handling,
- f) product modifications,

g) other faults or damage not attributable to material, production or construction faults, in that the preceding enumeration is not exhaustive.

Furthermore, cover in pursuance of the warranty is conditional on the end-user providing evidence that the fault or damage was not directly or indirectly attributable to - or that faults and deficiencies could not have been prevented by - failure to carry out maintenance as prescribed in the instruction and maintenance manual.

Written notification of defects

Notification of a defect covered by the warranty must be given in writing to Geopal System A/S or the distributor from which the product was purchased, within two (2) calendar months of the date on which the end user ascertained, or should have ascertained, the defect.

Geopal System A/S will then decide whether to repair or replace the product or to refund the purchase price.

Repairs during warranty cover period

Unless Geopal System A/S decides otherwise, the end user is responsible for the repair. The warranty includes delivery free of charge of spare parts such materials necessary for the end user's repair of the product.

Supply of substitute goods

The provision of substitute goods applies to the replacement of the old product with a new one of the same type, model and quality. If at the time notification of the defect is received the product is no longer manufactured or produced in exactly the same version, Geopal System A/S is entitled to replace it with a similar product.

Transport/ carriage to and from Geopal System A/S and/or the distributor and dismounting/remounting of the product, if applicable, must be arranged with Geopal System A/S prior to implementation, in which case the costs will be defrayed by Geopal System A/S.

Not covered by the warranty

This warranty does not cover products not indicated under "Warranty cover". As regards accessories, including pre-installed accessories, reference is made to the producer's warranty provisions. As regards other Geopal System A/S products,

regardless of whether these are pre-installed, the special conditions stated in this warranty apply, including those relating to the warranty period cf. "Warranty cover".

Geopal System A/S does not accept liability for consequential damage, including operating losses, or product liability over and above that encompassed by invariable legislation.

Geopal System A/S accepts no liability for losses directly or indirectly attributable to conditions over which Geopal System A/S has no control, including industrial action, lockouts, fire, war, terrorism, blockades, import restrictions, political unrest, exceptional natural occurrences, vandalism or other forms of force majeure.

Geopal System A/S does not accept liability for products not manufactured by Geopal System A/S, regardless of whether these are sold or are shown together with products indicated under "Warranty cover".

9 Disposal of electric and electronic products



This product complies with the labelling requirements of the WEEE Directive (2002/96/EC). The attached label states that this electric/electronic product must not be disposed of together with household waste.

Product category:

The product can be classified in category 9 in relation to Appendix 1A of the WEEE Directive (2002/96/EC). "Monitoring and control instruments".

May not be disposed of together with household waste!

More detailed information about environmentally safe disposal of electric and electronic waste such as discarded equipment or parts thereof are obtainable from your distributor. See the Geopal System A/S website given on the product.

10 Technical specifications

10.1 General specifications

Installation temperature:	-20 °C to + 50 °C
Storage temperature:	-25 °C to + 80 °C
Long-term stability	< 5 % over 12 months.
Repeatability:	< 5 %
Reaction time to gas	< 3 secs.
Start-up time from installation	30 min.
Self-test	On-going
Calibration	Automatic for selected gas/coolant
Relative humidity of surroundings:	20 % - 100 %, non-condensing
Protection:	IP 65

10.2 Electrical connections

Supply voltage:	1 x 110-230VAC (85-264VAC) (120-370VDC)
Frequency:	50-60 Hz
Maximum output:	23 Watts
Maximum fuse size	13 A
Output signals:	
Output analog:	Type: 4-20 mA / (2mA in event of fault) 1-5 Volts / (0.5V in event of fault) 2-10V / (1V in the event of fault)
Measuring range: (general)	0-100 % LEL 0-40.000 ppm
Alarm Signal 1, -2:	Type: Relay contact (C, NC & NO) AC1 230V/8A – AC15 230V/1.7A

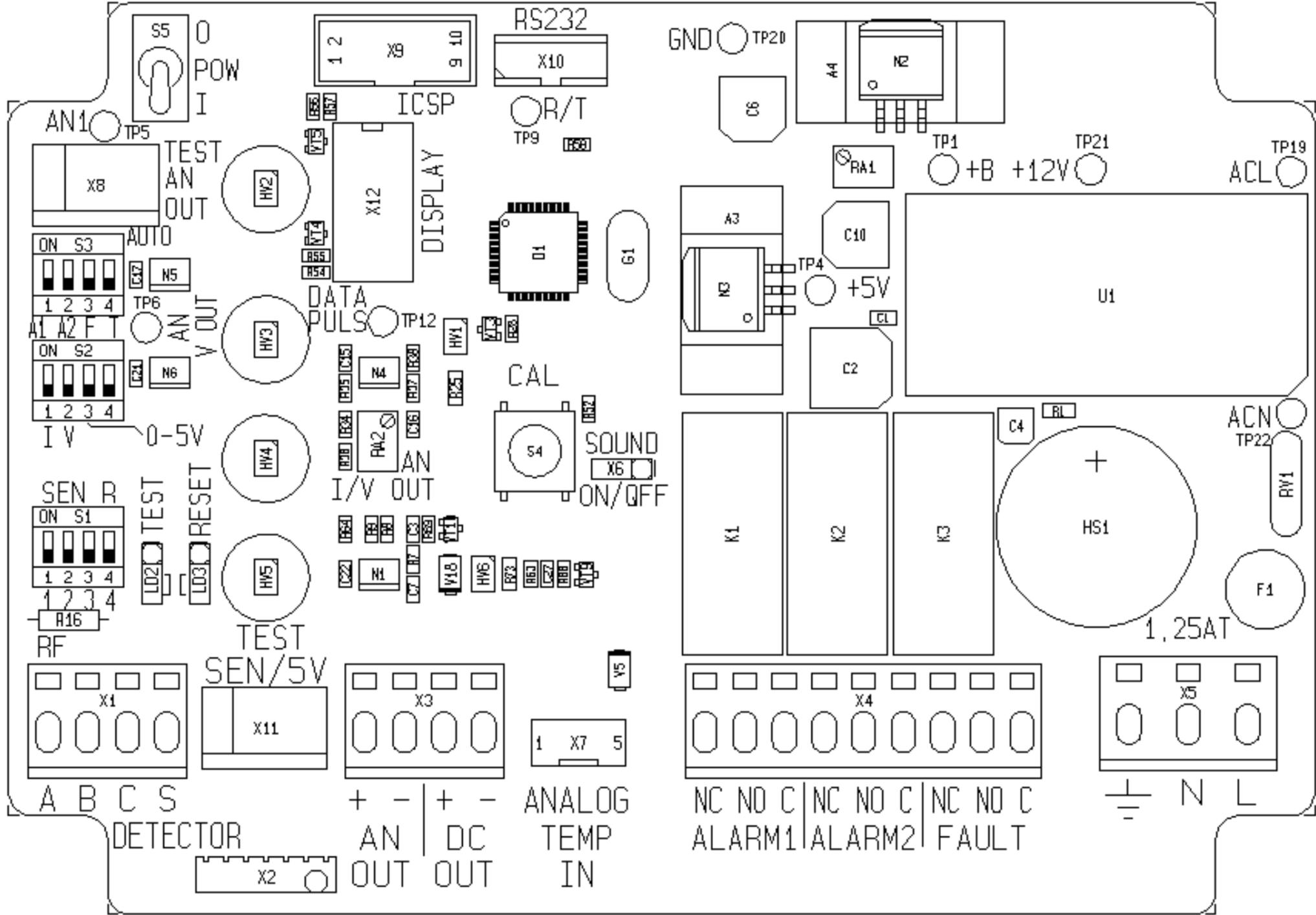
Fault signal:	Type:	Relay contact (C, NC & NO)
		AC1 230V/8A – AC15 230V/1.7A

10.3 Regulatory requirements:

The device is compliant with the following directives and standards:

LV 2006/95/EØF		EN 60 204-1.
EMC 2004/108/EØF,		EN 50 270, EN 61 326-1
	Emissions	EN 61 000-6-3, EN55022 L. B
	Immunity	EN 61 000-6-2,
	Harmonic	EN 61 000-3-2, EN 61 000-3-3.
Safety requirements		EN 61 010-1 & IEC 1010-1:

Appendix A. Positioning of components



Appendix B. Mounting measurements for Detector

