



GLACIÄR MIDI

Gas Leakage Detector for commercial and industrial applications



ENG USER MANUAL

V2.8

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2 PRODUCT DESCRIPTION

2.1 Intended use / Applications

The **GLACIÄR MIDI** series leakage detectors continuously monitor indoor air for any refrigerant leaks. The devices can be used for refrigeration applications (cold rooms, freezer rooms, machinery rooms).

The **GLACIÄR MIDI** series detectors are available in the following configurations:

- Built-in version
- Remote version

They are calibrated to detect most refrigerants currently available on the market. The sensitive elements are constructed using semiconductor (SC) technology, infrared (IR) technology, or electrochemical (EC) technology.

The **GLACIÄR MIDI** series detectors can be used in stand-alone applications or connected to **SAMON** controllers or third-party devices. Communication with controllers uses an analogue output, relays, or an RS-485 Modbus® serial connection.

When a refrigerant leakage exceeding a programmable concentration threshold is detected, an alarm or warning status is activated, depending on the level of concentration set, and the **GLACIÄR MIDI** responds as follows:

- The combination of LEDs that are on changes
- A dedicated internal relay (SPDT) is activated
- The analogue output is controlled (in proportion to the detected concentration)
- The change in status is signalled via the RS-485 Modbus output

Furthermore, the **"SAMON GLACIÄR" app**, available in both App Store for iPhone and Google Play for Android devices, can be used to access the device.

The **GLACIÄR MIDI** series detectors enable compliance with refrigeration safety standards (e.g., EN 378, ASHRAE 15) through alarms to alert personnel in the event of a refrigerant leakage.



WARNING: semiconductor sensors detect the gas they have been calibrated for, but are also sensitive to other types of gases, solvents, alcohol, or substances containing ammonia, such as cleaning products, present in the environment. This, in certain areas and applications, can lead to false alarms when the substances described above are present. Nonetheless, although they do not only detect the specific gas, but they also still give a reliable indication of the concentration of the gas they have been calibrated for.



WARNING: This device is neither certified nor approved for operation in oxygen-enriched atmospheres. Non-compliance can lead to EXPLOSION.



WARNING: This device has not been designed to guarantee intrinsic safety when used in areas classified as hazardous ("Directive 2014/34/EU ATEX" and "NFPA 70, Hazardous Location"). For operator safety, DO NOT use it in hazardous locations (classified as such).
If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

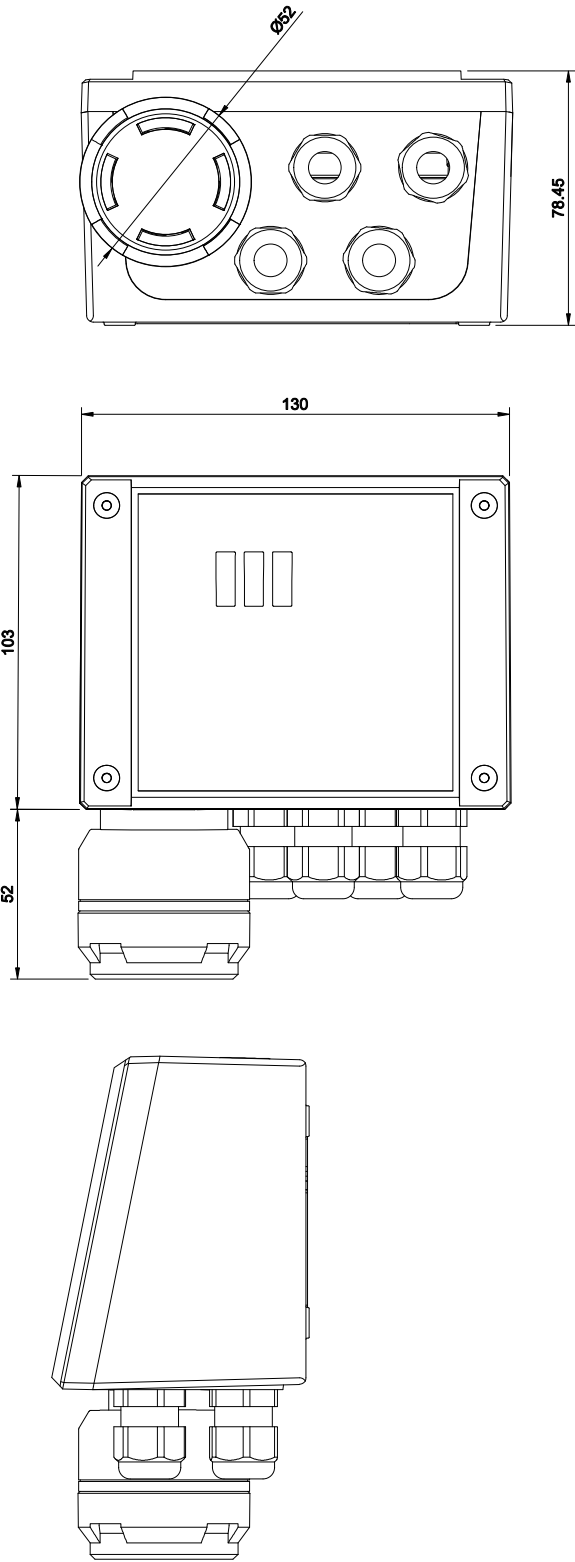
SENSOR TECHNOLOGY	SHORT NAME
Semiconductive	SC
Electrochemical	EC
Infrared	IR
Pellistor (Catalytic)	PEL

GLACIÄR MIDI is available in eight main versions:

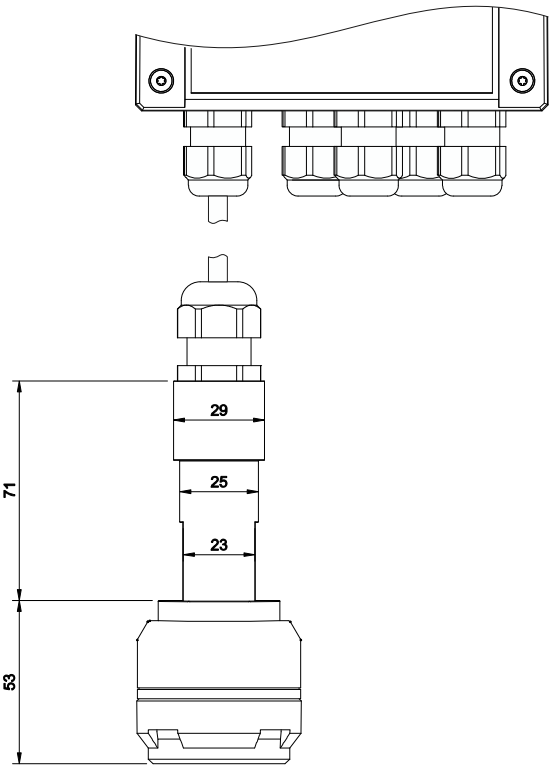
- IR version for CO₂
- IR version for CO₂ High range
- EC version for toxic gases
- SC version for HC refrigerant gases
- SC version for HFC/HFO refrigerant gases
- IR version for HC refrigerant gases
- IR version for HFC/HFO refrigerant gases
- PEL version for flammable gases

2.2 Physical dimensions

BUILT-IN VERSION



REMOTE VERSION



3 INSTALLATION



IMPORTANT: the gas detector must only be installed by qualified personnel.
It is recommended to read the manual completely in order to use the product correctly.

3.1 General information

The performance and overall effectiveness of the system strictly depend on the characteristics of the place where the gas detector is installed. It is therefore necessary to scrupulously comply with and carefully analyse every detail of the installation process, including (but not limited to) the following aspects:

- local, state and national regulations and standards governing the installation of gas monitoring equipment
- electrical standards governing the laying and connection of power and signal cables to gas monitoring equipment
- all possible environmental conditions that the devices will be exposed to
- the physical characteristics of the gas to be detected (in particular, its specific weight)
- the characteristics of the application (e.g., possible leakages, movement of air, areas where gas may stagnate, high pressure areas, etc.)
- the accessibility needed for routine maintenance and repairs
- the types of equipment and accessories needed to manage the system
- any limiting factors or regulations that may affect system performance or installations.



IMPORTANT: the installation surfaces must not be exposed to continuous vibrations so as to prevent damage to the connections and electronic devices.

3.2 Installation tips



CAUTION: THERE IS NO GENERAL RULE for establishing the appropriate number of sensors and their location for each application. Therefore, the guidelines described below are intended as support for installers, and not as rules in their own right. **SAMON accepts no liability for the installation of the gas detectors.**



IMPORTANT:
SC type sensor shall be used only in normal atmosphere (20,9 %vol. of Oxygen)

3.2.1 Sensor height

GAS TYPE	MOUNTING HEIGHT
NH ₃ Ammonia (R-717) - Lighter than air	20 cm below ceiling
HFC / HFO / C ₃ H ₈ Propane (R290) - Heavier than air	20 cm above the floor
CO ₂ Carbon Dioxide (R744) - Heavier than air	20 cm above the floor

3.2.2 Equipment rooms

In equipment rooms, the gas detectors can be installed as follows:

- Position the gas detectors near areas with a high concentration of refrigerant, such as compressors, cylinders, storage tanks, pipes and conduits. Avoid vibrating surfaces.
- Position the gas detectors near mechanical parts such as pressure reducers, valves, flanges, joints (brazed or mechanical) and pipes. In particular, above or below these in relation to the type of gas (see below).
- Position the gas detectors around the perimeter of the room, so as to completely surround the equipment.
- Position the gas detectors in all enclosed areas (stairwells, pits, enclosed corners, etc.) where pockets of stagnant gas may form.
- Position the gas detectors near ventilation air flows, both natural and mechanical (if present).
- Do not place the gas detectors too close to areas with high-pressure gas, to allow this to spread in the space around the gas detector. Otherwise, the device may not detect the refrigerant leak if the flow of gas is too fast.

3.2.3 Cold rooms

In cold rooms, position the gas detectors near the return air flow from the evaporator, ideally on a side wall, but not directly in front of the evaporator.

Where there are several evaporators, it may be possible to use one gas detector for every two evaporators if their positioning allows.

Finally, position the gas detectors near mechanical parts or joints such as valves, flanges, and pipes, avoiding areas with high-pressure gas.

3.2.4 Chillers

Measuring leaks on outdoor chillers is generally more difficult, given the highly variable air flow.

Generally, it is recommended to install the gas detectors near the compressor, as this is the place where refrigerant leaks are most likely to occur. In particular, check if it is possible to install the gas detector inside the closed unit near the compressor, where gas is more likely to stagnate. However, avoid vibrating surfaces or surfaces that are difficult to access for maintenance.

It is also recommended to install gas detectors along the ventilation system, especially in the event of low or variable air flow speeds.

3.2.5 Air conditioning - direct VRF/VRV systems

In air-conditioned buildings, it is recommended to install at least one gas detector in each room, identifying the areas of greatest risk, such as air flows from ventilation systems and heating systems such as radiators.

In these spaces, the refrigerant gas is usually denser than air: consequently, the gas detectors should be installed close to the floor.

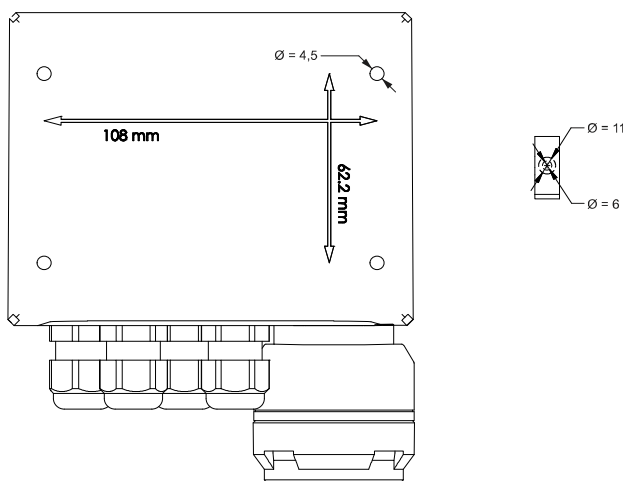
Also consider installing the gas detector in ceilings or false ceilings, if not adequately sealed. Do not install the gas detectors underneath mirrors/washbasins and inside bathrooms.

Do not install the gas detectors near sources of steam.

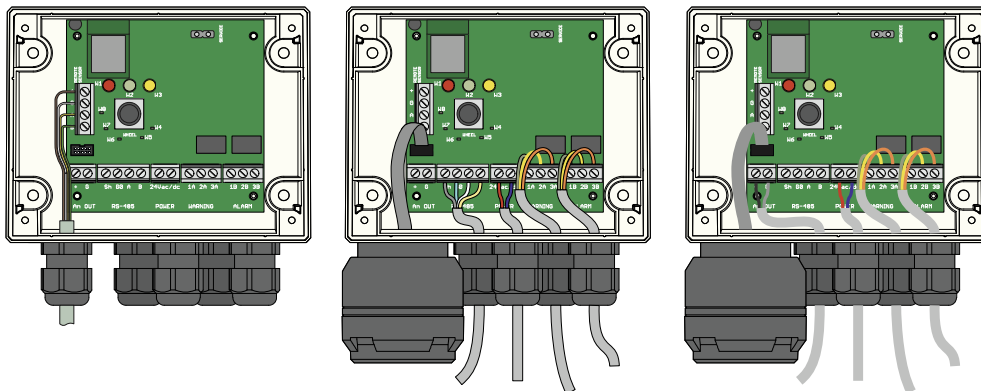
3.3 Installation

Once the optimal position to install the sensor has been chosen, it is recommended to install the sensor (identifiable on the device by the black sensor housing) in a vertical position, with the sensitive element (black part) facing downwards. The sensor can now be mounted on the wall, as follows:

- Drill the holes in the wall using the measures on the bottom side of the detector (shown in the picture below).
- Fix the device using four screws, chosen according to the type of installation and the type of wall, maximum diameter 4 mm, minimum length 15 mm and torque 2,5 Nm.
- Fix the remote sensor using one screw, chosen according to the type of installation and the type of wall, maximum diameter 4 mm, minimum length 15 mm and torque 2.5 Nm.

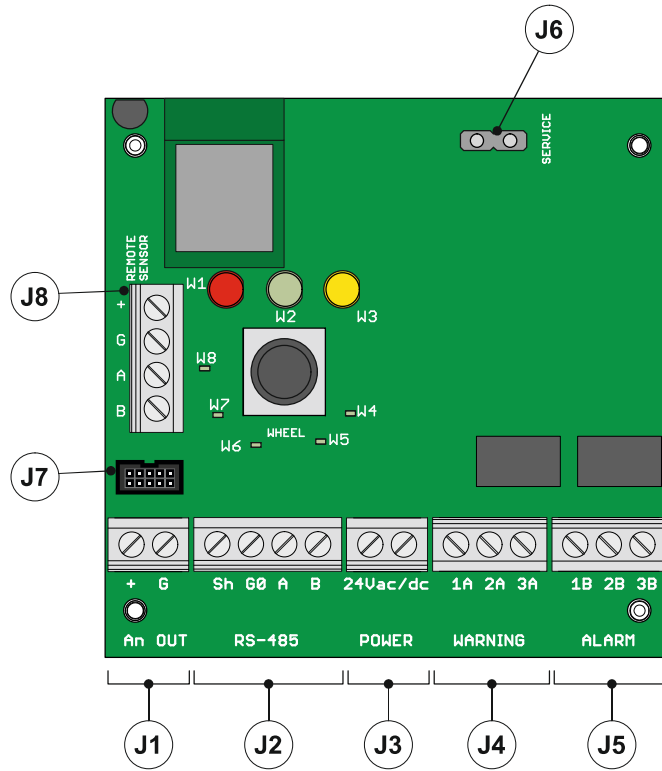


- Open the cover of the **GLACIÄR MIDI**, fit the cable glands and make the required electrical connections. The plug-in terminals can be removed from the device to facilitate wiring.



- Power the device on and complete the settings using the rotary switch, as described in the following paragraphs, or using the app, as described below or through the Modbus connection.
- Use the cable glands provided to pass through and connect the cables to the terminals, as shown in the figure and in the connection table below. The terminals can be removed to simplify wiring.
- Close the cover
- Cord range for M16 cable gland 5 - 10 mm, for M20 cable gland 7.5 - 11.3 mm
- Use UL listed approved cable, min. 50°C, suitable for electrical rating in application
- Tighten the cable glands with a torque of 2,5 Nm
- Close the cover.

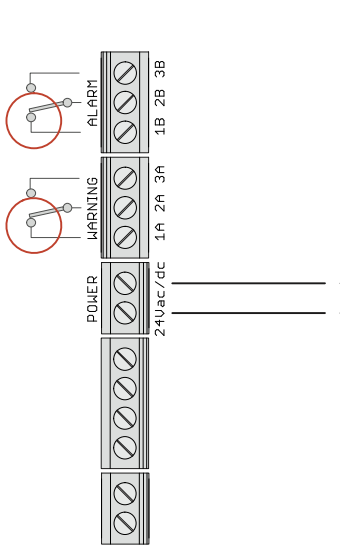
Electrical connections



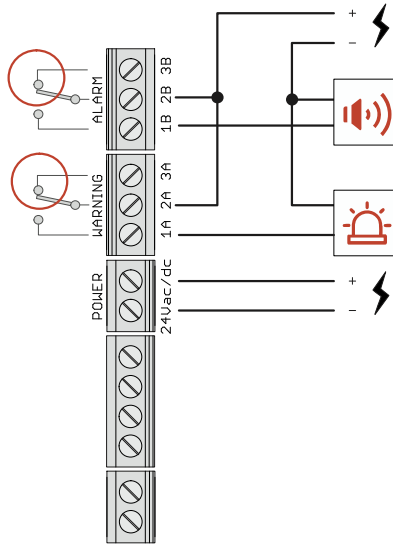
J1	+	Analogue output
	G	Analogue output reference
J2	Sh	Shielded RS-485 cable
	G0	GND for RS-485
	A	Tx+ / Rx+ for RS-485
	B	Tx- / Rx- for RS-485
J3	24 V AC/DC	For DC power supply, connect the power wires to the screw terminal, regardless the polarity. The device automatically recognizes + and -. For AC power supply, connect the power wires to the screw terminal, regardless the polarity. The device automatically recognizes L and N.
J4	1A	NO contact for the warning/fault relay
	2A	Common for the warning/fault relay
	3A	NC contact for the warning/fault relay
J5	1B	NO contact for the alarm relay
	2B	Common for the alarm relay
	3B	NC contact for the alarm relay
J6	+	V+ for the output voltage provided for service
	G	Service voltage reference
J7	/	Built-in version sensor connector
J8	/	Remote version sensor connector (connection not to be used for built-in products)

All external circuits connected to device shall be double or reinforced isolated from mains meet SELV and Limited energy requirements according to clause 9.4 of UL61010-1 3rd edition.

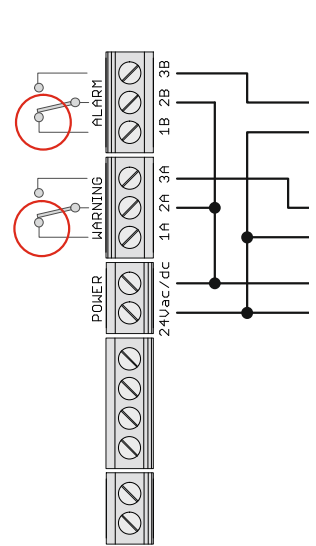
Alarm connections



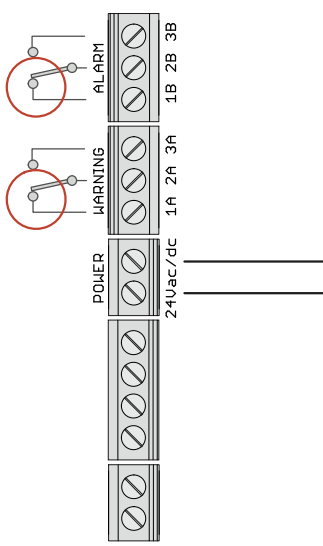
Non-powered



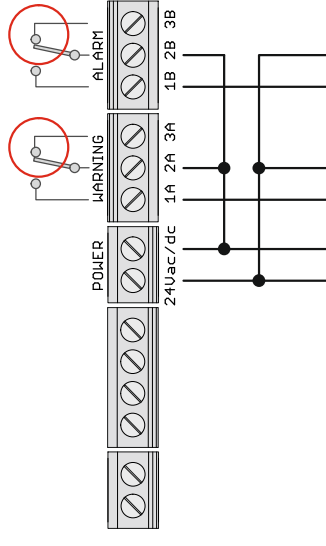
Failsafe (Default)



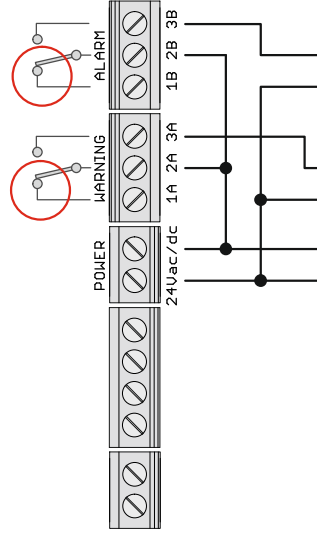
Non-failsafe *



Non-powered



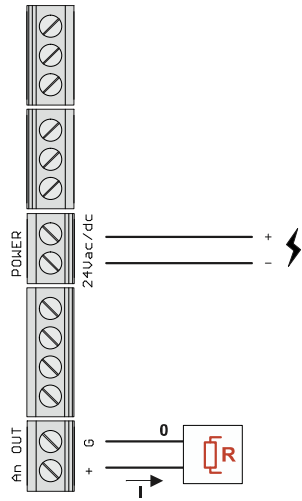
Failsafe (Default)



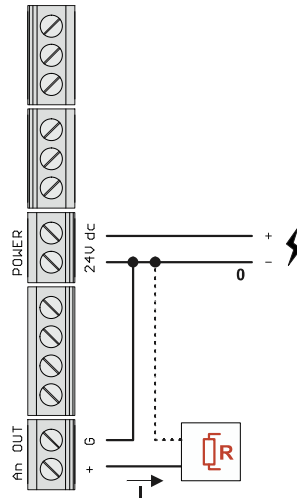
Non-failsafe *

* - Option (Can only be set via Modbus command)

4-20 mA loop connections



4 wires

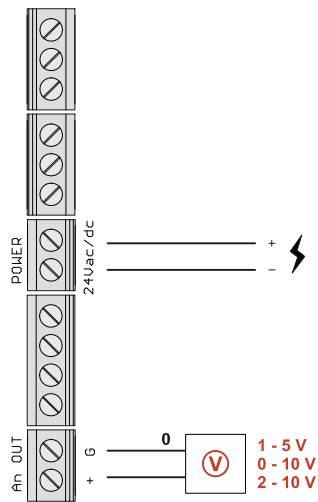


3 wires (DC only)

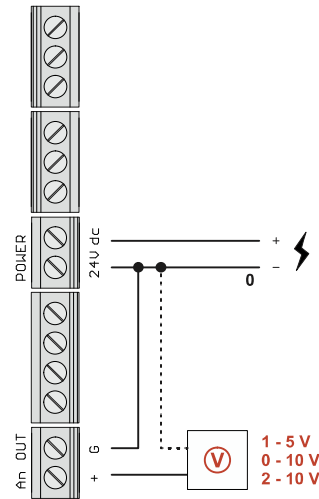
$$R = 250 \, \Omega$$

$$R_{\text{MAX}} = 500 \, \Omega$$

Voltage output connections



4 wires

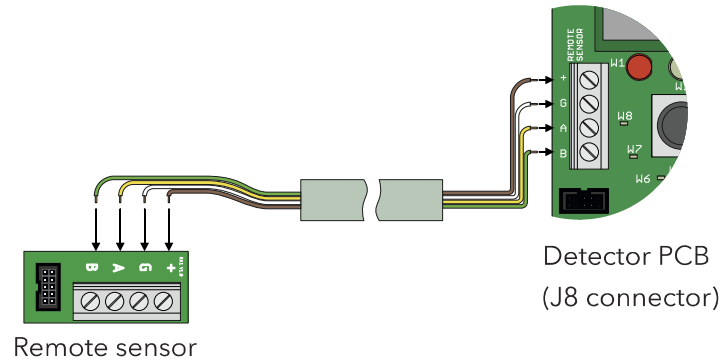


3 wires (DC only)



WARNING: AC Neutral (N) Is Not a True Ground. It is a current-carrying conductor, not a clean 0V reference like DC ground. This creates ground potential differences and can force AC voltage/current into the sensor's electronics, damaging internal components.

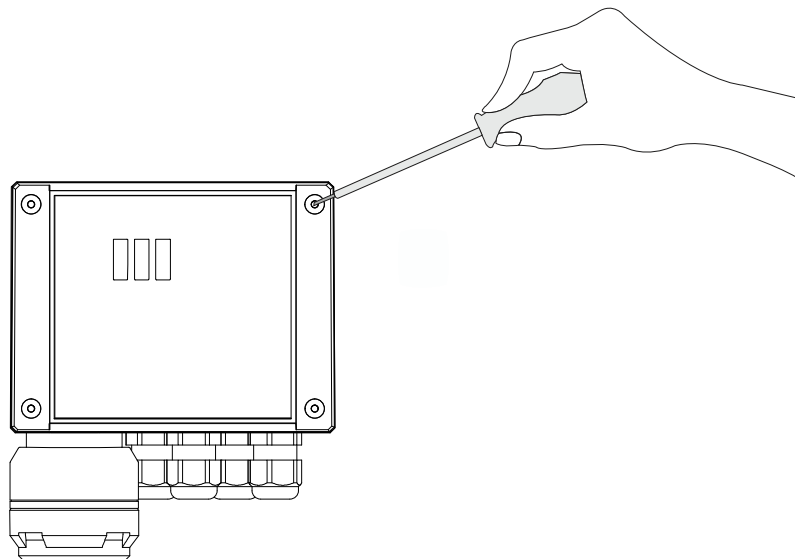
Remote sensor cable connections



WIRE CODE	COLOR	FUNCTION
+	Brown	12V DC
G	White	0V DC
A	Yellow	RS 485 Sensor Comm A
B	Green	RS 485 Sensor Comm B



WARNING: Not following the correct contact sequence may cause damage to the PCB, which is not covered by the warranty.



- Secure the detector cover with the four screws.
- Power the device on and set the parameters using the **"SAMON GLACIÄR" app** (see the relevant chapter) if the settings were not previously made using the rotary switch.

3.4 Additional installation notes

Before commencing electrical installation and wiring, carefully read the following notes:

- Power must be supplied by a safety isolation transformer (Class 2) with no earth connection on the secondary winding.
- The cable for the relays must be sized and fitted with fuses based on the rated voltages, currents, and environmental conditions.
- If stranded wires are used, it is recommended to use an end terminal.
- To comply with RFI immunity regulations, the communication cable shield on the supervisor must be earthed (e.g., to the chassis, earth bar, etc.)
- Complete all wiring before powering on.

4 OPERATION

4.1 Power on

When power is connected, the device begins the start-up cycle, divided into two phases:

- Start-up
- Warm-up

The start-up sequence lasts around 20 seconds, during which the main functions of the gas detector are initialized and verified. In this phase, the LEDs on the front panel are activated in sequence, and the device cannot yet be used. At the end of the start-up sequence, the warm-up phase commences, during which the sensor output signal is adjusted and stabilized. In this phase, the device can be used to detect gas, and installation can be completed via the controller only; nonetheless, the measurement is less reliable, and calibration is not possible.

During the warm-up phase, the green LED flashes around twice every second. The duration of the warm-up phase depends on the sensor technology used:

- Semiconductor = 5 min
- Electrochemical = 5 min
- Infrared = 2 min



IMPORTANT: The sensors may take longer to warm up than specified; in these cases, do not take any action, wait for the device to stabilise. The time needed for complete stabilisation of the device may vary from 2 hours (minimum time) to 24 hours (recommended time).

4.2 Device operating states

The **GLACIÄR MIDI** series gas detectors provide visual indications of their current operating status, in addition to the relay outputs. Visual indication of device operating status is provided by three LEDs (green/red/orange).

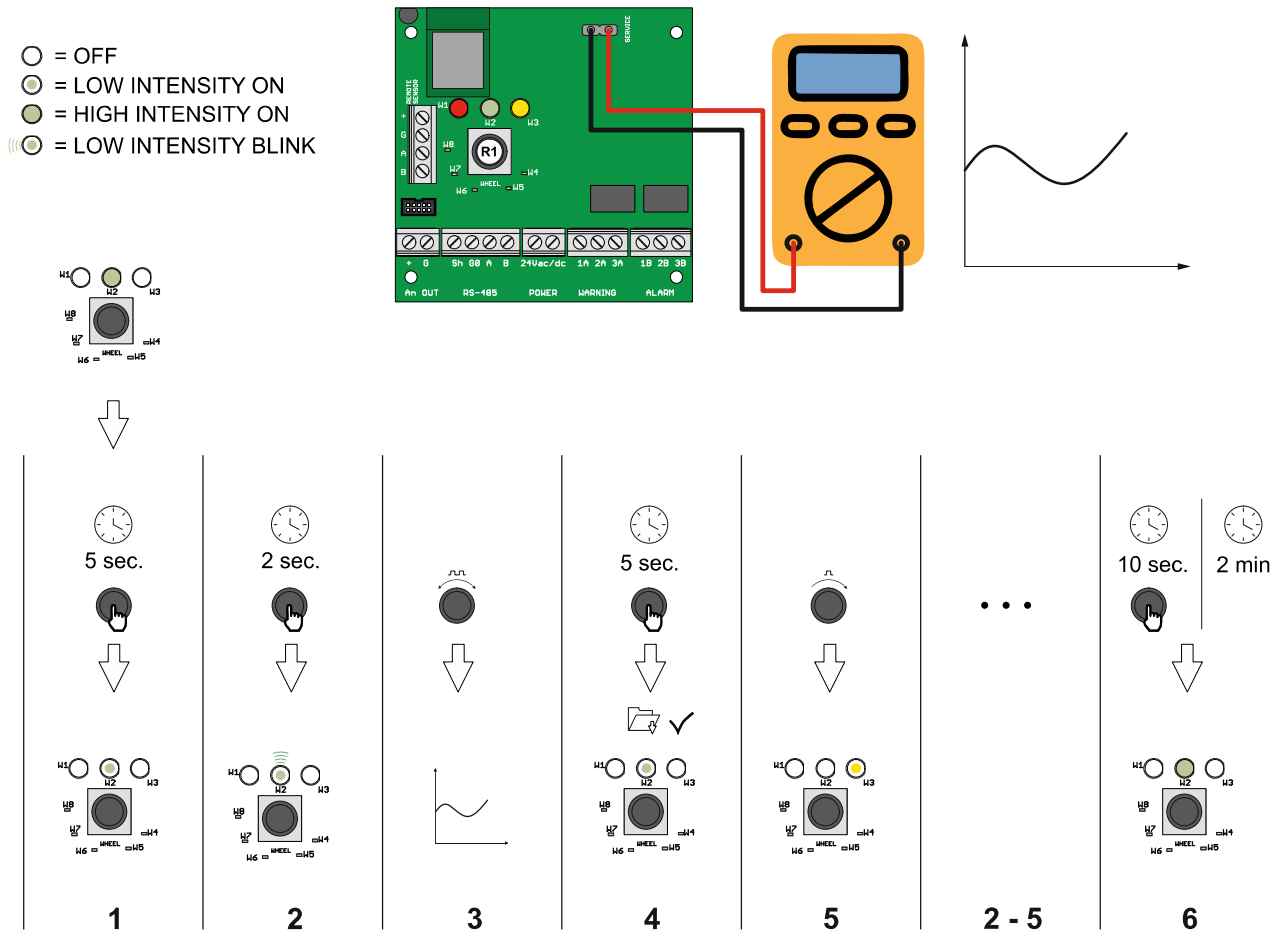
Device status and the corresponding outputs are shown in the following table:

STATUS	LED		WARNING/FAULT RELAY	ALARM RELAY
Warm-up		1 Hz Green blink	OFF	OFF
Normal		Green ON steady Red and yellow OFF	OFF	OFF
Bluetooth®		1 Hz Green double blink Red and yellow OFF	OFF	OFF
Serial connected		Internal LED W8 ON steady for 2 seconds after communication	---	---
Warning delay		1 Hz Yellow blink Red and green OFF	OFF	OFF
Alarm delay (RWF* = 0)		1 Hz Red blink Yellow OFF	ON	OFF
Alarm delay (RWF* = 1)		1 Hz Red blink Yellow OFF	OFF	OFF
Warning (RWF* = 0)		Green and yellow ON steady Red OFF	ON	OFF
Warning (RWF* = 1)		Green and yellow ON steady Red OFF	OFF	OFF
Alarm (RWF* = 0)		Red, green and yellow ON steady	ON	ON
Alarm (RWF* = 1)		Red, green and yellow ON steady	OFF	OFF
Fault (RWF* = 0)		Red and yellow ON steady Green OFF	ON	ON
Fault (RWF* = 1)		Red and yellow ON steady Green OFF	ON	OFF

*RWF = Relay WF Modbus register

4.3 Setup of the device using the rotary switch

The rotary switch (R1) is located inside the device, on the electronic board.



The basic configuration can be performed using the rotary switch, following the instructions described below. To complete the configuration, a digital multimeter is required, with the test leads connected to connector J6. In this way, the tester will show a voltage between 0 and 10 Volts, indicating the value selected by the rotary switch. The meaning of the voltage value displayed changes depending on the selected function: the table below shows the meaning of each voltage for each function.

Setting mode is activated by pressing and holding the rotary switch for 5 seconds (1). The LED that is ON acts as the menu point, indicating which parameters will be set (all the other LEDs are OFF). Turn the switch to select the parameter to be set. Reading the table, the voltage read with a voltmeter connected to the service terminal indicates the chosen setting.

Pressing the rotary switch for 2 seconds accesses the selected parameter (2). The corresponding LED flashes. Turning the rotary switch changes the parameter setting (3).

After having made the setting, pressing the rotary switch for 5 seconds saves the new value (4). Turning the rotary switch again moves to the next parameter (5).

After two minutes of inactivity or pressing the rotary switch for 10 seconds, the detector returns to normal operating mode (6).

Description of the rotary switch LEDs

The table below shows the value of the selected parameter and the corresponding voltage value. Each LED corresponds to a different parameter. The default parameter values are saved to permanent memory.

LED W1	Not used
LED W2	Warning level. The operator can set the warning threshold. See the table below for the voltage value corresponding to the selected setting.
LED W3	Alarm level The operator can set the alarm threshold. See the table below for the voltage value corresponding to the selected setting.
LED W4	Modbus address The operator can set the Modbus address. To set the values with greater precision, use the Modbus serial connection or app. See the table below for the voltage value corresponding to the selected setting.
LED W5	Alarm delay The operator can select the delay time for activation of the LED and the alarm relay after the alarm threshold has been exceeded. See the table below for the voltage value corresponding to the selected setting.
LED W6	Type of analogue output voltage. The operator can select the type of analogue output. See the table below for the voltage value corresponding to the selected setting.
LED W7	Alarm/warning reset function mode This parameter is used to select the warning and alarm reset modes. 0 = manual reset (latch) / 1 = automatic reset
LED W8	Modbus configuration The operator can choose the desired Modbus configuration from the options available. See the table below for the voltage value corresponding to the selected setting.

Possible configurations - Alarm/warning reset function mode (W7)

W=0 A=0	Manual reset Warning	Manual reset Alarm
W=1 A=0	Automatic reset Warning	Manual reset Alarm
W=0 A=1	Manual reset Warning	Automatic reset Alarm
W=1 A=1	Automatic reset Warning	Automatic reset Alarm

J6 voltage value conversion table / selected function

SERVICE WHEEL LED	W2 / W3					W4	W5	W6	W7	W8
	FULL SCALE 1000	FULL SCALE 4000	FULL SCALE 10000	FULL SCALE 100	FULL SCALE >10000					
VOLTAGE [V]	[PPM]	[PPM]	[PPM]	[PPM/LFL]	[PPM]	[--]	[M]	[--]	[--]	[--]
0	0	0	0	0	0	0	0			
0,1	100	100	100			1	1			
0,2	200	200	200			2	2			
0,3	300	300	300			3	3			
0,4	400	400	400			4	4			
0,5	500	500	500	5		5	5			
0,6	600	600	600			6	6			
0,7	700	700	700			7	7			
0,8	800	800	800			8	8			
0,9	900	900	900			9	9			
1	1000	1000	1000	10	10000	10	10			9600 8N1
1,1		1100	1100			11	11			
1,2		1200	1200			12	12			
1,3		1300	1300			13	13			
1,4		1400	1400			14	14			
1,5		1500	1500	15		15	15			
1,6		1600	1600			16	16			
1,7		1700	1700			17	17			
1,8		1800	1800			18	18			
1,9		1900	1900			19	19			
2		2000	2000	20	20000	20	20	4-20 mA	W=0 A=0	9600 8N2
2,1		2100	2100			21				
2,2		2200	2200			22				

SERVICE WHEEL LED	W2 / W3					W4	W5	W6	W7	W8
	FULL SCALE 1000	FULL SCALE 4000	FULL SCALE 10000	FULL SCALE 100	FULL SCALE >10000					
VOLTAGE [V]	[PPM]	[PPM]	[PPM]	[PPM/LFL]	[PPM]	[--]	[M]	[--]	[--]	[--]
2,3		2300	2300			23				
2,4		2400	2400			24				
2,5		2500	2500	25		25				
2,6		2600	2600			26				
2,7		2700	2700			27				
2,8		2800	2800			28				
2,9		2900	2900			29				
3		3000	3000	30	30000	30				19200 8N1
3,1		3100	3100			31				
3,2		3200	3200			32				
3,3		3300	3300			33				
3,4		3400	3400			34				
3,5		3500	3500	35		35				
3,6		3600	3600			36				
3,7		3700	3700			37				
3,8		3800	3800			38				
3,9		3900	3900			39				
4		4000	4000	40	40000	40				19200 8N2
4,1			4100			41				
4,2			4200			42				
4,3			4300			43				
4,4			4400			44				
4,5			4500	45		45				
4,6			4600			46				
4,7			4700			47				
4,8			4800			48				
4,9			4900			49				
5			5000	50	50000	50		1-5 V	W=1 A=0	
5,1			5100			51				
5,2			5200			52				
5,3			5300			53				
5,4			5400			54				
5,5			5500	55		55				
5,6			5600			56				
5,7			5700			57				
5,8			5800			58				
5,9			5900			59				
6			6000	60	60000	60				9600 8E1
6,1			6100			61				
6,2			6200			62				
6,3			6300			63				
6,4			6400			64				
6,5			6500	65		65				
6,6			6600			66				
6,7			6700			67				
6,8			6800			68				
6,9			6900			69				
7			7000	70		70				19200 8E1
7,1			7100			71				
7,2			7200			72				
7,3			7300			73				
7,4			7400			74				
7,5			7500	75		75				
7,6			7600			76				
7,7			7700			77				
7,8			7800			78				
7,9			7900			79				
8			8000	80		80		2-10 V	W=0 A=1	9600 8O1
8,1			8100			81				
8,2			8200			82				
8,3			8300			83				
8,4			8400			84				
8,5			8500	85		85				
8,6			8600			86				

SERVICE WHEEL LED	W2 / W3					W4	W5	W6	W7	W8
	FULL SCALE 1000	FULL SCALE 4000	FULL SCALE 10000	FULL SCALE 100	FULL SCALE >10000					
VOLTAGE [V]	[PPM]	[PPM]	[PPM]	[PPM/LFL]	[PPM]	[--]	[M]	[--]	[--]	[--]
8,7			8700			87				
8,8			8800			88				
8,9			8900			89				
9			9000	90		90				19200 801
9,1			9100			91				
9,2			9200			92				
9,3			9300			93				
9,4			9400			94				
9,5			9500	95		95				
9,6			9600			96				
9,7			9700			97				
9,8			9800			98				
9,9			9900			99				
10			10000	100		100		0-10 V	W=1 A=1	

4.4 Analogue output

The GLACIÄR MIDI series gas detectors feature a single configurable analogue output. During normal operation, the device's analogue output signal is proportional to the gas concentration measured, and can be selected from the following options:

- 1 to 5 V
- 2 to 10 V
- 0 to 10 V
- 4 to 20 mA (default)

The GLACIÄR MIDI series gas detectors use different voltage/current values to indicate different operating modes. In normal operation, the gas concentration is indicated by the analogue output signal level. The relationship between output signal level and gas concentration is shown below:

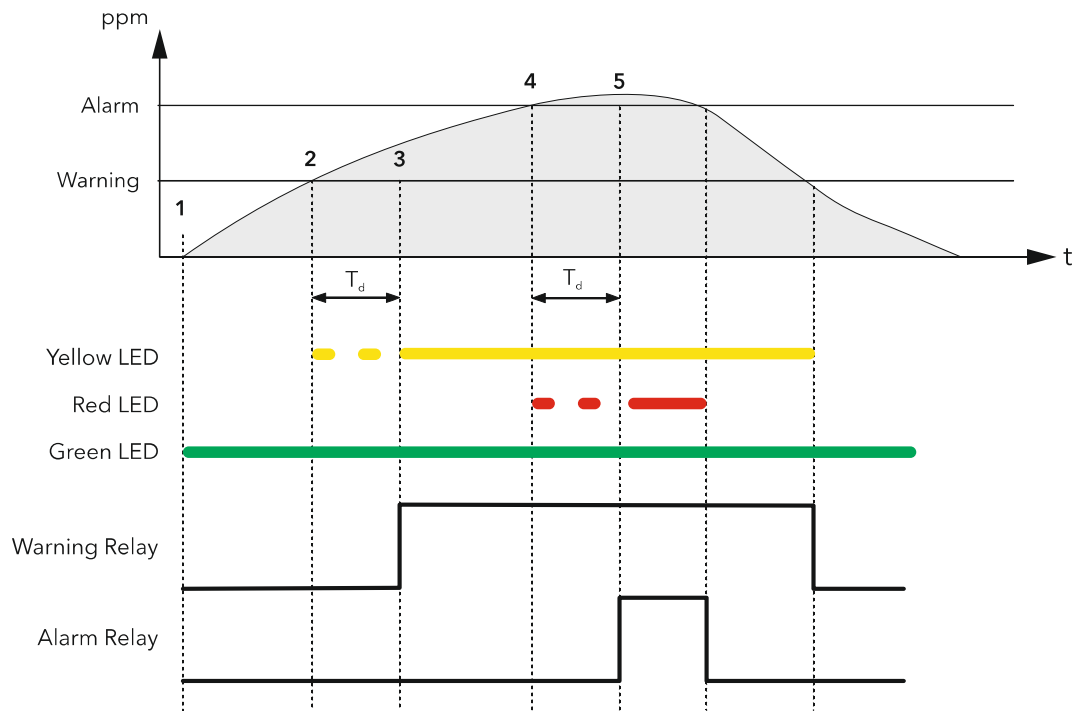
GAS CONCENTRATION	1-5 V	2-10 V	0-10 V	4-20 MA
Warm up	3 V	6 V	5 V	12 mA
Underrange	1 V	2 V	0 V	2 mA
0%	1 V	2 V	0 V	4 mA
50%	3 V	6 V	5 V	12 mA
100%	5 V	10 V	10 V	20 mA
Overrange	5 V	10 V	10 V	22 mA

4.5 Alarm management

The alarms are activated when the set thresholds are exceeded. The alarm threshold value must always be greater than the warning value. The alarm and warning thresholds must be less than or equal to the full-scale range and must be greater than or equal to the allowed limit. The alarms are activated when the set thresholds are exceeded.

Alarm set points

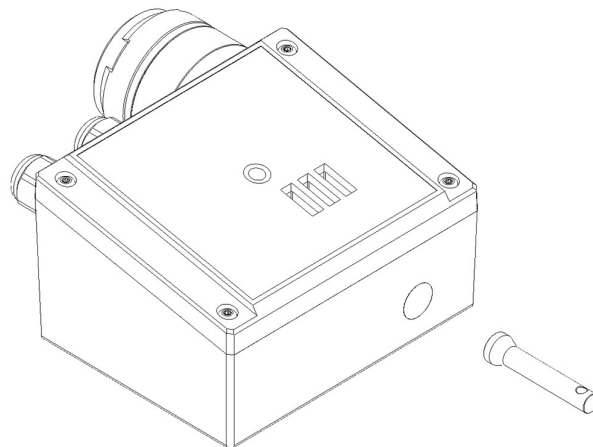
SENSOR, GAS AND RANGE	MINIMUM VALUE	WARNING DEFAULT	ALARM DEFAULT	MAXIMUM VALUE	UNIT OF MEASURE
SC, HFC/HFO 0-1000 ppm	150	150	500	800	ppm
SC, R290, 0-4000 ppm	400	400	800	3000	ppm
IR, CO ₂ , 0-10000 ppm	1000	1500	5000	9000	ppm
IR, HFC/HFO 0-2000 ppm	200	300	1000	1800	ppm
IR, HFC/HFO 0-5000 ppm	500	1000	2500	4500	ppm
IR, HFC/HFO 0-10000 ppm	1000	1500	5000	9000	ppm
EC, NH ₃ , 0-100 ppm	10	15	30	90	ppm
EC, NH ₃ , 0-1000 ppm	100	150	300	800	ppm
EC, NH ₃ , 0-5000 ppm	500	500	1000	4500	ppm



1	2	3	4	5
300 PreAlarmflag = 0	300 PreAlarmflag = 0	300 PreAlarmflag = 0	300 PreAlarmflag = 1	300 PreAlarmflag = 1
307 PreWarningFlag = 0	307 PreWarningFlag = 1	307 PreWarningFlag = 1	307 PreWarningFlag = 1	307 PreWarningFlag = 1
308 WarningFlag = 0	308 WarningFlag = 0	308 WarningFlag = 1	308 WarningFlag = 1	308 WarningFlag = 1
309 AlarmFlag = 0	309 AlarmFlag = 0	309 AlarmFlag = 0	309 AlarmFlag = 0	309 AlarmFlag = 1
Yellow LED OFF	Yellow LED flashing	Yellow LED ON	Yellow LED ON	Yellow LED ON
Red LED OFF	Red LED OFF	Red LED OFF	Red LED flashing	Red LED ON
Warning relay OFF	Warning relay OFF	Warning relay ON	Warning relay ON	Warning relay ON
Alarm relay OFF	Alarm relay OFF	Alarm relay OFF	Alarm relay OFF	Alarm relay ON

4.6 Magnetic key for configuration

The device is supplied with a magnet for configuration. By placing it in the slot provided, the following functions can be managed:



4.6.1 Bluetooth activation

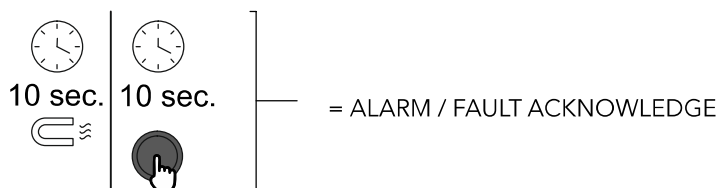
After 5 seconds of exposing the magnet to the magnetic sensor, Bluetooth mode is activated. If Bluetooth is already on, after 5 seconds of exposure Bluetooth is deactivated.

Bluetooth mode is automatically deactivated after 20 minutes of inactivity. Product operation in Bluetooth mode is indicated by the rapid flashing of the green LED.

Bluetooth Activation is used to set up the product on installation and/or enter maintenance mode. When in this mode, the alarms (if present) are disabled until the normal operating mode is restored, deactivating Bluetooth.

4.6.2 Alarm/warning management

If a warning or alarm is active, after 2 seconds of exposure, the alarm will be acknowledged and deactivated. If gas is still present, the detector will enter alarm or warning mode as usual, after a 10-second delay.



4.6.3 SAMON GLACIÄR app features

The **"SAMON GLACIÄR"** app lets users fully exploit the potential of the new **GLACIÄR MIDI** series gas detectors, allowing simple and intuitive interaction with the gas detector. This simplifies configuration by using a smartphone to interface with the **GLACIÄR MIDI** gas leakage detectors.

The **SAMON GLACIÄR app** is available on the ANDROID store and on the IOS App Store.



SAMON GLACIÄR can be used to perform the following functions:

- Configuration: modify alarm thresholds, configure Modbus settings, modify relay behaviour, and manage analogue output settings
- Maintenance: check correct functioning of the device
- Calibration, complete with calibration report
- Display of current gas concentration measurement and indication of alarm/fault status

4.6.4 Connecting the device via Bluetooth

Before connecting to the device via the **SAMON GLACIÄR app**, first make sure that the BLUETOOTH connection and GEOLOCATION are enabled on the smartphone used (Android only).

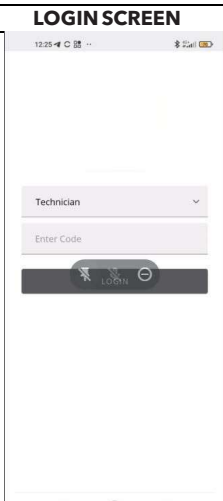
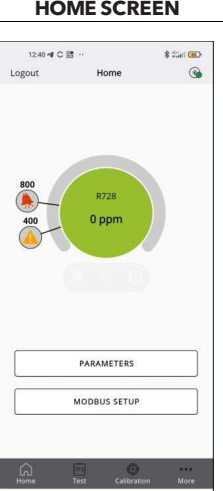
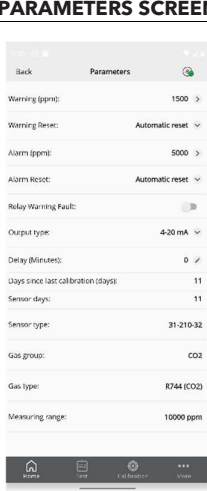
Make sure that Bluetooth mode has been activated on the **GLACIÄR MIDI** using the magnetic key, as described in the previous chapter.

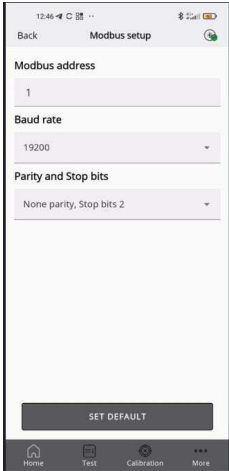


IMPORTANT:

Bluetooth mode is not available in startup or service wheel state.

Open the **SAMON GLACIÄR app** (previously downloaded); the following screen is displayed.

LOGIN SCREEN  Select: - Operator, to continue displaying the gas detector variables and parameters. - Technician, for password access and the possibility to set the parameters and variables. The password to unlock the device is 2222.	BLUETOOTH CONNECTION SCREEN  If all the functions described above have been enabled on the smartphone and the GLACIÄR MIDI is in Bluetooth mode, the available devices are shown on the app screen. If this is not the case, touch the app screen to refresh the display. Verify that the serial number on the label of the device being connected matches the one displayed on the screen. Select the correct device and verify correct connection. The Bluetooth symbol at the top right changes from red to green.
HOME SCREEN  From the home screen, it is possible to display the current concentration level measured by the sensor, with the corresponding alarm and warning thresholds. The following screens can also be accessed: - PARAMETERS - MODBUS SETUP - Test - Calibration - More	PARAMETERS SCREEN  This screen displays the sensor parameters. It is also possible to select the type of gas to be detected, from those that are compatible with the sensor. See the other information chapter in this manual for further details. The following parameters can be displayed and modified if the user is logged with Technician access: - Warning (ppm): Threshold for activating Warning. - Warning Reset: Determines if Warning will revert to IDLE automatically if gas levels drop below Warning threshold or requires manual acknowledgement to be reset. - Alarm (ppm): Threshold for activation of Alarm. - Alarm Reset: Determines if Alarm will revert to IDLE automatically if gas levels drop below Alarm threshold or requires manual acknowledgement to be reset. - Relay Warning Fault (RWF): Activate to turn Warning relay into a dedicated fault relay. - Output type: Choose analog output scale for J1. Mode description in section 4.4 (Insert reference). - Alarm delay: The delay in minutes from the measured concentration passes the threshold value to the moment the alarm activates. Affect both Warning and Alarm. - Gas type: The specific gas to be measured.

MODBUS SETUP SCREEN	TEST MODE SCREEN
	
The following parameters can be set: • Modbus address • Baud rate • Parity and stop bits. Pressing SET DEFAULT sets the default parameters shown in the table in the Modbus setup paragraph (Does not affect the Modbus address.).	If enabled, the following functions can be activated in test mode, i.e. not corresponding to the behaviour of the device, rather for debugging: • Warning relay • Alarm relay • Green LED • Red LED • Yellow LED • Analogue output

MORE SCREEN

Displays the app technical and legal information. • App settings, change the unit of measure for the temperature displayed in the app • Device Info, view information on the currently connected device • Create report: to make a copy of the most recent report generated • Change logo, to replace the default logo that is shown on the calibration certificate with a different one • Third party license, see information on the third-party licenses used.



IMPORTANT: the Calibration screen is explained in detail in paragraph 5.2 CALIBRATION VIA APP.

4.7 Modbus network

For the Modbus RS-485 network, use a shielded 3-wire cable. Recommended: Belden 3106A (or equivalent).

The Modbus communication parameters can only be set using the **SAMON GLACIÄR app** or the rotary switch on the device's electronic board.

Make sure that the network communication parameters are configured in the same way, including on the controller. To ensure optimal operation of the serial network, observe the following guidelines:

- make sure that the devices are configured with a single bus layout. Connecting several buses in parallel or branching several devices from the main bus may introduce incorrect combinations of signal impedance, reflections and/or distortions.
- Avoid using excessively long connections when connecting devices to the serial bus. The device - bus connection must not exceed a maximum length of 100 metre.
- Make sure that the polarity of the A / B signal is maintained across the serial network.
- Earth the cable shield only on the main unit side.
- Connect the cable shield to terminal SH on the gas detector.
- Make sure that the shield is intact across the serial network.
- Do not use the shield connection as a signal reference. Use a cable that provides a dedicated wire for the signal reference.
- Connect the signal reference to terminal GND on the gas detector.

The **GLACIÄR MIDI** series gas detectors feature a Modbus RTU digital interface. All of the status messages and most of the parameters accessible and/or configurable via the Bluetooth interface are also accessible and/or configurable via Modbus controller.

Parameters for RS-485 communication selectable via app or rotary switch

PARAMETER	POSSIBLE VALUES	DEFAULT VALUE
Address	0 to 247 via app 0 to 100 via device	0
Baud rate	9600 or 19200	19200
Stop bits	1 or 2	2
Parity	None, Even or Odd.	None



IMPORTANT: Each device connected to the same RS-485 bus must have its own address, otherwise there will be conflicts in transmission/reception that prevent serial communication.



IMPORTANT: The write registers are password-protected. By entering the password in the appropriate register, authorisation to write the variables will be provided for 15 minutes. There is a specific variable that indicates whether or not the device is currently locked.

The password to unlock the device is **2222**.

Table of Modbus variables

Function 04 Read Input Registers

ADDRESS	REGISTER NAME	SHORT DESCRIPTION	MEDIUM DESCRIPTION	LONG DESCRIPTION	MAX VALUE	MIN VALUE	UNIT OF MEAS.	MODBUS BIT POS.	MODBUS LENGTH	DEFAULT VALUE
101	Concentration	Concentration ppm	Sensor concentration in "units"	Sensor concentration in "units"	65535	0		0	16	
102	Status_0	No ICM contact	No contact with the sensor module (ICM)	No contact with the sensor module (ICM)	1	0		0	1	
102	Status_1	No response from the sensor	Sensor module (ICM) signals no contact with the sensor	Sensor module (ICM) signals no contact with the sensor	1	0		1	1	
102	Status_4	Over range	Sensor over range	Sensor over range	1	0		4	1	
102	Status_5	Under range	Sensor under range	Sensor under range	1	0		5	1	
102	Status_15	Diagnostic fault	Sensor module diagnostic fault (self-test fault)	Sensor module diagnostic fault (self-test fault)	1	0		15	1	
103	Range	Full scale	Sensor full scale	Sensor full scale	65535	0	ppm	0	16	
105	DaysOnline	DaysOnline	Number of days online	Number of days online	65535	0	day	0	16	
106	ModbusAddress	Modbus address	Detector Modbus address	Detector Modbus address	247	0		0	16	0
107	SWVer	SWVer	Firmware version	Firmware version	65535	0		0	16	
108	MachineCode	MachineCode	MachineCode	MachineCode	65535	0		0	16	
113	HWVer	HWVer	Hardware version	Hardware version	39321	0		0	16	
114	SensorType	Sensor type	Sensor cross-reference table value	Sensor cross-reference table value	999	0		0	16	
115	Units	Units	Sensor concentration unit	Sensor concentration unit	999	0		0	16	
116	AnalogOutputValue	Analogue output	Analogue output value	Analogue output value as a percentage	100	0	%	0	16	
117	GasGroup	Gas Group	Gas group listed in the table	1 R32 mixtures, 2 HFC/HFO, 3 HC, 4 CO2, 5 NH3	5	1		0	16	
118	DaysSinceService	Days since service	Days since last service performed	Days since last service performed	65535	0	day	0	16	
119	MaxDaysOnline	Max days online	Maximum number of days online allowed for the sensor	Maximum number of days online allowed for the sensor before replacement is required	65535	0	day	0	16	
120	MaxDaysToService	Max days to service	Maximum days until next	Maximum days until next service	65535	0	day	0	16	365

ADDRESS	REGISTER NAME	SHORT DESCRIPTION	MEDIUM DESCRIPTION	LONG DESCRIPTION	MAX VALUE	MIN VALUE	UNIT OF MEAS.	MODBUS BIT POS.	MODBUS LENGTH	DEFAULT VALUE
			service							

Function 06 Write Single Register & Function 03 Read Holding Registers

ADDRESS	REGISTER NAME	SHORT DESCRIPTION	MEDIUM DESCRIPTION	LONG DESCRIPTION	MAX VALUE	MIN VALUE	UNIT OF MEAS.	MODBUS BIT POS.	MODBUS LENGTH	DEFAULT VALUE
200	LimitAlarm	Alarm limit	Alarm threshold	Alarm threshold	10000	0	ppm	0	16	
201	Delay	Delay	Delay before alarm activation	Delay before alarm activation	20	0	min	0	16	0
203	LimitWarning	Warning limit	Warning threshold	Warning threshold	10000	0	ppm	0	16	
204	AnalogOutputType	Type of analogue output	Type of analogue output signal	2 = 4-20mA ; 5 = 1-5V ; 8 = 2-10V ; 10 = 0-10V	10	2		0	16	2
205	PassCode	PassCode	Password to authorise the next command	Password to authorise the next command	65535	0		0	16	
206	GasType (*)	Type of gas	Gas type value	Gas type value	50	0		0	16	
655	SpanConcentration	SpanConcentration	Span concentration for calibration	Span concentration for calibration	10000	0	ppm	0	16	0

Function 02 Read Input Status

ADDRESS	REGISTER NAME	SHORT DESCRIPTION	MEDIUM DESCRIPTION	LONG DESCRIPTION	MAX VALUE	MIN VALUE	UNIT OF MEAS.	MODBUS BIT POS.	MODBUS LENGTH	DEFAULT VALUE
300	PreAlarmFlag	Alarm flag	Indicator of whether the alarm threshold has been exceeded	1 = alarm threshold exceeded	1	0		0	1	0
302	Fault	Fault	Fault indication	1 = Fault activated	1	0		0	1	0
303	W1LED	W1LED	W1 RED status LED	W1 RED status LED	1	0		0	1	0
304	W2LED	W2LED	W2 GREEN status LED	W2 GREEN status LED	1	0		0	1	0
305	W3LED	W3LED	W3 YELLOW status LED	W3 YELLOW status LED	1	0		0	1	0
307	PreWarningFlag	PreWarning flag	Indicator of whether the warning threshold has been exceeded	1 = warning threshold exceeded	1	0		0	1	0
308	WarningFlag	Warning relay	Warning activation indicator including delay	1 = Warning ON	1	0		0	1	0
309	AlarmFlag	Alarm relay	Alarm activation indicator including delay	1 = Alarm on	1	0		0	1	0
310	BTStatus	BTStatus	Bluetooth status	1 = Bluetooth on	1	0		0	1	0
311	SensorExpired	Sensor expired	Flag showing if the sensor needs to be replaced	1 = sensor to be replaced	1	0		0	1	0
312	DeviceUnlocked	Device unlocked	Indicator for authorisation to modify variables	1 = unlocked	1	0		0	1	0

Input register 102: bits

BIT	DESCRIPTION	LONG DESCRIPTION	FAULT	SERVICE PORT ERROR CODE
0	No reply from SM		Yes	1 V
1	No reply from sensor		Yes	2 V
2	Preheating	From sensor, 1 during preheating		
3	Reserved	Internal use only		
4	Over range	Over range from sensor		5 V
5	Under range	Under range from sensor	Yes	3 V
6	Reserved	For internal use only		
7	Reserved	For internal use only		
8	Reserved	For internal use only		
9	Reserved	For internal use only		
10	ServiceDue	SM reporting service due		
11	SensorExpired	SM reporting sensor expired		
12	Reserved			
13	Reserved	For internal use only		
14	Reserved	For internal use only		
15	Diagnostic fault	Sensor module diagnostic fault (self-test fault)	Yes	

Function 05 Write Single Coil & Function 01 Read Coils

ADDRESS	REGISTER NAME	SHORT DESCRIPTION	MEDIUM DESCRIPTION	LONG DESCRIPTION	MAX VALUE	MIN VALUE	UNIT OF MEAS.	MODBUS BIT POS.	MODBUS LENGTH	DEFAULT VALUE
401	ServiceDue	Service needed	Maintenance indicator (Including calibration)	1 = maintenance required	1	0		0	1	0
402	Acknowledge	Acknowledge	Manually acknowledge warning or alarm	Write 1 to acknowledge	1	0		0	1	0
403	RelayFailSafe	Relay FailSafe	Relay in failsafe mode	1 = Relay in failsafe mode	1	0		0	1	0
404	RelayWF	Relay WF	Warning relay used as fault	1 = Warning relay used as fault	1	0		0	1	0
405	AcknowledgeWarning	Acknowledge warning	Manual/automatic warning acknowledgement setting	1 = automatic reset; 0 = manual reset	1	0		0	1	0
406	AcknowledgeAlarm	Acknowledge Alarm	Manual/automatic alarm acknowledgement setting	1 = automatic reset; 0 = manual reset	1	0		0	1	1
407	ZeroCalibration	Zero calibration	Start zero calibration command	1 = start calibration	1	0		0	1	1
408	SpanCalibration	SpanCalibration	Start span calibration command	1 = start span calibration	1	0		0	1	0
409	FactoryReset	Reset	Reset the detector to the factory settings	1 = restore factory settings	1	0		0	1	0

5 MAINTENANCE

5.1 Calibration kit

The calibration kit is used to perform periodic calibration required for maintenance of the device. The gas cylinder and pressure adapter to perform the calibration need to be procured separately.



5.2 Calibration procedure

The calibration procedure is performed periodically and involves introducing a known gas concentration at the sensor inlet, using the calibration kit.

GAS GROUP	CALIBRATION GAS	RECOMMENDED CALIBRATION GAS CONCENTRATION
4 (CO ₂)	CO ₂	50% of measuring range
5 (NH ₃)	NH ₃	50% of measuring range
1 (R32 mix)	R-32	100% of measuring range
2 (HFC/HFO)	R-134a	100% of measuring range
3 (HC)	R-290	100% of measuring range

For other groups see the gas table in 7.2 (Recommended calibration gas concentration = 50% of measuring range for all gases)

The need to perform calibration is signalled by a specific variable on the supervisor. Each type of device has a different calibration interval, as described in the technical specifications table. After a few years of operation, the sensor needs to be replaced, as described in the following chapters, as the calibration is no longer sufficient to guarantee reliability of the measurement performed.



IMPORTANT: CO₂ detectors do not require periodic calibration but simply need the sensor to be replaced approximately every 7 years. However, test can be performed every 12 months to ensure greater measurement accuracy or if a new calibration certificate is required.



IMPORTANT: R1234ze can negatively affect semiconductor gas sensors. Exposure may cause the sensor to become overly sensitive. In this state, it can take 24 hours or more for the sensor to return to normal operation, depending on the concentration and duration of exposure.
If the gas concentration goes above the sensor's measurement range, the sensor may not recover and should be replaced. We recommend replacing the sensor after any R1234ze leak to maintain reliable performance.



IMPORTANT: After a large refrigerant leakage is detected, the detector should be tested and, if necessary, replaced.



IMPORTANT: Warnings and alarms can be activated earliest 15 minutes after each calibration step.

5.3 Calibration via app

Below is a description of how to calibrate via the controller or via the app.

More information about the calibration procedure can be found by clicking the link: [MIDI calibration](#)

Also available via the QR code:

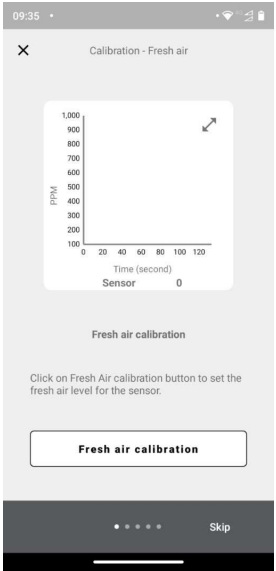
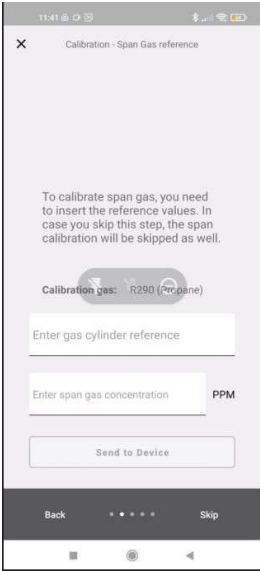


IMPORTANT: GLACIÄR MIDI CALIBRATION KIT manual contains important information about the calibration procedure. Make sure that you have read it before the starting the procedure.

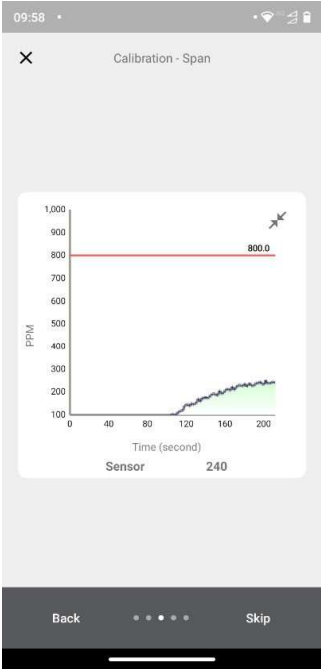
Before connecting to the device via the **SAMON GLACIÄR app**, first make sure that the BLUETOOTH connection and GEOLOCATION are enabled on the smartphone used.

Make sure that the Bluetooth mode on the **GLACIÄR MIDI** has been activated using the magnetic latch as described in the previous chapters.

Refer to the Functions chapter of the **SAMON GLACIÄR app** manual for details of all the app's features.

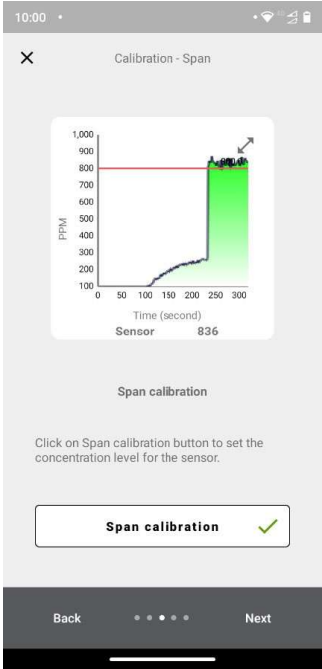
1	2
 Start calibration on the navigation bar. Make sure the sensor is ready and free of gas or other sources of pollution. Click Fresh air calibration at the bottom right, then select Next.	 To perform the calibration, the specific gas indicated as the "calibration GAS" needs to be used. Enter the gas cylinder reference (serial number of the reference gas or other information to be shown on the certificate). Enter the concentration of the gas used for calibration. Click send to device to set the gas concentration used for calibration.

3



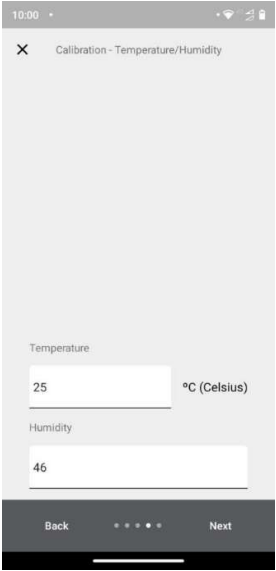
Supply the gas at the known concentration using the calibration kit.
Wait about 1 minute until the gas concentration stabilises.

4



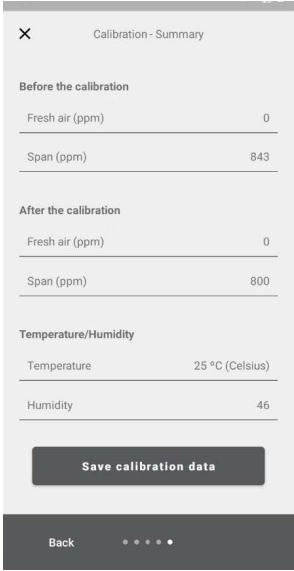
Click Span Calibration to set the calibration concentration.

5

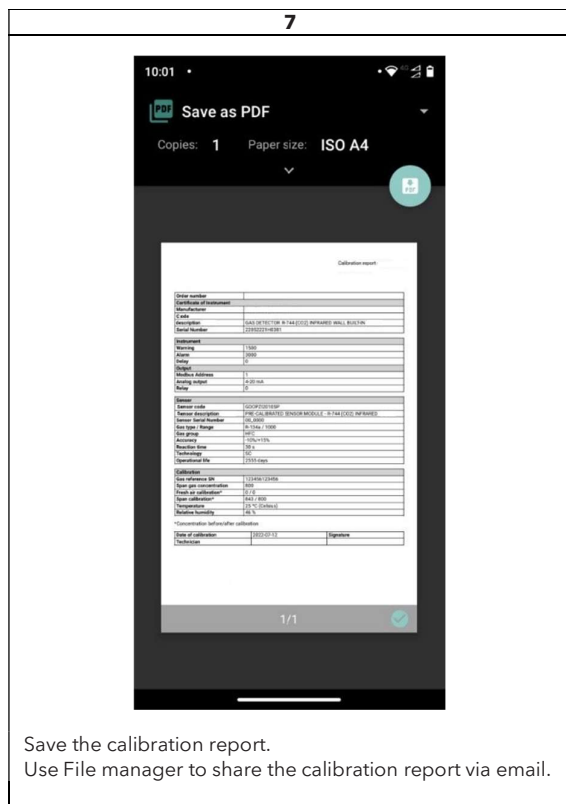


Enter the room temperature and relative humidity.
These values will be entered on the calibration certificate to indicate the environmental conditions during calibration.
It is not necessary to use a calibrated instrument to perform this measurement, an indicative value is sufficient.

6

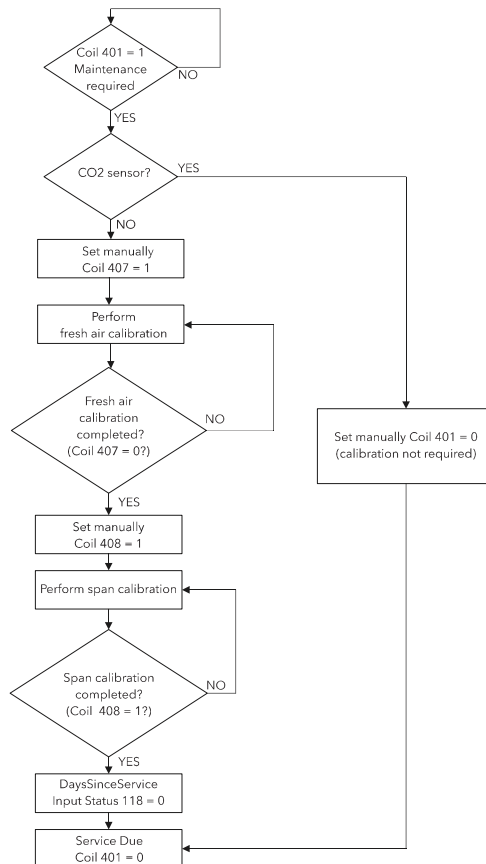


Verify the summary screen, checking that all the information has been entered correctly before generating the calibration report.



5.4 Calibration via Modbus communication

5.4.1 Operation of the registers for calibration



5.4.2 Fresh air calibration

Preparation

- Place the sensor in clean air and wait for the warm-up and the start-up phases to be completed
- Make sure the sensor is warmed up completely. We recommend that the unit has been in operation for a minimum of 24 hours before conducting this procedure to ensure that the sensor is calibrated correctly
- Enter the Technician password to access the device (2222 to register 205)

Fresh air calibration procedure

Send 1 to ZeroCalibration register (coil 407) to perform the fresh air calibration

- If coil 407 is read as 0 after calibration, it means that the fresh air calibration was successful

5.4.3 Span calibration

Preparation

- Use the span gas concentration suitable for the sensor type.
- Follow the preparation as for the Test procedure.

Span calibration procedure



NOTE: Do not perform Span calibration procedure without performing the fresh air calibration first

1. Attach the calibration adaptor to the sensor
2. With the adapter mounted on the sensor head, open the regulator on the gas cylinder. Wait around 1 to 2 minutes until the concentration is stable
3. Send 1 to SpanCalibration register (coil 408)
4. If coil 408 is read as 0 after calibration, it means that the span calibration was successful
5. Turn off and remove gas from the sensor

5.5 Sensor replacement procedure

When the need for replacement is signalled via Modbus communication (coil 311 SensorExpired), proceed as follows:

- Acquire a pre-calibrated sensor module with the same part number as the one mounted on the detector.
- Disconnect power

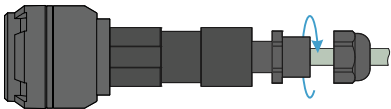
Built-in version

1. Open the cover
2. Disconnect the sensor connector J7
3. Unscrew the sensor module from the case
4. Screw in the new sensor module
5. Plug-in the sensor connector to terminal J7
6. Close the cover

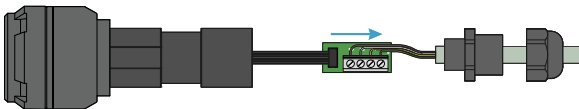
Remote version



1. Loosen the cap off the cable gland so that the cable is free to move inside the cable gland.



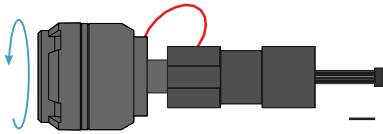
2. Completely unscrew the cable gland.
3. In the event of difficulties when loosening, use pliers.



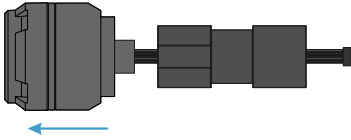
4. Pull out the electronic board from its housing by pulling the remote sensor cable



5. Unplug the sensor connector from the electronic board



6. Unscrew the sensor module from the tube so as to separate it from the other parts of the device



7. Pull out the sensor module



8. Make sure the new sensor module has the same part number as the one just removed.
9. Mount the sensor module in the opposite order to the above instructions for removal.

5.6 Cleaning the device

Clean the detector with a soft cloth using water and a mild detergent. Rinse with water. Do not use alcohol, degreasers, sprays, polishes, detergents, etc.

6 PERIODIC TEST

6.1 Equipment used for the test

- Modbus client installed on a PC
- Calibration kit
- Gas cylinder
- Flow regulator, 0,5l/min constant flow

6.2 Test

6.2.1 Preparation

According to the EN 14624:2020 in "12.7 Response time" is stated that the response time of the detector shall be 30 s or less at a concentration of 1,6 times the pre-set value. Choose the gas cylinder accordingly.
Use the gas regulator with constant flow of 0,5 l/min.

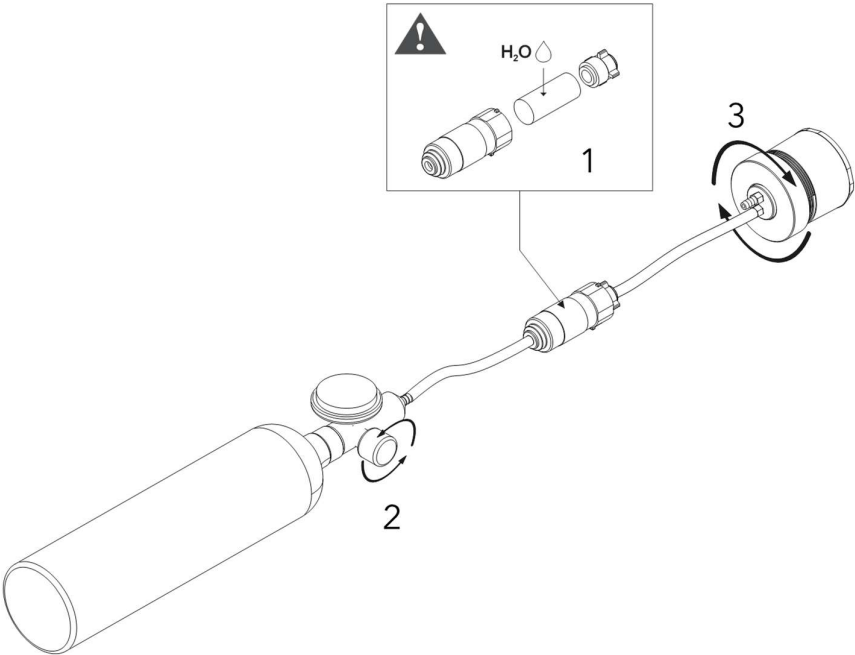
- Place the sensor in clean air and wait for the warm-up and the start-up phases to be completed
- Make sure the sensor is warmed up completely. We recommend that the unit has been in operation for a minimum of 24 hours before conducting this procedure to ensure that the sensor is tested correctly



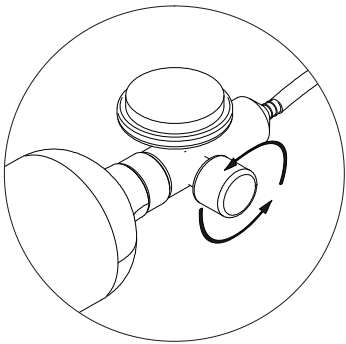
NOTE: In case that semi-conductive sensors are tested, the test gas must be balanced with air and humidified

- For semiconductive sensors, wet the filter core with tap water. Put the core back in place and close the filter. Note the direction of air flow (towards the sensor)
- To vent the hoses, open the regulator on the gas cylinder and let the gas flow for approximately 10 to 15 seconds without the calibration adapter connected to the sensor (to push out the air from the tube), then close the regulator

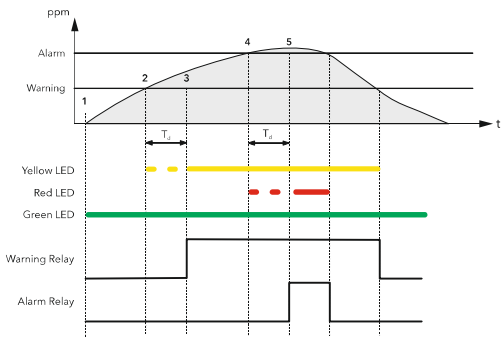
1. Attach the calibration adaptor to the sensor



6.2.2 Test procedure



1. With the adapter mounted on the sensor head, open the regulator on the gas cylinder



2. Control if the alarm relay and LED indication starts within 30 seconds form the start of the gas exposure.



NOTE: No alarm relay and LED functionality while Bluetooth app is active

Modbus

3. Check the Modbus Input Alarm flag at the register address 309

7 FURTHER INFORMATION

7.1 Sensor operating principle

7.1.1 Semiconductor sensors

Semiconductor or metal-oxide-semiconductor (MOS) sensors are very versatile and can be used in a wide range of applications: they can measure both gases and vapours at low ppm and combustible gases at higher concentrations. The sensor is made from a blend of metal oxides. These are heated to a temperature between 150 °C and 300 °C, depending on the gas to be detected. The operating temperature and composition of oxides determines the selectivity of the sensor with respect to different gases, vapours and refrigerants. Electrical conductivity increases significantly as soon as gas or vapour molecules come into contact with the sensor's surface by diffusion.

When the molecules of the selected gas come into contact with the sensor's surface, the conductivity of the semiconductor material increases significantly in proportion to the concentration of gas. Consequently, the current running through the sensor also varies. Water vapour, high ambient humidity, temperature fluctuations and low oxygen levels can alter the readings, giving a higher concentration than the actual level.

By using this technology, **GLACIÄR MIDI** allows the gas detected to be selected based on its category. Gases are divided into three categories or groups. Group 1 includes R32 gases, group 2 those HFCs/HFOs and group 3 HCs. Depending on the gas to be detected, the specific device that detects that category of gas needs to be purchased, and then the specific gas selected via app or Modbus.

The table in the next chapter shows the list of gases detected and the corresponding group.

For example, if needing to detect R-410A, the required device needs to be purchased, described as "Group 1". At the time of installation, then, select R-410A via app or by setting the corresponding Modbus register.

7.1.2 Electrochemical sensors

Electrochemical sensors measure the partial pressure of gases in atmospheric conditions. The monitored ambient air diffuses through a membrane into a liquid electrolyte inside the sensor. Immersed in the electrolyte are a measuring electrode, a counter electrode and a reference electrode. An electronic circuit with a potentiometer supplies a constant voltage between the measuring electrode and the reference electrode. The voltage, the electrolyte and the material used to make the electrodes are selected according to the gas being measured, so that this is correctly transformed electrochemically on the electrode for measurement and thus a current is generated that flows through the sensor. The current value is proportional to the concentration of gas. At the same time, oxygen from the ambient air reacts with the counter electrode. At an electronics level, the current signal is amplified, digitised and corrected based on other control

parameters (e.g. ambient temperature).

7.1.3 Infrared sensors

Infrared (IR) gas sensors operate by exploiting the principle of infrared absorption by gas molecules. The sensor contains an infrared source that emits light through a sampling chamber containing the ambient air. A specific wavelength, unique to the target gas, is selected using an optical filter before the light reaches a detector. When the target gas is present in the sampling chamber, it absorbs a portion of the infrared energy at its characteristic wavelength. The detector measures the resulting reduction in light intensity. This absorption is governed by the Beer-Lambert law, meaning the amount of light absorbed is directly proportional to the concentration of the target gas.

The sensor's internal electronics process the detector's signal. This involves amplifying the signal, applying compensation algorithms for environmental influences such as temperature, and converting it into a digital concentration reading, typically displayed in parts per million (ppm), percent of lower flammability level (%LFL) or percent volume (% vol).

7.1.4 Catalytic (pellistor) sensors

A pellistor is a sensor used to detect flammable gases, such as methane, propane, or hydrogen.

It works by partially burning the gas on a special surface called a catalyst, which produces heat.

The sensor contains a small bead or wire coil coated with this catalyst. Gas enters the sensor through a porous protective mesh, which keeps out dust and sparks. When gas reaches the bead, it reacts with oxygen in the air, producing a small amount of heat. This heat causes the bead to warm up, and the sensor measures this temperature change. The amount of heat corresponds to the concentration of the gas. Some sensors include a second bead without a catalyst, called a reference, to improve accuracy.

The sensor is able to detect gases from very levels up to dangerous concentrations. Response is fast, usually within a few seconds. Pellistors require oxygen to work, so they cannot detect gases in airless environments.

7.1.5 Pre-calibrated sensors and devices

Pre-calibrated sensors and devices are supplied with the calibration certificate included in the packaging, in addition to the instruction sheet.



IMPORTANT:

This product uses semiconductors that may be damaged by electrostatic discharges (ESD).
When handling printed circuit boards, observe proper ESD precautions so as to not damage the electronics.

7.2 Gas detected

REGISTER 117 GROUP	GAS GROUP	TECHNOLOGY	DEFAULT GAS	CALIBRATION GAS
0	Not supported			
1	High sensitivity HFC/HFO ppm	Semiconductor	R-32	R-32
2	Low sensitivity HFC/HFO ppm	Semiconductor	R-134a	R-134a
3	HC ppm	Semiconductor	R-290	R-290
4	CO ₂ ppm	Infrared	CO ₂	CO ₂
5	NH ₃ ppm	Electrochemical	NH ₃	NH ₃
6	IR+ R-32 ppm	Infrared	R-32	R-32
7	IR R-134a ppm	Infrared	R-134a	R-134a
8	IR ppm	Infrared	Variants: R-1234yf, R-123ze, R-32, R-410a, R-449a, R-407c	R-1234yf, R-123ze, R-32, R-410a, R-449a, R-407c
9	IR %LFL	Infrared	Variants: R-1234yf, R-1234ze, R-32, R-454a, R-454b, R-454c, R-455a	R-1234yf, R-1234ze, R-32, R-454a, R-454b, R-454c, R-455a
10	IR+ HC %LFL	Infrared	Variants: R-290, R-600, R-600a, R-1270	R-290, R-600, R-600a, R-1270
11	NH ₃ Long life EC ppm	Electrochemical	NH ₃	NH ₃
12	IR CO ₂ 50000 ppm	Infrared	CO ₂	CO ₂
13	Catalytic %LFL	Catalytic (Pellistor)	***	***
14	EC ppm	Electrochemical	***	***

*** - Later stage implementation

GAS	SENSOR MODULE GROUP	RANGE OF MEASUREMENT.	GAS TYPE REGISTER VALUE
R-22	2	0-1000 ppm	1
R-134a	2	0-1000 ppm	2
R-404a	2	0-1000 ppm	3
R-407c	1	0-1000 ppm	4
R-410a	1	0-1000 ppm	5
R-290	3	0-4000 ppm	7
R-600a	3	0-4000 ppm	9
R-717	5	0-100, 0-1000, 0-5000 ppm	10
R-744	4	0-10000 ppm	11
R-1270	3	0-4000 ppm	13
R-407a	1	0-1000 ppm	19
R-407f	1	0-1000 ppm	22
R-32	1	0-1000 ppm	23
R-1234yf	2	0-1000 ppm	27
R-1234ze	2	0-1000 ppm	28
R-455a	1	0-1000 ppm	29
R-448a	1	0-1000 ppm	33
R-449a	1	0-1000 ppm	34
R-450a	2	0-1000 ppm	35
R-452a	1	0-1000 ppm	36
R-452b	1	0-1000 ppm	38
R-513a	2	0-1000 ppm	39
R-454b	1	0-1000 ppm	40
R-454a	1	0-1000 ppm	43
R-454c	1	0-1000 ppm	44
R-466a	1	0-1000 ppm	47
R-464a	1	0-1000 ppm	48
R-465a	1	0-1000 ppm	49

R-468a	1	0-1000 ppm	50
R-1233zde	2	0-1000 ppm	51
R-50	3	0-4000 ppm	52
R-1150	3	0-4000 ppm	53
R-507a	1	0-1000 ppm	54
R-32	6	0 - 2000 ppm	100
R-404a	6	0 - 2000 ppm	101
R-134a	6	0 - 2000 ppm	102
R-125	6	0 - 2000 ppm	103
R-407a	6	0 - 2000 ppm	104
R-417a	6	0 - 2000 ppm	105
R-448a	6	0 - 2000 ppm	106
R-1234ze	6	0 - 2000 ppm	107
R-407f	6	0 - 2000 ppm	108
R-1234yf	6	0 - 2000 ppm	109
R-449a	6	0 - 2000 ppm	110
R-507	6	0 - 2000 ppm	111
Reserved	N/A	N/A	112
R-410a	6	0 - 2000 ppm	113
R-452b	6	0 - 2000 ppm	114
R-227	6	0 - 2000 ppm	115
R-22	6	0 - 2000 ppm	116
R-513a	6	0 - 2000 ppm***	117
R-422d	6	0 - 2000 ppm	118
R-1233zd	6	0 - 2000 ppm	119
R-442a	6	0 - 2000 ppm***	120
R-453a	6	0 - 2000 ppm***	121
R-427a	6	0 - 2000 ppm***	122
R-450a	6	0 - 2000 ppm***	123
R-454a	6	0 - 2000 ppm***	124
R-454c	6	0 - 2000 ppm***	125
R-455a	6	0 - 2000 ppm***	126
R-422a	6	0 - 2000 ppm***	127
R-424a	6	0 - 2000 ppm***	128
R-434a	6	0 - 2000 ppm***	129
R-438a	6	0 - 2000 ppm***	130
R-452a	6	0 - 2000 ppm***	131
R-515A	6	0 - 2000 ppm***	132
R-515B	6	0 - 2000 ppm***	133
R-134a	7	0 - 5000 ppm	200
R-442a	7	0 - 5000 ppm	201
R-453a	7	0 - 5000 ppm	202
R-1234yf	8	0 - 5000 ppm	300
R-1234ze	8	0 - 5000 ppm	301
R-32	8	0 - 10000 ppm	302
R-410a	8	0 - 10000 ppm	303
R-449a	8	0 - 5000 ppm	304
R-513a	8	0 - 5000 ppm	305
R-407c	8	0 - 5000 ppm	306
R-1234yf	9	0 - 100 %LFL	400
R-1234ze	9	0 - 100 %LFL	401
R-32	9	0 - 100 %LFL	402
R-454a	9	0 - 100 %LFL	403
R-454b	9	0 - 100 %LFL	404
R-454c	9	0 - 100 %LFL	405
R-455a	9	0 - 100 %LFL	406
R-290	10	0 - 100 %LFL	500
R-600	10	0 - 100 %LFL	501
R-600a	10	0 - 100 %LFL	502
R-1270	10	0 - 100 %LFL	503
NH ₃ (100)	11	0 - 100 ppm	600
NH ₃ (1000)	11	0 - 1000 ppm	601
NH ₃ (5000)	11	0 - 5000 ppm	602
CO ₂ (50000)	12	0 - 50000 ppm	700
LFL	13	0 - 100 %LFL***	800
CO	14	TBD***	900
H ₂	14	TBD***	901
CL ₂	14	TBD***	902
CLO ₂	14	TBD***	903
HBR	14	TBD***	904

NO ₂	14	TBD***	905
SO ₂	14	TBD***	907
SiH ₄	14	TBD***	908
HNO ₃	14	TBD***	909
ASH ₃	14	TBD***	910
B ₂ H ₆	14	TBD***	911
BCL ₃	14	TBD***	912
C ₂ H ₄	14	TBD***	913
C ₂ H ₂	14	TBD***	914
CH ₃ SH	14	TBD***	915
ETO	14	TBD***	916
F ₂	14	TBD***	917
H ₂ S	14	TBD***	918
HCL	14	TBD***	919
HCN	14	TBD***	920
NO	14	TBD***	921
O ₂	14	TBD***	922
O ₃	14	TBD***	923
PH ₃	14	TBD***	924
NH ₃	14	TBD***	925
VOC	14	TBD***	926
SF ₆	14	TBD***	927
TEOS	14	TBD***	928

*** - Later stage implementation



WARNING: Semiconductor (SC) based sensors must be used only in normal atmospheric conditions (Containing 20,9 %vol. of Oxygen).

7.3 Technical specifications

SENSOR TYPE	SC	EC	IR CO ₂	IR HFC/HFO	IR+ HFC/HFO	PEL
Typical operating range	0-1000 ppm 0-4000 ppm 0-TBD	0-TBD 0-100 ppm 0-1000 ppm 0-5000 ppm	0-10000 ppm	0-10000 ppm 0-100 %LFL	0-10000 ppm 0-100 %LFL	0-100 %LFL
Accuracy*	<-10%/+15%	±5%	±5%	±5%	±5%	+/-2% LFL
Start-up time*	5 minutes	5 minutes	2 minutes	2 minutes	2 minutes	5 minutes
Working life *	5 years	Up to 5 years	7 years	7 years	7 years	5 years
Calibration interval	12 months	12 months	Not required	Not required	Not required	6 months

POWER SUPPLY VOLTAGE **	24VDC/AC +/- 20%, 5W, 50/60Hz
USER INTERFACE	App with Bluetooth
ANALOGUE OUTPUT:	4-20mA / 0-10V / 1-5V / 2-10V selected via software
SERIAL COMMUNICATION:	Modbus RS-485 isolated slaves
DIGITAL OUTPUT 1 SPDT:	Alarm - relay 1 A/24 VDC/AC, resistive load
DIGITAL OUTPUT 2 SPDT:	Warning/FAULT - relay 1 A/24 VDC/AC, resistive load
RELAY FAILSAFE	Yes, selectable
SELECTABLE DELAY:	0-20 min; 1-minute steps, selectable via Modbus register/app
HYSTERESIS	± 10% of the threshold value
IP PROTECTION:	IP67
SENSING ELEMENT	Pre-calibrated (also available as a spare part) with certificate
REMOTE CABLE LENGTH	5 metres
STORAGE TEMPERATURE	-40 °C to +50 °C.
STORAGE HUMIDITY	5-90% relative humidity, non-condensing.
STORAGE POSITION	Any
OPERATING TEMPERATURE	-40 °C to +50 °C.
OPERATING HUMIDITY	5-90% relative humidity, non-condensing.
MAXIMUM INSTALLATION ALTITUDE	2000 metres
OPERATING POSITION	Intended for vertical mounting with the sensor at the bottom

*- Reference conditions at 25°C 50% RH atmospheric pressure 101.3 kPa

** - The device is intended to be supplied from an isolated Limited Energy Source per UL61010-1, 3rd edition cl. 9.4 or Limited Power Source per UL60950-1 or Class 2 per NEC

7.3.1 Mechanical specification

ENCLOSURE SIZE (W×H×D) (APPROX.)	Built-in: 233x175x97 mm
	Remote: 233x175x97 mm
PRODUCT WEIGHT + CASING (APPROX.)	Built-in: 590 g
	Remote: 850 g

7.4 Disposal of the device

7.4.1 Disposal of electrical and electronic equipment

Since August 2012, rules governing the disposal of electrical and electronic equipment defined in European Directive 2012/19/ EU (WEEE) and national laws, which apply to this device, have been in force throughout the European Union. Common household appliances can be disposed of via special collection and recycling sites. However, this device has not been registered for home use. Therefore, it must not be disposed of using these services. Do not hesitate to contact **SAMON** if you have any further questions on this topic.

7.4.2 Disposal of the sensors

Dispose of the sensors in accordance with local laws.



DANGER: Do not throw the sensors into fire, due to the risk of explosion and consequent chemical burns.



WARNING: Do not force open the electrochemical sensors.



WARNING: Observe local regulations regarding waste disposal. For information, contact your local environmental agency, local government offices or appropriate waste disposal services.

7.4.3 Conformity to standards

- 2014/30/EU (EMC)
- 2014/35/EU (LVD)
- F-Gas Regulation (EU) 2024/573
- EN61010-1, UL61010-1/CSA C22.2 No. 61010-1
- EN 378 (Pending)
- EN14624 (Pending)
- EN50270
- ASHRAE 15 (Pending)
- 2014/53/EU, 2022/30/EU (RED)
- FCC

8 ORDER INFORMATION

8.1 Gas Detector GLACIÄR MIDI series product numbers

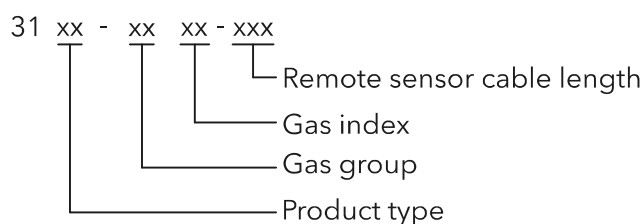
PART NUMBER #	DESCRIPTION	SENSOR	GAS	RANGE
31-210-32	GLACIÄR MIDI IR CO2 10000 ppm	IR	CO ₂	0-10000 ppm
31-510-32	GLACIÄR MIDI Remote IR CO2 10000 ppm	IR - Remote	CO ₂	0-10000 ppm
31-220-12	GLACIÄR MIDI SC HFC/HFO Group 1 1000 ppm	SC	HFC/HFO Group 1	0-1000 ppm
31-520-12	GLACIÄR MIDI Remote SC HFC/HFO Group 1 1000 ppm	SC - Remote	HFC/HFO Group 1	0-1000 ppm
31-220-17	GLACIÄR MIDI SC HFC/HFO Group 2 1000 ppm	SC	HFC/HFO Group 2	0-1000 ppm
31-520-17	GLACIÄR MIDI Remote SC HFC/HFO Group 2 1000 ppm	SC - Remote	HFC/HFO Group 2	0-1000 ppm
31-290-13	GLACIÄR MIDI SC R290 HC 4000 ppm	SC	R290 / HC	0-4000 ppm
31-590-13	GLACIÄR MIDI Remote SC R290 HC 4000 ppm	SC - Remote	R290 / HC	0-4000 ppm
31-250-22	GLACIÄR MIDI EC NH3 100ppm	EC	NH ₃	0-100 ppm
31-550-22	GLACIÄR MIDI Remote EC NH3 100 ppm	EC - Remote	NH ₃	0-100 ppm
31-250-23	GLACIÄR MIDI EC NH3 1000 ppm	EC	NH ₃	0-1000 ppm
31-550-23	GLACIÄR MIDI Remote EC NH3 1000 ppm	EC - Remote	NH ₃	0-1000 ppm
31-250-24	GLACIÄR MIDI EC NH3 5000 ppm	EC	NH ₃	0-5000 ppm
31-550-24	GLACIÄR MIDI Remote EC NH3 5000 ppm	EC - Remote	NH ₃	0-5000 ppm

- For UL listed product add "-UL" at the end of the part number

8.2 Sensor module for GLACIÄR MIDI series spare part numbers

PART NUMBER	DESCRIPTION	SENSOR	GAS	RANGE
SEN-41032	Sensor module IR CO2 10000ppm	IR	CO ₂	0-10000 ppm
SEN-41036	Sensor module IR CO2 50000ppm	IR	CO ₂	0-50000 ppm
SEN-42012	Sensor module SC HFC/HFO Group 1 1000ppm	SC	HFC/HFO Group 1	0-1000 ppm
SEN-42017	Sensor module SC HFC/HFO Group 2 1000ppm	SC	HFC/HFO Group 2	0-1000 ppm
SEN-49013	Sensor module SC R290 Group 3 4000ppm	SC	R290/HC	0-4000 ppm
SEN-45022	Sensor module EC NH3 100ppm	EC	NH ₃	0-100 ppm
SEN-45023	Sensor module EC NH3 1000ppm	EC	NH ₃	0-1000 ppm
SEN-45024	Sensor module EC NH3 5000ppm	EC	NH ₃	0-5000 ppm

8.3 Configurator: Gas Detector and spare parts for GLACIÄR MIDI series (new) product numbers



CODE	PRODUCT TYPE
01	Detector
02	Sensor module

CODE	GAS GROUP
01	HFC/HFO - High sensitivity, Semiconductive sensor - Selectable gases, ppm
02	HFC/HFO - Low sensitivity, Semiconductive sensor - Selectable gases, ppm
03	HC, Semiconductive sensor - Selectable gases, ppm
04	CO ₂ , Infrared sensor - Single gas, ppm
05	NH ₃ , EC sensor - Single gas, ppm
06	HFC/HFO, Infrared sensor IR+ - Selectable gases, ppm
07	HFC/HFO, Infrared sensor IR - Selectable gases, ppm
08	HFC/HFO, Infrared sensor IR - Single gas, ppm
09	HFC/HFO, Infrared sensor IR - Single gas, %LFL
10	HC, IR sensor IR+- Single gas, %LFL
11	NH ₃ , Long life EC sensor - Single gas, ppm
12	CO ₂ , IR sensor - Single gas, ppm
13***	Flammables, Catalytic (Pellistor) sensor, %LFL
14***	General, EC sensor - Single gas, ppm

*** - Later stage implementation

GAS GROUP	GAS INDEX	GAS	RANGE
01	00	HFC/HFO - High sensitivity ****	0 - 1000 ppm
02	00	HFC/HFO - Low sensitivity ****	0 - 1000 ppm
03	00	HC ****	0 - 4000 ppm
04	00	CO ₂	0 - 10000 ppm
05	00	NH ₃	0 - 100 ppm
05	01	NH ₃	0 - 1000 ppm
05	02	NH ₃	0 - 5000 ppm
06	00	R32****	0 - 2000 ppm
07	00	R134a ****	0 - 5000 ppm
08	00	R1234yf	0 - 5000 ppm
08	01	R1234ze	0 - 5000 ppm
08	02	R32	0 - 10000 ppm
08	03	R410a	0 - 10000 ppm
08	04	R449a	0 - 5000 ppm
08	06	R407c	0 - 5000 ppm
09	00	R1234yf	0-100 %LFL (0 - 6,2 %vol.)
09	01	R1234ze	0-100 %LFL (0 - 6,5 %vol.)
09	02	R32	0-100 %LFL (0 - 14,4 %vol.)
09	03	R454a	0-100 %LFL (0 - 6,3 %vol.)
09	04	R454b	0-100 %LFL (0 - 7,7 %vol.)
09	05	R454c	0-100 %LFL (0 - 6.2 %vol.)
09	06	R455a	0-100 %LFL (0 - 11,8 %vol.)
10	00	R290	0-100 %LFL
10	01	R600	0-100 %LFL
10	02	R600a	0-100 %LFL
10	03	R1270	0-100 %LFL
11	00	NH ₃	0 - 100 ppm
11	01	NH ₃	0 - 1000 ppm
11	02	NH ₃	0 - 5000 ppm
12	05	CO ₂ ***	0 - 50000 ppm
13	06	Flammables***	0 - 100 %LFL
14	00	CO***	0 - TBD
14	01	H ₂ ***	0 - TBD
14	02	CL ₂ ***	0 - TBD
14	03	CLO ₂ ***	0 - TBD
14	04	HBR***	0 - TBD
14	05	NO ₂ ***	0 - TBD
14	06	NH ₃ ***	0 - TBD
14	07	SO ₂ ***	0 - TBD
14	08	SIH***	0 - TBD
14	09	HNO ₃ ***	0 - TBD

*** - Later stage implementation

****- see 7.2 Gas detected for details

CODE	REMOTE SENSOR CABLE LENGTH
	Fixed detector
5m	5 meters
10m	10 meters ***
20m	20 meters ***

8.4 Accessories

	PART NUMBER	DESCRIPTION
	61-9040	GLACIÄR MIDI - Calibration kit
	62-9031	GLACIÄR MIDI - Pipe Adapter
	62-9041	GLACIÄR MIDI - Duct Adapter
	4000-0002	GLACIÄR MIDI - Power adapter
	62-9022	GLACIÄR MIDI - Delivery Protection Cap (4 pcs)
	62-9051	GLACIÄR MIDI - Magnetic Wand (pack of 5)
	6100-0002	LED sign - Refrigerant Alarm
	4120-xxx	Calibration Gas <i>For full list of cal. gases contact our sales</i>
	40-901	Protection bracket, Inner dimension L x H: 174x92mm
		Splash guard

*For more available accessories contact sales@samon.com



Manufactured by:

SAMON AB

Modemgatan 10
SE-235 39 Vellinge,
Sweden

www.samon.com