Sample draw system for wall mounting

Operation Manual
GMA200-MGSS

GMA200-M

www.GfG.biz

R1 R2 R3 R4 R5 R6 R7 R8
ON SRV FLT FLT
SRQ GMA TRM
AL1 AL2 AL3

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The original operation manual was created in German.

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Information on the operation manual

These operating instructions enable the safe and efficient handling of the sample draw system, GMA200-MGSS, for monitoring gases and vapors. It is part of the product and must be kept in the vicinity of the equipment, accessible to users at all times.

The operating instructions must be read carefully and understood before starting any work. The basic prerequisite for safe working is the observance of all specified safety notes and handling instructions. In addition, national and international safety and accident prevention regulations apply.

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List of changes

Revision	Date of issue	Change	Editing	Approval
1	26.02.2021	First edition	Mironiuk	Böttger
2	18.03.2021	Specifying adjustment times, p. 36	Mironiuk	Böttger
3	28.04.2021	Supplement to applicable documents, p. 14 warning notice on sensor specifications, p. 31	Mironiuk	Mironiuk
4	09.07.2021	Specifying adjustment times, p. 19	Mironiuk	Mironiuk
5	16.03.2022	Error corrections and clarification of wording	Mironiuk	Mironiuk

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1. Overview

The GMA200-MGSS is a sample draw system for wall mounting. It is used for sequential monitoring of a maximum of 6 measuring points for up to 3 gases or gas mixtures. Flammable gases and vapors in the range below the lower explosion limit, toxic gases and oxygen concentrations can be monitored. For this purpose, the GMA200-MGSS has an electronically controlled pump with flow monitoring and an internal sensor block for connecting up to three sensor units.

Up to 12 external transmitters and/or 4 relay modules can also be connected via the RS-485 interface.

Measured values and alarms can optionally be stored on an SD card via data logger. An alarm is indicated both visually and acoustically. In addition, the GMA200-MGSS offers 8 internal relays and a GMA bus output.

Basically, 3 versions are distinguished:

» **GMA200-MGSS/V0**
   For one measuring point without gas switching valve for applying test gas
» **GMA200-MGSS/V1**
   For one measuring point with gas switching valve for applying test gas
» **GMA200-MGSS/V2 to V6**
   For two to six measuring points with gas switching valve for applying test gas

1.1 Device Setup GMA200-MGSS

1.1.1 Housing

1   Alarm horn
2   Housing Cover
3   LC display
4   Push buttons
5   Alarm light
6   Status LEDs - internal relays
7   Status LEDs - operating states
8   Status LED - Power supply
          status (green)
9   Status LEDs - Alarms
10 Terminal and
    cable gland cover
11 Type plate with
    serial number (on the side)
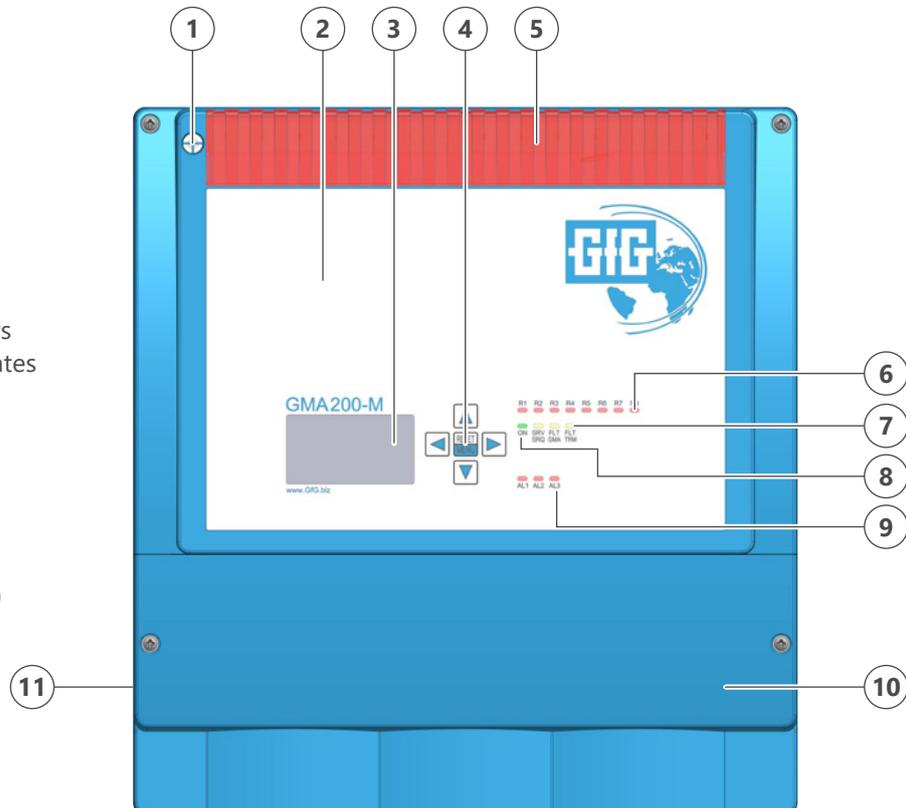
GMA200-MGSS Front

1.1.2 Housing cover

*Housing
cover - outside*

11 Alarm lights
12 Alarm horn
13 Circuit board with display
14 Ribbon cable for connection
    to the main circuit board

Housing cover - inside

1.1.3 Cover

*Cover
outside*

Cover inside with terminal assignment diagram
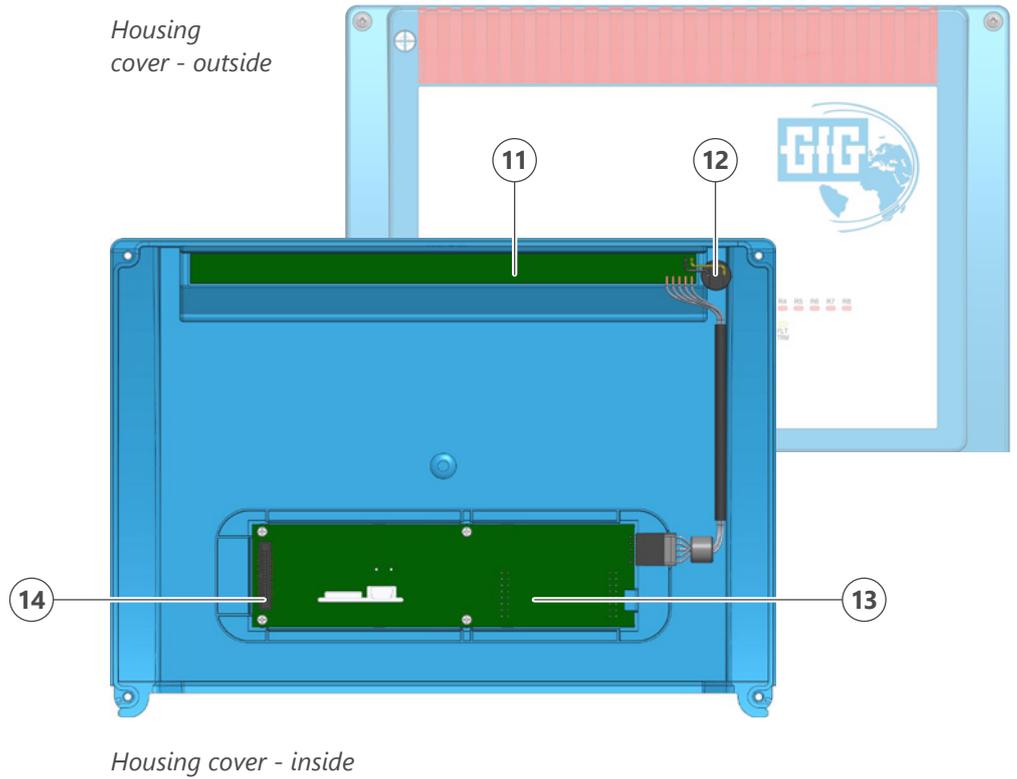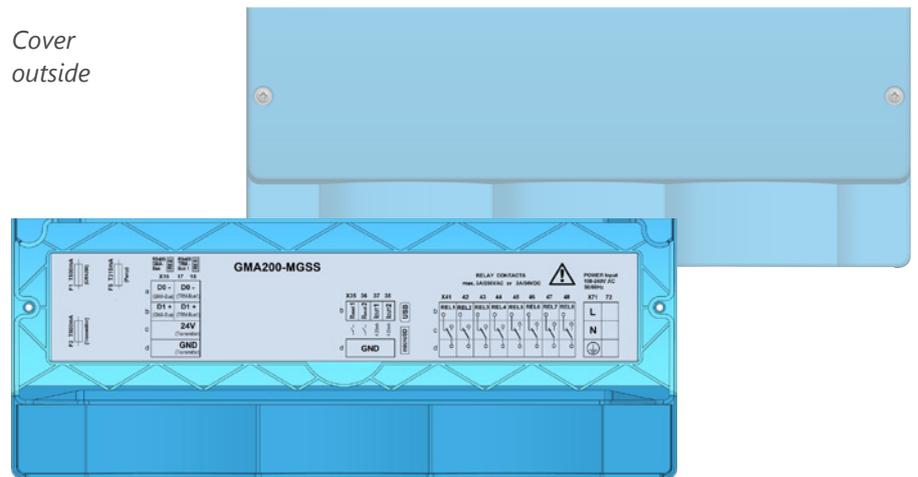
For information on the terminal assignment diagram and the possible options, refer to section *4.2 Electrical connections* (► Page 39).

1.2 GMA200-MGSS/V0

1   Diaphragm pump
2   Power Supply Unit
3   Flow sensor
4   Sensor block
5   USB port
6   Socket for microSD card
7   Gas outlet
8   Cable gland (6X)
9   Gas inlet
10 Type plate with serial number
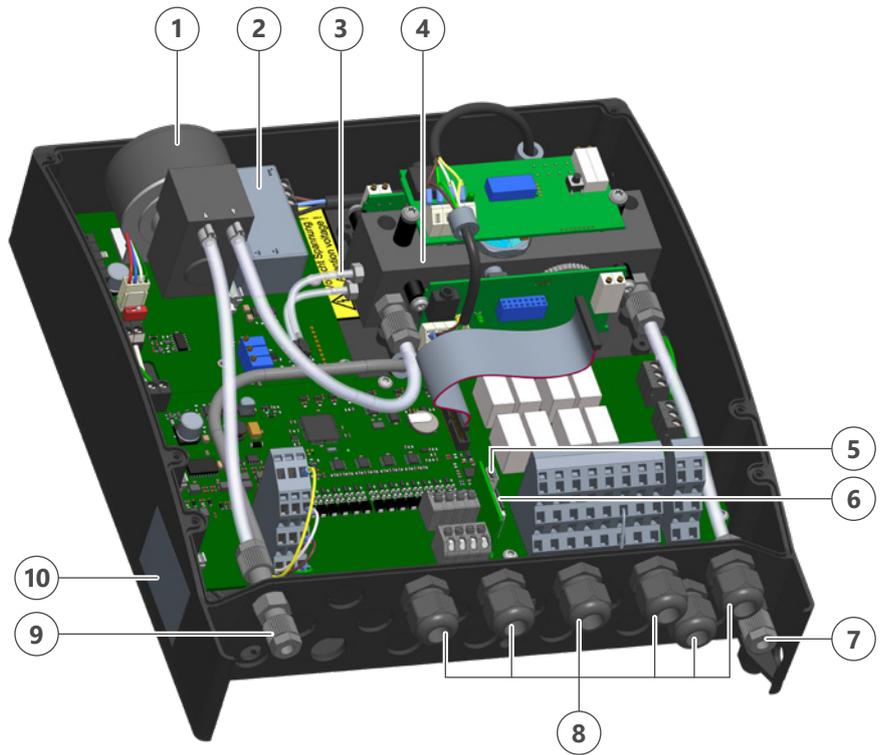
Assemblies GMA200-MGSS/V0
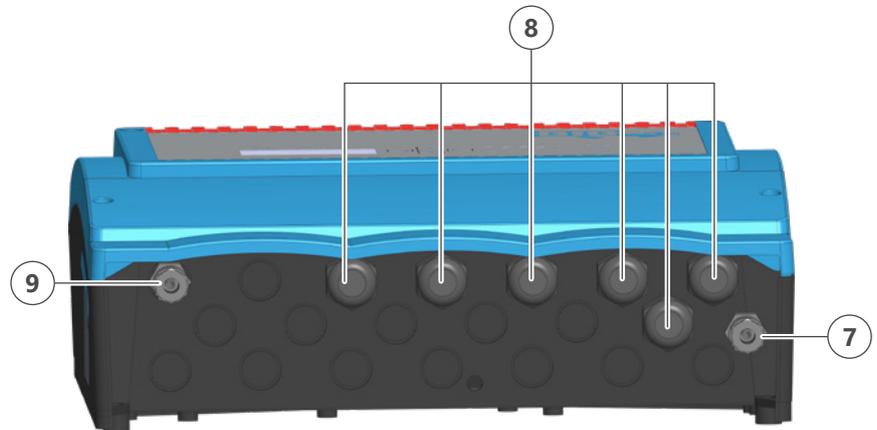
Connections GMA200-MGSS/V0

1.3 GMA200-MGSS/V1

1   Diaphragm pump
2   Switching valve
3   Power Supply Unit
4   Flow sensor
5   Sensor block
6   USB port
7   Socket for microSD card
8   Gas outlet
9   Cable gland (6X)
10 Changeover switch
    measuring gas/test gas
11 Gas inlet test gas
12 Gas inlet measuring gas
13 Type plate with serial number
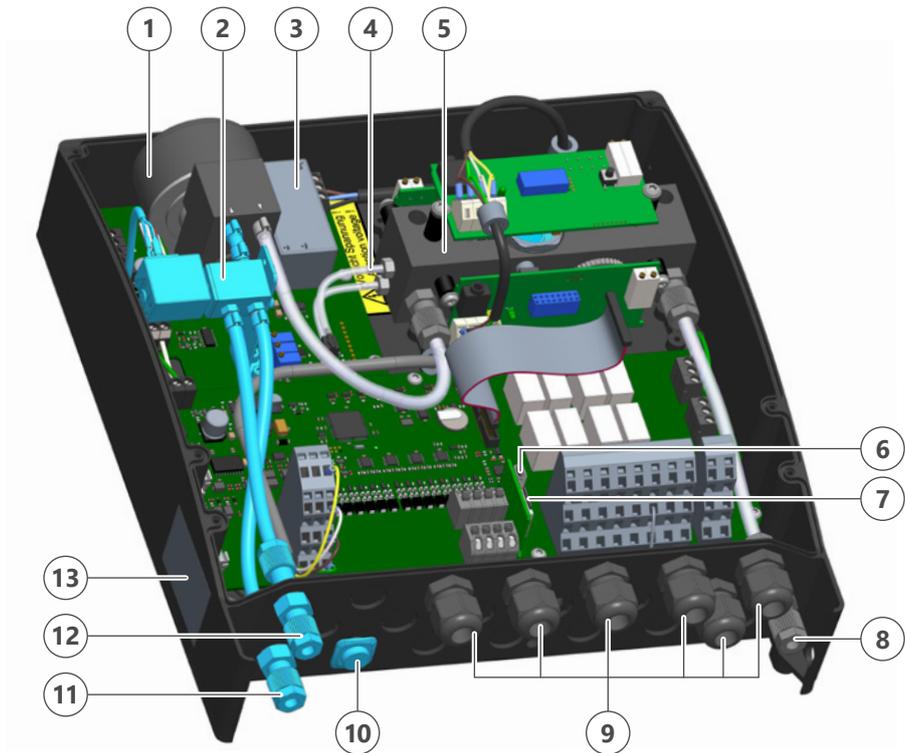
Assemblies GMA200-MGSS/V1
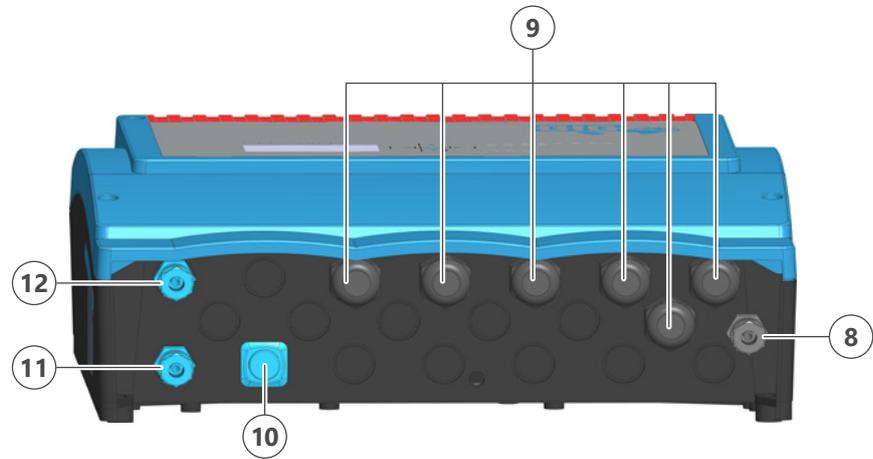
Connections GMA200-MGSS/V1

1.4 GMA200-MGSS/V2 to V6

1   Diaphragm pump
2   Switching valve
3   Power Supply Unit
4   Flow sensor
5   Sensor block
6   USB port
7   Socket for microSD card
8   Gas outlet
9   Cable gland (5x)
10 Valve block for switching
    the intake channels
11 Gas inlet test gas
12 Changeover switch
    measuring gas/test gas
13 Gas inlet measuring gas
14 Type plate with serial number
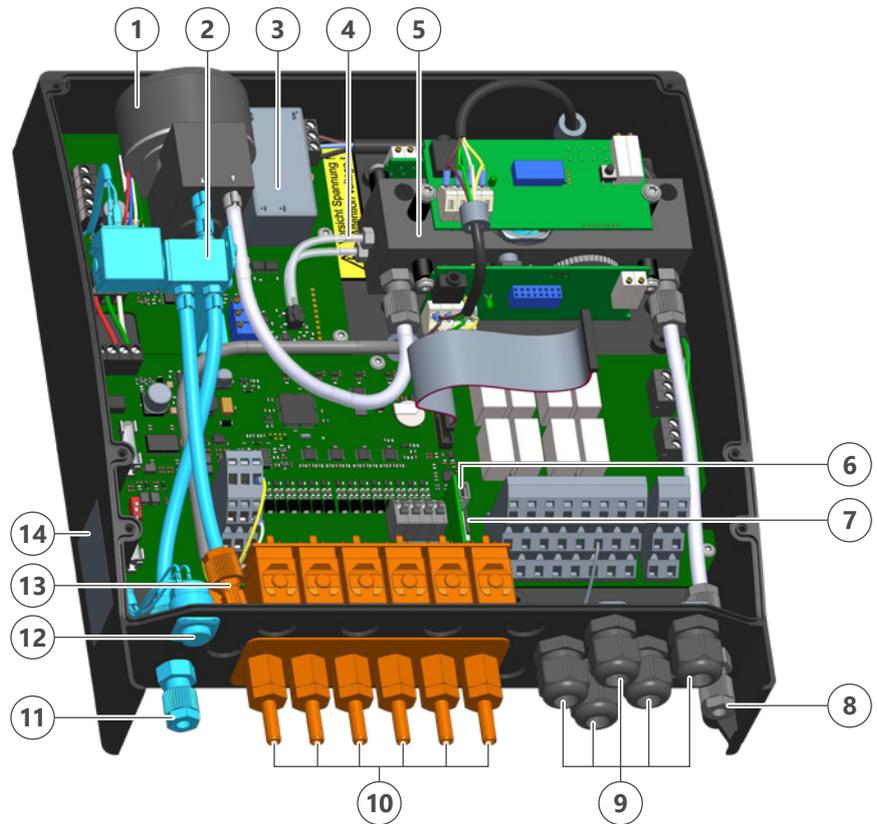
Assemblies GMA200-MGSS/V6
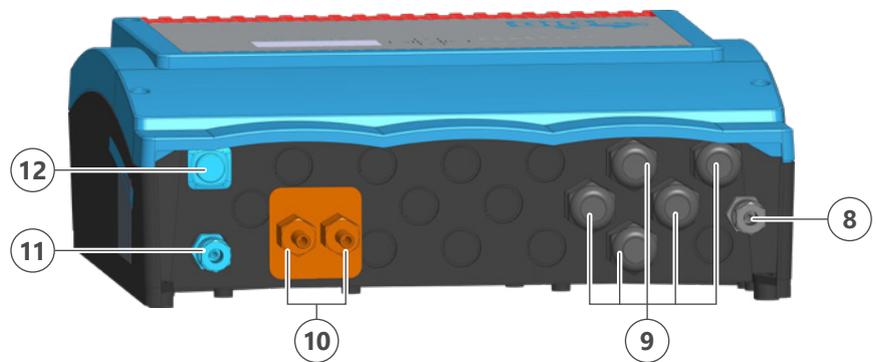
Connections GMA200-MGSS/V2
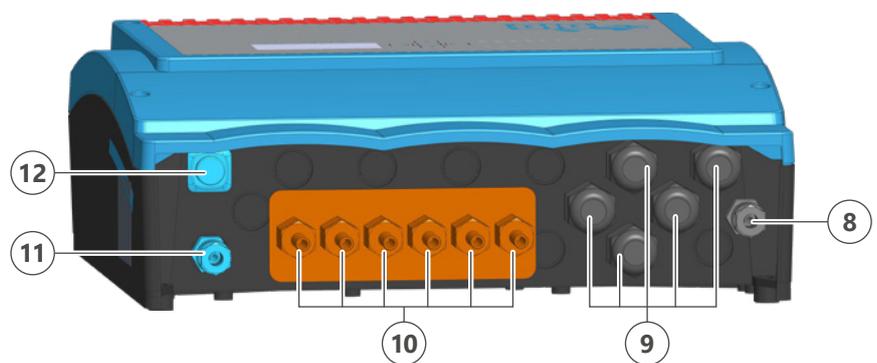
The variants V2 to V6 differ only in the number of valve block elements. Their number corresponds to the number of planned measuring points.

Connections GMA200-MGSS/V6

1.5 GMA200-MGSS – Optional components

1   Flame arrester FA30
2   Water barrier
3   Condensate separator
4   Cooling coil
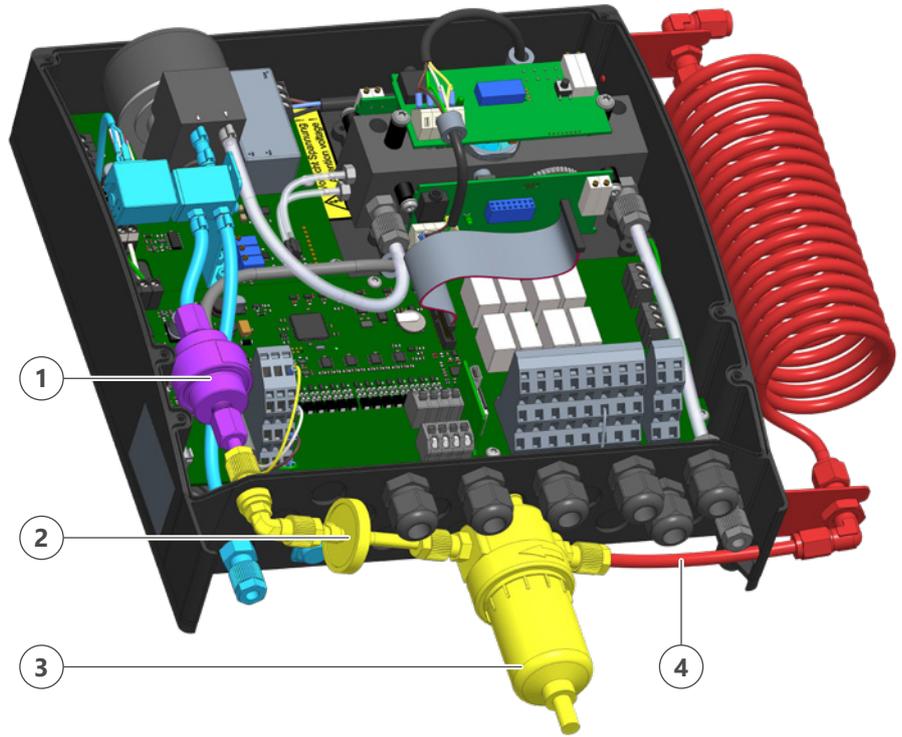
*Optional components using the example of a GMA200-MGSS/V1.
Attachment to the GMA200-MGSS/V0 accordingly.*

For the GMA200-MGSS/V2-6, the optional components are mounted outside the housing and connected to the valves of the valve block.
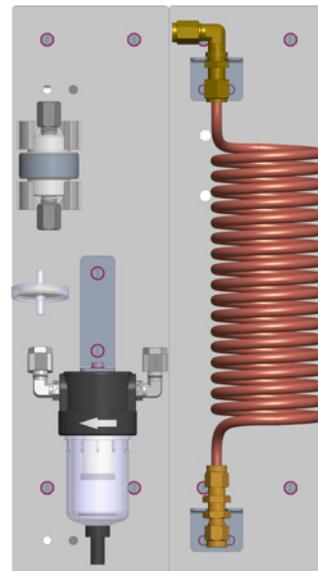
Possible arrangement of the optional accessories on the mounting plates

The illustration may differ from the supplied GMA200-MGSS. The number and arrangement of the elements depend on the number of measuring points and the gases to be monitored.

The following optional accessories are available for the GMA200-MGSS:

Zubehör	Artikelnummer
Flame arrester type FA30	2203051
Condensate separator with filter element and water barrier	2203052
Cooling coil (copper)	2203053
Cooling coil (stainless steel)	on request
Mounting plate "Multi" for DIN rail mounting	on request
Mounting bracket FA30 external	on request
Mounting plate for cooling coil	on request
Mounting plate for condensate separator	on request

Other accessories on request.

1.6 Applicable Documents

This technical document is complete in itself.

The following table lists the applicable documents. If required, GfG can provide you with further information on the product and additional editions of these documents.

» Configuration	Enclosed with the delivery
» Test report	Enclosed with the delivery
» Declaration of Conformity	In the appendix to this operation manual
» Mounting template	In the appendix to this operation manual

Depending on the system configuration:

Document number:

» nex of Operation Manual "Modbus Implementation"	222-000.46_AOM_GMA200-Modbus
» OM for the relay modules	222-000.44_OM_GMA200-RT
» OMs of the external transmitters	Depending on the respective transmitter. Included in the scope of delivery of the transmitter.

In addition, observe all relevant laws, standards and directives as well as the accident prevention and environmental protection regulations of the country in which the product is used.

If you believe that these operating instructions contain errors, contradictions or ambiguities, contact the manufacturer before using the product.

2. Safety

This operation manual contains detailed descriptions for the safe and proper installation, connection, commissioning, use, maintenance and testing of the product. It also contains safety instructions and general information about the product.

It is intended exclusively for specially trained users and authorized technical personnel.

Read this technical document carefully to familiarize yourself with the product. Pay special attention to the information in this chapter.

2.1 Manufacturer

Manufacturer of the product is:

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If required, GfG can provide you with further information on the product and additional editions of these documents

2.2 Disclaimer

All information and notes in this technical document have been compiled taking into account the applicable standards and regulations, the state of the art and our many years of knowledge and experience.

The manufacturer assumes no liability for damage due to:

» the use of unauthorized accessories
» the use of non-approved spare parts
» technical modifications
» failure to comply with these instructions
» use not in accordance with the intended purpose
» unauthorized modification
» operation by employees without appropriate training or specialist knowledge

The obligations agreed in the delivery contract, the general terms and conditions and delivery conditions of the manufacturer as well as the legal regulations valid at the time of the conclusion of the contract shall apply.

2.3 Subject to alterations

The information contained in this technical document corresponds to the technical specifications released at the time of publication. Changes will be taken into account in a new edition of the operation manual.

Composition of the document number:

232-000.40_OM_GMA200-MGSS_EN_v5

Version
Language
Product name
Document type
Key number
Project number
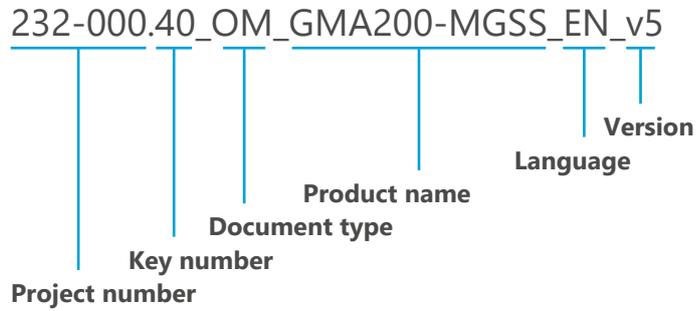
2.4 Place of storage

This technical document and any other applicable documents must be kept ready to hand and accessible at all times for later use.

2.5 Symbols in this manual

Safety instructions are identified by symbols in this manual. The safety instructions are introduced by a signal word expressing the extent of the hazard.

DANGER

Specific designation of the type of hazard
Behavior to avoid danger

This combination of symbol and signal word indicates an **imminently** hazardous situation which, if not avoided, will result in **death or serious injury**.

WARNING

Specific designation of the type of hazard
Behavior to avoid danger

This combination of symbol and signal word indicates a **potentially** hazardous situation which, if not avoided, could result in **death or serious injury**.

CAUTION

Specific designation of the type of hazard
Behavior to avoid danger

This combination of symbol and signal word indicates a **potentially** hazardous situation which, if not avoided, may result in **minor or moderate injury**.

ATTENTION

Specific designation of the type of hazard
Behavior to avoid danger

This combination of symbol and signal word indicates a **possibly** hazardous situation which, if not avoided, may result in **property damage**.

2.6 Safety information in handling instructions

Safety instructions may refer to individual instructions for action. Such safety instructions are embedded in the action instruction so that they do not interrupt the flow of reading while performing the action. The previously described signal words are used.

Example:

The SD card must be removed to read out the data.

ATTENTION

Possible loss of data and/or corrupted files
Stop data recording before removing the SD card

» Press RESET/MENU for 3 s. This will take you to the main menu
» Scroll down, to the menu item Status Data Logger
» Confirm the selection with RESET/MENU
» Stop REC is shown in the center of the bottom line of the display.
   Stop the recording by pressing the RESET/MENU key.

2.7 Warning signs used

The following warning signs are used in safety instructions to draw attention to particular hazards:

Warning sign	Type of danger
⚠️	General warning sign
⚡	Warning of dangerous electrical voltage
🔥	Fire hazard

Tips and recommendations

ℹ️	This symbol highlights useful tips and recommendations as well as information for efficient and trouble-free operation.
📖	Reference to another chapter in this document.

2.8 Other markings

The following paragraphs provide an overview of the spelling and abbreviations used in these operating instructions.

2.8.1 General Spellings

Within this document, certain information is highlighted by special notations to ensure better readability.

Notation	Usage	Example
VERSALIA	Hardware operating element	ON/OFF switch
Underlined	Software operating element	Press Next button
[Bracket]	Keyboard key	[ctrl] + [alt]
Bold	System message	**Alarm1** limit value exceeded
Text > Text	Menu path	Parameter > Control parameter
(► page page number)	Cross reference	(► page 23)
1. Text 1 2. Text 2	Step by step instruction	1. Pull out mains plug 2. Remove the housing cover. For this...
» ...	Enumeration without order	

2.8.2 Definitions of terms

Listed below are some definitions of terms used in these operating instructions:

» **Measuring gas:** The gas or gas mixture to be monitored. It usually consists of air, the target gas and other components. In the case of the GMA200-MGSS, it enters the measuring chamber of the sensor block from the measuring point(s) via the pump. When external transmitters are connected, it usually reaches their sensor by diffusion.

» **Target gas:** Gaseous substance to be detected in the measuring gas and to be warned of its presence.

» **Zero gas:** Test gas that contains neither the target gas nor interfering impurities.

» **Test gas:** Gas mixture of known composition used for calibration and adjustmentof gas detection devices.

» **Replacement test gas:** Gas/air mixture used as a substitute for a difficult-to-handle test gas.

» **Interfering gas:** A gas that causes the sensor to react even if the target gas is not present, or that falsifies the measurement result when target gas is present.

» **Cross-sensitivity:** It represents the sensitivity of a measuring device to quantities other than the measurand.

» **Calibration:** Comparison of the displayed result of a gas detector / sensor with a known test gas concentration without adjusting.
Depending on the degree of deviation detected:
    - the device can continue to be operated within the permissible deviation from the setpoint
    - the device must be adjusted
    - the device must be repaired

» **Adjustment:** Adjustments of the zero point and sensitivity of the gas detector / sensor with a known zero gas or test gas.
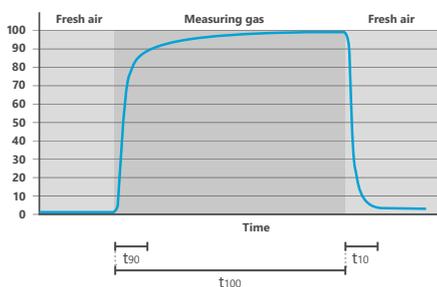
» **Adjustment time:** The adjustment time t_{100} is the time span required by a measuring device to react to a sudden change in the value of the measurand with a corresponding change in the measuring signal.
The change of the measuring signal itself is not rapid, but runs in the form of a logarithmic curve, i.e. becoming flatter with time. The shorter the setting time, the faster e.g. a transmitter will display the true concentration of a gas.

Since it takes a disproportionately long time to settle to the last 10 % accuracy both when rising and when falling, intermediate values such as t_{90}, t_{50} or, in the case of decreasing gas concentration, t_{10} , are much more important. They provide significantly better response times with sufficient accuracy.

For detailed information on the adjustment times of the sensors for the GMA200-MGSS, see *Chapter 3.9.5 > Sensor specification* (► page 31).

2.8.3 Abbreviations and SI units

In this document, abbreviations are shown and used in the same way as they are shown in the display of the GMA200-MGSS for reasons of space. SI units are used according to international guidelines.

2.9 Intended Use

The GMA200-MGSS is a sample draw system for indoor wall mounting. This also includes mounting in appropriately suitable control cabinets.

It is used for sequential monitoring of a maximum of 6 measuring points for up to 3 gases or gas mixtures. In addition, up to 12 external transmitters can be connected via the RS-485 interface

The GMA200-MGSS may function as a fully-fledged stand-alone solution, as it can provide both visual and audible alarms on site. The internal relays and the possibility of connecting external GMA200-RT and GMA200-RTD series relay modules open up further options.

When used as intended and in Attention with the prerequisites and conditions specified in this technical document and the warnings given in this technical document and on the product, the product does not pose any risk to persons, property or the environment. This applies throughout the entire service life, from delivery, assembly and operation to dismantling and disposal.

Adjustments in service mode may only be carried out by professionally qualified personnel.

Any use beyond the intended use or any other use is considered misuse.

2.10 Due diligence of the operator

In order to avoid accidents, malfunctions and inadmissible impairment of the environment, the persons responsible for installation, operation, maintenance and disposal must ensure the following:

» All safety warnings and hazard warnings must be observed
» The employees are instructed with regard to occupational safety and the use of the product, in particular the safety instructions listed in the operation manual.
» Regulations, operating instructions for safe work as well as the instructions for the behavior of the personnel in case of alarms must be kept ready to hand at all times and, if necessary, posted on the premises
» The product is onlyoperatedin perfect, functional condition
» The prescribed inspection intervals and maintenance cycles areadhered to complied
» Only spare parts and auxiliary materials approved by the manufacturer are used
» The specified operating conditions and requirements for the installation site are observed
» Installation, connection to the electrical system and commissioning of the product are carried out exclusively by qualified, trained personnel.

The operator must ensure that the product is used as intended.

3. Functional design

3.1 Push button interface and displays
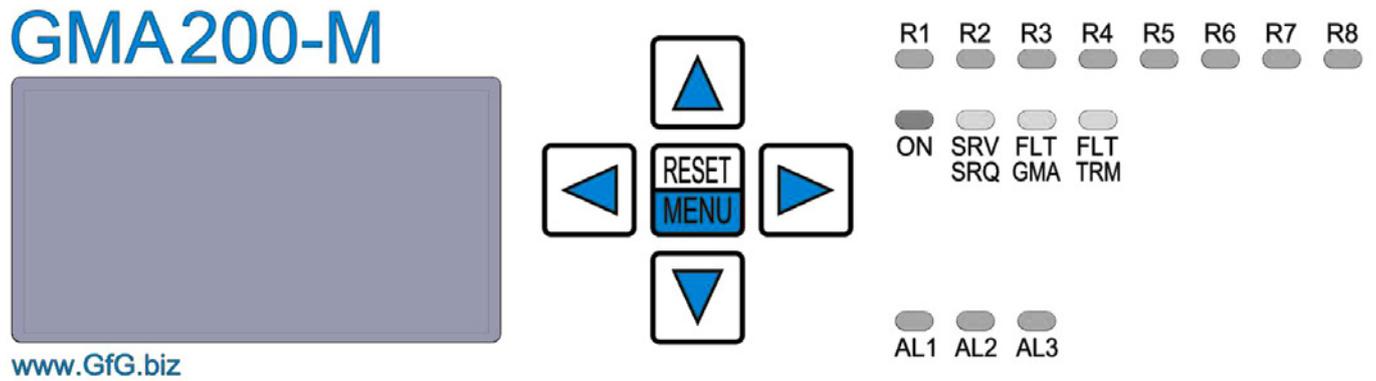
Located on the front of the GMA200-MGSS are:

- » the LC display
- » Status LEDs of the internal relays
- » Status LEDs of the operating states
- » Status LEDs of the alarms
- » 5 push buttons
  Alarm acknowledgement and selection button RESET/MENU
  4 control buttons with arrows (up, down, right, left)

3.1.1 Push button interface
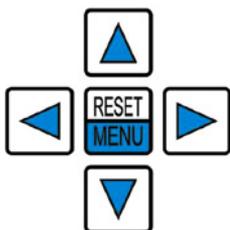
In measuring mode, use the push buttons to call up different displays of the measured values or to return to the overview. The RESET/MENU button is used for alarm acknowledgement and to call up the main menu.

Use the push buttons in the main menu and in the service menu to navigate through the menus or to make changes to settings. For more information, see *Section 5.1 > Push button and operation* (► Page 43)

3.1.2 Status LEDs
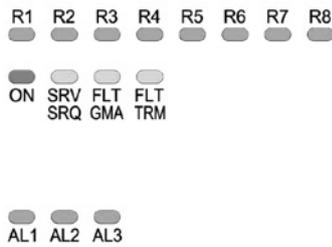
Status LEDs of the internal relays

The topmost LEDs, labeled "R1" to "R8", are the status LEDs of the internal relays. These are labeled accordingly as Relay 1 to Relay 8. In normal operation, the LEDs are off. In the event of an alarm or fault, the corresponding LED lights up red.

"R1"-"R8"   (red)   Lights up when a relay is switched due to an alarm or fault.

Status LEDs of the operating states

The 4 status LEDs "ON", "SRV/SRQ", "FLT/GMA", "FLT/TRM" signal the operating status of the GMA200-MGSS.

"ON"   (green) Lights up when power is supplied to the device.
"SRV/SRQ" (gelb)   Lights up continuously when the device is in service mode.
                       Flashes when service is due for the GMA200-MGSS.
"FLT/GMA" (gelb)   Lights up continuously when there is a fault in the GMA.
"FLT/TRM" (gelb)   Lights up continuously when there is a fault on a
                       sensor unit or transmitter.

Status LEDs of the alarms

The 3 status LEDs for alarms are used to indicate different alarm thresholds when exceeding or falling below limit values.

"AL1"   (red)   Flashes when the alarm threshold Alarm 1 is exceeded.
"AL2"   (red)   Flashes when the alarm threshold Alarm 2 is exceeded.
"AL3"   (red)   Flashes when the alarm threshold Alarm 3 is exceeded.
"AL1", "AL2", "AL3" are continuously lit when the alarm has been acknowledged.

For a non-latching alarm, if an alarm is triggered, the corresponding alarm LED will continue to flash until the alarm condition is no longer met. The alarm is then automatically reset.

An alarm can be acknowledged by pressing the RESET/MENU button or an optional external switch. If the alarm condition for an alarm is still fulfilled after acknowledgement, the flashing of the LED changes to continuous light.

If another alarm is subsequently triggered by another measuring point, the corresponding alarm LED starts flashing again.

It also activates the integrated visual and audible alarms. Exact information about the level of the gas concentration that triggered the alarm is highlighted on the LC display during the alarm.

3.1.3 LC display
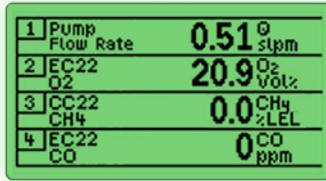
Active = with displayed values

The 2.2" LC display is backlit in green during normal operation. Press any push button to make the display backlight brighter. It is automatically dimmed again after 60 seconds.

In case of an alarm, the backlight changes to red. The measured value that triggered the alarm is displayed inverted.
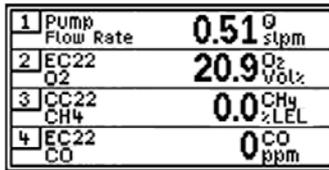
In measuring mode, the display shows the measuring points with numbers, designations and the current measured values.
A maximum of 8 measuring points are displayed simultaneously. If more than 8 sensor units or transmitters are connected to the GMA, the displayed measuring points change every few seconds.
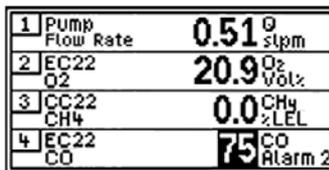
In the event of an alarm, the display automatically switches to the alarm display. The current measured value is displayed inverted.
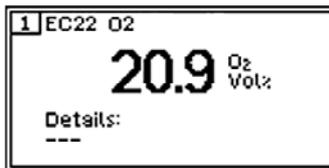
Use the push buttons UP, DOWN, RIGHT, LEFT to switch between the different detail views.

The GMA200-MGSS treats the internal flow sensor of the pump like another measuring point. You can view the pumping capacity and set alarm thresholds to be alerted in case of clogging.
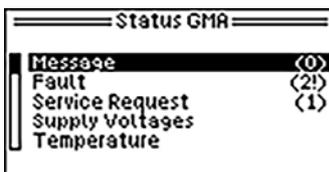
Press the RESET/MENU key longer to switch to the main menu. This also works during an alarm.
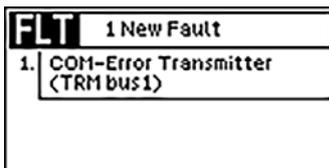
At Main Menu > GMA Status you can even after acknowledging with RESET/MENU access the following information:

» Fault (FLT),
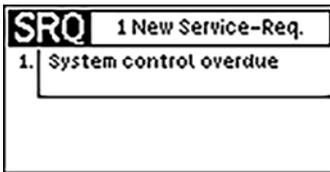
» Service Requests (SRQ) and
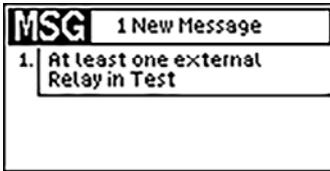
» other messages (MSG)

3.2 Visual and audible alarm

Integrated into the housing of the GMA200-MGSS are an alarm light and a horn for local visual and audible alarms. They are activated when the limits defined in the alarm configuration are exceeded or undershot, respectively.

The horn can be assigned to specific alarm functions and measuring points like an internal relay by means of the GMA200Config software.

For more information on configuring the various alarms, see the section *5.2.2.1 Configuring the alarms* (► Page 45)

3.3 USB port and microSD slot
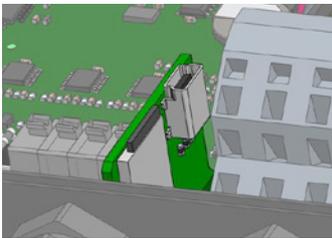
The GMA200-MGSS has a USB port and a slot for a microSD card on the motherboard. These are located to the left of the relay terminal block.

The USB port is used exclusively as an interface for configuration. The GMA200-MGSS can be connected to a PC or laptop via USB cable. This allows it to be configured for a wide variety of measurement tasks using the GMA200Config software.

The microSD slot is designed for normal microSD cards with a capacity of up to 2 GB. This memory card can be used as a data logger if the GMA200-MGSS features the option.

For more information on configuring the data logger, see section *5.5.2 Service menu > Data logger* (► page 66).

3.4 RS-485 digital interfaces

The GMA200-MGSS has 2 digital RS-485 interfaces. Up to 12 GfG transmitters with digital RS-485 interfaces and up to 4 external relay modules GMA200-RT or GMA200-RTD can be connected to one of these interfaces, the TRM-Bus1.

These external relay modules can likewise be connected to the second RS-485 interface, the GMA bus. Alternatively, the GMA bus can also be used to transmit the measurement data, alarm statuses and other status information to another device on request. Such a device can be a higher-level control unit, a PLC, a gateway or a panel PC for visualization of the measurement data.

The descriptions of the connections of the two RS-485 interfaces can be found in section *4.2 Electrical connections* (➤ page 39).

3.5 Relay

3.5.1 Internal relays

The GMA200-MGSS has a total of 8 internal relays, each with a floating changeover contact. For the implementation of defined protective measures and for alarming, 6 relays are freely configurable by means of the GMA200Config software.

In addition, there is a relay for fault messages and a relay for maintenance messages. For more information about the internal relays, refer to section *5.4.5 Main menu > Info Relays* (➤ Page 61).

If the internal relays are not sufficient, additional external relay modules can be used.

3.5.2 External relay modules

The relay modules GMA200-RT and GMA200-RTD allow the expansion of gas detection systems by 16 additional freely configurable relays with one floating changeover contact each.

A maximum of 4 relay modules can be managed via one GMA200-MGSS. They will be connected via the RS-485 interface. The relay modules can be up to 1200 m away from the GMA200-MGSS.

Data transmission to the external relay modules typically takes place with a cycle time of 1.0 s. In case of short-term disturbances of the data transmissions, the reaction time of the relay module may be extended to <4 s.

If the data transmission to the relay module is disturbed for a longer period of time, a fault is displayed on the GMA200-MGSS after the third consecutive faulty data transmission.

The relay modules are not part of these operation manual. For further information, please refer to the GMA200-RT/RTD operating manual (222-000.44_OM_GMA200-RT).

3.5.3 Configuration of the relays

The internal and external relays are configured exclusively via the GMA200Config software. It offers extensive options to assign the relays to the alarm functions and measuring points or measured value groups.

Configuration options:
- » Open-circuit current principle / closed-circuit current principle
- » Individual alarms per measuring point and alarm limit value
- » Collective or group alarms
- » Fault messages
- » Configuration of And/Or links
- » Voting functions (e.g. 2 out of 3 measuring points)

3.6 External alarm acknowledgement

Alarms can be acknowledged by pressing the RESET/MENU button. In addition, up to 2 external buttons can be connected to acknowledge alarms of individual measuring points or measuring point groups.

The GMA200Config software is used to assign the measuring points to the acknowledgement inputs. For a description of the connections of the alarm acknowledgement inputs, refer to section *4.2.5 Use of the alarm acknowledgement inputs (Reset1+2)* (➤ Page 42).

3.7 Analog outputs

The GMA200-MGSS also has 2 analog 4-20 mA outputs, at which the measured values of 2 measuring points can be output. These analog signals can be easily processed by higher-level control systems, since the measured values are already linearized.

Which measuring point is assigned to which analog output can be set in the service menu of the GMA or by means of the GMA200Config software. For descriptions of the connections of the analog outputs, see section *4.2.6 Use of the 4-20 mA current outputs* (➤ page 42).

Below is listed which output current corresponds to which GMA state.

Output current	States in measuring mode and special states
approx. 0,0 mA	no active measuring point assigned
approx. 0,0 mA	GMA in start-up phase
approx. 0,0 mA	GMA fault (affecting the measured value acquisition of the measuring points)
1,0 mA (für 5 s)	Measuring point assignment changed within the last 5 s (self-recovering)
1,2 mA	Fault at the assigned measuring point
1,6 mA	Start-up of the assigned measuring point
2,0 mA	GMA in configuration mode (maintenance)
2,4 mA	Maintenance at the assigned measuring point
2,8 mA	Measured value ≤ -7.5 % of the measuring range (if clamping* is not active)
2,8 to 4,0 mA	Measured value ≤ 0 % of the measuring range (if clamping* is not active)
4,0 mA	Measured value ≤ 0 % of the measuring range (if clamping* is active)
4,0 to 20(22) mA	Measured value 0 to 100(112.5) % of the measuring range
22,0 mA	Measured value ≥ 112.5 % of the measuring range
manual specification	Test mode active (maintenance)

* Clamping prevents the output current from becoming < 4 mA in measuring mode for measured values below the measuring range. Otherwise, problems may occur in interaction with PLCs. The setting whether clamping is active or not is made by means of the GMA200Config software.

3.8 Using a memory card as a data logger

As an option, the GMA200-MGSS can be equipped with a data logger for storing the measured values. A normal microSD card with a capacity of up to 2 GB serves as storage medium. The memory card must be formatted to FAT(FAT16).

The slot for the memory card is located on the circuit board of the GMA200-MGSS, to the left of the terminal block. For more information about operating the data logger, refer to section *5.4.2 Service menu > Data logger* (► page 59).

3.9 Sensor block

3.9.1 Description
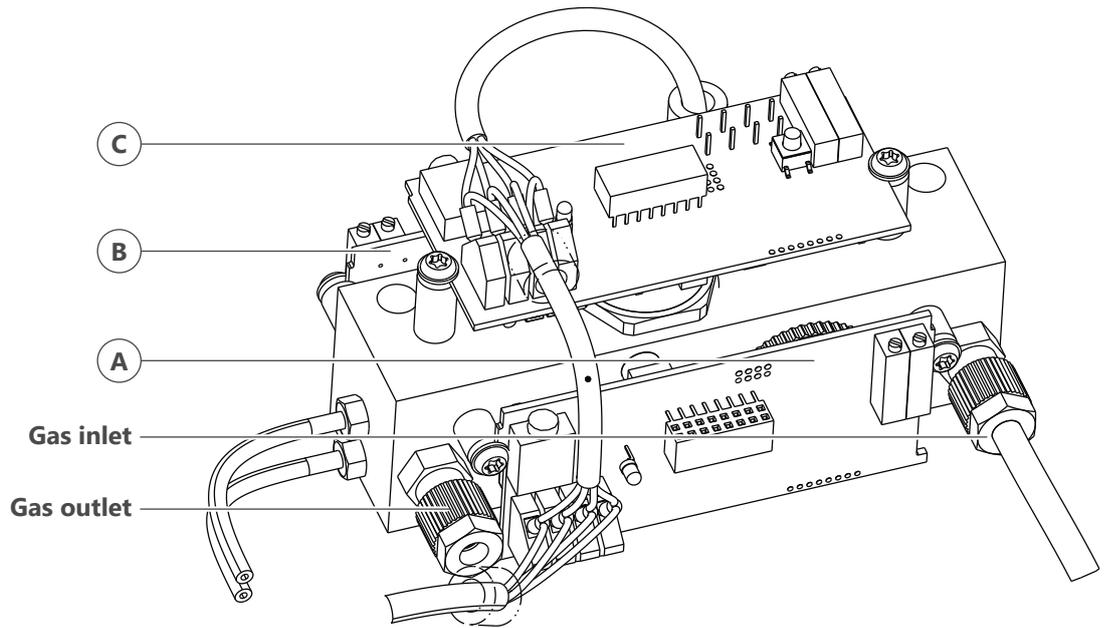
The GMA200-MGSS has an internal sensor block. This sensor block is configured at the factory according to the specifications at the time of ordering and is delivered fully assembled.

The core of the sensor block is a common measuring chamber for connecting up to 3 sensor units. It also features one inlet and one outlet port for the gas to be monitored, as well as two ports for the flow sensor.

The flow sensor monitors the air flow generated by the pump. The flow rate in measuring mode is 0.5 slpm (standard liters per minute). The measurement results of the flow sensor can be treated as a normal transmitter measurement value and shown as a separate measuring point in the display.

Up to 3 internal sensor units, consisting of a sensor and its electronics for recording measured values, can be connected to the measuring chamber. Depending on the gas to be monitored, the sensors use different measuring principles. Electrochemical sensors (EC), infrared sensors (IR) and catalytic combustion sensors (CC) are available.

Not all sensor units can be connected to every opening.
Below is an overview:

Measuring principle	Connectable to opening	Maximum number
Electrochemical	A, B	2
Infrared	A, B	2
Catalytic combustion	C	1

Openings to which no sensor unit is connected are sealed gas-tight with a blanking plug.

3.9.2 Sensor units

The sensor system of the GMA200-MGSS can consist of up to 3 sensor units. It is tested for function and correct readout before delivery.

The sensor block can accommodate up to 2 electrochemical and/or infrared sensors plus one catalytic combustion sensor.

Calibration is performed with appropriate test gases. However, depending on transport, assembly and ambient conditions, deviations may arise. For this reason, the gas detection system must be commissioned and tested for function by a qualified person.

After power on, the transmitter needs 1-2 minutes for:
» a self-test during which the program memory and RAM are checked
» reading and evaluation of the device parameters including a simultaneous memory check
» eading and evaluation of the sensor parameters including a simultaneous memory check
» the stabilising of the sensor

During the startup phase, the memory tests are performed within the first few seconds and the display of the GMA200-MGSS reads "Startup".

If a device error is detected during the startup phase, the affected sensor element switches to fault operation. The display then shows an error message (see *section 5.3ff* ► page 50) Displaying special states and malfunctions). The yellow fault LED lights up continuously.

3.9.3 Available sensor units

The following sensor units (consisting of sensor and singal processing electronics) are available for the GMA200-MGSS:

Gas	MK no.	Measuring range	Measuring principle*	Item number
CH_4 (methane)	MK217-2	0 to 100 % LEL	CC	2203060
HC (hydrocarbons)	MK91-1	0 to 100 % LEL	CC	2203061
O_2 (oxygen)	MK465-0	0 to 25 vol%	EC	2203062
CO (carbon monoxide)	MK443-0	0 to 500 ppm	EC	2203063
H_2S (hydrogen sulfide)	MK445-0	0 to 100 ppm	EC	2203064
NH_3 (ammonia)	MK453-0	0 to 500 ppm	EC	2203068
SO_2 (sulfur dioxide)	MK440-0	0 to 20 ppm	EC	2203070
CO_2 (carbon dioxide)	MK250-0	0 to 5 vol%	IR	2203066
CH_4 (methane)	MK254-0	0 to 100 % LEL	IR	2203067
C_3H_8 (propane)	MK253-0	0 to 100 % LEL	IR	2203072

* CC = Catalytic Combustion, EC = Electrochemical, IR = Infrared

Other gases and measuring ranges on request.

3.9.4 Particularity of the catalytic combustion sensor

A significant exceeding of the measuring range of more than 12 % will result in sensor units with catalytic combustion sensor being de-energized for safety reasons. This is done because firstly there is a risk of explosion and secondly the measured value would become smaller again at higher concentrations (ambiguity).

> ⚠️ **WARNING**
>
> **A The catalytic combustion sensor is switched off if the measuring range is exceeded by more than 12 %!**
> It must be switched on again manually. Only when it has been ensured that no more combustible gas is present at the measuring point may this state be terminated by pressing the acknowledgement button.

Acknowledgement button
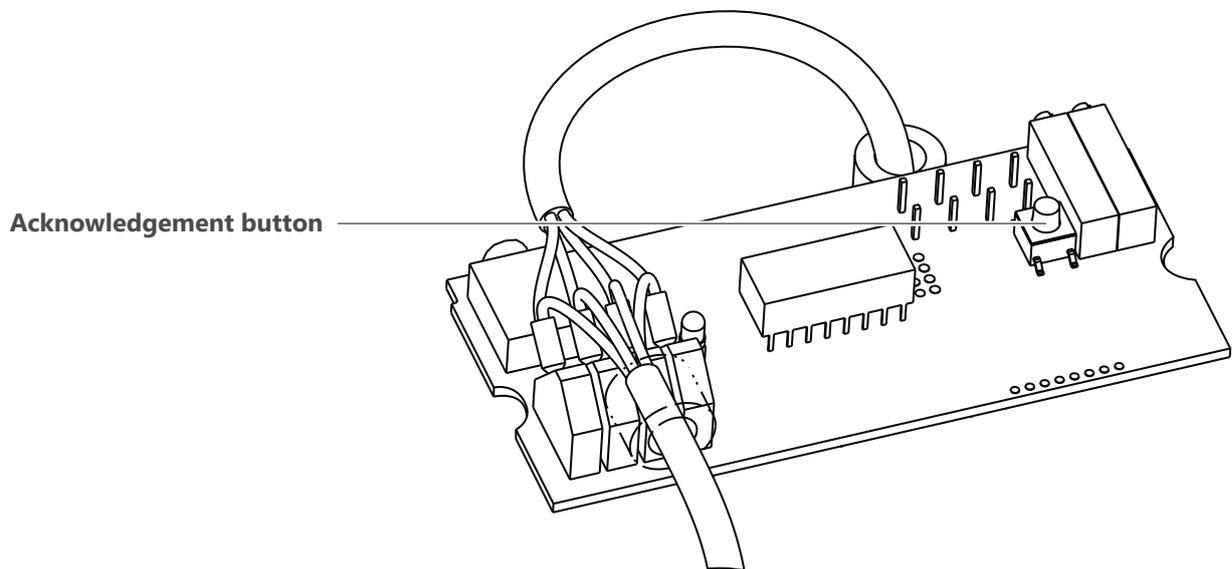
To do so, remove the cover and the housing lid and briefly press the acknowledgement button on the circuit board.

3.9.5 Sensor specifications

⚠️ **ATTENTION**

For the parameters pressure, humidity and temperature, the larger specified value applies to <u>all</u> sensors.

Catalytic combustion sensors

MK91-1 Catalytic combustion sensor for combustible gases and vapours

Measuring range / Resolution	0 to 100 % LEL / 0.5 % LEL	or 0 to 4 vol% NH_3 / 0.05 vol% NH_3
Adjustment time t_{50}:	≤ 5 s (CH_4). ≤ 5 s (C_3H_8) *1	with windscreen: ≤ 8 s (CH_4). ≤ 8 s (C_3H_8) *1
t_{90}:	≤ 9 s (CH_4). ≤ 10 s (C_3H_8) *1	with windscreen: ≤ 15 s (CH_4). ≤ 17 s (C_3H_8) *1
Pressure 80 to 110 kPa:	max. ±3 % of the measuring range or	±7 % of the displayed value (regarding 100 kPa) *3
Humidity 5 % to 90 % RH:	max. ±5 % of the measuring range or	±10 % of the displayed value (regarding 50 % RH and 40 °C) *3
Temperature -25 to +55 °C:	max. ±5 % of the measuring range or	±15 % of the displayed value (regarding 20 °C) *3

Cross-sensitivity factors	Methane – measuring range *2		Propane – measuring range *2		Nonane – measuring range *2	
at 50 % LEL:	2.20 vol% CH_4:	= 100 %	0.85 vol% C_3H_8:	= 100 %	0.35 vol% C_9H_{20}:	= 100 %
	2.00 vol% H_2:	approx. 131 %	2.00 vol% H_2:	approx. 160 %	2.00 vol% H_2:	approx. 328 %
	1.25 vol% C_3H_6O:	approx. 97 %	1.25 vol% C_3H_6O:	approx. 111 %	1.25 vol% C_3H_6O:	approx. 231 %
	1.15 vol% C_2H_4:	approx. 96 %	2.20 vol% CH_4:	approx. 107 %	2.20 vol% CH_4:	approx. 224 %
	0.85 vol% C_3H_8:	approx. 96 %	1.15 vol% C_2H_4:	approx. 101 %	1.15 vol% C_2H_4:	approx. 213 %
	1.10 vol% $C_4H_8O_2$:	approx. 92 %	1.10 vol% $C_4H_8O_2$:	approx. 95 %	0.85 vol% C_3H_8:	approx. 210 %
	1.00 vol% C_3H_8O:	approx. 87 %	1.00 vol% C_3H_8O:	approx. 93 %	1.10 vol% $C_4H_8O_2$:	approx. 201 %
	0.85 vol% $C_4H_{10}O$:	approx. 87 %	0.85 vol% $C_4H_{10}O$:	approx. 87 %	1.00 vol% C_3H_8O:	approx. 193 %
	0.50 vol% C_6H_{14}:	approx. 74 %	0.50 vol% C_6H_{14}:	approx. 69 %	0.85 vol% $C_4H_{10}O$:	approx. 180 %
	0.55 vol% C_7H_8:	approx. 72 %	0.55 vol% C_7H_8:	approx. 67 %	0.50 vol% C_6H_{14}:	approx. 143 %
	0.35 vol% C_9H_{20}:	approx. 57 %	0.35 vol% C_9H_{20}:	approx. 49 %	0.55 vol% C_7H_8:	approx. 132 %
at 2 vol% NH_3:	2.00 vol% NH_3:	approx. 57 %	2.00 vol% NH_3:	approx. 49 %	2.00 vol% NH_3:	approx. 100 %

Specifics:	This sensor is not suitable for measuring hydrogen and for use in an environment containing hydrogen. The sensor reacts to hydrogen, of course, but with this gas it is only suitable for alarm purposes. In case of continuous gassing with hydrogen, a steadily increasing signal has to be expected.
Expected lifetime:	5 years

MK217-2 Catalytic combustion sensor for combustible gases and vapours

Measuring range / Resolution	0 to 100 % LEL / 0.5 % LEL	
Adjustment time t_{50}:	≤ 5 s (CH_4). ≤ 7 s (C_3H_8) *1	with windscreen: ≤ 9 s (CH_4). ≤ 9 s (C_3H_8) *1
t_{90}:	≤ 10 s (CH_4). ≤ 12 s (C_3H_8) *1	with windscreen: ≤ 18 s (CH_4). ≤ 21 s (C_3H_8) *1
Pressure 80 to 110 kPa:	max. ±3 % of the measuring range or	±7 % of the displayed value (regarding 100 kPa) *3
Humidity 5 % to 90 % r.F.:	max. ±5 % of the measuring range or	±10 % of the displayed value (regarding 50 % RH and 40 °C) *3
Temperature -10 to +40 °C:	max. ±5 % of the measuring range or	±15 % of the displayed value (regarding 20 °C) *3

Cross-sensitivity factors	Methane – measuring range *2		Propane – measuring range *2		Nonane – measuring range *2	
at 50 % LEL:	2.20 vol% CH_4:	= 100 %	0.85 vol% C_3H_8:	= 100 %	2.00 vol% H_2:	= 100 %
	2.00 vol% H_2:	approx. 115 %	2.00 vol% H_2:	approx. 188 %	2.20 vol% CH_4:	approx. 86 %
	0.85 vol% C_3H_8:	approx. 65 %	2.20 vol% CH_4:	approx. 162 %	0.85 vol% C_3H_8:	approx. 53 %

Specifics:	If the sensor was exposed to a gas concentration that was significantly above 100 % LEL, the zero point and the sensitivity of the sensor must be checked after this concentration has decayed.
Expected lifetime:	5 years

---

*1:   For other gases, especially for nonane, longer adjustment times apply.

*2:   Cross sensitivities can vary significantly from sensor to sensor and depend on the gas concentration as well as the age of the sensor. Other combustible gases not listed here will also cause the displayed value to increase.

*3:   This specification applies to methane and propane.

Electrochemical sensors

MK440-0 Electrochemical sensor for sulfur dioxide SO_2	
Measuring ranges: Resolution / Tolerance: Adjustment time:	0 to 10 / 20 / 50 / 100 ppm 0.1 ppm / ±0.2 ppm t_{50} < 10 s t_{90} < 30 s
Pressure 80 to 120 kPa: Humidity 15 % to 90 % RH: Temperature -20 to +50 °C:	max. ±0.2 ppm or ±5 % of the displayed value (regarding 100 kPa) max. ±0.3 ppm or ±3 % of the displayed value (regarding 50 % RH @ 20 °C) max. ±0.3 ppm or ±5 % of the displayed value (regarding 20 °C)
Cross sensitivities: Expected lifetime:	C_2H_2 < 300 %; NO_2 < -170 %; C_2H_4 < 90 %; HCN < 50 %; Cl_2 < -40 %; NO < 10 %; H_2S < 0.4 %; CO < 0.4 %; H_2 < 0.3 %; NH_3 = 0 %; (*4) 3 years in air

MK443-0 Electrochemical sensor for carbon monoxide CO	
Measuring ranges: Resolution / Tolerance: Adjustment time:	0 to 200 / 300 / 500 / 1000 / 1500 / 2000 ppm 1 ppm / ±3 ppm t_{90} < 30 s (at 20 °C)
Pressure 80 to 120 kPa: Humidity 15 % to 90 % RH: Temperature -20 to +55 °C:	max. ±3 ppm or ±5 % of the displayed value (regarding 100 kPa) max. ±3 ppm or ±2 % of the displayed value (regarding 50 % RH @ 20 °C) max. ±3(5) ppm or ±7(10) % of the displayed value (regarding 20 °C)
Cross sensitivities: Expected lifetime:	C_2H_4 ≈ 96 %. C_2H_2 ≈ 90 %. H_2 < 30 % (typ.15 %). NO < 20 %. Cl_2 < 7 %. C_2H_6O ≈ 0.5 %. SO_2 = NH_3 = H_2S = 0 % (*4) 3 years in air

MK445-0 Electrochemical sensor for hydrogen sulfide H_2S	
Measuring ranges: Resolution / Tolerance: Adjustment time:	0 to 30 / 50 / 100 / 200 / 300 / 500 ppm 0.1 ppm / ±0.3 ppm t_{90} < 30 s (at 20 °C)
Pressure 80 to 120 kPa: Humidity 15 % to 90 % RH: Temperature -20 to +50 °C:	max. ±1 ppm or ±7 % of the displayed value (regarding 100 kPa) max. ±1 ppm or ±7 % of the displayed value (regarding 50 % RH @ 20 °C) max. ±1 ppm or ±7 % of the displayed value (regarding 20 °C)
Cross sensitivities: Expected lifetime:	NO_2 < 10 %. CO < 2 %. NO < 1 %. CO_2 = SO_2 = Cl_2 = NH_3 = C_2H_4 = 0 % (*4) low methanol cross sensitivity 3 years in air

MK453-0 Electrochemical sensor for ammonia NH_3	
Measuring ranges: Resolution / Tolerance: Adjustment time:	0 to 100 / 200 / 300 / 400 / 500 ppm 1 ppm / ±3 ppm t_{90} < 45 s (at 20 °C)
Pressure 80 to 120 kPa: Humidity 15 % to 90 % RH: Temperature (-20)-10 to +50 °C:	max. ±1 ppm or ±10 % of the displayed value (regarding 100 kPa) max. ±1 ppm or ±10 % of the displayed value (regarding 50 % RH @ 20 °C) max. ±1(2) ppm or ±15(20) % of the displayed value (regarding 20 °C)
Cross sensitivities: Expected lifetime:	H_2S ≈ 120 %. NO_2 ≈ -100 %. SO_2 ≈ -30 %. CO = NO = CO_2 = H_2 = C_2H_6O = 0 % (*4) 2 to 3 years in air

MK465-0 Electrochemical sensor for oxygen O_2

Measuring ranges: Resolution / Tolerance: Adjustment time:	0 to 25 vol% 0.1 vol% / ±0.3 vol% t_{20} < 5 s t_{90} < 15s (at 20 °C)
Pressure 80 to 120 kPa: Humidity 5 % to 95 % RH: Temperature -20 to +50 °C:	max. ±0.3 vol% or ±2.5 % of the measuring range (regarding 100 kPa) max. ±0.3 vol% or ±2.5 % of the measuring range (regarding 50 % RH @ 20 °C) max. ±0.4 vol% or ±3.0 % of the displayed value (regarding 20 °C)
Expected lifetime:	3 years in air

*4: Displayed gas concentration with reference to the applied concentration in the range of threshold limit values (TLV).

Infrared sensors

MK250-0 Infrared sensor for carbon dioxide CO_2

Measuring ranges: Resolution: Tolerance band: Adjustment time:	0.00 to 5.00 vol% 0.01 vol% ±0.00 vol% t_{50} < 25 s t_{90} < 50 s t_{10} < 50 s
Pressure 70 to 130 kPa: Humidity 0 % to 95 % RH: Temperature -25 to +50 °C: Long-term stability per month:	<1.6 % of the displayed value per 1 % change in pressure (regarding 100 kPa) max. ±0.01 vol% or ±2 % of the displayed value (regarding 50 % RH @ 20 °C) max. ±0.02 vol% or ±10(15) % of the displayed value (regarding 20 °C) max. ±0.01 vol% or ±2 % of the displayed value (under laboratory conditions)
Expected lifetime:	> 5 years

MK253-0 Infrared sensor for propane C_3H_8

Measuring ranges: Resolution: Tolerance band: Adjustment time:	0.0 to 100.0 % LEL or 0.00 … 2.00 vol% C_3H_8 0.2 % LEL or 0.01 vol% ±1.0 % LEL or ±0.02 vol% t_{50} < 25 s t_{90} < 50 s
Pressure 70 to 130 kPa: Humidity 0% to 95 % RH: Temperature -25 to +50 °C:	<1.2 % of the displayed value per 1 % change in pressure (regarding 100 kPa) max. ±2.0 % LEL or ±15 % of the displayed value (regarding 0 % RH @ 40 °C) max. ±2.0 % LEL or ±10(15) % of the displayed value (regarding 20 °C)
Expected lifetime:	> 5 years

MK254-0 Infrared sensor for methane CH_4

Measuring ranges: Resolution: Tolerance band: Adjustment time:	0.0 to 100.0 % LEL or 0.00 to 5.00 vol% CH_4 0.2 % LEL or 0.01 vol% ±1.0 % LEL or ±0.05 vol% t_{50} < 25 s t_{90} < 50 s
Pressure 70 to 130 kPa: Humidity 0 % to 95 % RH: Temperature -25 to +50 °C:	<1.5 % of the displayed value per 1 % change in pressure (regarding 100 kPa) max. ±2.0 % LEL oder ±15 % of the displayed value (regarding 0 % RH @ 40 °C) max. ±2.0 % LEL oder ±10(15) % of the displayed value (regarding 20 °C)
Querempfindlichkeiten @ 50% LEL:	1.20 vol% C_2H_6 → >125 % LEL (5.5 vol%) 0.55 vol% C_5H_{12} → approx. 55 % LEL (2.5 vol%) 0.85 vol% C_3H_8 → approx. 90 % LEL (4.0 vol%) 2.20 vol% CH_4 → = 50 % LEL 1.55 vol% C_2H_6O → approx. 80 % LEL (3.5 vol%) 0.50 vol% C_6H_{14} → approx. 45 % LEL (2.0 vol%) 0.70 vol% C_4H_{10} → approx. 65 % LEL (2.9 vol%) 1.15 vol% C_2H_4 → approx. 20 % LEL (0.9 vol%) They may vary from sensor to sensor and depend on the gas concentration.
Expected lifetime:	> 5 years

> ⚠️ **ATTENTION**
>
> **Possible deviations in the measured values**
> The initial commissioning of the GMA200-MGSS requires a calibration and, if necessary, an adjustment of the zero points (ZERO) and the sensitivities (SPAN) after the adjustment time of the installed sensors.

3.9.6 External transmitters

Up to 12 external transmitters can be connected to the GMA200-MGSS via transmitter bus 1.

📖 For installation and commissioning observe the operation manual of the respective transmitter and the appendix to the operation manual GMA200-MT/-MW "Modbus implementation".

3.10 Functional unit pump, power supply and flow sensor

Within the GMA200-MGSS/V0, the power supply unit, the controlled diaphragm pump and the flow monitoring system form one functional unit. In the event of a defect, they can only be replaced together.

Versions V1 to V6 also have a switching valve that can be used to switch from sample gas supply to calibration gas supply.

📖 Not shown here, the round switch in the bottom of the case. It can be seen in the illustrations of the connections of the GMA200-MGSS/V1 (► page 10) and GMA200-MGSS/V6 (► page 11).
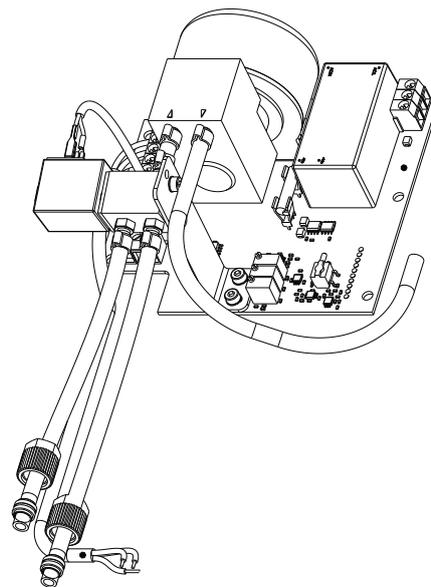
Version GMA200-MGSS/V1-6   *Version GMA200-MGSS/V0*
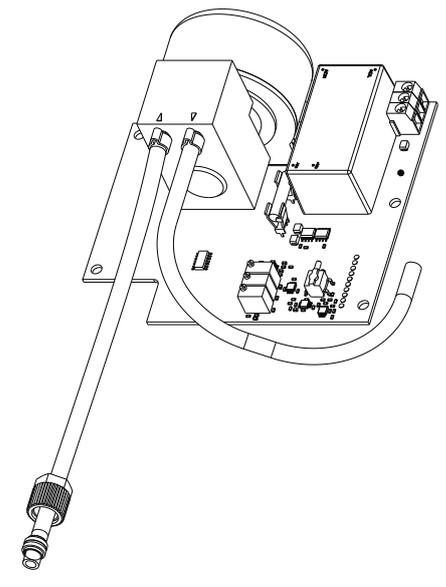
3.10.1 Power Supply Unit

The GMA200-MGSS has a soldered 20 W / 24 V miniature power supply (52.4 x 27.2 x 24 mm) in AC-DC module design. This product allows a universal input voltage range of UAC = 100 to 240 V. The flame retardant plastic housing and fully potted silicone provide improved heat dissipation and meet vibration resistance requirements up to 2 G. In addition, it provides basic resistance to dust and moisture.

Its efficiency is up to 85 % and the extremely low no-load power consumption of less than 0.1 W meets the global regulation for low power consumption of electronic devices.

3.10.2 Pump

The GMA200-MGSS has a regulated, 24 V diaphragm pump with flow monitoring. The maximum operating pressure is 1400 kPa.
Similar to the alarm thresholds for gas measurement, limit values can be set for the pump capacity to indicate insufficient sample gas throughput.

3.10.3 Flow sensor

The flow sensor continuously monitors the gas flow. Its measuring range is 0 to 1.35 slpm (standard liters per minute), where a value of 0 means that the pump is off. The specified pumping rate of the GMA200-MGSS is 0.5 slpm.

The signal of the flow sensor is output via a 4-20 mA interface and can be shown in the display of the GMA like any other sensor value. The usual factory setting is to display the flow rate as measuring point 1 (Pump Flow).

The 3 alarm thresholds are freely configurable via the GMA200Config software and can be configured for both too low and too high pump capacity.

3.10.4 Time control, suction paths and adjustment times

The GMA200-MGSS/V0 and GMA200-MGSS/V1 versions do not require any time control, since the sample gas always comes from the same measuring point, which is continuously monitored.

For the versions GMA200-MGSS/V2 to GMA200-MGSS/V6, on the other hand, it is necessary to calculate the pumping time for each measuring point to ensure that the sensor units also have sufficient time to monitor the actual gas concentration.
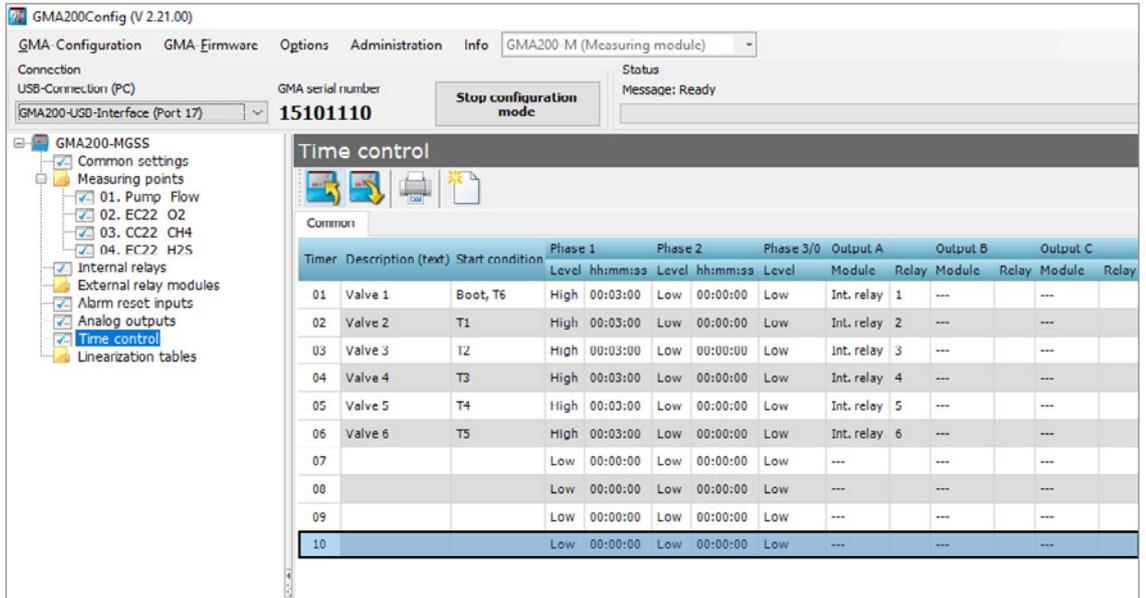
The t_{90} response time of the sensor at 0.5 slmp flow rate plus the time required for suction from the respective suction point is decisive.

Influencing variables:
t_{90} response time of the CO sensor MK433*:
* other sensors deviating

starting at test gas inlet	15 s
equipped with condensate separatorv	24 s
equipped with condensate separator and cooling coil	31 s
	+
per 10 m PE hose (4 mm inside diameter)	17 s

Example:
GMA200-MGSS with condensate separator,
cooling coil and 70 m suction hose: 31 s + (7 x 17 s) = 150 s

> ⚠️ **ATTENTION**
>
> **Determine times for each suction process during commissioning!**
> The figures are approximate values based on many years of experience. The exact time for the suction process must be determined for each measuring point during commissioning by means of a test gas application at the measuring point and the system must than be configured accordingly. The measured times must be documented.

Accordingly, the time interval must be entered under hh:mm:ss in the menu item Time control of the GMA200Config software. The circulation time for all suction points is the sum of the times for the individual suction points.

3.10.5 Switching valve

The versions GMA200-MGSS/V1 to GMA200-MGSS/V6 are equipped with a changeover valve for easier switching from sample gas to test gas. For the GMA200-MGSS/V0, the hose at the sample gas inlet must be loosened and the hose of the test gas container must be connected.

The relay configuration for 1 measuring gas input plus 1 test gas input is done in the GMA200Config software. Switching from sample gas to test gas is then done with the changeover switch on the bottom of the GMA housing.
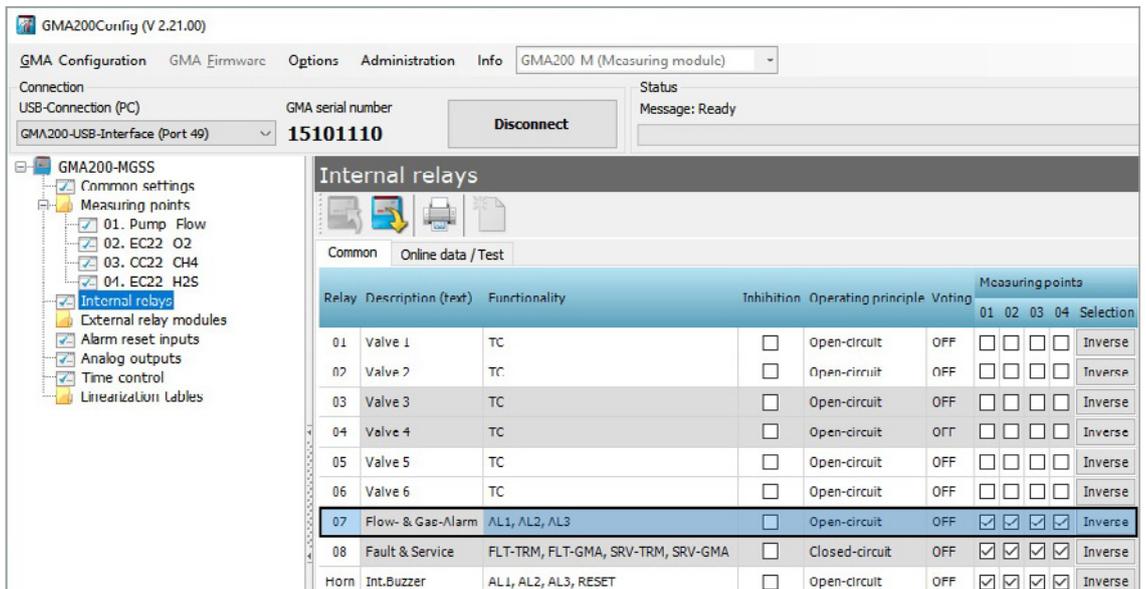
Regardless of whether test gas container is attached or not, the pump then draws in gas via the test gas inlet. If measuring point 1 is configured for the flow sensor, the information in the display changes to service mode. The yellow LED "SRV/SRQ" lights up continuously, the red LED of the service relay R7 lights up continuously and the display no longer shows the flow rate for the measuring point, but **--- SRV**.

After calibration or adjustment has been completed, the operating switch must be actuated again to allow the GMA200-MGSS to draw in gas again via the sample gas inlet.

3.11 Accessories (optional)

Complementary accessories are available for the GMA200-MGSS to easily adapt it to a wide range of application scenarios. Depending on the version of the GMA200-MGSS, the accessories can be mounted in, on or next to the GMA.

Accessories	Item number
Flame arrester type FA30	2203051
Condensate separator with filter element and water barrier	2203052
Cooling coil (copper)	2203053
Cooling coil (stainless steel)	on request
Mounting plate "Multi" for DIN rail mounting	on request
Mounting bracket FA30 external	on request
Mounting plate for cooling coil	on request
Mounting plate for condensate separator	on request

Other accessories on request.

4. Mounting and installation

4.1 Mounting location and housing installation

The GMA200-MGSS is designed for indoor wall mounting. This also includes mounting in appropriately suitable control cabinets.

⚠️ **WARNING**

The devices must not be mounted in Ex zones
In the event that gas is drawn from a hazardous area into a nonhazardous area, a flame arrester FA30 must be installed!

⚠️ **ATTENTION**

Defect due to mechanical vibrations
Mount the GMA200-MGSS in such a way that it is not exposed to mechanical vibrations.

⚠️ **WARNING**

Danger due to electric shock
Only work on the device when it is free of mains voltage. Before starting work, switch off all power supplies and secure them against being switched on again.

Mount the GMA200-MGSS horizontally with the connections facing downwards. A mounting template can be found in the appendix of these operating instructions (Appendix A).

The housing is fastened with 4 pan-head screws. The diameter must be 4 to 5 mm. The diameter of the screw head must be 7 to 9.5 mm and have a flat bearing surface. If necessary, use washers.

The two upper screws must be screwed into the wall so far that there is still a gap of 3 to 4 mm for latching the housing.

The two lower screws must be tightened to a torque of approx. 1 Nm above the screw-in torque.

4.2 Electrical connections

The connection of the power supply, pump, sensor block, external pushbuttons and external transmitters is made according to the terminal assignment diagram located on the inside of the cover.
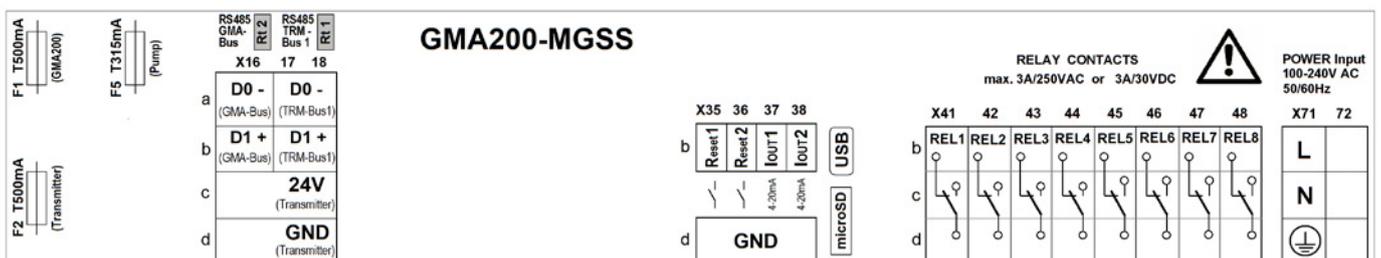
4.2.1 Safety note

> **⚠ DANGER**
>
> **Danger due to electric shock**
> The electrical installation must always be carried out in compliance with DIN VDE 0100 or the corresponding national standard.
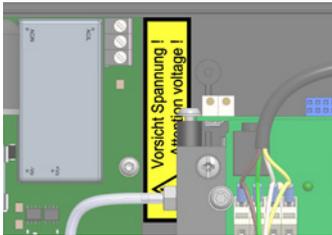
Cables with AC voltages that are dangerous to touch, e.g. 230 V, and cables with non-dangerous DC voltages, e.g. 24 V, must be laid separately from each other. The cables used must be suitable for the intended purpose.

If the cover and the housing cover of the GMA200-MGSS have to be removed or lifted during operation due to maintenance work, be aware that dangerous voltages may be present in the area of the relay connection terminals X41-48, in the area of the mains connection terminal X71 and terminals 5, 6 and 7 (PE, N, L). Do not touch these areas!

These areas are specially marked with warning stickers.

4.2.2 Mains connection and disconnecting device

> **⚠ DANGER**
>
> **Danger due to electric voltage**
> If the GMA200-MGSS is supplied with mains voltage, it is mandatory to install a disconnecting device.

If the GMA200-MGSS is supplied with mains voltage (UAC=100 to 240 V) via the Clamp X71, a "disconnecting device" must be provided in the supply line. This separator must:

- » comply with the requirements of IEC60947-1 and IEC60947-3
- » be clearly marked as a disconnecting device of the GMA200-MGSS
- » be permanently freely accessible

The mains supply line must have a conductor cross-section of at least 0.75 mm^2 and be protected with an appropriate overcurrent protection device. The protective conductor must have at least the same cross-section as the L and N conductors and is connected to terminal X71d, the terminal marked with the protective conductor symbol.

4.2.3 Floating relay contacts

⚠️ **DANGER**

Gefahr durch elektrische Spannung

If the GMA200-MGSS is supplied with mains voltage, it is mandatory to install a disconnecting device.

Additional external warning devices such as warning lights, acoustic signal devices or similar can be connected to terminals X41-48 (contacts of relays 1-8). The contacts of the adjacent relays 1&2, 3&4, 5&6 as well as 7&8 may only be operated with the same voltage category.

Voltages dangerous to touch (e.g. UAC=30 V) and protective extra-low voltages (e.g. UDC=24 V) must not be connected together to these adjacent relays.

4.2.4 Connection of transmitters with digital interface (RS-485)

Transmitters with digital interface can be connected to terminals X17-18 (TRM bus1). Four connection terminals (GND, 24V, DO-, D1+) are available for the transmitter bus.

However, the total current consumption of all connected transmitters must not exceed 2.4 A. For detailed information, please refer to the operation manuals of the connected transmitters. The wire cross-section to be used depends on the current consumption of the transmitters and the length of the cable.

There are two red slide switches on the motherboard located behind the terminals X17 and X18. They can be used to connect a 120 Ohm terminating resistor for each of the bus connections when the GMA is connected to the end of the line (factory setting: TRM bus1=ON; GMA bus=OFF). The bus assignment of these slide switches can be found on the label on the inside of the cover.

4.2.5 Use of the alarm acknowledgement inputs (Reset1+2)

There are two freely configurable alarm acknowledgement inputs (Reset1, Reset2) at terminals X35b and X36b for the connection of external pushbuttons. If the reset input is configured accordingly, the alarm is acknowledged on an edge change in the direction of GND.

For details on the functionality, refer to section *5.4.7.3 Main menu > Test > Test ext. AL-Reset* (► page 64).
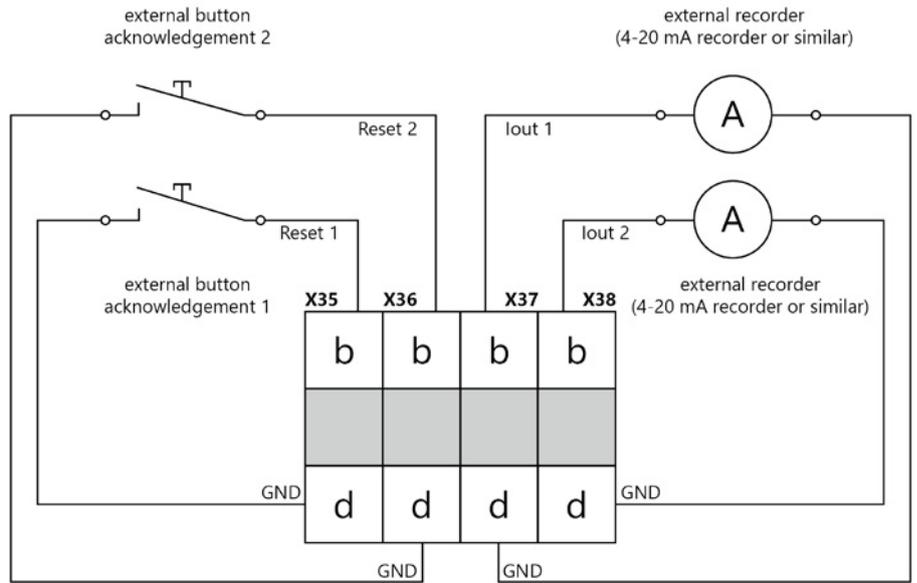
4.2.6 Use of 4-20 mA current outputs

Two freely configurable 4-20 mA current outputs (Iout1, Iout2) are located at terminals X37b and X38b (see Fig. above). External recording devices or recorders can be connected to these outputs against GND.

4.3 Commissioning

After completion of the assembly of the GMA200-MGSS with all extensions and hoses, any external transmitters as well as all additional control modules and after the power supply has been ensured, commissioning can be carried out.

In accordance with national regulations, gas warning devices must be tested for function by a competent person after installation but before measurement operation is started (initial commissioning). Applicable e.g. in Germany are "DGUV Information 213-056 (Leaflet T 021 Section 8.1)" and "DGUV Information 213-057 (Leaflet T 023 Section 8.1)". Observe the applicable standards and regulations at the place of installation!

5. Notes on operation

5.1 Keypad and operation

The GMA200-MGSS has 5 push button interface:

▶	◀	▲	▼	RESET MENU
RIGHT	LEFT	UP	DOWN	RESET/MENU

In measuring mode and after calling up the main menu or the service menu, these buttons have the following functions:

Use the UP and DOWN buttons to move up and down in the menus.
When entering characters, scroll forward or backward through the available characters.
When entering values, scroll up or down through the possible values.

Use the RIGHT and LEFT buttons to move one detail level lower or higher.
When entering characters, jump to the next or previous entry point.
When entering values, jump to the next or previous entry point.

The RESET/MENU button has the following functions depending on the operating state and menu:

Operating status	Action	Function
Measuring mode	press for 3 s	activates the main menu
Alarm	press	acknowledges latching alarms silences the audible alarm for non-latching alarms
Main menu	press	confirms entered characters or values and jumps to the next item/confirms the entry
Service menu	press	confirms entered characters or values and jumps to the next item/confirms the entry

5.2 Measuring mode

The regular measuring mode of the GMA200-MGSS controller is reached approx. 30 s after switching on the power supply. When changing from the start-up phase to the measuring mode, the display switches from red backlight to the normal green backlight.

Depending on the sensor units and transmitter types and their adjustment time, the display shows "SRT" at the respective measuring points during the start-up phase. Typically, the start-up time is between 1 and 2 minutes, depending on the sensor in the sensor block or the connected transmitter.

In normal measuring mode, only the ON operating indicator is lit green. All other LEDs are off. The display shows the configured measuring points with the current measured values.

5.2.1 Measuring ranges and tolerance band (deadband)
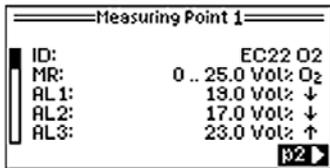
Measuring range MR for O_2

The measuring ranges of the connected sensors can beviewedin the main menu. Main menu > Info measuring points > MR:

For a better overview, the details of the configured measuring ranges with:
  » longer range value
  » tolerance band
  » resolutions
are documented on the "Measuring point overview" page of the supplied GMA200 configuration.

The tolerance band suppresses minor fluctuations in the measured value. In the case of processor-controlled transmitters with digital output signal (e.g. CS22, EC22, CC28), these fluctuations are already suppressed by the transmitter. The tolerance band can be deactivated directly at the transmitter in these cases.

For more information on the measuring range, tolerance band, and resolution of the sensor units, refer to section *3.9.5 Sensor specifications* (► page 31).

For more detailed information on the measuring range, tolerance band and resolution of external transmitters, please refer to the operation manuals of the respective transmitters.

5.2.2 Alarms

Three alarm thresholds can be configured for each measuring point within the measuring range.

When the alarm thresholds are exceeded or undershot, the corresponding red alarm LEDs "AL1", "AL2", "AL3" (current alarm level) and the integrated visual and acoustic alarm are activated.
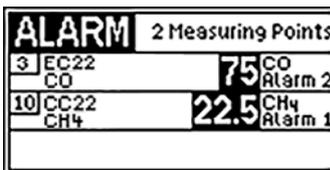
The display changes to the red backlit alarm screen. The measured values that triggered the alarm are displayed inverted.
In addition to the gas concentration, the triggered alarm status (Alarm 1, Alarm 2, Alarm 3) of the respective measuring point is shown in the display.

Once acknowledged, this information is also available in the overview and individual screens. If more than 4 measuring points are displayed, the exceeded alarm threshold is displayed in a shortened form ("AL1", "AL2", "AL3").

In addition, the configured relays and the relay LEDs "R1"-"R6" are activated (typical configuration).

5.2.2.1 Alarm configuration

The following settings can be configured for each measuring point using the GMA200Config software:

» Alarm threshold Alarm 1
» Alarm threshold Alarm 2
» Alarm threshold Alarm 3
» Alarm exceeding, latching
» Alarm exceeding, non-latching
» Alarm undershot, latching
» Alarm undershot, non-latching
» Alarm with switch-on delay (up to max 3 min)
» Alarm with switch-off delay (up to max 60 min)

The 3 alarm thresholds can also be changed in the menu of the GMA200-MGSS. Main menu > Service menu > Measuring points > Alarm thresholds

5.2.2.2 Acknowledging alarms (RESET)

For a description of the behavior of the alarm LEDs before and after acknowledging an alarm, refer to section *3.1.2 Status LEDs* (► page 22).

Non-latching alarm:
A non-latching alarm is automatically reset at gas concentration below (above) the alarm threshold and the assigned relay(s) are deactivated.

Latching alarm:
A latching alarm will persist at gas concentrations below (above) the alarm thresholds.

The alarm and the assigned relay(s) can be acknowledged only after falling below (exceeding) the alarm threshold. This can be done either via RESET button on the controller or via external buttons if the reset inputs are configured accordingly.

Acknowledgeable alarm relay:
Relays can also be configured to be acknowledgeable. This configuration is reserved exclusively in connection with acoustic and/or visual alarm devices.

This can be done either via RESET button on the controller or via external buttons if the reset inputs are configured accordingly.

5.2.3 Functions of the data logger

An optional data logger is available for the GMA200-MGSS. It can also be retrofitted at any time if it was not ordered when the GMA was purchased. Please contact your sales or service representative if you would like to retrofit the data logger.

If the GMA200-MGSS features a data logger, then it can be used to store the measured values of all measuring points on a FAT(FAT16)-formatted microSD card.

The measured values are always saved in a mean value file with a configured recording interval and a configured file refresh. In this file, in addition to the mean values, the minimum and maximum values for each measuring point are also stored for each interval, so that no essential information is lost even with longer recording intervals. (The factory setting of the interval is 5 min).

Once an alarm is triggered, in addition the current readings of all measuring points are stored in an alarm file. Usually, this recording interval is shorter. The factory setting is 10 s.

The data logger is configured with the GMA200Config software. The recording intervals for both file types can be set as follows:

» Mean value file: 5/10/15/20/30 s or 1/2/3/5/10/15/20/30/60 min
» Alarm file: 5/10/15/20/30/60 s

The measured values are saved under a calendar file name depending on the configuration. The time for creating new files can be configured as follows:

» daily   (file name: year-month/day/type*) e.g. 13-0622M.txt
» weekly   (file name: year-W/cw/type*) e.g. 13-W24M.txt
» monthly   (file name: year-month/type*) e.g.13-06M.txt
» annual   (file name: year-00/type*) e.g. 13-00M.txt

*either M = mean value or A = current values at alarm

The SD card must be removed to read out the data.

⚠ ATTENTION

Possible loss of data and/or corrupted files
Stop data recording before removing the SD card

» Press RESET/MENU for 3 s. This will take you to the main menu
» Scroll down, to the menu item Status Data Logger
» Confirm the selection with RESET/MENU
» Stop REC is shown in the center of the bottom line of the display.
  Stop the recording by pressing the RESET/MENU key.

ℹ **The position of operating notes in the display (left, center, right) corresponds to the function keys LEFT, RESET/MENU, RIGHT.**
This applies to all GfG devices with display. As a rule, the function keys are located directly below the note. On the GMA200-MGSS, they are located to the right of the display.

After reading out the SD card, insert it back into the microSD slot.
The display now reads Start REC. Launch the Data recording by pressing the RESET/MENU button.

If the recording is not restarted manually, the GMA200-MGSS initiates an automatic restart of the recording 15 min after the recording has stopped. If no SDcard is inserted at that time, a maintenance request is triggered.

To avoid this, switch off the data logger if it is foreseeable that the SDcard will have to be removed for longer than 15 min. This is done in the menu item Data logger of the service menu.
Main Menu > Service Menu > Data Logger > LOG-REC: OFF

📖 For more information on configuring the data logger, see section *5.5.2 Service menu > Data logger* (☞ page 66).

5.2.4 Service requests

ℹ The following information applies equally to sensor units and transmitters. For reasons of readability of the texts, only transmitters will be referred to in the following.

A maintenance request (SRQ) can be triggered during normal measuring operation. In this case, the yellow LED "SRV/SRQ" flashes and a corresponding message appears in the display.

Optionally, relays can be parameterized to switch when maintenance is requested. The maintenance request has no influence on the normal measuring operation. The SRQ message in the display can be acknowledged by pressing the RESET/MENU button.

The message can still be displayed via the Main Menu > Status GMA > Service Request. A service request can be triggered by:

Service requests of the GMA

Service Request	Cause and remedy

Service Request

Cause and remedy

```
SRQ   1 New Service-Req.
1. System control overdue
```
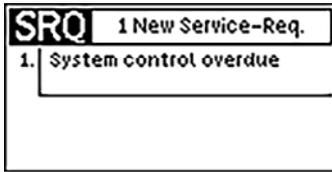
In this case, the deadline for the next system check, which usually has to be performed once a year, has been exceeded.
Remedy: A system check should be performed as soon as possible. The date for the system check can only be changed using the GMA200Config software.

```
SRQ   1 New Service-Req.
1. Error during write
   cycle on SD-Card
```
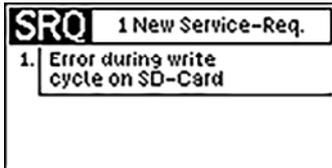
An error occurred when writing to the SD card, so that the data logger no longer records any data. The cause may be a defect in the SDcard itself or its contacting. However, it is also possible that the SDcard was removed without (permanently) stopping the data recording.
Remedy: Remove the card and read out and save the data on a computer. Afterwards format the SD card with FAT and insert it again or replace it completely if necessary.

```
SRQ   1 New Service-Req.
1. Invalid RTC date and
   time information
```

Date and time are invalid in the clock module of the GMA200. This indicates that the buffer battery of the clock module is empty or not properly contacted, so that when the GMA200 is switched off, the clock module cannot continue to operate and thus the date and time are lost.
Remedy: Set the date and time in the service menu. In case of recurrence, contact GfG service (replace GMA200). The battery cannot be changed.

```
SRQ   1 New Service-Req.
1. Communication Error with
   RTC
```
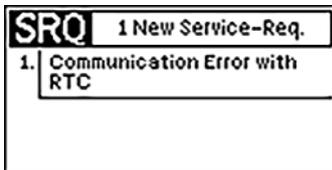
Date and time cannot be read by the clock module. This indicates a hardware defect on the mainboard of the GMA200. However, the measured value acquisition and evaluation runs independently of this time information.
Remedy: Set the date and time in the service menu. In case of recurrence, contact GfG service (replace GMA200).

```
SRQ   1 New Service-Req.
1. Communication Error with
   EEPROM
```
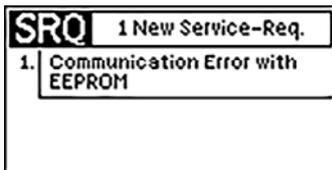
The GMA200 can no longer communicate with the external EEPROM. This means that the data stored in the second parameter memory (e.g. designation texts) cannot be accessed. Thus, there is also no backup copy of the parameters available in the RAM.
Remedy: If this service request is still displayed as current in the main menu, then the GfG service should be used (replace GMA200).

```
SRQ   1 New Service-Req.
1. Parameter Backup Memory
   corrupted
```
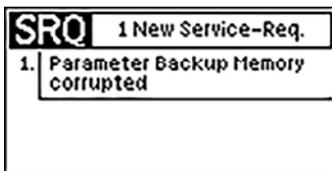
The parameters stored in the backup copy are faulty. Even copying the parameters from the RAM to the backup copy did not eliminate this error.
Remedy: If this service request is still displayed as current in the main menu, then the GfG service should be used (replace GMA200).
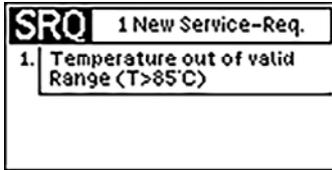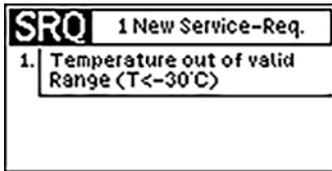
Temperature on the main board of the GMA is outside the permissible range (T < -30 °C) or (T > 85 °C). If the current temperature is not outside the limits, this indicates a hardware defect on the GMA's mainboard. If the temperature falls below -30 °C, the measured values in the display are also updated much more slowly.

Remedy: Normalize temperature influence or, if necessary, call GfG service (replace GMA).

Service requests of sensor unit and transmitter

Service Request   **Cause and remedy**

At the transmitter, the signal zero point has drifted away negatively, so that the measuring range of the transmitter has been clearly undercut (Underrange typically < -5 % from measuring range).

Remedy: The zero point of the transmitter should be adjusted.
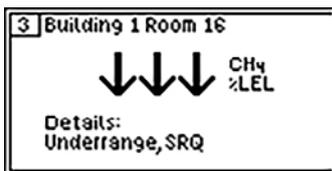
Maintenance request of a transmitter with digital RS-485 interface. In this example, the sensor must be replaced because it will soon be used up. A corresponding message or signal is displayed on the transmitter.

Remedy: Call for service (replace sensor if necessary).
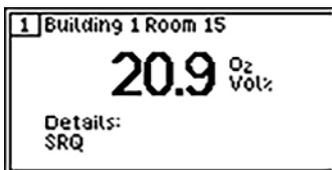
5.3 Special states

The GMA200-MGSS can be in various special states.

5.3.1 System startup

At system start the GfG logo, the device name and first the version number of the bootloader and then the version number of the mainboard firmware is displayed. During this time, various internal self-tests are performed. After completion of the internal tests, a short test of the display, all LEDs and the horn is performed. During the entire time, the yellow "FLT/GMA" fault LED is lit and the relays are de-energized.

5.3.2 Startup (adjustment time)

The connected transmitters usually require some adjustment time. To allow digital transmitters to start up on own, the GMA200 waits 30 seconds after power-up until it addresses the transmitters via the digital RS-485 interface.
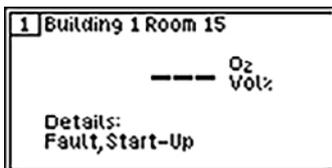
Depending on the connected transmitter, the start-up time may vary and lie in the range of a few seconds to a few minutes. During this time, the display shows **"SRT"** or **"Fault, start-up"** for the individual measuring points. Depending on the transmitter type and sensor type, they may enter normal measurement mode at different times. During this time, an appropriately configured current output outputs 1.6 mA. The relays behave according to the configured functionality and the fault relay has dropped out. The yellow fault LED "FLT/TRM" is lit and only turns off when all measuring points are ready for operation.

5.3.3 Fault

In the case of fault messages, a distinction is made between faults of transmitters/ measuring points (yellow LED "FLT/TRM") and faults of the GMA controller (yellow LED "FLT/GMA"). In the event of a fault, the respective yellow LED lights up statically, the corresponding fault relay is de-energized and the correspondingly configured current output outputs either 1.2 mA or approx. 0 mA, depending on the cause of the fault. Fault messages are not latching.

Fault messages from sensor units and transmitters

Störung (FLT/TRM)	Cause and remedy
	In this case the transmitter is in its start-up phase. During this time, the sensor adjusts or is warmed up. This adjustment time is transmitter and sensor dependent and can take several minutes. **Remedy:** Time simply has to be bided.
	In this case the sensor signal in the transmitter has exceeded the measuring range of the transmitter electronics. The cause could be a very high gas concentration at the transmitter or a gas with a very high cross-sensitivity. It is also possible that the sensor or the transmitter electronics are defective. **Remedy:** If it is ensured that it is not a high gas concentration or an interfering gas, then the transmitter must be checked. Refer to the operating manual of the transmitter.
	In this case the sensor signal in the transmitter has significantly exceeded the transmitter measuring range (usually > 112 %). The cause could be a very high gas concentration at the transmitter or a gas with a very high cross-sensitivity. It is also possible that the sensor or the transmitter electronics are defective. **Remedy:** If it is ensured that it is not a high gas concentration or an interfering gas, then the transmitter must be checked. Refer to the operating manual of the transmitter.
	In this case the sensor signal in the transmitter has clearly fallen below the transmitter measuring range (usually < -7.5 %). It is possible that a gas with a negative cross-sensitivity is present at the measuring point or that the Zero point signal has drifted away due to aging of the sensor or due to environmental influences. **Remedy:** Refer to the operating manual of the transmitter.
	Here, the sensor signal in the transmitter has even fallen below the measuring range of the transmitter electronics. It is possible that a gas with a negative cross-sensitivity is present at the measuring point or that the Zero point signal has drifted away due to aging of the sensor or due to environmental influences. **Remedy:** Refer to the operating manual of the transmitter.
	In this case there is a communication problem between the GMA and a transmitter. The cause could be a missing voltage supply of the transmitter, an incorrect bus assignment, an incorrectly set bus address or baud rate at the GMA or at the transmitter. It could also be a break in the communication line within the hardware, or the cables could have been connected incorrectly. However, a defect in the transmitter could also have led to the malfunction. **Remedy:** Check the voltage supply of the transmitter, the correct bus assignment, the settings of the bus addresses and baud rates and correct them if necessary. Check bus cabling and correct if necessary.
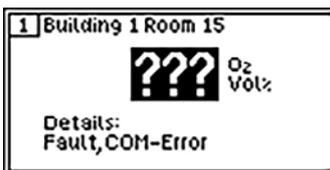
In this case, there is a malfunction of the digital transmitter. It is possible that the supply voltage of the transmitter is too low or too high or the transmitter itself is defective.

Remedy: Check the voltage supply of the transmitter and, if necessary, check the transmitter itself. Refer to the operating manual of the corresponding transmitter.
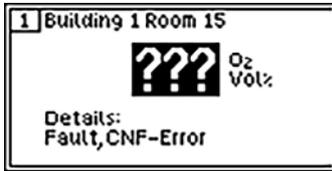
In this case the configuration in the GMA does not match the configuration of the connected transmitter. There may be differences in the gas type, the gas unit, the measuring range or the number of decimal places. However, it is possible that only the assignment of the transmitter is not correct due to an incorrectly set bus address.

Remedy: Check for correct transmitter assignment and bus address. Check for correct measuring range setting on the transmitter and modify if necessary. Otherwise adjust the configuration of the measuring point in the GMA.

Observe the instructions in the operating manuals of the connected transmitters.
These are considered as applicable documents.

GMA fault messages
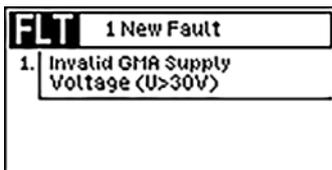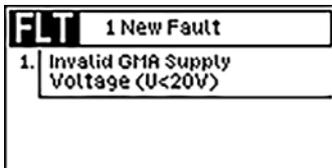
Fault (FLT/GMA)	Cause and remedy
	If the GMA is **only supplied by the PC via the USB cable** for configuration, the message "Impermissible GMA supply voltage (U < 20 V)" is always displayed together with the message "Impermissible relay supply voltage (U < 18.2 V)". This is normal. Otherwise the supply voltage of the GMA200 is too low (U < 20 V) or too high (U > 30 V). The cause could be a defective power supply unit. **Remedy:** For normal operation check voltage supply and contact GfG service if necessary.
	If the GMA is **only supplied by the PC via the USB cable** for configuration, the message "Inadmissible relay supply voltage (U < 18.2 V)" is always displayed together with the message "Inadmissible GMA supply voltage (U < 20 V)". This is normal. If the impermissible relay supply voltage is reported alone, because the voltage supply of the internal relays and the current outputs is too low (U < 18.2 V) or too high (U > 19.5 V), this indicates a defect of the GMA200. **Remedy:** Contact GfG service.
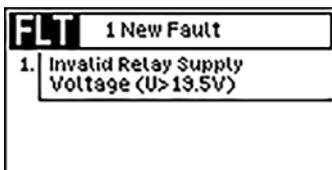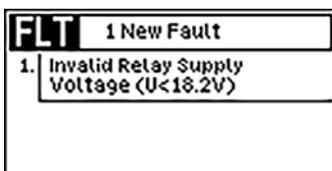
FLT 1 New Fault 1. Invalid CPU Supply Voltage (U<3.1V)	The voltage supply of the internal electronics is too low (U < 3.1 V) or too high (U > 3.5 V). This indicates a Defect of the GMA200. **Remedy:** Contact GfG service.
FLT 1 New Fault 1. Invalid CPU Supply Voltage (U>3.5V)	
FLT 1 New Fault 1. COM-Error Transmitter (TRM bus1)	Communication error between the GMA200-MGSS and a transmitter on the TRM bus1. The cause could be a missing power supply of the transmitter, an incorrect bus assignment, an incorrectly set bus address or baud rate at the GMA or at the transmitter. It could also be a break in the communication line within the hardware, or the cables could have been connected incorrectly. However, a defect in the transmitter could also have led to the malfunction. **Remedy:** Check the voltage supply of the transmitter, the correct bus assignment, the settings of the bus addresses and baud rates and correct them if necessary. Check bus cabling and correct if necessary.
FLT 1 New Fault 1. COM-Error Rel.Mod. 1,2 (GMA bus, TRM bus1)	Communication error between the GMA200-MGSS and external relay modules GMA200-R. In this case, there should be one relay module on the GMA bus and one relay module on the TRM bus1. The cause could be the missing power supply of the relay modules, wrongly set baud rates or bus addresses at the GMA200-M or at the GMA200-R. The relay modules could simply have been swapped here, for example. There could also be a hardware interruption in the communication line or the lines could have been connected the wrong way round. **Remedy:** Check the power supply of the relay modules, correct device assignment, the setting of the bus addresses and baud rates and set them correctly if necessary. Check bus cabling and correct if necessary.
FLT 1 New Fault 1. Communication Error with Display-PCB	The internal communication between mainboard and display board is disturbed. The most likely cause is a defect in the ribbon cable that connects the two circuit boards. A defect on one of the two circuit boards is also possible. **Remedy:** Call GfG service and replace the ribbon cable if necessary.
FLT 1 New Fault 1. 3× int. Relay defect (Rel: 3,5,8)	The switching function may no longer be executed on the corresponding internal relays. This can be caused by a defect in the relay, a contact problem on the mainboard or a defect in the monitoring circuit. **Remedy:** If the error occurs repeatedly after a restart, the GMA200 must be replaced.

```
FLT    1 New Fault
1. 2x ext. Relay defect
   (Relaymodul: 1)
```
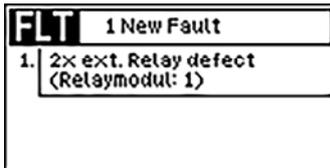
The switching function may no longer be executed at the relays of the external relay module GMA200-RT/-RTD. This may be caused by a defect in the relay, a contact problem on the relay board or a defect in the monitoring circuit.
Remedy: If the error occurs repeatedly after restarting the external relay module, the relay module must be replaced.

```
FLT    1 New Fault
1. 1x Relaymodul Fault
   (Relaymodul: 1)
```
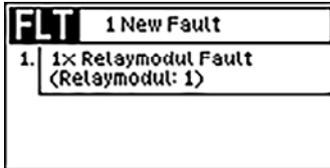
An external relay module GMA200-RT/-RTD signals a fault. There can be many different reasons for this (e.g. incorrect supply voltages, defective program memory, defective data memory, defective parameter memory, etc.)
Remedy: If the external relay module has a display, its display content can be read for fault location. If there is no display here, you should first check its supply voltage and then, if necessary, establish a connection with the GMA200Config software via the USB port. If the cause cannot be found and eliminated, the external relay module must be replaced.

```
FLT    1 New Fault
1. System Clock out
   of valid range
```
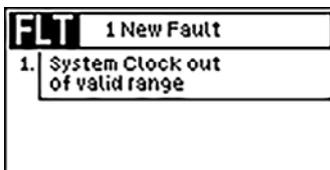
The system clock of the GMA200 is too fast or too slow or the reference clock is disturbed. The cause is a hardware defect on the mainboard. This may also disrupt communication via the RS-485 buses and the USB interface.
**Remedy:** The GMA200 must be replaced.

```
FLT    1 New Fault
1. External Watchdog defect
```

A malfunction was detected when checking the external monitoring module on the mainboard.
Remedy: If the error still occurs after restarting the GMA200, the GMA200 must be replaced.

```
Parameter Fault
Working Memory
could not be repaired

Reset ■
```

There is incorrect data stored in the parameters in the RAM, which cannot be corrected automatically due to a hardware defect on the mainboard.
Remedy: If the error still occurs after restarting the GMA200, the GMA200 must be replaced.

```
FLT    1 New Fault
1. Parameter Memory
   inconsistent
```
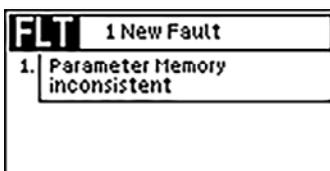
Despite the fact that the parameters in the RAM and in the backup copy are each correct, they have different values. This may have been caused by a power failure during a configuration change.
Remedy: The parameters are saved from the RAM to the backup copy by simply acknowledging this message. The then valid configuration can be checked with the Software GMA200Config and corrected if necessary.

```
FLT    1 New Fault
1. System control overdue
   since 30 days
```
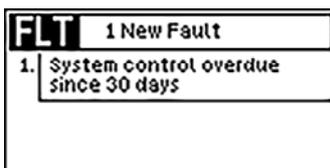
The fault was triggered because the deadline for the system check was exceeded by at least 30 days. The fact that a fault was triggered for this reason has been optionally configured.
Remedy: Perform system check and set new date for system check.

FLT | **1 New Fault**
1. Logical Program Sequence Error
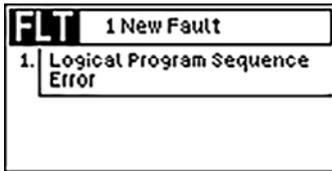
he normal program sequence is disturbed so that the correct function of the GMA200 is no longer ensured. There might be a defect on the mainboard or the display board.
Remedy: The GMA200 automatically restarts 3 s after this error occurs. If this error is reported again, the GMA200 must be replaced.

FLT | **1 New Fault**
1. Data Memory (RAM) from Co-Processor defect
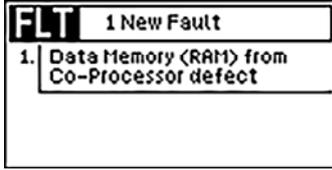
The RAM of the subprocessor on the display board is defective.
Remedy: If the error occurs repeatedly after a restart, the GMA200 must be replaced.

FLT | **1 New Fault**
1. Program Memory (ROM) from Main Processor defect

Boot V1.32
GiG GMA 200
Error: Main
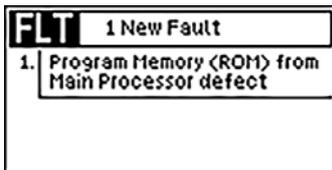
The software within the program memory of the main processor on the mainboard is faulty.
Remedy: The GMA200 automatically restarts 3 s after this error occurs. If the check of the program memory by the bootloader again results in an error, then a firmware update must be carried out by a service technician. If the error cannot be eliminated by the update, the GMA200 must be replaced.

FLT | **1 New Fault**
1. Program Memory (ROM) from Co-Processor defect
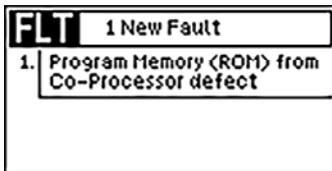
The software within the program memory of the subprocessor on the display board is faulty.
Remedy: If the error still occurs after a restart and cannot be eliminated by a firmware update by a service technician, then the GMA200 must be replaced.

FLT | **1 New Fault**
1. Co-Processor is running in Bootloader

After a reboot the slave processor on the display board only runs in the bootloader because the program of the slave processor is faulty.
Remedy: If the error still occurs after restarting the GMA200, a firmware update of the processor on the display board must be performed with the GMA200Config software.

FLT | **1 New Fault**
1. No Bootloader installed on Main-Processor
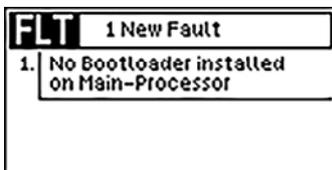
The bootloader of the main processor on the mainboard does not work properly due to a memory defect or was not installed correctly.
Remedy: If the error still occurs after restarting the GMA, the GMA must be replaced.

FLT | **1 New Fault**
1. No Bootloader installed on Co-Processor
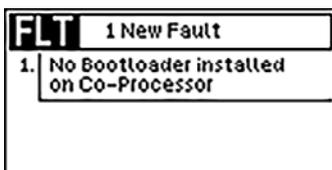
The bootloader of the subprocessor on the display board does not work properly due to a memory defect or was not installed correctly.
Remedy: If the error still occurs after restarting the GMA, the GMA must be replaced.
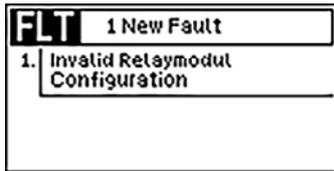
The configuration for an external relay module is not permitted for at least one of the following reasons:

» Although the TRM buses are not configured as a ring at "General" > "Bus communication", the TRM ring bus was configured at the bus connection for the external relay module..

» Although the setting of the GMA bus address at "General" > "Bus communication" is not equal to zero (no MASTER), the GMA bus was configured at the bus connection for the external relay module.

» Several external relay modules on the same bus areassignedthe same bus address.

Remedy: Check and correct the configuration for the external relay modules using the GMA200Config software. If necessary, contact GfG service.
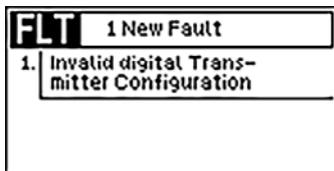
The configuration for the transmitters with digital interface is not permitted for at least one of the following reasons:

» Although the TRM buses are not configured as a ring at "General" > "Bus communication", the TRM ring bus was configured at the digital interface of a transmitter.

» Several digital transmitters have the same bus address on the same bus assigned.

Remedy: Check and correct the configuration for measuring points with digital interface using the GMA200Config software. If necessary, contact GfG service.
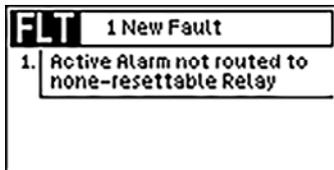
Invalid relay or alarm configuration. An alarm has been configured at a measuring point which is not linked to any relay.
Remedy: Check and correct the relay configuration or the alarm configuration for all measuring points using the GMA200Config software. If necessary, contact GfG service.
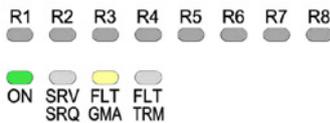
yellow LED "FLT/GMA"
is lit, although no fault
is displayed at "Status GMA"

If the GMA200 works properly but the yellow fault LED "FLT/GMA" is permanently lit and does not go out even during the LED test, then the ribbon cable between the mainboard and the display board may be defective. A defect on one of the two circuit boards is also possible.
Remedy: Contact GfG service and replace the ribbon cable if necessary.

5.3.4 Maintenance

Maintenance mode is signaled when the safety function of the GMA200 is only available to a limited extent or not at all due to deliberate intervention by an user respectively service personnel. In any case, maintenance is indicated by the yellow LED "SRV/SQR" lighting up continuously and the maintenance relay switching on. Maintenance operation may be caused by the following:

Maintenance on a sensor unit or transmitter
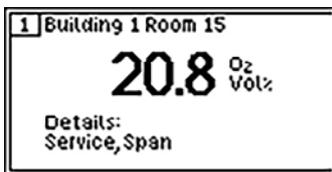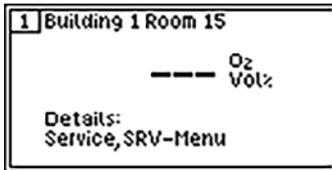
n case of transmitters with digital interface (bus), the GMA is notified that maintenance work is being carried out on the transmitter. Depending on the display mode, either **"SRV"** is displayed below the gas type or, in the single mode, **"Service"** is displayed in combination with **"SRV menu"**, **"Zero"** or **"Span"**. Normally, no measured value is displayed in this case. Only in the single mode, a measured value is additionally displayed during the Zero point adjustment (Zero) and sensitivity adjustment (Span).

Maintenance on the GMA
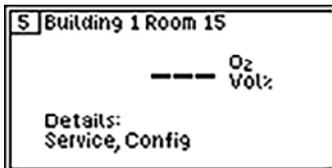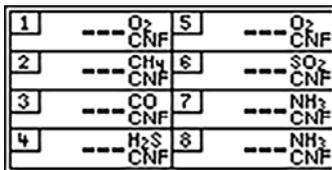
Configuration change with the GMA200Config software

» Interlocking of measuring points or relays
» Changes to the measuring point or relay configuration
» Changes to the overall GMA configuration
» Relay test of internal relays or on external relay modules
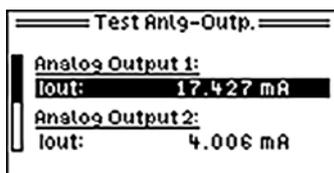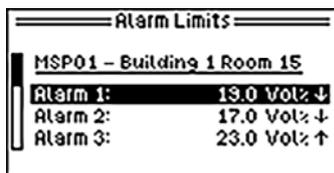
Changing the configuration using the service menu of the GMA200

» Changing the alarm thresholds of measuring points
» Changing the BUS settings
» Interlocking of at least one measuring point (INH = inhibit)
» Inhibiting of at least one relay
» Relay test of internal relays or on external relay modules

Depending on which cause led to the maintenance operation, only part of the safety function of the GMA200 may have been cancelled at that moment. If applicable, the safety function of the GMA200 is still intact for the unaffected parts.

Not until all causes for the maintenance operation have been eliminated, however, does the yellow "SRV/SRQ" LED turn off again and the maintenance relay is switched off.

5.3.5 Configuration by parameterization

The configuration of the GMA200 can only be changed to a very limited extent by changing parameters via the service menu on the device itself.

For details, refer to section *5.5 Service menu* (► page 64).

However, the GMA200 can be fully configured by means of a computer and the configuration software GMA200Config. The connection is established via USB cable. Once the configuration software has established a connection with the GMA200, operation via the service menu is no longer possible.

While the configuration of the GMA200 is being changed by means of the configuration software, CNF is shown for all measuring points in the displays. During this configuration phase, the special state "Maintenance" is activated as well.

For details, refer to section *5.3.4 Maintenance* (► page 57).

When the configuration via the configuration software is finished, the GMA200 returns to normal measuring operation.

5.4 Main Menu

User guidance in the main menu is provided by means of the push buttons on the GMA200-MGSS.

For details, refer to section *5.1 Keyboard and operation* (► page 43). The dialogs described below apply to the display language "English".
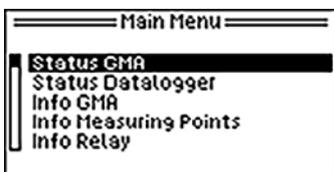
The main menu is divided as follows:

- » Status GMA
- » Status Datalogger
- » Info GMA
- » Info Measuring Points
- » Info Relay
- » Info Analog Outputs
- » Tests (Test LC display, LED/Horn, external button)
- » Service Menu (password protected)
  For details, refer to section *5.5 Service menu* (► page 64).

Press RIGHT to go back from the main menu to the measured value displays in measuring mode.

5.4.1 Main Menu > Status GMA
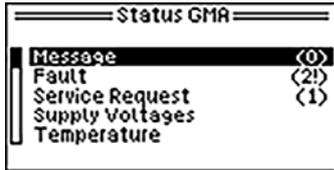
The Status GMA menu item is divided as follows:

» Message
» Fault
» Service Request
» Supply Voltages
» Temperature

The values in parentheses for *message*, *fault* and *maintenance* requirement represent the number of items of information that can be called up. The "!" after the value is a sign for messages, faults and maintenance requirements that are still active at that moment. If there is no "!" after the value, it is a stored information, which however does not concern a current state.

In the menu item *supply voltages*, the supply voltages Upwr1 and Upwr2 of the GMA are displayed, at least one of which should typically be at 24 V or in the range of 20 to 30 V.

Furthermore, the supply voltage for the internal relays Urel is displayed, which typically should be 18.8 V respectively in the range of 18.2 to 19.5 V, and the supply voltage Ucpu of the CPU is displayed, which typically should be 3.3 V respectively in the range of 3.1 to 3.5 V.

The menu item Temperature displays the temperature measured within the device, which is always slightly higher than the ambient temperature at the GMA, depending on the level of activity of the internal relays, the electronics and the power supply.

5.4.2 Main menu > Data logger
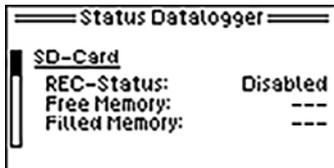
Logging of the data can be stopped and restarted in this menu.

⚠️ **ATTENTION**

Possible loss of data and/or corrupted files
Stop data recording before removing the SD card.

Before removing the memory card, be sure to stop recording. If this is not done, data on the memory card may be lost.

The data logger of the GMA200-MGSS is an option. It can be retrofitted at any time if it was not ordered when the GMA was purchased. Please contact your sales or service representative if you would like to retrofit the data logger.

5.4.3 Main Menu > Info GMA

The following information is displayed at Info GMA:

- » GMA-Type   (device type)
- » FW-Version   (firmware version)
- » SN   (serial number)
- » Current time of the clock module
- » Current date of the clock module
- » GMA bus mode for operation as master or GMA bus address for operation as slave
- » Set baud rate of GMA bus and TRM bus1

5.4.4 Main Menu > Info Measuring Points
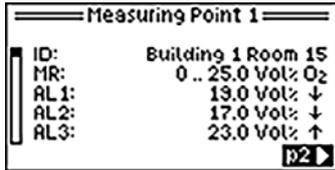
In this menu item the parameterization of the transmitters can be checked. Changing the parameters is not possible. Shown here, a few examples.

```
═══Measuring Point 1═══
ID:          Building 1 Room 15
MR:              0 .. 25.0 Vol% O₂
AL 1:              19.0 Vol% ↓
AL2:              17.0 Vol% ↓
AL3:              23.0 Vol% ↑
                              p2 ▶
```

```
═══Measuring Point 2═══
ID:          Building 1 Room 16
MR:              0 .. 500 ppm CO
AL 1:              30 ppm ↑
AL2:              60 ppm ↑
AL3:              100 ppm ↑
                              p2 ▶
```

```
═══Measuring Point 2═══
TRM:          EC28 (MK174-7)
Input:        TRM-Bus1 (Adr.2)

                              p1 ◀
```
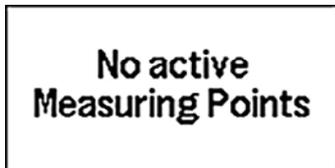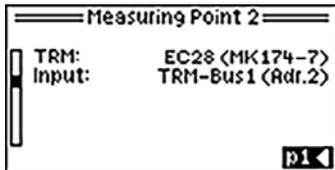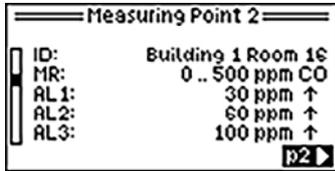
Minor adjustments are possible. However, more complex changes, such as adding or removing measuring points, are only possible using the GMA200Config configuration software.

```
No active
Measuring Points
```

For more information on configuring the data logger, refer to section *5.5.3 Service menu > Data logger* (► page 67).

5.4.5 Main Menu > Info Relay

Internal relays

At Info Relays information about the 8 internal relays and eventually connected relay modules can be retrieved.

```
═══Info Relay═══
Internal Relay
Relay Modul 1
Relay Modul 3
```

```
═══Info int. Relay 1═══
Name:          Pre-Alarm
Status:          Ok
State:          OFF
Work-Mode:   Open-Circuit
Resettable:   No
```

```
═══Info int. Relay 2═══
Name:          Main-Alarm
Status:          Ok
State:          OFF
Work-Mode:   Open-Circuit
Resettable:   No
```

External relay modules

```
══════ Info Relay ══════

  Internal Relay
  Relay Modul 1
  Relay Modul 3
```

```
══════ Relay Modul 1 ══════

  Name:       Exhauster control
  Type:          GMA200-RTD
  Status:                  OK
  Bus/Addr:         GMA bus/1
```

```
═══ Info ext. Rel.1/Mod.1 ═══

  Name:          Exhauster 1
  Status:                 OK
  State:                 OFF
  Work-Mode:     Open-Circuit
  Resettable:             No
```

```
═══ Info ext. Rel.1/Mod.2 ═══

  Name:          Exhauster 2
  Status:                 OK
  State:                 OFF
  Work-Mode:     Open-Circuit
  Resettable:             No
```

Information on the external relay module and its individual relays can then be called up at "Relay module X".
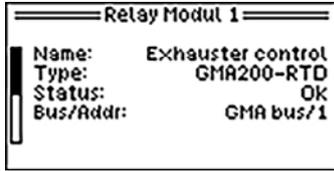
5.4.6 Main Menu > Info Analog Outputs

```
═══ Info Analog Outputs ═══

  Analog Output 1:
   MSP01 – Building 1 Room 15
  Analog Output 2:
   Disabled
```
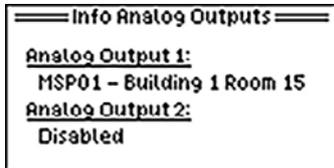
For the GMA200-MGSS, both entries always say Inactive.

5.4.7 Main menu > Tests

```
══════ Tests ══════

  Test LCD
  Test LED/Horn
  Test ext. AL-Reset
```
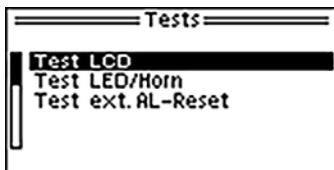
In the submenu Tests a test of the LCD display as well as a test of all LEDs and the internal horn can be performed.

In addition, the functioning of the external buttons (acknowledgement) can be checked at "Test ext.AL-Reset".

5.4.7.1 Main menu > Tests > Test LCD
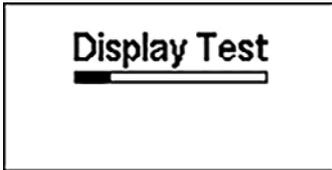
After switching on the device, a test of the display starts automatically. This test can be triggered manually here. If any defects are detected, replace the unit.

5.4.7.2 Main menu > Tests > Test int. Signaler
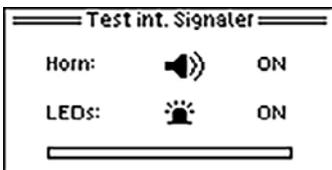
After switching on the device, a test of the LEDs and the horn starts automatically. This test can be triggered manually here. If any defects are detected, replace the unit.
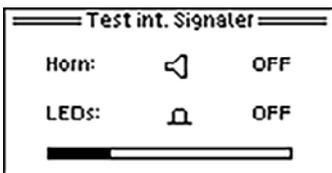
5.4.7.3 Main menu > Tests > Test ext. AL-Reset
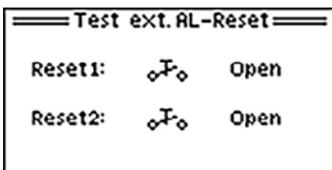
Whether the inputs for external alarm acknowledgements are working or not can be checked in this menu. For this purpose, terminal X35c (Reset1) respectively terminal X36 (Reset2) must be bridged with terminal X35d (GND).

If the terminals are bridged, for example by pressing the pushbutton, the display for Reset1 or Reset2 changes from "Open" to "Closed".
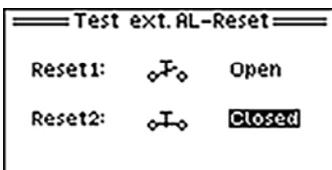
5.4.8 Main Menu > Service Menu

Some configuration settings can also be changed in the service menu.

For Detailed information, refer to section *5.5. Service menu* (► page 64).

5.5 Service Menu

ATTENTION

Locked access to the service menu

Access to the service menu is locked as long as the GMA200-MGSS is connected to the GMA200Config software. The connection must be terminated first. On the other hand, the GMA200Config software cannot connect to the GMA200 if the service menu has already been activated on the GMA200.
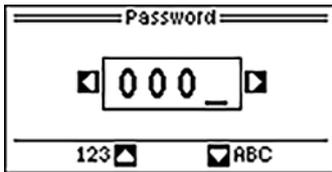
Access to this menu is password protected for security reasons. The password is set to "0000" by default at delivery. It can be changed in the service menu.

WARNING

Unauthorized access to the settings of the GMA

Change the preset password at the latest with commissioning to prevent unauthorized access and accidental changing of the settings.

The *service menu* is divided into:

1. System Setup
2. Datalogger
3. Measuring Points
4. Relay
5. Analog Outputs

5.5.1 Service Menu > System Setup

The system settings are subdivided into 6 additional sub-items:

1. Time/Date
2. Password
3. Language
4. Bus Setup
5. Display Contrast
6. Horn Volume

5.5.1.1 Service Menu > System Setup > Time/Date

The following can be set or changed here:

» Time
» Date
» Format (DD.MMM.YYYY or YYYY-MM-DD)

In the representation DD.MMM.YYYY the month names are displayed shortened, for example January = JAN.
In the representation YYYY.MM.DD the months are represented as digits, thus 01 = January.

5.5.1.2 Service Menu > System Setup > Password
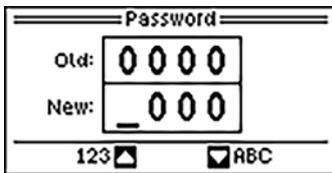
The password for access to the "Service menu" can be changed alphanumerically here.
Lowercase letters, uppercase letters and the digits 0 to 9 are available.

Notice: If the password is no longer known, it can only be read out and changed using the GMA200Config configuration software.

ATTENTION

Password forgotten or changed
If the password has been accidentally changed or is no longer known, it can only be read out and changed using the GMA200Config configuration software.

5.5.1.3 Service Menu > System Setup > Language
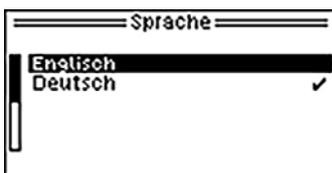
In this menu item you can switch between the display languages German and English respectivly between the display languages English and French.

Factory setting DE/EN = German
Factory setting EN/FR = English

5.5.1.4 Service Menu > System Setup > Bus Setup
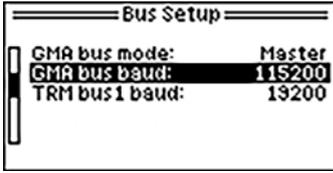
Various bus settings can be changed in this menu item.

If **"GMA bus mode: Master"** is set, then only the baud rates for the two buses can be changed. In master mode, the bus address for the GMA bus cannot be set. The mode can only be changed by means of the GMA200Config software.

If the GMA200 is not in master mode on the GMA bus, then the bus address can be changed from 1 ... 247 at "GMA Bus Addr:".

The baud rates of the two buses can be set as follows:

» GMA bus baud: 9600 / 19200 / 38400 / 57600 / 115200 / 230400 Bit/s
   (Default = 115200 Bit/s)
» TRM bus1 baud: 9600 / 19200 / 38400 Bit/s
   (Default = 19200 Bit/s)

5.5.1.5 Service Menu > System Setup > Display Contrast
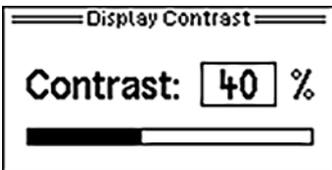
The contrast of the LC display can be adjusted in 5 % stepsbetween 0 % and 100 % to suit the conditions on site.

(Default = 40 %).

5.5.1.6 Service Menu > System Setup > Horn Volume
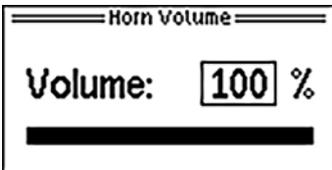
The volume of the internal horn can be set here in 5 % steps between 0 % and 100 %.

(Default = 50 %).

5.5.2 Service Menu > Datalogger

The data recording on the microSD card for service purposes can be started for a maximum of 8 hours in the SRV-REC menu item. The recording can also be stopped manually here again.

Data logging for **s**ervice purposes works even if the GMA does not possess a data logger (file name: ***S**.txt). However, an appropriately formatted microSD card is required.

At " LOG-REC " the data recording of the normal data logger can generally be switched on or off.

5.5.3 Service Menu > Measuring Points

≡≡≡ Measuring Points ≡≡≡
Alarm Limits
Calibration
Inhibit
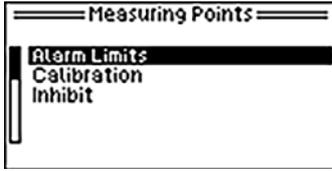
The Measuring Points submenu is divided into:

1. Alarm Limits
2. Fine adjustment
3. Inhibit

5.5.3.1 Service Menu > Measuring Points > Alarm Limits

≡≡≡ Alarm Limits ≡≡≡
MSP03 – Building 1 Room 16
Alarm 1:   19.0 Vol% ↓
Alarm 2:   17.0 Vol% ↓
Alarm 3:   23.0 Vol% ↑

≡≡≡ Alarm Limits ≡≡≡
MSP03 – Building 1 Room 16
Alarm 1:   19.0 Vol% ↓
Alarm 2:   17.0 Vol% ↓
Alarm 3:   23.0 Vol% ↑

≡≡≡ Alarm Limits ≡≡≡
MSP03 – Building 1 Room 16
Alarm 1:   19.0 Vol% ↓
Alarm 2:   17.0 Vol% ↓
Alarm 3:   23.0 Vol% ↑

≡≡≡ Alarm Limits ≡≡≡
MSP03 – Building 1 Room 16
Alarm 1:   19.0 Vol% ↓
Alarm 2:   **17.0** Vol% ↓
Alarm 3:   23.0 Vol% ↑
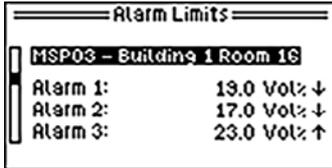
After selecting the measuring point, the *limit values* for Alarm 1, Alarm 2 and Alarm 3 within the measuring range can be changed in the Alarm Limits menu item.
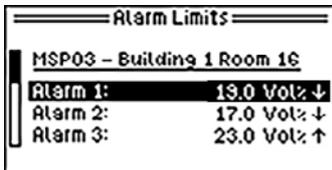
If the alarm threshold is set to 0.0 (zero), then the alarm is turned off. Whether an alarm is triggered when the limit value is exceeded or undershot is indicated by the arrow behind the gas unit.
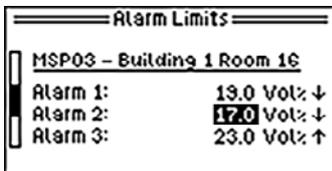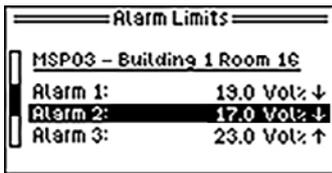
5.5.3.2 Service Menu > Measuring Points > Calibration

≡≡≡ Calibration ≡≡≡
MSP02 – Building 1 Room 15
Measurand: −1.5%LEL
Zero: 0
Span: 0

≡≡≡ Calibration ≡≡≡
MST01 – Pump Flow
Measurand: 0.51slpm
Zero: 0
Span: 0
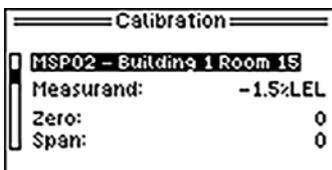
The pump flow sensor is the only analog sensor that can be displayed on the GMA200-MGSS.

The flow rate is displayed under the measuring point.
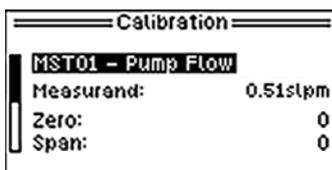
The menu items Zero and Span have no function with the GMA200-MGSS.

5.5.3.3 Service Menu > Measuring Points > Inhibit
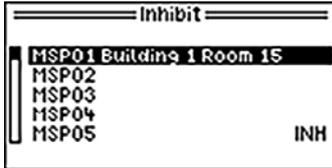
Measuring points can be locked for maintenance purposes (INH = Inhibit).

Service work can then be carried out at the measuring points without triggering an alarm.

⚠️ **ATTENTION**

Switch to maintenance mode
If a measuring point is inhibited, the special state Maintenance is assumed. This means that the maintenance relay remains switched on even in measuring mode.

In measuring mode, the yellow LED "SRV/SRQ" is then permanently lit and in the overview of sensor units and transmitters in the display, --- is shown instead of the measured value for the inhibited measuring point and SRV is shown instead of the gas unit.

In the individual display of the inhibited measuring point, SRV-INH is displayed at details. The state is unlimited in time. Even if the power supply is interrupted and the GMA is then put back into operation, the Inhibit state remains until it is changed.

5.5.4 Service Menu > Relay

The Relays menu item is divided into:

1. Test
2. Inhibit
3. Time Control Start

5.5.4.1 Service Menu > Relay > Test
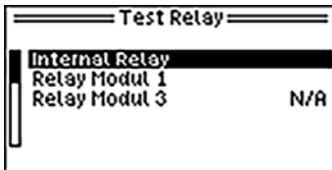
Within the menu item Test the switching of the internal relays of the GMA200 and of relays on external relay modules can be tested.
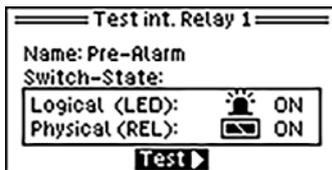
5.5.4.2 Service Menu > Relay > Inhibit
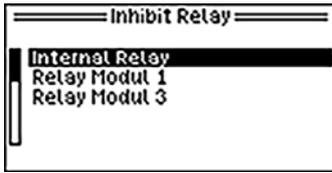
One or more relays can be inhibited for maintenance purposes (INH = Inhibit).

The maintenance relay and the fault relay cannot be inhibited.
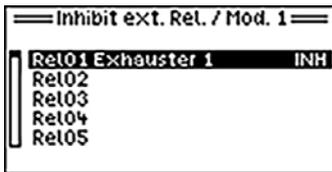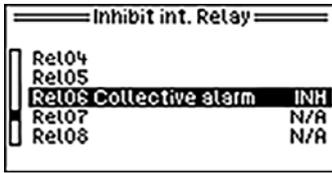
ATTENTION

**Switch to maintenance mode**
If a relay is locked, the special state Maintenance is assumed. This means that the maintenance relay is switched on.

In measuring mode, the yellow LED "SRV/SRQ" then lights up continuously. The date since which at least one relay has been inhibited is indicated under Main menu > Status GMA > Messages. The state is unlimited in time. Even if the power supply is interrupted and the GMA is then put back into operation, the Inhibit state remains until it is changed.

5.5.4.3 Service Menu > Relay > Time Control Start

The GMA200 offers the possibility to switch relays time-controlled. If such a time control has been configured and set as a start condition in the service menu using the GMA200Config software, it can be started here.

5.5.5 Service Menu > Analog Outputs
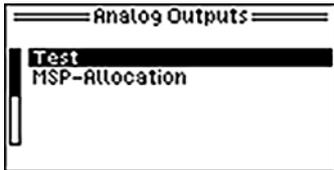
The Analog Outputs menu item is divided into:

1. Test
2. MSP-Allocation

5.5.5.1 Service Menu > Analog Outputs > Test
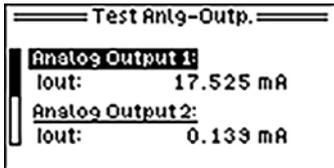
At "Test Analg-Outp." the two analog outputs can be tested in the range from 0.4 mA to 24.0 mA

The prerequisite for this is that the DC supply voltage of the GMA200 is in the range of 20 to 30 V (typically UDC=24 V).

5.5.5.2 Service menu > Analog Outputs > Anlg.-Outp. Alloc.
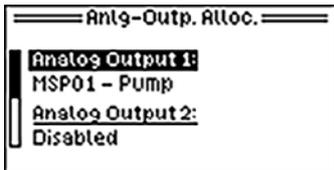
The assignment of the measuring points to the analog outputs can be set or changed here.

With the GMA200-MGSS, measuring point 1 is usually the flow sensor of the pump.

5.5.6 Exit Service Menu

To return to the main menu from the service menu, press the RIGHT button. To switch further to the measured values in measuring mode, this button has to be pressed again.

If settings have been changed in the service menu, then a query appears when you exit the service menu (see image on the left).

WARNING

Faulty setting of the GMA
Safety-relevant changes may only be carried out by authorized and skilled personnel.

Control of the changes made
To verify that the setting changes have been applied as desired, switch back to the service menu. Especially after changing safety-relevant settings, such as alarm thresholds, the control must be performed in this way.

6. Service works

To maintain the functionality of a gas detection system, its regular maintenance is required. It requires appropriate knowledge and, in accordance with national regulations, a certificate of competence of the person performing the work, if applicable.

⚠️ **WARNING**

Danger due to incorrect inspection or maintenance
All inspections and maintenance work may only be carried out by competent persons.

If there are no suitably qualified employees in the company, please contact GfG. GfG offers appropriate training and refresher courses for your employees as well as suitable service agreements for all maintenance tasks.

6.1 Cleaning and Care

⚠️ **WARNING**

Danger due to electric shock
Only clean the device if it is disconnected from the power supply. Before starting work, switch off all power supplies and secure them against being switched on again.

External soiling of the device housing can be removed with a cloth moistened by water. Do not use solvents or cleaning agents!

6.2 Service and Maintenance

According to DIN EN 60079-29-2 section 11 and DIN EN 45544-4 section 8, maintenance and servicing include testing and inspection during operation as well as repair of the gas detection system.

Also observe all other applicable national and international regulations, in Germany for example "DGUV Information 213-056 (Leaflet T 021 Section 9)" and "DGUV Information 213-057 (Leaflet T 023 Section 9)".

Depending on the results, it may be necessary to arrange for or carry out adjustment work and repairs. Any defects found must be rectified immediately!

6.2.1 Visual Check

Perform visual checks on a regular basis. The interval between checks must not exceed **1 month**.

The visual check includes:

- » Checking the status LEDs
  (power supply LED "On", alarm and fault LEDs "Off")
- » Checking the housing (e.g. for mechanical damage and external soiling)
- » Checking the sampling system (e.g. for mechanical damage and condensation)
- » Checking the gas inlets for soiling and clogging
- » Documenting the check

The corresponding documentation must include:

- » Identification of the gas detection system
  (e.g. plant section, measuring point)
- » Confirmation of the completion of the check
- » Defects found
- » Date and name

6.2.2 Functional Check

The function check can be performed at intervals depending on the gas hazard to be monitored. The respective national regulations are authoritative.

For gas detection systems for monitoring toxic gases/vapors and oxygen as well as for gas warning devices for explosion protection, for example, the inspection period in Germany is **4 months**.

The functional check includes:

- » Visual check according to section 6.2.1 "Visual check"
- » Supplying zero gas and test gas
  - • For checking and evaluating the measured values displayed (calibration) and, if necessary, for adjustment
  - • For checking and evaluating the response time in accordance with the information in the manufacturer's operation manual
  - • For comparison with the results of previous functional checks
  - • Checking the equipment for sample gas delivery and sample gas preparation as well as associated monitoring equipment
  - • Flow rate control
  - • Feeding test gas at the measuring point for checking and evaluating the measured value displayed as well as the response time
  - • Checking leak tightness and flow rate
- » Triggering of device-specific test functions for display elements during operation without triggering switching functions
- » Checking the stored messages, faults and maintenance requests
- » Documenting the check

The corresponding documentation must include:

» Identification of the gas detection system
  (e.g. plant section, measuring point)
» Composition of the test gases used
» Measured value at zero gas and test gas before and after
  performing calibration/adjustment
» Assessment of response times
» Defects found
» Work performed
» Date and name

The functional check eliminates the need for a visual check due at the same time.

6.2.3 System Check (Proof Test)

The system check must be performed at regular intervals. The period between system checks must not exceed **1 year.**

It includes the following activities:

» Functional check according according to section *6.2.2 "Functional Check*"
» Checking all safety functions including the triggering of switching
  functions (e.g. start-up of technical ventilation or other measures listed
  in the risk assessment)
» Checking parameterization by target/actual comparison
» Checking the signaling and recording devices
» Documenting the check

The corresponding documentation must include:

» Identification of the components of the gas detection system
  (e.g. plant section, measuring point) and the downstream
  safety-related equipment
» Composition of the test gases used
» Deviations of the parameterization from the set values
» Measured values at zero gas and test gas before and after
  performing calibration/adjustment
» Assessment of response times
» Defects found
» Work performed
» Date and name

The system check eliminates the need for a function check or visual check that is due at the same time.

> **WARNING**
>
> **Danger due to isolated examination of the gas detection system**
> The system check by the competent person must be carried out in close cooperation with the operator of the plant, especially when checking the safety functions.
> If this is not possible for operational reasons, then it is necessary to define and document points up to which the system check is to be carried out.

6.2.4 Calibration and Adjustment

Calibration with zero gas and test gases is used to check the displayed measured values.

The adjustment with zero gas and test gases is used to set the displayed measured values. Always adjust the zero point first and only then the sensitivity. It is recommended to finally check the zero point once again.

Calibration and adjustment are part of the functional check and the system check.

6.2.4.1 Zero Gas and Test Gas

As a rule, unpolluted fresh air (without interfering gas components) or, in polluted atmospheres, synthetic air can be used as zero gas. Only electrochemical O_2 sensors and infrared CO_2 sensors use 100 vol.% N_2.

For information on the test gases to be used, refer to the test protocol supplied. Alternatively, the suitable gases can be derived from the sensor specifications of the sensors (► page 31ff *Sensor specifications*).

As a rule, the test gas must match the sample gas during calibration. The test gas concentration should be known with an accuracy of at least ±5 %, if technically possible.

If the sample gas is difficult to handle as a test gas, a substitute test gas may be used. The substitute test gas and the associated sensitivity setting value must be determined and documented in consultation with the manufacturer of the gas detector. In this case contact GfG service.

ATTENTION

Particularity of the sensor units with CC sensor
Unpolluted fresh air (without interfering gas components) or, in polluted atmospheres, synthetic air can be used as zero gas.

ATTENTION

Particularity of the sensor units with EC sensor
When selecting the zero gas, a distinction must be made between sensor units with oxygen sensor and other electrochemical sensors.

For oxygen sensors, use only 100 vol% N_2.

For all other electrochemical sensors, unpolluted fresh air (without interfering gas components) can be used as zero gas or synthetic air in polluted atmospheres.

> ⚠️ **ATTENTION**
>
> **Particularity of the sensor units with IR sensor**
> When selecting the zero gas, a distinction must be made between sensor units with carbon dioxide sensor and other infrared sensors.

For Carbon dioxide sensors, use only 100 vol% N_2.

For all other electrochemical sensors, unpolluted fresh air (without interfering gas components) can be used as zero gas or synthetic air in polluted atmospheres.

6.2.4.2 Gas Sampling Fitting
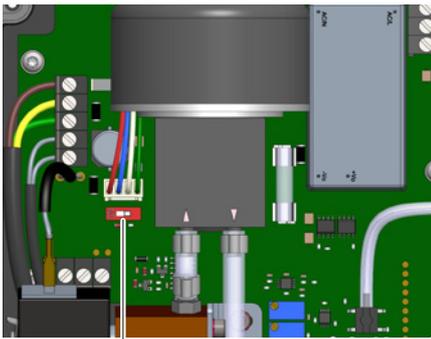
Switch S5 on the circuit board for switching the pump off and on

Use a gas sampling fitting with demand flow regulator for sampling gas from disposable test gas cylinders.

If no gas sampling fitting with demand flow controller is available, a pressureless test gas feed must be ensured to protect the pump, for example by means of fillable gas bags.

Use one gas bag per zero gas or test gas to avoid contamination of the gases. Empty the bag completely using the vacuum pump before filling.

Alternative: This procedure can also be performed with a commercially available 0.5 l/min pressure reducer. To do this, first switch off the pump at switch S5. After completion, the pump must be switched on again.

6.2.4.3 Calibrating & adjusting the zero point of the sensor units [ZERO]

The sensor units of the GMA200-MGSS cannot be calibrated and adjusted via the display and the push buttons of the housing, as the terminal cover and the housing cover must be removed for this purpose.

> ⚠ **ATTENTION**
>
> **Damage to components**
> When removing the housing cover, pay attention to the ribbon cable between the main board and the display board. Carefully remove the ribbon cable from the housing cover. Store the housing cover safely until reassembly.

> ⚠ **ATTENTION**
>
> **Damage due to electrostatic discharge**
> When carrying out work inside the GMA200-MGSS, pay attention to the ESD protection of the components.

Remote control RC22

Required accessories: Remote control RC22
Calibration and adjustment of the sensor units of the GMA200-MGSS is performed using the RC22 remote control. It temporarily adds a display and push buttons to a sensor unit. Once the RC22 is connected, it can be operated like an external transmitter with a corresponding sensor. The measured values and menus are shown on the display and all work steps can be carried out as usual using the operating keys.

Zero point adjustment [ZERO]:

1. Prepare zero gas
   The gas supply must be pressureless. Only use the gas sampling fittings listed in section 6.2.4.2 *Gas sampling fittings* (► page 75) for direct gas sampling from test gas cylinders.
   During calibration and adjustment, the gas is sucked in by the pump of the GMA200-MGSS.

   Alternative: This procedure can also be performed with a commercially available 0.5 l/min pressure reducer. To do this, first switch off the pump at switch S5.
   After completion, the pump must be switched on again.

2. Make sure that the zero gas can be discharged freely and without pressure.

3. Remove the terminal cover.

4. Remove the housing cover. To do this, disconnect the ribbon cable from the display's control board connector.
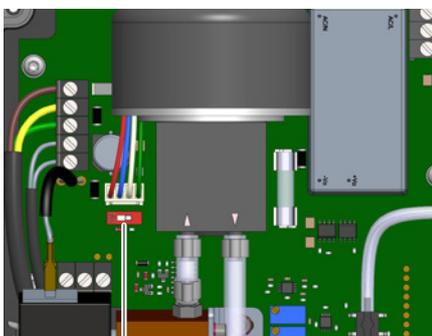
Switch S5 on the circuit board for switching the pump off and on

5. Attach the zero gas.

    | Version V0: | 5.1 | Disconnect the sample gas hose at the gas inlet |
    | | 5.2 | Connect the zero gas hose to the gas inlet for sample gas |

    | Version V1-6: | 5.1 | Connect the zero gas hose to the gas inlet for test gas |
    | | 5.2 | Operate the changeover switch to change from sample gas to zero gas |

    All versions of the GMA200-MGSS have Teflon hoses routed to the outside at all gas inlets and gas outlets ex works. Supply hoses and discharge hoses can be simply plugged on.

6. Connect the RC22 to the sensor unit.

    Up to 3 sensor units can be connected to the sensor block of the GMA200-MGSS. Each sensor unit has a blue female connector (marked yellow in the picture) for connecting the RC22.

    Plug the male connector at the end of the ribbon cable of the RC22 into the female connector.

⚠️ **ATTENTION**

Damage to components
Always plug the male connector into the female connector in such a way that the ribbon cable faces the PCB and the lug on the top of the insulator can be seen from the outside.

As soon as the RC22 is connected, it shows the information that would otherwise be shown in the display of the GMA200-MGSS. It does not have to be started first.

7. Calibrate the zero point

    Wait until the RC22 display shows a stable reading. Note the displayed value in the documentation.

    If the value is zero, no further action is necessary. If the value deviates from zero, the zero point must be adjusted.

8. Adjust the zero point.
    To adjust the zero point, switch to the ZERO adjustment service menu item.

    8.1 Press and hold the TEST/ZERO key for at least 3 s. The input window
         for the service code appears.
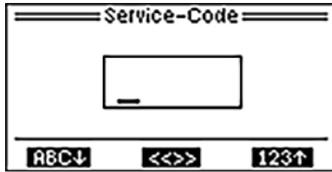
    8.2 Enter the service code **0011** via the push buttons. Confirm the
         entry by pressing QUIT/MENU. The display changes to the
         ZERO adjustment menu.

         Press the left TEST/ZERO button briefly: scroll backwards through the
         letters and digits.
         Press the right INFO/SPAN button briefly: scroll forward through the
         letters and digits.
         Press the center QUIT/MENU key briefly: jump to the next cursor position
         or confirm entry.
         Press and hold the center QUIT/MENU key: jump to the previous
         cursor position.

    8.3 The display now shows at Display: the current measured value and
         at Zero gas: the set zero gas concentration.
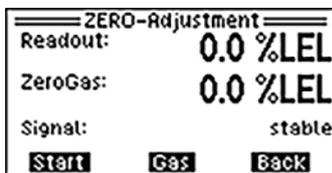
         If the displayed gas reading does not deviate too much from 0
         at zero gas, an adjustment of the zero point is possible. The degree
         of permissible deviation depends on the type of sensor unit:

         » Sensor unit with CC sensor: permissible deviation < 25 %
            of the measuring range
         » Sensor unit with EC sensor: permissible deviation < 10 %
            of the measuring range
         » Sensor unit with IR sensor: permissible deviation < 10 %
            of the measuring range

Beispiel: CC-Sensor

⚠ ATTENTION

Loss of sensor unit operativeness
If the displayed gas measured value deviates more than permissible
from zero, the sensor must be replaced. Contact GfG service.

Press the left TEST/ZERO button to start the zero point adjustment. After
successful adjustment, wait 5 s or press the right INFO/SPAN button briefly
to return to the ZERO adjustment menu. The middle QUIT/MENU key has
no function during zero point adjustment. Press the right INFO/SPAN
key briefly to exit the menu.

8.4 It appears:

Press the left TEST/ZERO button briefly to return to the zero point adjustment.
Press the center QUIT/MENU button briefly to exit the menu.
Press the right INFO/SPAN button briefly to exit the menu and accept the new zero point.

If there is more than one sensor unit on the measuring chamber, repeat steps 6 to 8 for the other sensor units. Make sure that the zero gas for the sensor is correct.

6.2.4.4 Calibrating & adjusting the sensitivity of the sensor units [SPAN]

The sensor units of the GMA200-MGSS cannot be calibrated and adjusted via the display and the push buttons of the housing, as the terminal cover and the housing cover must be removed for this purpose.

ATTENTION

Damage to components
When removing the housing cover, pay attention to the ribbon cable between the main board and the display board. Carefully remove the ribbon cable from the housing cover. Store the housing cover safely until reassembly.

ATTENTION

Damage due to electrostatic discharge
When carrying out work inside the GMA200-MGSS, pay attention to the ESD protection of the components.

Remote control RC22

Required accessories: Remote control RC22
Calibration and adjustment of the sensor units of the GMA200-MGSS is performed using the RC22 remote control. It temporarily adds a display and push buttons to a sensor unit. Once the RC22 is connected, it can be operated like an external transmitter with a corresponding sensor. The measured values and menus are shown on the display and all work steps can be carried out as usual using the operating keys.

Sensitivity adjustment [SPAN]:

1. Prepare test gas
   The gas supply must be pressureless. Only use the gas sampling fittings listed in section *6.2.4.2 Gas sampling fittings* (➤ page 75) for direct gas sampling from test gas cylinders. During calibration and adjustment, the gas is sucked in by the pumpof the GMA200-MGSS.
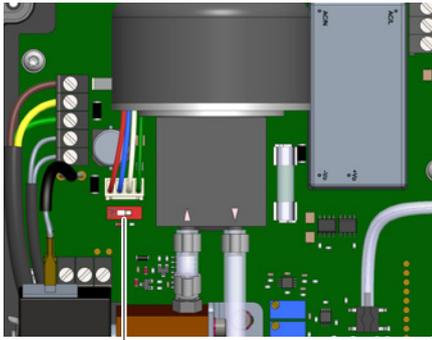
Switch S5 on the circuit board for switching the pump off and on

Alternative: This procedure can also be performed with a commercially available 0.5 l/min pressure reducer. To do this, first switch off the pump at switch S5.
After completion, the pump must be switched on again.

2. Make sure that the test gas can be discharged freely and without pressure.

3. Remove the terminal cover.

4. Remove the housing cover. To do this, disconnect the ribbon cable from the display's control board connector.

5. Attach the test gas.

   Version V0:   5.1 Disconnect the sample gas hose at the gas inlet
                  5.2 Connect the test gas hose to the gas inlet for sample gas

   Version V1-6: 5.1 Connect the test gas hose to the gas inlet for test gas
                  5.2 Operate the changeover switch to change from sample gas to test gas

   All versions of the GMA200-MGSS have Teflon hoses routed to the outside at all gas inlets and gas outlets ex works. Supply hoses and discharge hoses can be simply plugged on.

6. Connect the RC22 to the sensor unit.

   Up to 3 sensor units can be connected to the sensor block of the GMA200-MGSS. Each sensor unit has a blue female connector (marked yellow in the picture) for connecting the RC22.

   Plug the male connector at the end of the ribbon cable of the RC22 into the female connector.

⚠ ATTENTION

Damage to components
Always plug the male connector into the female connector in such a way that the ribbon cable faces the PCB and the lug on the top of the insulator can be seen from the outside.

As soon as the RC22 is connected, it shows the information that would otherwise be shown in the display of the GMA200-MGSS. It does not have to be started first.

7. Calibrate the sensitivity

⚠ ATTENTION

Toxic properties of the test gases
When handling toxic gases, including most flammable gases and vapors, special behavioral instructions must be observed depending on the test gas used. Information on this can be found in the corresponding safety data sheets.

Wait until the RC22 display shows a stable reading. Note the displayed value in the documentation.

If the value is identical to the test gas concentration specification on the gas certificate of the connected gas cylinder, no further action is necessary. If the values differ, the sensitivity must be adjusted.

8. Adjust the sensitivity

   To adjust the sensitivity, switch to the SPAN adjustment service menu item.

   8.1 Press and hold the INFO/SPAN button for at least 3 s.
        The input window for the service code appears.
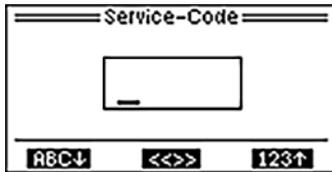
   8.2 Enter the service code **0011** via the push buttons. Confirm the entry by pressing QUIT/MENU. The display changes to the SPAN adjustment menu.

        Press the left TEST/ZERO button briefly: scroll backwards through the letters and digits.
        Press the right INFO/SPAN button briefly: scroll forward through the letters and digits.
        Press the center QUIT/MENU key briefly: jump to the next cursor position or confirm entry.
        Press and hold the center QUIT/MENU key: jump to the previous cursor position.

   8.3 The display now shows at Display: the current measured value and at Cal. gas: the last used test gas concentration.

        Check whether the set test gas concentration corresponds to the test gas concentration of the test gas used.

        If the values are identical, no further action is necessary. If the values differ, the setting for cal. gas must be adjusted.

   8.4 Changing the cal. gas setting
        Press and hold the QUIT/MENU button for at least 3 s. The Cal. gas value is now displayed inversely and can be changed. Set the cal. gas value according to the concentration on the gas certificate of the test gas cylinder.

        Press the left TEST/ZERO button briefly: Decrease the value of the cal. gas concentration.
        Press the right INFO/SPAN button briefly: Increase the value of the cal. gas concentration.

        Press the center QUIT/MENU button briefly: Confirms the displayed value.

Beispiel: CC-Sensor

8.5 Start the adjustment of the sensitivity

⚠️ **ATTENTION**

Prerequisite for the adjustment
The displayed gas reading must be at least 7 % of the measuring range.

Press the left TEST/ZERO button briefly to start the sensitivity adjustment.
After successful adjustment, wait 5 s or press the right INFO/SPAN button briefly to return to the SPAN adjustment menu.
Briefly press the right INFO/SPAN key again to exit the menu.

8.6 It appears:

Press the left TEST/ZERO button briefly to return to the sensitivity adjustment.
Press the denter QUIT/MENU button briefly to exit the menu without accepting the new set sensitivity.
Press the right INFO/SPAN button briefly to exit the menu and accept the new set sensitivity.

If there is more than one sensor unit on the measuring chamber, repeat steps 6 to 8 for the other sensor units. Make sure that you use the correct test gas for the sensor.

6.2.4.5 Calibration & adjustment of external transmitters

For information on calibrating external transmitters, please refer to the operation manuals of the respective transmitter.

6.2.4.6 Checking the pump performance and tightness

For proper operation, ensure that the pump output is 0.5 slpm as designed, the entire system is gas tight, and the alarms are triggered according to the preset alarm thresholds.

⚠️ **ATTENTION**

Consider the configuration of the entire gas detection system when checking.
Consider the configuration of the entire gas detection system when checking.
No two GMA200-MGSS installations are identical and so are the possible vulnerabilities and sources of errors. Follow the procedure for commissioning the gas detection system to check pumping capacity and tightness during the function check and system check.

Possible sources of error:

» Pump	failure or reduced performance
» Hoses and tubes	porosity, pitting corrosion or damage
» Connections	seals, compression fittings and fittings
» Accessories and extensions	condensate separator

> ⚠️ **ATTENTION**
>
> **Leakage due to incorrectly mounted condensate separator**
> Reassemble the condensate trap so that it is gas-tight after draining or changing the filter. When screwing on the collection container, do not tilt and tighten it firmly.

Simple alarm test

With the GMA200-MGSS/V0:
Either seal the opening at the suction point or disconnect the sample gas hose at the GMA200-MGSS and seal the gas inlet.

With the GMA200-MGSS/V1-6:
Either seal the opening at the suction point or operate the changeover switch to switch from the sample gas inlet to the test gas inlet. Depending on the method, seal the sample gas inlet or the test gas inlet.

The resulting negative pressure triggers alarm thresholds 1 and 2 for the pump in succession.
At the same time, proof is provided that the system does not draw air through leaks or leaking connections, at least as of the point at which it was sealed. Closure of the sample gas inlet is therefore preferable in order to check the entire conveying line.

> ⚠️ **ATTENTION**
>
> **Damage to the core**
> Never pinch or kink the hose to close the suction path. Cracks in the hose or damage to the core may occur.

The performance of the pump is checked during the service intervals by means of a variable area flow meter.

6.2.5 Maintenance
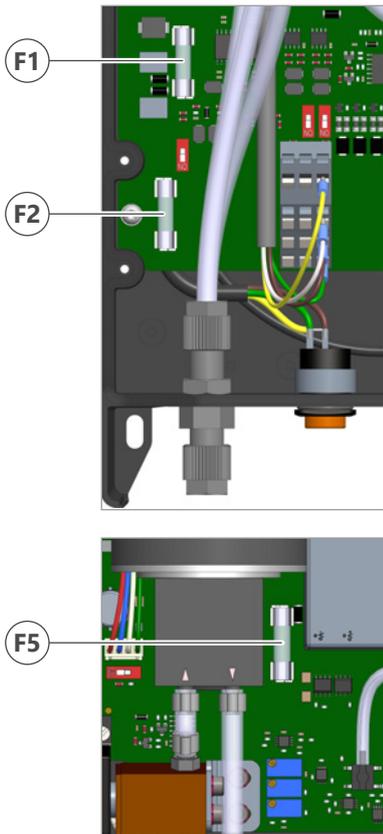
Maintenance includes all repairs and replacements. These activities may only be carried out by the manufacturer and by persons authorized by GfG Gesellschaft für Gerätebau mbH.

Only original spare parts tested and approved by the manufacturer and original assemblies may be used.

To change the internal fuses of the GMA200-MGSS (F1 for the GMA200, F2 for the transmitters or F5 for the pump), first remove the terminal and cable gland cover and then the housing cover.

> ⚠️ **ATTENTION**
>
> **Damage to components**
> When removing the housing cover, pay attention to the ribbon cable between the main board and the display board in the cover and remove it carefully if necessary.

> ⚠️ **ATTENTION**
>
> **Damage due to electrostatic discharge**
> When replacing the fuses, pay attention to the ESD protection of the components on the circuit boards
> .

6.3 Spare parts and accessories

	Designation			Item no.
1.	microSD card 2 GB			2200202
2.	Spare fuse T 500 mA	(F1/F2 - GMA200/transmitter)	PU = 10 piece	2200301
3.	Spare fuse T 315 mA	(F5 - Pump)	PU = 5 piece	2200332
4.	Screws for GMA200-MGSS wall-mounted enclosure		PU = 10 piece	2200304
5.	Sealing insert for GMA200-MGSS cable gland		PU = 20 piece	2200305
6.	Ribbon cable for GMA200-MW16 (L = 33 cm)			2200308

6.4 Note on the environmentally frindly disposal of used parts

According to §11 of the general terms and conditions of GfG, the purchaser of the device assumes the obligation to dispose of the device or device components in an environmentally friendly manner in accordance with §§11, 12 ElektroG.

If desired, proper disposal can also be carried out by GfG in Dortmund.

6.5 Technical Data

Type designation	GMA200-MGSS
Display & Controls	2.2" graphic display, 5 buttons, alarm light and buzzer max. 100 dB(A) adjustable 15 status LEDs for alarms, the operating status and relay states
Ambient conditions for storage: for operation: Mounting location:	 -25 to +60 °C | 0 to 99 % RH (recommended: 0 to +30 °C | 40 to 60 % RH) -10 to +45 °C | 0 to 99 % RH only indoors up to an altitude of 2000 m above sea level
Power supply Operating voltage: Power consumption: Fuses:	 UAC = 100-240 V / 50-60 Hz mains voltage or UDC = 24 V (20-30 V permissible) max. 42 VA or 20 W F1 = T 500 mA (for GMA200) F2 = T 500 mA (for sensors) F5 = T 315 mA (for flow controller)
Sample gas feed Gas conditioning: Path switching: Sample gas pump:	 Cooling coil (optional) Condensate separator with water barrier (optional) flame arrester (optional) solenoid valve (optional) Diaphragm pump (flow-controlled, typically 0.5 l/min)
Gas sensors Sensor block:	 with maximum 3 sensors 1 catalytic combustion sensor for measuring flammable gases and vapors 2 electrochemical or infrared sensors for measuring toxic and flammable gases as well as oxygen
Processing of measured values Update time: Adjustment times: Readiness Delay:	 1 s Increasing $t_{50} < 2$ s resp. $t_{90} < 2$ s Falling $t_{50} < 2$ s resp. $t_{10} < 2$ plus the setting times of the gas sensors and depending on the length of the intake section (extended by setting times of the transmitters) < 40 s (possibly extended due to adjustment times of the transmitters)
RS-485 outputs GMA bus: TRM bus1:	 RS-485; half-duplex; max 230400 baud (for GMA200 relay modules, controler, PC, PLC or gateway) RS-485; half-duplex; max 38400 baud (only for GMA200 relay modules)
Relay outputs Contacts: Contact rating: Minimum switching current: Minimum switching voltage: Switching frequency: Insulation spacings:	 8 relays with a changeover contact UAC = 250 V / 3 A or UDC = 30 V / 3A 10 mA 5 V max 100 per year (per relay contact), applies to SIL applications according to EN 50402 Basic insulation between the relays: 1 & 2, 3 & 4, 5 & 6, 7 & 8 Double insulation between the relays: 2 & 3, 4 & 5, 6 & 7
Analog outputs IOUT1+2: Accuracy:	 4-20 mA with linear transfer function (load max. 560 Ω) ±0.3 % MR @ 10 to 30 °C or ±0.8 % MR @ -20 to 50 °C (MR = measuring range)

Alarm acknowledgement inputs	
Reset1+2:	UDC=0 to 3 V (alarm acknowledgement occurs on contact with GND; UDCMAX = 30 V)
Data logger (optional)	max 2 GB microSD card with FAT formatting (FAT16)
USB port	Mini-B USB socket for device configuration via computer
Housing	
Protection class:	IP54 according to IEC 60529; IK08 according to IEC 62262
Material:	Plastic
Weight:	2.8 kg to 3.2 kg (depending on version)
Dimensions:	270 x 290 x 98 mm (W x H x D) (varies depending on the version)
Connection cable	
Cable:	3-wire ≥ 0,75 mm² LiYY, NYM (for GMA200 supply)
	2-wire 1 x 2 x 0,22 mm² BUS-LD (for GMA bus with length > 10 m)
Cable glands:	7 pieces M16x1.5 (for cable diameter 4.5 to 10 mm)
Terminal strips:	0.08 to 2.5 mm² Cross section
Approvals/Certifications	
Electromagnetic compatibility:	EN 50270:2015 (interference emission: type class I, interference immunity: type class II)
Electrical Safety:	EN 61010-1:2010 (pollution degree 2, overvoltage category II for mains supply) (pollution degree 2, overvoltage category III for relay contacts)

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GfGsafety.com

smart
GasDetection
Technologies

6.6 Declaration of Conformity

EU Declaration of Conformity

GMA200-MGSS

Edited: 14.12.2018   Amended:

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GfG Gesellschaft für Gerätebau mbH develops produces and sells gas sensors and gas warning devices which are subject to a **quality management system** as per DIN EN ISO 9001.
Subject to supervision by means of a **quality system**, surveilled by the notified body, DEKRA EXAM GmbH (0158), is the production of electrical apparatus of instrumentation Group I and II, categories M1, M2, 1G and 2G for gas sensors, gas detectors, gas warning systems in types of protection flameproof enclosures, increased safety, encapsulation and intrinsic safety, as well as their measuring function.

The Gas detection controller **GMA200-MGSS** complies with council directive **2014/30/EU** for electromagnetic compatibility, with directive **2014/35/EU** for electrical safety and with directive **2011/65/EU** (RoHS) on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

The directive 2014/30/EU is complied considering the following standard:
- Electromagnetic compatibility - Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen   EN 50270: 2015
Radio shielding   Type class 1
Interference resistance   Type class 2
The EMC test laboratory EM TEST GmbH at Kamen has tested and certified the electromagnetic compatibility.

The directive 2014/35/EU is complied considering the following standard:
- Safety requirements for electrical equipment for measurement, control and laboratory use. General requirements.   EN 61010-1: 2010
The company du.tronic Consulting & Engineering at Ratingen has tested and certified the electrical safety.

The directive 2011/65/EU is complied considering the following standard:
- Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances   EN 50581: 2012

Dortmund, 14 December 2018

B. Siebrecht
QMB

EG-Kon-59.1/Siebrecht
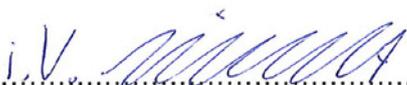
6.7 Mounting plan
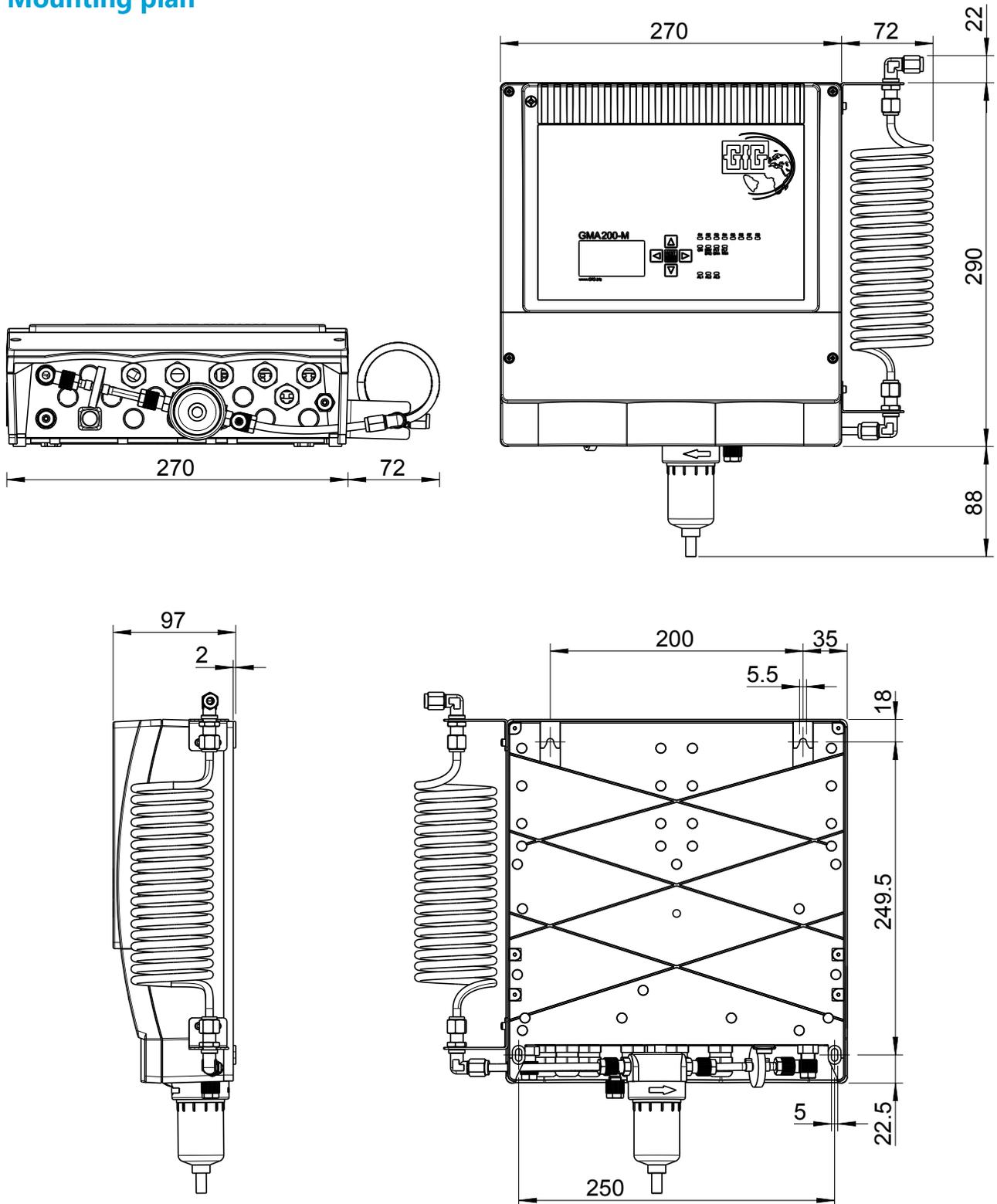
Rev.	Changes	Date	Name	Date	Name	Verified	Title:		
				2018-02-21	Leonhardt	Böttger	**GMA200-MGSS**		
				Adhere to protection note ISO 16016 Schutzvermerk ISO 16016 beachten			**Package dimensions and mounting template**		
				GfG Gesellschaft für Gerätebau mbH Klönnestr.99, D - 44143 Dortmund			Document-No.: 232-005.23		Page 1 of 1
							Replaces:	Replaced by:	