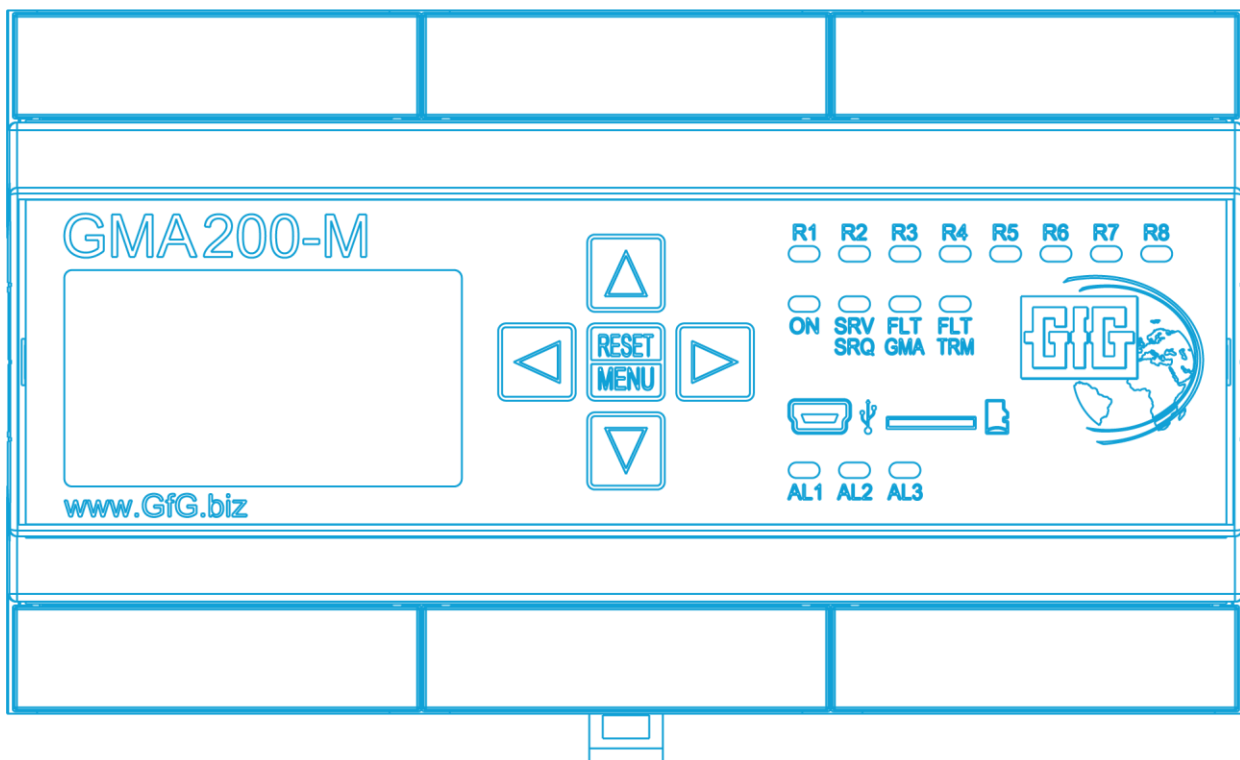## Operation Manual

GMA200-MT6/-MT16

Gas measurement controller for rail mounting

Translation of the original operation manual

Table of Contents

1 INTRODUCTION

1.1 For Your Safety

In accordance with the Product Safety Act (ProdSG), this operations manual refers to the proper use of the product and is designed to prevent hazards. It must be read and observed by all persons who apply or use, maintain, service and inspect this product. This device can serve its intended purpose only if it is operated, serviced, maintained and inspected according to the instructions given by the Gesellschaft für Gerätebau mbH.

Otherwise, the warranty assumed by GfG Gesellschaft für Gerätebau mbH shall expire. Adjustments in service mode may only be carried out by qualified personnel.

1.2 Field of application and intended use

The GMA200-MT6 and the GMA200-MT16 are gas measurement controllers for rail mounting. In combination with connected gas measuring transmitters, they form a stationary gas warning system for continuous measurement of gas concentrations and are used to warn of flammable gases and vapours in the area below the lower explosion limit, of toxic gases in the ambient air and for oxygen measurement (lack, excess or inerting). External relay modules GMA200-RT/RTD are also available. Section 3.4 „Examples of different system variants" shows some variants for the interconnection of such system components.

he gas detection controllers GMA200-MT6 and GMA200-MT16 have been tested by TÜV Rheinland Industrie Service GmbH to meet the requirements of the product standard EN 50402, IEC 61508 and IEC 62061 for SIL2 and PL-d according to EN ISO 13849-1. They can be used in a single-channel HFT=0 structure up to SIL2/PL-d and in a redundant HFT=1 architecture up to SIL3/PL-e. A corresponding certificate N°: 968/FSP 1324.01/17 is available.

The GMA200-MT6 and the GMA200-MT16 have a type examination in accordance with ATEX Directive 2014/34/EU on metrological suitability for warning against explosive gas mixtures. This test was carried out by DEKRA Testing and Certification GmbH on the basis of DIN EN 60079-29-1 "Gas detectors – Performance requirements of detectors for flammable gases" and DIN EN 50271 " Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen – Requirements and tests for apparatus using software and/or digital technologies". As "safety, control and regulating devices" for use outside of hazardous areas it is therefore marked as follows:

> **II (2)G   BVS 19 ATEX G 001 X   X 0158**

In addition, the GMA200-MT6 and the GMA200-MT16 were also tested by DEKRA Testing and Certification GmbH for its metrological suitability with regard to the measurement of oxygen deficiency, excess oxygen and inertisation in accordance with DIN EN 50104 "Electrical apparatus for the detection and measurement of oxygen - Performance requirements and test methods" and for the measurement of toxic gases in accordance with DIN EN 45544-1/-2/-3 „ Electrical apparatus used for the direct detection and direct concentration measurement of toxic gases and vapours - Part 1: General requirements and test methods ", Part 2: "Performance requirements for apparatus used for exposure measurement" and Part 2: "Performance requirements for equipment for concentration measurement in the range of limit values" and Part 3: "Performance requirements for apparatus used for general gas detection". A corresponding EU-Type Examination Certificate with the following number is available:

> **PFG 19 G 002 X**

The GMA200Config software program is required to configure the controllers GMA200MT6 and the GMA200-MT16 and the GMA200-RT and GMA200-RTD relay modules, which were tested as an accessory during the type examination. The GMA200Config configuration software is not described in these operations manual. (For further information please see OM 222-000.48). The GMA200-RT/RTD relay modules are also not described in these operation manual (For reference see OM 222-000.44). The GMA200-Visual software program can be used to display the measured values and status information provided via the GMA bus, which was also tested as an accessory during the type examination

Function and maintenance of the different transmitters are described in separate operating instructions.

1.3 Safety functions

Using the GMA200 system, it is possible to realise six different safety functions. Further details are given in section 5.5 „Functional safety and parameters". The information flow of the security functions (SF) was as follows:

SF1: ➔ Analog transmitter input of the GMA200-M (4-20 mA or 0.2-1 mA)
➔ Signal processing in the GMA200-M
➔ internal relay outputs the GMA200-M

SF2: ➔ Digital RS485 transmitter input of the GMA200-M (TRM bus)
➔ Signal processing in the GMA200-M
➔ internal relay outputs the GMA200-M

SF3: ➔ Analog transmitter input of the GMA200-M (4-20 mA or 0.2-1 mA)
➔ Signal processing in the GMA200-M
➔ Data transmission with RS485 bus (TRM bus or GMA bus)
➔ Signal processing in the GMA200-M
➔ Relay outputs of the GMA200-R

SF4: ➔ Digital RS485 transmitter input of the GMA200-M (TRM bus)
➔ Signal processing in the GMA200-M
➔ Data transmission with RS485 bus (TRM bus or GMA bus)
➔ Signal processing in the GMA200-M
➔ Relay outputs of the GMA200-R

SF5: ➔ Analog transmitter input of the GMA200-M (4-20 mA or 0.2-1 mA)
➔ Signal processing in the GMA200-M
➔ Data transmission via RS485 to downstream system (GMA bus)

SF6: ➔ Digital RS485 transmitter input of the GMA200-M (TRM bus)
➔ Signal processing in the GMA200-M
➔ Data transmission via RS485 to downstream system (GMA bus)

If the fault relay drops, the outputs of the safety functions SF1, SF2, SF3, SF4 are invalid. Therefore, an evaluation of the switching state of the fault relay is absolutely necessary. It must also be possible to detect short-term disturbances of about 3 seconds.

It is also possible that during maintenance work on transmitters or by locking measuring points or relay outputs, the safety function may be at least partially restricted (inhibit). For this reason it is also necessary to evaluate the switching status of the maintenance relay.

1.4 Special Requirements for Safe Usage

For safety reasons, only components authorized by the manufacturer GfG may be used.

The function "time control" of relays was not subject of the type tests.

From the metrological standards EN 60079-29-1 (EX) and EN 50104 (OX) the following requirements must be taken into account:

- Alarms with switch-on delay should not be used for safety-related purposes. If their use is unavoidable, the time delay must be set to the smallest value possible for the required application. The maximum possible rate of increase of the gas concentration must be taken into account when setting the on-delay.
- When measuring combustible gases with transmitters that can provide signals in the measuring range at concentrations above the full scale, the latching function must be activated when the measuring range is exceeded ("Filter time constant" setting 0 s)
- When measuring flammable gases, the "Resolution" parameter may be set to a maximum of 1% of the full scale value and the "Tolerance band" parameter may be set to a maximum of 5 % of the full scale value.
- When measuring oxygen, the parameter "Error message when measuring range underflow" must not be set to a value below -5 % of the measuring range end value.
- When measuring oxygen, the "Resolution" parameter may be set to a maximum of 1 % of the measuring range end value but not higher than 0.1 vol%. The "Tolerance band" parameter may be set to a maximum of 2 % of the measuring range end value.

From the metrological standards EN 45544-1 (EX) and EN 45544-3 (TOX) the following requirements must be taken into account:

- When used in accordance with EN 45544-2, the GMA200 is suitable for operation with transmitters where the output current at the workplace limit is between 4.48 mA and 12 mA.
- When used in accordance with EN 45544-2, the "Resolution" parameter may be set to a maximum of 1 % of the full scale value of the measuring range and not higher than 5 % of the occupational exposure limit. The lower range value is a maximum of 0.6 % of the measuring range. It becomes smaller if the "Resolution" parameter is set to a smaller value.
- When used according to EN 45544-2, the "Tolerance band" parameter must be set to the lower range value (calculated for the combination of GMA200 and connected transmitter) or to a smaller value.
- When used according to EN 45544-3, the "Resolution" parameter may be set to a maximum of 1 % of the measuring range end value and the "Tolerance band" parameter to a maximum of 5 % of the measuring range end value.

According to the requirements of EN 60079-29-1, EN 45544-1/-2/-3 and EN 50104, the alarms with the highest safety significance must be configured to be latching for each measuring point. In addition, relays for safety-relevant switching actions must be configured in such a way that they cannot be reset if an alarm condition is present.

Likewise, at least one internal relay must be configured as a collective message for all measuring point faults (FLT/TRM) and for GMA faults (FLT/GMA).

For measuring points for monitoring toxic gases and vapours according to EN45544-2 (exposure measurement), the following configuration restrictions apply to transmitters with analogue interface:

- a transmitter with analogue 4-20 mA interface must be parameterized.
- a linear transfer characteristic must be parameterized.
- the measuring range end value may be a maximum of 33 times the smallest limit value to be monitored, i.e. the alarm threshold may be a minimum of 3 % of the measuring range end value.

According to the requirements of EN 50271 section 4.5, the following is for digital data transmission between transmitter and GMA200, when using the internal relays, the measured value evaluation and alarming is only suitable for transmitter setting times from T90 ≥ 10 s.
If there are more than 16 transmitters and relay modules on the same TRM bus and the data transmission is only at 9600 baud, the cycle time on the TRM bus is extended from 1.0 to max. 1.3 seconds.

If the controllers GMA200-MT6 and GMA200-MT16 are used in the scope of application of the Machinery Directive according to EN 62061 or ISO 13849-1, the alarm relays must be parameterized in the closed-circuit current principle. Alternatively, comparable safety requirements must be met (e.g. by using a redundant or fail-safe power supply).

2   Controller GMA200-MT6/MT16

2.1 General Description

The design and construction of the controllers GMA200-MT6 and GMA200-MT16 offers flexible, simple and easy use in industrial and commercial applications for measuring combustible and toxic gases/vapours and for measuring oxygen concentrations.

Using the "GMA200Config" software program, measuring points and relays can be configured quickly and easily, even when expanding already installed GMA200 gas detection systems. It is possible to configure e.g. measuring point designation, transmitter type, gas type and measuring range as well as 3 individual or pre-set alarm limit values per measuring point.

2.2 Device Setup

Transmitters with analogue 4-20 mA or 0.2-1 mA interfaces and transmitters with digital RS485 interfaces can be connected to the GMA200MT6 and GMA200-MT16. A microprocessor evaluates the analogue or digital input signals of the connected transmitters and displays the measured values. LEDs signal the status of the controller, the measuring points and the relays. The connection of transmitters with analogue interface is described in section 3.2 „Electrical Terminal Installation".
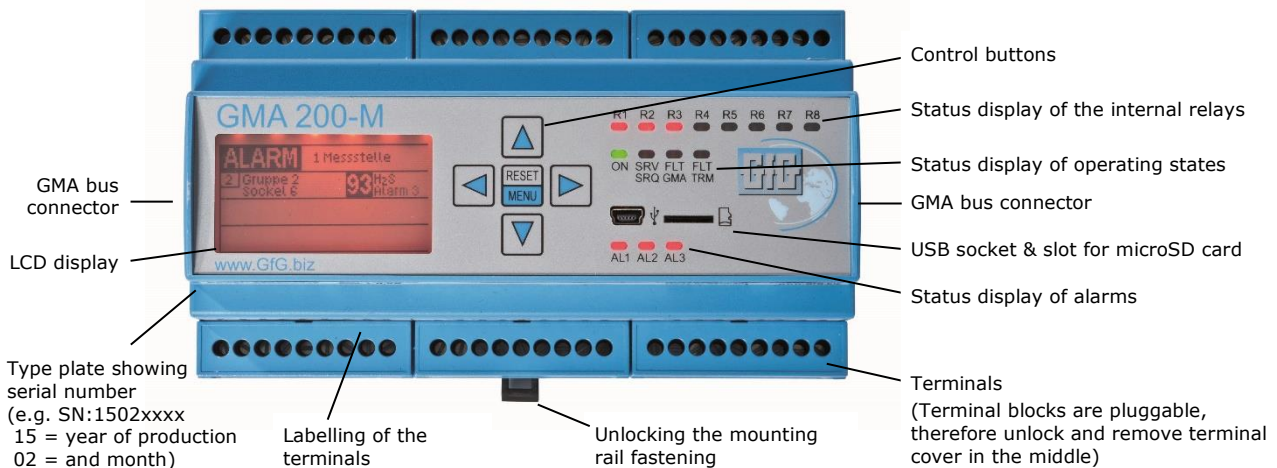
2.2.1 Control buttons
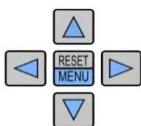
In measuring mode, the Arrow keys are used to navigate between the different screens, which display the measuring points in various ways, and the RESET key is used for alarm acknowledgement. The buttons are also used for menu control, to call up information and in service mode to change some of the settings. In section 4 „Operating Instructions" this is described in more detail.

2.2.2 LED status indicators

LED status indicators on the GMA200 controller show the following states during operation, depending on the event:

green LED „ON"	➔	Device in operating mode
yellow LED "SRV/SRQ"	➔	Service operation (continuously lit) / service request (flashing)
yellow LED "FLT/GMA"	➔	GMA malfunction
yellow LED "FLT/TRM"	➔	transmitter or measuring point malfunction
red LED "AL1"	➔	Alarm 1
red LED "AL2"	➔	Alarm 2
red LED "AL3"	➔	Alarm 3
red LED "R1…R8"	➔	Relay 1…8 (activated in case of alarm or malfunction)

If an alarm has been triggered, the corresponding red alarm LED will continue to flash until in the case of a non-latching the alarm condition is no longer fulfilled and this alarm is automatically reset. However, if the alarm condition for any alarm is still fulfilled and is "acknowledged" by pressing the RESET button or an external alarm acknowledgement input, the flashing of the LED

changes to a steady red light. If an additional alarm is triggered by another measuring point, the corresponding alarm LED starts flashing again.

2.2.3 LCD graphic display

In measuring mode, the measuring points are shown in the graphic display with numbers, designations and the current measured values. You can switch between the collective and individual displays using the operating keys. In the event of an alarm, the system automatically switches to the alarm display.
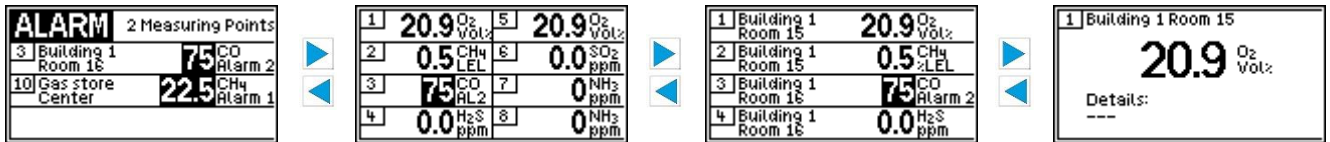
The LCD display is equipped with a red/green backlight, which can be made brighter by pressing any control button. In the event of an alarm or fault, the green backlight is automatically replaced by the red one. The display of faults (FLT), maintenance requests (SRQ) and other messages (MSG) is still possible even after they have been acknowledged by pressing the RESET button by choosing GMA status in the main menu.
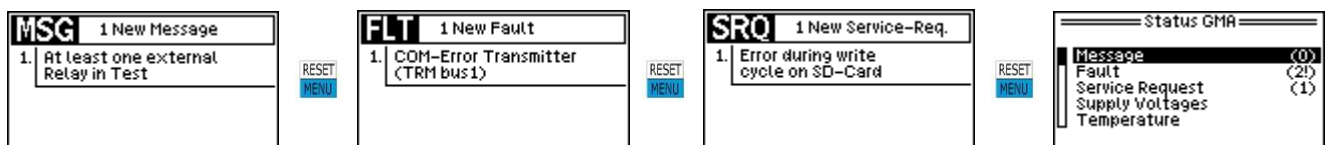
Further details on the displayed information, operation and menus are given in section 4 „Operating Instructions".

2.2.4 Internal relays

The GMA200-MT6/MT16 has a built-in horn for localized acoustic alarm. Like an "internal relay", the horn can be assigned to certain alarm functions and measuring points using the GMA200Config software.

2.2.5 USB socket and microSD slot

The USB socket serves exclusively as an interface for configuration purposes. GMA200-MT6/-MT16 can be configured for a wide range of measuring tasks by means of a PC or laptop connected via USB cable using the GMA200Config software.

The microSD slot is designed for normal microSD cards up to a capacity of 2GB. This memory card can be used as a data logger if the GMA200 is configured for the data logger option (see section 2.8 „Memory card as data logger") for more information.

2.3 Analogue inputs

Up to 6 transmitters with analogue 4-20 mA or 0.2-1 mA interfaces in two-wire or three-wire technology can be connected directly to the GMA200-MT6. Up to 16 transmitters with analogue 4-20 mA or 0.2-1 mA interfaces can be connected directly to the GMA200-MT16. In this case only the current signals are connected to the GMA. With the GMA200-MT16, the power supply for these transmitters has to be provided separately. Whether a transmitter with a 4-20 mA signal or a transmitter with a 0.2-1 mA signal is connected to the analogue input can be configured using the GMA200Config software. Hardware-wise the analogue inputs are identical.

2.4 Digital RS485 interfaces

The GMA200-MT6/MT16 provides three digital RS485 interfaces. Up to 16 GfG transmitters with digital RS485 interfaces and up to four external relay modules GMA200-RT/RTD can be connected to two of these interfaces, the TRM-Bus1 and the TRM-Bus2. These external relay modules can also be connected to the third RS485 interface, the GMA bus. Alternatively, the GMA bus can be used to transmit measuring values, alarms and other status information on request to another device. Such a device can be a higher-level control unit, a PLC, a gateway or a panel PC for visualization of the measured data. The connections of the three digital RS485 interfaces are described in section 3.2 „Electrical Terminal Installation".

2.5 Relays

Internal relays

The GMA200-MT6/MT16 has a total of 8 relays internally, each with one potential-free normally open contact. To implement defined safety measures and alarms, 6 relays can be freely configured using the "GMA200Config" software program. A additional relay is available for safety-related fault indication and one more for indicating the maintenance status. The connections of the internal relay contacts are described in section 3.2 „Electrical Terminal Installation". If the number of internal relays is not sufficient, it can be extended by external relay modules.

External relay modules:

A relay module GMA200-RT/RTD enables the expansion by a further 16 freely configurable changeover relays. A total of 4 relay modules and thus 64 additional relays can be managed via the GMA200-MT6/MT16 controller. The GMA200-R relay modules are connected to the GMA200-MT6/MT16 controller via a digital RS485 interface, which also permits spatial separation of the relay modules (max. 1200 m).

Data transmission to external relay modules is typically performed with a cycle time of 1 s. However, if there are more than 16 transmitters and relay modules on the same TRM bus and the data transmission rate is 9600 baud, then the cycle time is extended from 1.0 to max. 1.3 s. If the data transmission is briefly disturbed, the reaction time of the relay module can be extended to <4 s. If the data transmission to the relay module is disturbed for a longer period of time, a fault is reported on the GMA200-MT6/MT16 from the third faulty data transmission in succession.

The relay module is not described in this operating manual (for reference see OM 222-000.44).

Configuration of the relays

The internal and external relays are configured exclusively via the GMA200Config software, which offers extensive options for assigning the relays to the alarm functions and to individual measuring points or measured value groups.

Configuration options:

- Open-circuit principle / closed-circuit 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)

2.6 External alarm acknowledgement

In addition to the internal RESET button, which is used for alarm acknowledgement of all measuring points, two external buttons can be connected, allowing alarms from individual measuring points or measuring point groups to be acknowledged remotely. The GMA200Config software is used to define which measuring point is assigned to which acknowledgement input. The connections of the alarm acknowledgement inputs are described in section 3.2 „Electrical Terminal Installation".

2.7 Analogue Outputs

The GMA200-MT6/MT16 also has two 4-20 mA analogue outputs that can be used to output the measured values of two measuring points. These analogue signals can be easily further processed by higher-level control systems, since the measured values are already linearized. The assignment of which measuring point is assigned to which analogue output can be set in the service menu of the GMA or with the GMA200Config software. The connections of the analogue outputs are described in section 3.2 „Electrical Terminal Installation". The following table shows 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 the start-up phase
approx. 0,0 mA	GMA fault (affecting the measured value acquisition of the measuring points)
1.0 mA (for 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 mA 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 mA to 20(22) mA	Measured value 0 % to 100(112.5) % of measuring range
22.0 mA	Measured value >=112,5 % of measuring range
manual specification	Test mode active (maintenance)

2.8 Memory card as data logger

The GMA200-MT6/MT16 can optionally be equipped with a data logger for storing measured values. A normal microSD card up to a capacity of 2GB can be used as a storage medium in the front of the device. This microSD card has to be formatted with FAT (FAT16). Further details on the operation of the data logger are described in section 4.2.3 „Data logger function" .

3   MOUNTING AND INSTALLATION

3.1 Mounting Location

The GMA200-MT6 and the GMA200-MT16 are designed for rail mounting in control cabinets or wall-mounted housings and must not be installed in hazardous areas. If possible, they should be mounted in such a way that they are not exposed to vibrations.

When using the side connectors, the connectors and the devices must be secured on both sides against sliding on the rail using top-hat rail locks.

3.2 Electrical Terminal Installation

The power supply and transmitter are connected according to the terminal assignment diagram, which can also be found on the GMA200 housing near the terminal covers.

This symbol shown on the terminal assignment diagrams means:
General warning, consult operation manual

For GMA200-MT6:

For GMA200-MT16:

Important note: The power supply of the transmitters connected to the GMA200-MT16 cannot be provided by the controller, but must be ensured by an additional terminal strip with an appropriate power supply.

3.2.1 Security advice

The electrical installation must always be carried out in accordance with DIN VDE 0100 or a comparable country-specific standard. Cables with voltages dangerous to the touch e.g. 230 Vac and cables with non-hazardous voltages e.g. 24 Vdc must be laid separately.

The cables used must be suitable for the connected transmitters or devices. If due to maintenance work the GMA200-MT6 or GMA200-MT16 is handled during operation, be aware that dangerous voltages may be present in the area of the relay terminals Y41-59. Contact with these areas must be avoided under all circumstances.

3.2.2 Potential-free relay contacts

Additional external warning devices such as indicator lights, acoustic signalling devices or similar can be connected to terminals Y41-59 (contacts of relays 1-8). The contacts of the adjacent relays 1&2, 3&4, 5&6 and 7&8 may only be operated with the same voltage category.

Voltages dangerous to the touch (e.g. 230 Vac) and protective low voltages (e.g. 24 Vdc) must not be connected together to these adjacent relays.

3.2.3 Voltage supply with 24 Vdc

The voltage supply of a GMA200-MT6/MT16 is usually provided by an external 24 Vdc power supply unit. This voltage is connected to terminals Y12 (24 V DC1) and Y11 (GND). As an option, a second 24V DC power supply unit can also be connected to terminals Y13 (24 V DC2) and Y14 (GND) for redundant power supply. The power supply unit used should comply with EN60950-1, or have reinforced or double insulation between the mains circuit and the output voltage circuit, as is the case with devices of protection class II (protective insulation $\square$).

If the GMA200-MT6/MT16 is operated on a 24 Vdc supply, it has to be safety extra-low voltage (SELV) or protective extra-low voltage (PELV). Otherwise, the same requirements apply to the insulation of this 24 Vdc supply as for the power supply units described above.

3.2.4 Connecting transmitters with analogue interface

With the GMA200-MT6, six transmitters with analogue 4-20 mA or 0.2-1 mA output signals can be connected to terminals Y21-39. Three connection terminals (I_{IN}, 24 V, GND) are available per transmitter. For transmitters with two-wire technology, only two terminals (I_{IN}, 24 V) are required. The wire cross-section depends on the current consumption of the transmitter and the cable length. Please refer to the operating manual of the connected transmitters for detailed information.

With the GMA200-MT16, only the signal lines of 16 transmitters with analogue 4-20 mA or 0.2-1 mA interface can be connected to terminals Y21-38. Only one terminal (I_{IN}) is available per transmitter, so that the power supply of the transmitters has to be separate and connected via external terminals.

Important note: If 24 Vdc is inadvertently connected to the I_{IN} terminals, the GMA input may be damaged or destroyed.

3.2.5 Connecting transmitters with digital interface (RS485)

Transmitters with a digital interface (RS485) can be connected to terminals Y61-63 (TRM-Bus1) or Y64-66 (TRM-Bus2). Three connection terminals (GND, DO-, D1+) are available per transmitter bus. The 24 V supply of the transmitters is connected differently depending on the GMA200 type.

For the GMA200-MT6, unused 24 V terminals (Y22, Y25, Y28, Y32, Y35 or Y38) can be used for the 24V transmitter supply. However, the total current consumption of all connected transmitters must not exceed 900 mA. Please refer to the operating manual of the connected transmitters for detailed information. The wire cross-section depends on the current consumption of the transmitter and the cable length. With the GMA200-MT16, the 24 Vdc power supply for the transmitters must be provided separately and connected via external terminals.

The picture on the right shows three red slide switches with which a 120 Ohm terminating resistor can be switched on for each of the bus connections if the GMA is connected at the end of the line. (Factory setting: TRM-Bus1=ON; TRM-Bus2=ON; GMA-Bus=OFF)

3.2.6 Connecting further devices with a digital interface (RS485)

To expand the GMA200-MT6/MT16 with additional relays, further relay modules can be connected to terminals Y61-63 (TRM-Bus1), Y64-66 (TRM-Bus2) or Y67-69 (GMA-Bus) or to the GMA-Bus connector. If the GMA bus is used for this extension, the GMA bus connection has to be configured as master (Adr.0).

To further process the measured data of the GMA200-MT6/MT16, a central unit or a corresponding bus interface can be connected to terminals Y67-69 (GMA bus) or the GMA bus connector. In this case, the GMA200 bus connection must be configured as slave (Adr. 1...247).

3.2.7 Using the alarm acknowledgement inputs(Reset1+2)

Terminals Y15 and Y16 provide the two freely configurable alarm acknowledgement inputs (Reset1, Reset2) for the connection of external acknowledgement buttons.

If the reset input is configured accordingly, the alarm is acknowledged when an edge changes to GND.
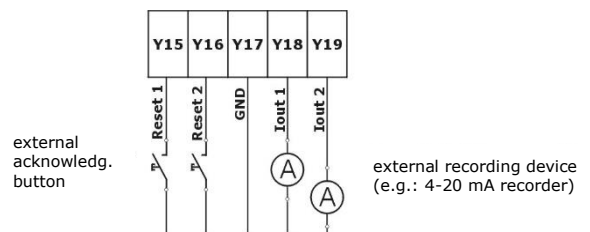
In section 4.2.2.2 „Alarm acknowledgement (reset)" their functionality is described in detail.

3.2.8 Use of the 4-20 mA current outputs

There are two freely configurable 4-20 mA current outputs (Iout1, Iout2) at terminals Y18 and Y19. External recording devices or recorders can be connected to these outputs against GND (see image in section3.2.7"Using the alarm acknowledgement inputs").

3.3 Commissioning

The installation of the GMA200-MT6/MT16 and all transmitters as well as all additional control modules has been completed and the power supply has been ensured, commissioning can be carried out.

According to national regulations, gas detection devices must be checked for proper operation by a qualified person after installation and before initial operation. In Germany, the following standards apply: "DGUV Information 213-056 (leaflet T 021 / previously BGI 836 Section 8.1)" and "DGUV Information 213-057 (leaflet T 023 / previously BGI 023 Section 8.1)".

3.4 Examples of different system variants

In the following two illustrations, transmitters with analogue interfaces are connected to the GMA200-MT6 in star wiring. In the right illustration, an external relay module GMA200-RT is connected to the GMA bus or one of the TRM buses.

In the following two illustrations, transmitters with digital interfaces are connected via bus cabling (on the left as separate strings on TRM-Bus1 and TRM-Bus2 and on the right as a ring on the TRM ring bus). In both cases two more relay modules are connected to the GMA bus.
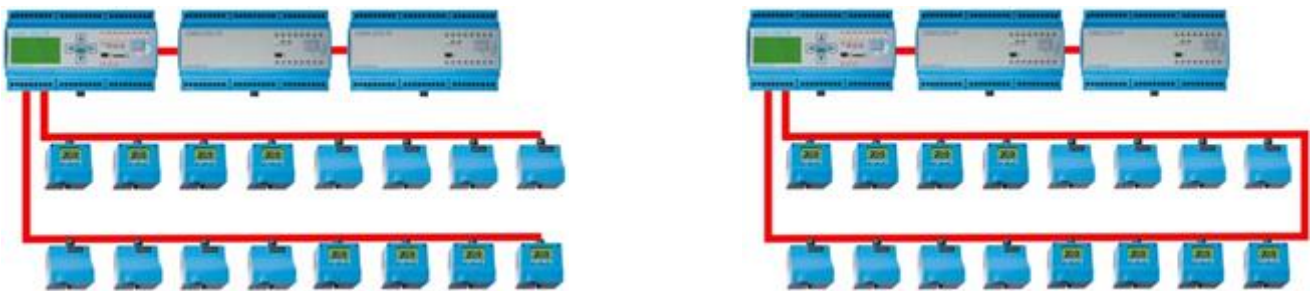
In the following two illustrations, transmitters with digital interfaces are connected via bus cabling (on the left as separate strings on TRM-Bus1 and TRM-Bus2 and on the right as a ring on the TRM ring bus). In both cases a gateway is also connected to the GMA bus for further data processing.
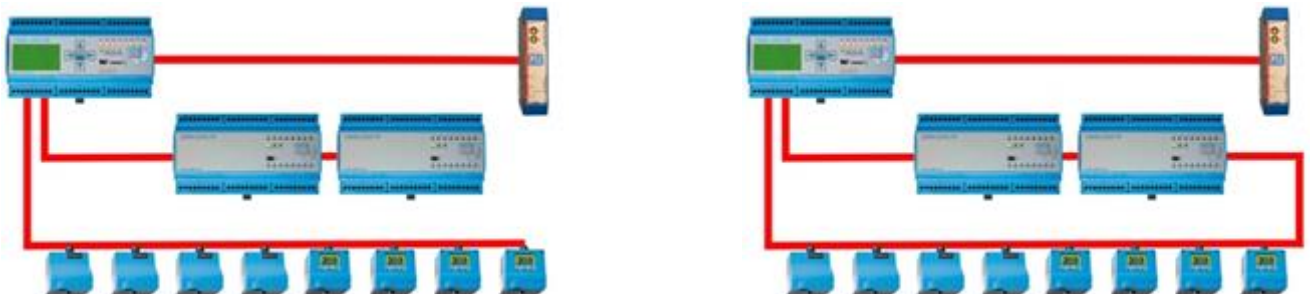
4 Operating Instructions

4.1 Control buttons and operation

With the control buttons of the GMA200, alarms and messages can be acknowledged on the display. They can also be used to navigate in the main menu and the service menu. They can even be used to change some of the configuration settings in the service menu. The functions of the individual keys and how to navigate through the menus are described below:

Key **Function on actuation:**

RESET MENU
Alarm acknowledgement for latching alarms (with short keystroke)
Activation of main menu (if key is pressed >3 s)

▶
Access to detailed information in the main menu (see section 4.4 „Main menu"), modification of the measuring point display up to the individual measuring point display, change from alarm display function to display function, selection of cursor position Password entry Service menu.

	Toggle through menu items in the main menu, in case of single measuring point display to single display of other measuring points, toggle to total display (1-8, 9-16), select numerical values for entering the password in the service menu.
	Function when pressed: Exit the detailed information in the main menu, exit the main menu, change the display until all measuring points are shown in the display, change from display function to alarm display function, select cursor position for entering the password in the service menu.
	Function when pressed: Toggle through menu items in the main menu, with single measuring point display to single display of other measuring points, activation of the auto scroll function (10 sec. or 10 min., automatic switching of the displayed data), digit selection for entering the password in the service menu.

If the GMA200 is in measuring mode, the menus are accessed by pressing and holding the key RESET MENU . The main menu is then displayed first. From there you can also switch to the "Service menu".

4.2 Measuring mode

Normal measuring operation of the GMA200 is reached approx. 30 seconds after switching on the power supply. A brief optical signal indicates readiness for measurement.

Depending on the transmitter type and its running-in time, the "SRT" is displayed next to the respective measuring point during the running-in time. Typically, the run-in time is between 1 and 2 minutes, depending on the transmitter.

In the normal measuring mode, all LEDs are inactive and the ON indicator is lit green. The display shows all configured measuring points (up to max. 8 measuring points, see section 2.2.3 „LCD graphic display", for changes to the displayed information see section 4.1).

4.2.1 Measuring ranges and tolerance band (dead band)

The measuring ranges can be displayed in the main menu of the GMA200 under "Info measuring points" (see section 4.4.4). For a better overview, the details of the configured measuring ranges with range starts, tolerance bands and resolutions are documented on the "Measuring point overview" page of the supplied GMA200 configuration document.

With older, purely analogue gas transmitters (such as the CS21, CI21, EC24), the tolerance band is used to suppress small fluctuations in measured values in the zero point range for toxic and flammable gases from the GMA200. When measuring oxygen, slight fluctuations of 20.9 vol% O_2 (fresh air range) may be suppressed. To avoid leaps, the display value is adjusted to the actual measured value up to twice the value of the tolerance band. This tolerance band is always activated, but can be switched off for individual measuring points by means of the GMA200Config software.

With processor-controlled transmitters with analogue or digital output signal (e.g. CS22, EC22, CC28), such small fluctuations in measured values are already suppressed in the transmitter. The tolerance band can be deactivated here directly at the transmitter. The operating manuals of these gas transmitters describe the measuring range, tolerance band and resolution in more detail.

4.2.2 Alarms

Three alarm thresholds within the measuring range can be configured for each measuring point. If the alarm thresholds are exceeded or undercut, the red alarm LEDs AL1, AL2, AL3 (collective alarm display) and the integrated acoustic alarm are activated. Detailed information on the gas concentration level, alarm status (AL1, AL2 or AL3) of the respective measuring point are simultaneously shown on the graphic display (see section 2.2.3 „LCD graphic display").
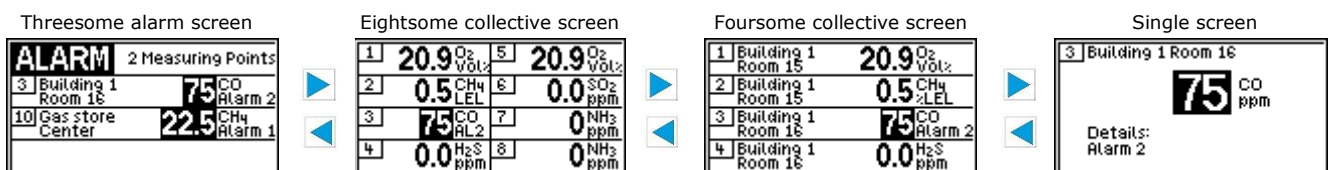
In addition, depending on the configuration, the configured relays and the Relay LEDs R1-R6 (typical configuration) are activated.

4.2.2.1 Alarm configurations

With the GMA200Config software, the following settings can be configured for each measuring point:

Alarm threshold Alarm 1 (can be modified in the main menu / service menu)
Alarm threshold Alarm 2 (can be modified in the main menu / service menu)
Alarm threshold Alarm 3 (can be modified in the main menu / service menu)
Alarm exceeding, latching
Alarm exceeding, non-latching
Alarm undercut, latching
Alarm undercut, non-latching
Alarm with switch-on delay (up to max. 3 minutes)
Alarm with switch-off delay (up to max. 60 minutes)

4.2.2.2 Alarm acknowledgement (reset)

The behaviour of the alarm LEDs before and after alarm acknowledgement is described in section 2.2.2 „LED status indicators".

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

Latching alarm:
A latching alarm remains in effect even if the gas concentration is below (above) the alarm thresholds. The alarm and the assigned relay(s) can only be acknowledged with the RESET button on the controller once the alarm threshold has been undercut (exceeded). Alternatively, an acknowledgement is then also possible using the external reset inputs if these are configured accordingly.

Acknowledgeable alarm relay:
Relays can be configured to be acknowledgeable and are reserved exclusively for connection with acoustical/optical messages. The acknowledgement can be be done by pressing the RESET button on the controller module. Alternatively, an acknowledgement is also possible using the external reset inputs if these are configured accordingly.

4.2.3 Data logger function

If the GMA200 is equipped with the optional data logger, the measured values from all measuring points can be stored on a FAT(FAT16)-formatted microSD card.

The measured values are always saved in an average value file with a configured recording interval and a configured file replenishment. In this file, the minimum and maximum values for each measuring point are stored for each interval in addition to the average values, so that no essential information is lost even with longer recording intervals. (Factory setting = 5 minutes)

As soon as an alarm is triggered, the actual values of all measuring points are also stored in an additional alarm file, usually at a shorter recording interval. (Factory setting = 10 seconds)

The data logger is configured via the GMA200Config software. This allows the recording intervals for both file types to be set as follows:

- Average file: 5/10/15/20/30 seconds or 1/2/3/5/10/15/20/30/60 minutes
- Alarm file: 5/10/15/20/30/60 seconds

Depending on the configuration, the measured values are saved under a calendar file name. For example, the times at which new files are created can be configured as follows:

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

*M=mean value / A=Actual values in the case of an alarm

To read out the data, the SD card has to be removed.

Before removing the SD card, the data recording must be temporarily stopped as follows (pause function)

- Activate the main menu of the GMA200 by pressing and holding the key
- Select "Status data logger" and confirm by pressing the key
- Select "Stop REC by pressing the key In this menu item the status (still available memory capacity) is also displayed.
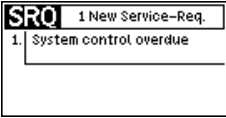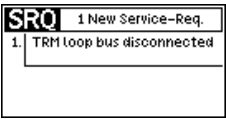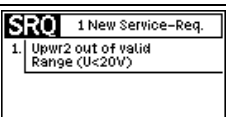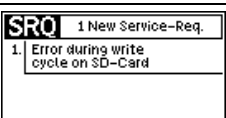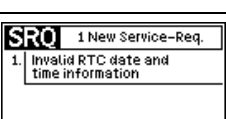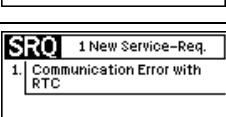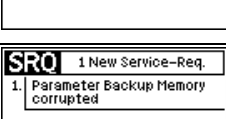
If the SD card is inserted into the slot again after reading, data recording can be restarted in the same menu item by pressing "Start REC". If this is not done manually, an automatic recording start is initiated 15 minutes after the recording stopped.

However, if the SD card will not be inserted again within these 15 minutes and the data logger is configured to trigger a maintenance request in case of a missing or faulty SD card, then the data recording should be switched off correctly in the service menu. This is described in section 4.5.2 „Service Menu / "Datalogger".

4.2.4 Maintenance request

During normal measuring operation, a maintenance request (SRQ) can be triggered. In this case, the yellow LED "SRV/SRQ" flashes and a corresponding message appears on the display. Optionally, relays can be parameterized to switch when maintenance is required. The maintenance request has no influence on the normal measuring operation. The SRQ message in the display can be acknowledged by pressing the "RESET" button. Via the "Main menu" the message can still be called up under "Status GMA" / "Maintenance required". There are the following options that can trigger a maintenance request:

Maintenance request by the GMA200

Service Request	Cause and remedy
SRQ 1 New Service-Req. 1. System control overdue	In this case the deadline for the next system check was exceeded, which usually has to be carried out once a year. **Remedy** The system check should be performed as soon as possible. The date for the system check can only be changed with the GMA200Config software.
SRQ 1 New Service-Req. 1. TRM loop bus disconnected	The TRM ring bus, whose cabling starts at the connections of TRM bus1, leads to all transmitters one after the other, possibly also relay modules, and then ends at the connections of TRM bus2, was interrupted at at least one point. If not a communication fault is reported at the same time, then at least all bus participants can still be reached. **Remedy** Check bus cabling as soon as possible and repair it if necessary.
SRQ 1 New Service-Req. 1. Upwr2 out of valid Range (U<20V)	This maintenance request appears if monitoring of both supply inputs is configured on the GMA200, but then one of the two supply voltages (Upwr2 or Upwr1) becomes too low or fails. **Remedy** The failed supply voltage should be restored as soon as possible.
SRQ 1 New Service-Req. 1. Error during write cycle on SD-Card	An error has occurred while writing to the SD card, so that the data logger no longer records data. The cause may be a defect in the SD card itself or in its contacts. It is also possible that the SD card was removed without stopping the data recording (permanently). **Remedy** Remove the card and read out and save the data on the PC. Then format the SD card with FAT and reinsert it 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 date and time are lost. **Remedy** Set the date and time in the service menu. If this happens again, call 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, measured value acquisition and evaluation runs independently of this time information. **Remedy** Set the date and time in the service menu. If this happens again, call 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 data stored in the second parameter memory (e.g. designation texts) cannot be accessed. This means that no backup copy of the parameters is available in the RAM. **Remedy** If this maintenance request is still displayed as current in the main menu, then the GfG service should be called (replace GMA200).
SRQ 1 New Service-Req. 1. Parameter Backup Memory corrupted	The parameters stored in the backup copy are incorrect. Copying the parameters from the RAM to the backup copy did not eliminate this error either. **Remedy** If this maintenance request is still displayed as current in the main menu, then the GfG service should be called (replace GMA200).

	Temperature on the mainboard of the GMA is outside the permissible range (T<-30 °C) respectively (T>85 °C). If the temperature doesn't really has this value, it indicates a hardware defect on the GMA mainboard. If the temperature falls below -30°C, the measured values in the display are also updated much more slowly.
SRQ 1 New Service-Req. 1. Temperature out of valid Range (T<-30°C)	**Remedy** Normalize temperature influence or, if necessary, call GfG service (replace GMA).
SRQ 1 New Service-Req. 1. Temperature out of valid Range (T>85°C)	

Maintenance request by the transmitter

Service Request		Cause and remedy
3 Building 1 Room 16 **-5.5** CH₄ %LEL Details: Underrange, SRQ	3 Building 1 Room 16 ↓↓↓ CH₄ %LEL Details: Underrange, SRQ	At the transmitter the signal zero point has drifted away negatively, so that the measuring range of the transmitter was clearly undercut (under range typ. <-5 % of measuring range). **Remedy:** Thezero point of the transmitter needs to be adjusted.
1 20.9 %O₂ SRQ 5 20.9 %O₂ 2 0.0 CH₄ LEL 3 0 CO ppm 4 0.0 H₂S ppm	1 Building 1 Room 15 **20.9** O₂ Vol% Details: SRQ	Maintenance request for a transmitter with digital RS485 interface. In this example, the sensor hast to be replaced as it will soon be used up. A corresponding message or signal is given at the transmitter. **Remedy** Call GfG service (replace sensor if necessary).

4.3 Special states

The device can be in various special states.

4.3.1 System start

Boot V1.32 GMA 200

V2.10 GMA 200

At system startup the GfG logo, the device name and first the version number the bootloader and then the version number of the mainboard firmware is displayed.

During this time various internal self-tests are carried out. After completion of the internal tests, a short test of the display, all LEDs and the horn is performed.

During the whole time the yellow fault LED FLT/GMA is on, the relays are de-energized and the analogue outputs provide approx. 0 mA.

If no errors have occurred during the internal self-tests, the instrument then switches to the special state Startup (warm-up time) or to normal measuring operation.

4.3.2 Startup (warm-up time)

The connected transmitters usually require a warm-up time. To enable digital transmitters to perform their own start-up, the GMA200 waits 30 seconds after power-on before addressing transmitters equipped with a digital RS485 interface.

1 --- O₂ SRT	5 --- O₂ SRT
2 --- CH₄ SRT	6 --- SO₂ SRT
3 --- CO SRT	7 --- NH₃ SRT
4 --- H₂S SRT	8 --- NH₃ SRT

1 Building 1 Room 15
--- O₂ Vol%
Details:
Fault, Start-Up

Even if only transmitters with an analogue interface are connected, the wait time is at least 30 seconds. Depending on the connected transmitter, the warm-up time can vary in length and last from 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 and sensor type, they can switch to normal measuring operation at different times. During this time an appropriately configured current output provides 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 on and only turns off when all measuring points are ready for operation.
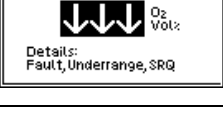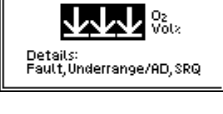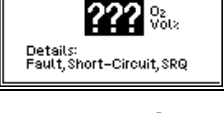
4.3.3 Fault
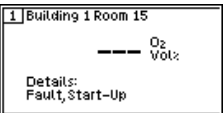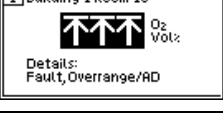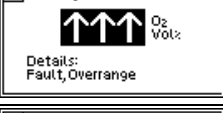
With fault messages, a distinction is made between faults in the transmitter (yellow LED "FLT/TRM") and faults in the GMA controller (yellow LED "FLT/GMA"). In the event of a fault, the respective yellow LED lights up statically, the corresponding fault relay is de-energized and the correspondingly configured current output provides either 1.2 mA or approx. 0 mA, depending on the cause of the fault. Fault messages are not latching.
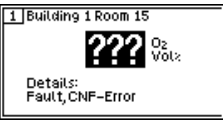
The following fault messages apply to transmitters with **analogue** interface (**mA**):

Fault [FLT/TRM]	Cause and remedy
1 Building 1 Room 15 ↑↑↑ O₂ Vol% Details: Fault, Overrange/AD	In this case the level of the analogue transmitter signal exceeds the current measuring range of the GMA200-M (I_{IN} >24 mA respectivly I_{IN} >1,2 mA). This may be caused by a too high gas concentration at the transmitter or a defect at the transmitter or in the wiring. **Remedy** If it is ensured that the gas concentration is not high, the output signal has to be checked directly at the transmitter. Replace the transmitter if necessary. Otherwise the transmitter wiring must be checked and repaired if necessary.
1 Building 1 Room 15 ↑↑↑ O₂ Vol% Details: Fault, Overrange	In this case the measuring range of the transmitter was exceeded to such an extent that the signal level has reached the error level. The current intensity that defines the error level is transmitter-dependent (e.g. 22...24 mA or 1.1...1.2 mA). **Remedy** The gas concentration at the measuring point has to be reduced.
1 Building 1 Room 15 ↓↓↓ O₂ Vol% Details: Fault, Underrange, SRQ	In this case, the measuring range of the transmitter was undercut so far that the signal level has reached the error level. The current intensity that defines the error level is transmitter-dependent (e.g. 2.8 mA or 0.14 mA). **Remedy** If it can be excluded that gas is present at the measuring point causes a negative cross-sensitivity with the sensor, then the zero point should be adjusted at the transmitter.
1 Building 1 Room 15 ↓↓↓ O₂ Vol% Details: Fault, Underrange/AD, SRQ	In this case the level of the analogue transmitter signal falls below the current measuring range of the GMA200-M (I_{IN} = 0 mA). The reason can be a lack of power supply of the transmitter, a defect of the transmitter or a line interruption. **Remedy** If it is ensured that the power supply of the transmitter is OK, the output signal has to be checked directly at the transmitter. Replace the transmitter if necessary. Otherwise the transmitter wiring must be checked and repaired if necessary.
1 Building 1 Room 15 ??? O₂ Vol% Details: Fault, Short-Circuit, SRQ	In this case a short circuit in the transmitter cable or at the cable end on the side of the transmitter is detected. The analogue current signal does not behave as if it came from a current source. **Remedy** Check the current signal at the GMA200 input and the transmitter output with a current meter. If necessary, check and repair the cable routing from the transmitter to the GMA200.

Note: **The relevant instructions in the operating manuals of the connected transmitters must also be observed.**
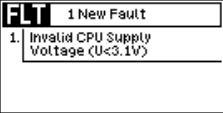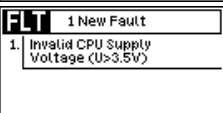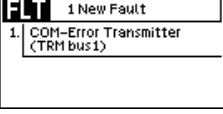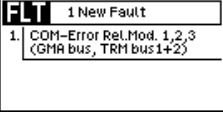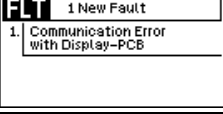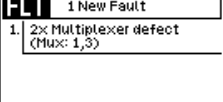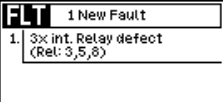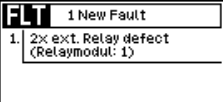
The following fault messages apply to transmitters with **digital** interface (**Bus**):
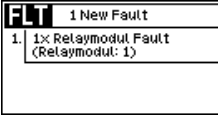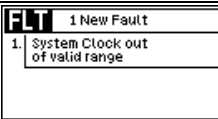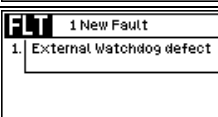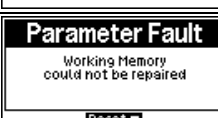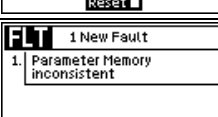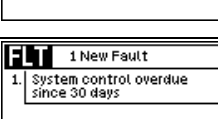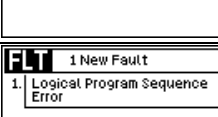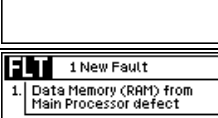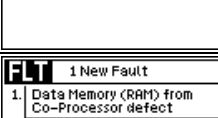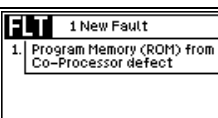
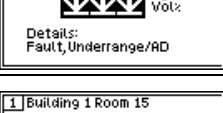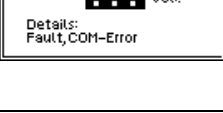| Fault [FLT/TRM]	Cause and remedy
1 Building 1 Room 15 ─ ─ ─ O₂ Vol% Details: Fault, Start-Up	The transmitter is in the start-up phase. During this time the sensor is run in or warms up. This run-in period depends on the transmitter and sensor and can last several minutes. **Remedy** Please wait until the process is completed.
1 Building 1 Room 15 ↑↑↑ O₂ Vol% Details: Fault, Overrange/AD	In this case the sensor signal in the transmitter has exceeded the measuring range of the transmitter electronics. This may be caused by a too high gas concentration at the transmitter or a gas with a very high cross-sensitivity. It may also be that the sensor or the transmitter electronics are defective. **Remedy** If it is ensured that it is not due to a high gas concentration or a gas with a high cross-sensitivity, then the transmitter has to be checked. Please also refer to the operation manual of the transmitter.
1 Building 1 Room 15 ↑↑↑ O₂ Vol% Details: Fault, Overrange	In this case, the sensor signal in the transmitter has clearly exceeded the transmitter's measuring range (usually >112 %). This may be caused by a too high gas concentration at the transmitter or a gas with a very high cross-sensitivity. It may also be that the sensor or the transmitter electronics are defective. **Remedy** If it is ensured that it is not due to a high gas concentration or a gas with a high cross-sensitivity, then the transmitter has to be checked. Please also refer to the operation manual of the transmitter.
1 Building 1 Room 15 ↓↓↓ O₂ Vol% Details: Fault, Underrange	In this case, the sensor signal in the transmitter has clearly fallen below the transmitter's measuring range (usually <-7.5 %). It is possible that a gas with a negative cross-sensitivity is present at the point of measurement or that the zero point signal has drifted away due to ageing of the sensor or environmental influences. **Remedy** Please also refer to the operation manual of the transmitter.
1 Building 1 Room 15 ↓↓↓ O₂ Vol% Details: Fault, Underrange/AD	In this case the sensor signal in the transmitter has fallen below the measuring range of the transmitter electronics. It is possible that a gas with a negative cross-sensitivity is present at the point of measurement or that the zero point signal has drifted away due to ageing of the sensor or environmental influences. **Remedy** Please also refer to the operation manual of the transmitter.
1 Building 1 Room 15 ??? O₂ Vol% Details: Fault, COM-Error	In this case the communication between the GMA and a digital transmitter is disturbed. The cause could be a missing power supply of the transmitter, a wrong bus assignment, a wrongly set bus address or baud rate at the GMA200-M or at the transmitter. It could also be a hardware-related interruption of the communication line or the lines have been connected incorrectly. However, a defect in the transmitter could also have led to the malfunction. **Remedy** Check the power 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 adjust if necessary.
1 Building 1 Room 15 ??? O₂ Vol% Details: Fault, TRM-Error	In this case the digital transmitter is malfunctioning. Possibly the supply voltage of the transmitter is too low or too high or there is a defect in the transmitter itself. **Remedy** Check the power supply of the transmitter and if necessary check the transmitter itself. Please refer to the operating manual of the transmitters for detailed information.
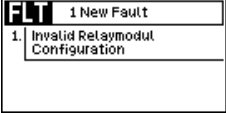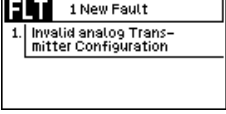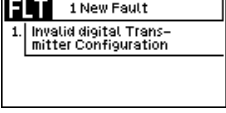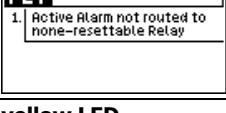
	In this case the configuration in the GMA does not match the configuration of the connected transmitter. There may be differences in gas type, unit, measuring range or number of decimal places. However, it is possible that merely the assignment of the transmitter is incorrect due to an improper bus address.
1 Building 1 Room 15 **???** O₂ Vol% Details: Fault, CNF-Error	**Remedy** Check correct transmitter assignment and bus address. Check the correct measuring range setting on the transmitter and if necessary correct. Otherwise, adjust the configuration of the measuring point in the GMA.

Note: **The relevant instructions in the operating manuals of the connected transmitters must also be observed.**

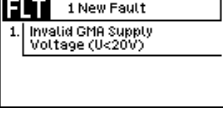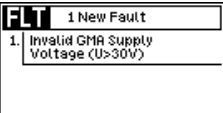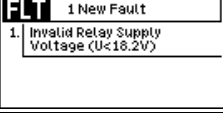The following fault messages apply to the GMA itself:

Fault [FLT/GMA]	Cause and remedy
FLT 1 New Fault 1. Invalid GMA Supply Voltage (U<20V) **FLT** 1 New Fault 1. Invalid GMA Supply Voltage (U>30V)	For configuration, the GMA can be **supplied with power from the PC** via USB cable. In this case, the message "Invalid GMA supply voltage (U < 20 V)" is always displayed along with the message "Invalid relay supply voltage (U < 18.2 V)". This is normal in this case. Otherwise the supply voltage of the GMA200 is too low (U < 20 V) or too high (U > 30 V)>. The reason could be a defective power supply unit or the malfunction of the redundant power supply. **Remedy** For normal operation, check power supply and replace power supply unit if necessary.
FLT 1 New Fault 1. Invalid Relay Supply Voltage (U<18.2V) **FLT** 1 New Fault 1. Invalid Relay Supply Voltage (U>19.5V)	For configuration, the GMA can be **supplied with power from the PC** via USB cable. In this case the message "Invalid relay supply voltage (U < 18.2 V)" is always displayed along with the message "Invalid GMA supply voltage (U< 20 V)". This is normal in this case. If the impermissible relay supply voltage is only reported 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), it indicates that the GMA200 is defective. **Remedy** Call GfG service.
FLT 1 New Fault 1. Invalid CPU Supply Voltage (U<3.1V) **FLT** 1 New Fault 1. Invalid CPU Supply Voltage (U>3.5V)	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 in the GMA200. **Remedy** Call GfG service.
FLT 1 New Fault 1. COM-Error Transmitter (TRM bus1)	Communication error between the GMA200-M and a transmitter on the TRM bus1. The cause could be a missing power supply of the transmitter, a wrong bus assignment, a wrongly set bus address or baud rate at the GMA200-M or at the transmitter. It could also be a hardware-related interruption of the communication line or the lines have been connected incorrectly. However, a defect in the transmitter could also have led to the malfunction. **Remedy** Check the Power 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 adjust if necessary.
FLT 1 New Fault 1. COM-Error Rel.Mod. 1,2,3 (GMA bus, TRM bus1+2)	Communication error between the GMA200-M and external relay modules GMA200-R. In this case there should be one relay module on the GMA bus, one relay module on the TRM bus1 and one relay module on the TRM bus2. This could be caused by a lack of power supply to the relay modules, incorrectly set baud rates or bus addresses on the GMA200-M or the GMA200-R. The relay modules could have been simply mixed up here, for example. It could also be a hardware-related interruption of the communication line or the lines have been connected incorrectly. **Remedy** Check the power supply of the relay modules, correct device assignment, the setting of the bus addresses and baud rates and adjust correctly if necessary. Check bus cabling and adjust if necessary.
FLT 1 New Fault 1. Communication Error with Display-PCB	The internal communication between mainboard and displayboard is disturbed. The most probable cause is a defect in the ribbon cable connecting both circuit boards. A defect on one of the two circuit boards is also possible. **Remedy** Replace ribbon cable as a precaution and call GfG service if necessary.
FLT 1 New Fault 1. 2x Multiplexer defect (Mux: 1,3)	A persistent error has occurred at the corresponding multiplexers of the analogue input signals. The reason for this may have been a contact problem on the mainboard or an excessive error voltage at the analogue inputs. **Remedy** If the error occurs repeatedly after a restart, the GMA200 has to be replaced.
FLT 1 New Fault 1. 3x int. Relay defect (Rel: 3,5,8)	The switching function may no longer be possible at the corresponding internal relays. The reason for this may have been a contact problem on the mainboard or an excessive error voltage at the analogue inputs. **Remedy** If the error occurs repeatedly after a restart, the GMA200 has to be replaced.
FLT 1 New Fault 1. 2x ext. Relay defect (Relaymodul: 1)	The switching function may no longer be possible at the relays of the external relay modules GMA200-RT/-RTD. This can 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, it has to be replaced.
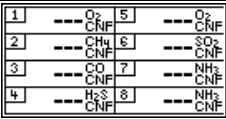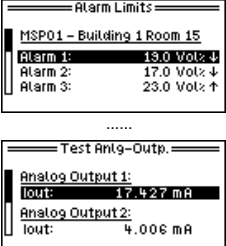
FLT 1 New Fault 1. 1x Relaymodul Fault (Relaymodul: 1)	An external relay module GMA200-RT/-RTD signals a fault. There can be various reasons for this (e.g. wrong supply voltage, defective program memory, defective data memory, defective parameter memory, etc.) **Remedy** If the external relay module is equipped with a display, the displayed information can be used for error analysis. If there is no display, first check its supply voltage and then, if necessary, connect to the GMA200Config software via the USB port. If the cause cannot be found and eliminated, the external relay module has to be replaced.
FLT 1 New Fault 1. System Clock out of valid range	The system cycle of the GMA200 is too fast or too slow, or the reference cycle is disturbed. The cause is a hardware defect on the mainboard. It is possible that communication via the RS485 buses and the USB interface is also disturbed. **Remedy** The GMA200 has to 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 has to be replaced.
Parameter Fault Working Memory could not be repaired Reset ■	The parameters in the main memory contain incorrect data that cannot be corrected automatically due to a hardware defect on the mainboard. **Remedy** If the error still occurs after restarting the GMA200, the GMA200 has to be replaced.
FLT 1 New Fault 1. Parameter Memory inconsistent	The parameters in the RAM and in the backup copy are each without errors, but have different contents. 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 and, if necessary, corrected with the GMA200Config software.
FLT 1 New Fault 1. System control overdue since 30 days	The malfunction was triggered because the deadline for the system check was exceeded by at least 30 days. The fact that this triggered a fault has been configured as an option. **Remedy** Carry out system check and have a new date set for the system check.
FLT 1 New Fault 1. Logical Program Sequence Error	The normal program operation is disturbed, so that a correct function of the GMA200 is no longer guaranteed. Possibly there is a defect on the mainboard or the display board. **Remedy** The GMA200 will automatically restart three seconds after this error occurs. If this error is reported again, the GMA200 has to be replaced.
FLT 1 New Fault 1. Data Memory (RAM) from Main Processor defect	The RAM of the main processor on the mainboard is defective. **Remedy:** The GMA200 will automatically restart three seconds after this error occurs. If this error is reported again the GMA200 has to be are replaced.
FLT 1 New Fault 1. Data Memory (RAM) from Co-Processor defect	Memory of the slave processor on the display board is defective. **Remedy** If the error occurs repeatedly after a restart, the GMA200 has to be replaced.
FLT 1 New Fault 1. Program Memory (ROM) from Main Processor defect Boot V1.32 **GfG** GMA 200 Error: Main	The program in the program memory of the main processor on the mainboard is faulty. **Remedy** The GMA200 will automatically restart three seconds after this error occurs. If the check of the program memory by the bootloader shows again an error, then a GfG service technician has to carry out a firmware update. If the error cannot be eliminated by the update, the GMA200 has to be replaced.
FLT 1 New Fault 1. Program Memory (ROM) from Co-Processor defect	The program in the program memory of the slave processor on the display board is faulty. **Remedy** If the error still occurs after restarting and cannot be removed by a GfG service technician with a firmware update, the GMA200 has to be replaced.
FLT 1 New Fault 1. Co-Processor is running in Bootloader	After a restart 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 has to be performed using 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 or was not installed properly due to a memory defect. **Remedy** If the error still occurs after restarting the GMA, the GMA has to be replaced.
FLT 1 New Fault 1. No Bootloader installed on Co-Processor	The bootloader of the slave processor on the display board does not work properly or was not installed correctly due to a memory defect. **Remedy** If the error still occurs after restarting the GMA, the GMA has to be replaced.

FLT 1 New Fault 1. Invalid Relaymodul Configuration	For at least one of the following reasons, this configuration for an external relay module is not permitted: - Although the TRM busses are configured as a ring under "General" in "Bus Communication", either TRM bus 1 or TRM bus 2 was configured for the external relay module during bus connection. - Although the TRM busses are **not** configured as a ring under "General" in "Bus Communication", the TRM ring bus was configured at the bus connection for the external relay module. - Although under "General" in "Bus Communication" the setting of the GMA bus address 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 are assigned the same bus address. **Remedy** Check and correct the configuration for the external relay modules with the GMA200Config software. Call GfG service.
FLT 1 New Fault 1. Invalid analog Transmitter Configuration	For one of the following reasons, this configuration for transmitters with analogue interface is not permitted: - At least one analogue transmitter connection is assigned to several measuring points. - The number of analogue transmitter connections, depending on the GMA200 type, has been exceeded. (e.g. max. 4 for GMA200-MW4 or max. 6 for GMA200-MT6) - At least one linearization table is incorrectly assigned to a transmitter with an analogue interface, because the linearization table was changed after the assignment. **Remedy** Check and correct the configuration for measuring points with analogue interface with the GMA200Config software. Call GfG service.
FLT 1 New Fault 1. Invalid digital Transmitter Configuration	For one of the following reasons, this configuration for transmitters with digital interface is not permitted: - Although the TRM busses are configured as a ring under "General" in "Bus Communication", the digital interface for a transmitter was configured either for TRM-Bus1 or TRM-Bus2. - Although the TRM busses are **not** configured as a ring under "General" in "Bus Communication", the TRM ring bus was configured for the digital interface of a transmitter. - Several digital transmitters on the same bus are assigned the same bus address. **Remedy** Check and correct the configuration for measuring points with digital interface with the GMA200Config software. Call GfG service.
FLT 1 New Fault 1. Active Alarm not routed to none-resettable Relay	Invalid relay or alarm configuration. At one measuring point an alarm was configured which is not linked to any relay. **Remedy** Check and correct the configuration for all measuring points with the GMA200Config software. Call GfG service.
yellow LED "FLT/GMA" lights up, although no fault is displayed under "Status-GMA"	If the GMA200 is working 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 not be entirely okay. A defect on one of the two circuit boards is also possible. **Remedy** Replace ribbon cable as a precaution and call GfG service if necessary.
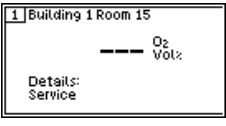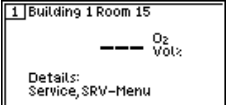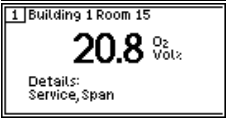
4.3.4 Maintenance

Maintenance mode is indicated when the safety function of the GMA200 is only available to a limited extent or no longer at all due to deliberate intervention by an operator or service personnel. In any case, maintenance is indicated by the yellow LED "SRV/SQR" being permanently lit and by the maintenance relay being switched on. There can be the following causes for maintenance operation:

GMA200 maintenance

1 ---O₂ CNF 5 ---O₂ CNF 2 ---CH₄ CNF 6 ---SO₂ CNF 3 ---CO CNF 7 ---NH₃ CNF 4 ---H₂S CNF 8 ---NH₃ CNF 5 Building 1 Room 15 --- O₂ Vol% Details: Configuration	Configuration change using the GMA200Config software • Locking of measuring points or relays • Change of the measuring point or relay configuration • Change of the general GMA configuration • Relay test of internal relays or of external relay modules • Test of analogue outputs
Alarm Limits MSP01 - Building 1 Room 15 Alarm 1: 13.0 Vol% ↓ Alarm 2: 17.0 Vol% ↓ Alarm 3: 23.0 Vol% ↑ ...... Test Antg-Outp. Analog Output 1: Iout: 17.427 mA Analog Output 2: Iout: 4.006 mA	Configuration change via the service menu of the GMA200 • Modification of the alarm thresholds of measuring points • Fine adjustment of ZERO and SPAN for analogue measuring points • Change of the BUS settings • Locking of at least one measuring point (INH = inhibit) • Locking of at least one relay • Relay test of internal relays or of external relay modules • Test of analogue outputs

Transmitter maintenance

1 Building 1 Room 15 --- O₂ Vol% Details: Service	For a number of transmitters with an analogue interface, the current level indicates to the GMA200 that maintenance work is being carried out on the transmitter. In this case, no measured value is displayed and, depending on the screen, "**SRV**" is displayed at gas type and "**Maintenance**" at detail.
1 Building 1 Room 15 --- O₂ Vol% Details: Service, SRV-Menu 1 Building 1 Room 15 **20.8** O₂ Vol% Details: Service, Span	For transmitters with digital interface (bus), the GMA is signalled that maintenance work is being carried out on the transmitter. Depending on the screen, "**SRV**" is displayed at gas type or "**Maintenance**" in the individual display at details in combination with "**SRV Menu", "Zero"** or "**Span**". Usually no measured value is displayed. Only in the individual display a measured value is displayed during the zero point (Zero) and sensitivity adjustment (Span).

Depending on what caused the maintenance operation, only certain parts of the safety function of the GMA200 may have been cancelled at this point. Eventually, the safety function of the GMA200 is still intact for the parts not affected. But only after all causes for the maintenance operation have been eliminated, the yellow SRV/SRQ LED goes out again and the maintenance relay is switched off.

4.3.5 Configuration by parameterization

The configuration of the GMA200 itself can only be changed to a very limited extent by changing parameters via the service menu of the device. For more details see the section 4.5 „Service Menu". However, the GMA200 is fully configurable by means of a PC and the configuration software "GMA200Config" via a USB connection. 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 changed using the configuration software, this state is indicated in the controller display with "**CNF**" at all measuring points. In this configuration phase, the special state "Maintenance" is activated at the same time (see section 4.3.4 „Maintenance"). When the configuration is completed and the configuration software disconnected, the GMA200 returns to normal measuring mode.

4.4 Main menu

User guidance in the main menu is provided by the keypad on the GMA200 controller (see section 4.1 „Control buttons and operation"). The dialogues described below apply to the displayed language "English".

The main menu is divided into:
- Status GMA
- Status data logger
- Info GMA
- Info measuring points
- Info relays
- Info analogue outputs
- Tests (Test LCD display, LED/horn, external button)
- Service menu (password-protected, refer to section 4.5)

To return from the main menu to the measured value displays in measuring mode, the button ◀ must be pressed.

4.4.1 Main menu / "Status GMA"

The "Status GMA" is divided into:
- Message
- Fault
- Maintenance requirement
- Supply voltages
- Temperature

The figures in brackets for notification, malfunction and maintenance requirements represent the number of messages that can be retrieved. The "**!**" behind the number is an indicator for

currently still active messages, faults and maintenance requirements. If there is no "**!**" behind the number, this is just a stored information, but it is no longer active.

The menu item "Supply voltages" displays the GMA supply voltages Upwr1 and Upwr2, at least one of which should typically be at 24 V or in the range of 20 V to 30 V. Furthermore the internal relay supply voltage Urel is displayed, which should typically be 18.8 V or in the range of 18.2 V to 19.5 V, and the CPU supply voltage Ucpu is displayed, which should typically be 3.3 V or in the range of 3.1 V to 3.5 V.

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

4.4.2 Main menu / "Status data logger"
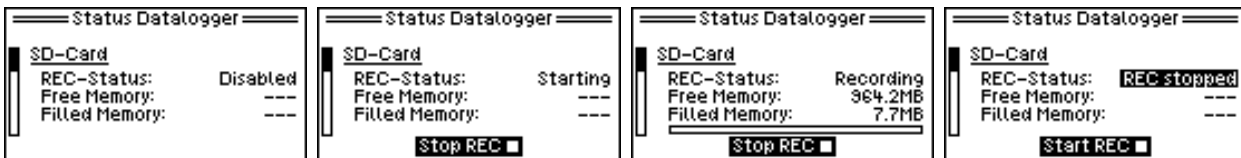
The logging of the data can be stopped respectively restarted in this menu.
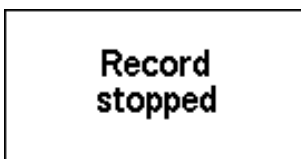
Note: It is essential to stop recording before removing the memory card; if this is not done, data on the memory card may be lost.
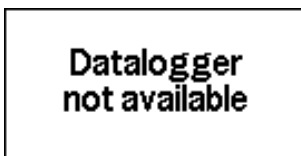
Note: The data logger is an optional extra. If you wish to use this function, please contact a service or sales representative of the manufacturer.

4.4.3 Main menu / „Info GMA"
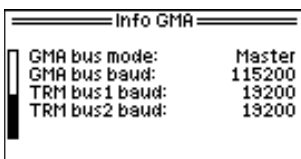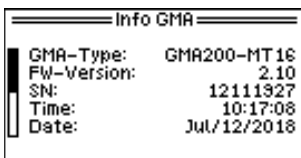
The following information can be displayed under "Info GMA":
- GMA type (device type)
- FW version (version of the firmware)
- SN (serial number of the GMA200)
- current time of the clock module of the GMA200
- current date of the clock module of the GMA200
- GMA bus mode for master operation or
  GMA bus address for slave operation
- Baud rate settings of GMA bus, TRM bus1 and TRM bus2

4.4.4 Main menu / „Info measuring points"

In this menu item the parameterization of the analogue as well as the digital transmitters can be checked. It is not possible to make any changes.

Some examples are shown below:

```
═══Measuring Point 1═══        ═══Measuring Point 1═══        ═══Measuring Point 2═══        ═══Measuring Point 2═══
ID:      Building 1 Room 15    TRM:        EC22 (MK338-0)     ID:      Building 1 Room 15    TRM:        CC22 (MK217-2)
MR:        0 .. 25.0 Vol% O₂   Input:    TRM bus1 (Addr.1)    MR:      0 .. 100.0 %LEL CH4   Input:       lin2 (4-20mA)
AL1:            19.0 Vol% ↓                                   AL1:            20.0 %LEL ↑
AL2:            17.0 Vol% ↓                                   AL2:            40.0 %LEL ↑
AL3:            23.0 Vol% ↑                                   AL3:            60.0 %LEL ↑
                       P2▶                          P1◀                              P2▶                          P1◀
```

```
═══Measuring Point 3═══        ═══Measuring Point 3═══        ═══Measuring Point 4═══        ═══Measuring Point 4═══
ID:      Building 1 Room 16    TRM:        EC22 (MK441-0)     ID:      Building 1 Room 16    TRM:        EC24 (MK446-2)
MR:         0 .. 500 ppm CO    Input:   TRM bus1 (Addr.106)   MR:     0 .. 100.0 ppm H₂S     Input:      lin11 (4-20mA)
AL1:             30 ppm ↑                                     AL1:             5.0 ppm ↑
AL2:             60 ppm ↑                                     AL2:            10.0 ppm ↑
AL3:            100 ppm ↑                                     AL3:            20.0 ppm ↑
                       P2▶                          P1◀                              P2▶                          P1◀
```

```
═══Measuring Point 5═══        ═══Measuring Point 5═══
ID:       Building 2 Room 5    TRM:        ZD21 (MK395-10)          No active
MR:        0 .. 25.0 Vol% O₂   Input:      lin12 (4-20mA)       Measuring Points
AL1:            19.0 Vol% ↓
AL2:            17.0 Vol% ↓
AL3:            17.0 Vol% ↓
                       P2▶                          P1◀
```

Note: Minor adjustments can be made as explained in section 4.5.3 „Service menu / "Measuring Points". More complex changes, such as adding or removing measuring points, are only possible using the configuration software GMA200Config.

4.4.5 Main menu / „Info Relay"

At "Internal Relay" some information about the individual relays can be called up.

```
═══Info Relay═══           ═══Info int. Relay 1═══       ═══Info int. Relay 2═══
Internal Relay             Name:        Pre-Alarm        Name:        Main-Alarm
Relay Modul 1              Status:             Ok        Status:             Ok
Relay Modul 3              State:             OFF         State:             OFF
                           Work-Mode:  Open-Circuit      Work-Mode:  Open-Circuit
                           Resettable:         No        Resettable:         No
```
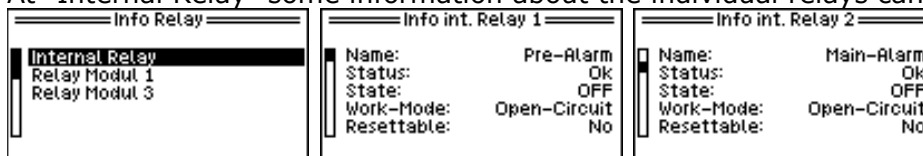
At "Relay Module X" some information about the respective external relay module and its individual relays can be called up.

```
═══Info Relay═══           ═══Relay Modul 1═══            ═══Info ext. Rel.1/Mod.1═══    ═══Info ext. Rel.1/Mod.2═══
Internal Relay             Name:    Exhauster control     Name:        Exhauster 1       Name:        Exhauster 2
Relay Modul 1              Type:        GMA200-RTD         Status:             Ok        Status:             Ok
Relay Modul 3              Status:             Ok          State:             OFF         State:             OFF
                           Bus/Addr:       GMA bus/1       Work-Mode:  Open-Circuit      Work-Mode:  Open-Circuit
                                                           Resettable:         No        Resettable:         No
```
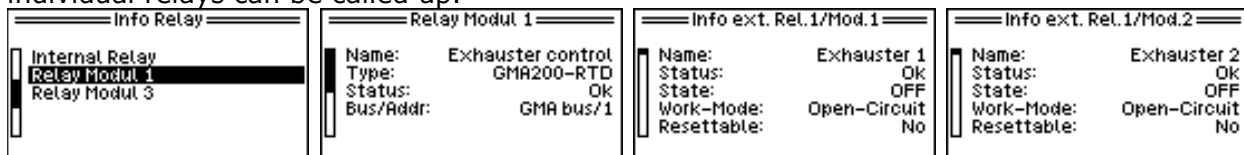
4.4.6 Main menu / „Info Analogue Outputs"

```
═══Info Analog Outputs═══
Analog Output 1:
  MSP01 - Building 1 Room 15
Analog Output 2:
  Disabled
```
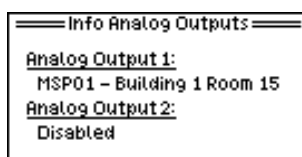
In this example, analogue output 1 is assigned to measuring point 1 with the measuring point designation "House 1 Cellar".

The analogue output 2 is not assigned to any measuring point.

4.4.7 Main menu / „Tests"

```
═══Tests═══
Test LCD
Test LED/Horn
Test ext. AL-Reset
```
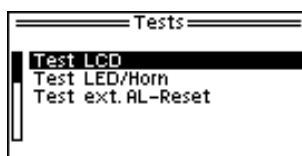
A test of the LCD display, all LEDs and the internal horn can be started in the submenu "Tests".

Furthermore, at "Test ext.AL-Reset" it is possible to check the function of the external alarm acknowledgement inputs.

4.4.7.1 Tests / "Test LCD"

After switching on the device, a display test is automatically started. This test can be additionally triggered here. If defects are detected, the device has to be replaced.

4.4.7.2 Tests / "Test LED/Horn"

After switching on the device, a LED/Horn Test is automatically started. This test can be additionally triggered here. If defects are detected, the device has to be replaced.
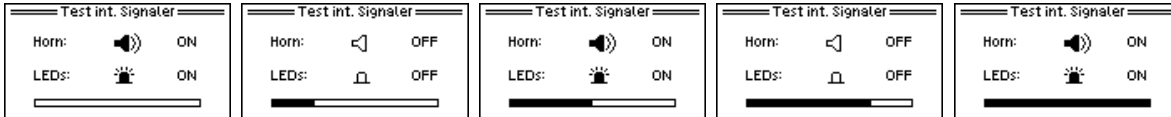
4.4.7.3 Tests / "Test ext.AL-Reset"

If required, the functionality of the alarm reset inputs can be checked here. For this purpose terminal 15 (Reset1) or terminal 16 (Reset2) has to be bridged with terminal 14 (GND).

4.4.8 Main menu / „Service Menu"
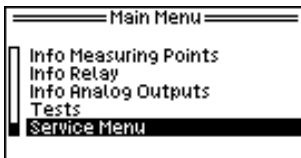
Settings can be displayed and changed in the service menu. In the following section, the scope of functions is described in detail.

4.5 Service Menu

Note: Access to the "Service menu" is blocked when the GMA200 is connected to the GMA200Config software. The connection has to be disconnected first.
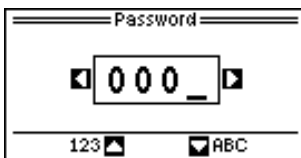
Because of this special functionality, access to this menu is password protected. The password is set to "0000" by default on delivery. This password can be changed in the service menu.

Note: Neither is it possible to connect to the GMA200 using the GMA200Config software if the "Service Menu" is activated on the GMA200 at the same time.

The "Service Menu" is divided into five submenus: 1. System Setup, 2. Datalogger,
3. Measuring Points, 4. Relay and 5. Analog Outputs.

Submenus are described in the following sections.

4.5.1 Service Menu / "System Setup"
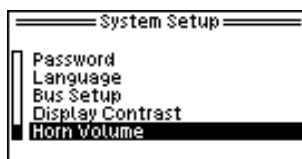
The "System Setup" is divided into another six sub-items: 1. Time/Date, 2. Password, 3. Language, 4. Bus Setup, 5. Display Contrast and 6. Horn Volume

4.5.1.1   System Setup / "Time/Date"
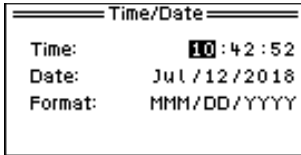
The following can be set or changed here:
* Time
* Date
* Date format (DD.MM.YYYY or YYYY-MM-DD)

4.5.1.2   System Setup / "Password"
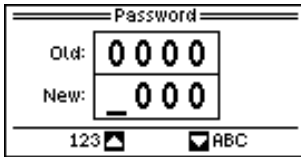
The password for access to the "Service Menu" can be changed alphanumerically here.

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

4.5.1.3   System Setup / "Language"
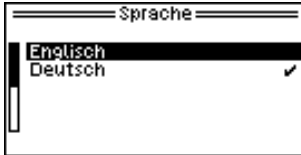
Here you can choose between the display languages
German and English.

(Default = German).

4.5.1.4   System Setup / "Bus Setup"

Various bus settings can be changed here. If "**GMA Bus Mode: Master**" is set, only the baud rates for the three buses can be changed. In master mode the bus address for the GMA bus cannot be set. The mode can only be changed using the GMA200Config software.

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

The baud rates of the three buses can be set as follows:
* GMA bus baud: 9600/19200/38400/57600/115200/230400 Bit/s (Default = 115200)
* TRM bus1 baud: 9600/19200/38400 Bit/s (Default = 19200)
* TRM bus2 baud: 9600/19200/38400 Bit/s (Default = 19200)

4.5.1.5   System setup / "Display Contrast
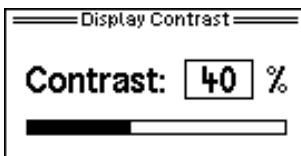
The contrast of the LCD display can be adjusted here between 0 % and 100 % in 5 % steps to suit local conditions.

(default = 40 %).

4.5.1.6   System Setup / "Horn Volume"
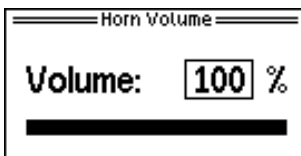
The volume of the internal horn can be adjusted here between 0% and 100% in 5% steps.
 (default = 50 %).

4.5.2 Service Menu / "Datalogger"
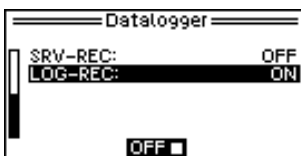
With "SRV-REC" the data recording for service purposes on the microSD card can be started or stopped for a maximum of 8 hours. This data recording for **S**ervice purposes works even if the GMA has no data logger. (file name: ***S**.txt)
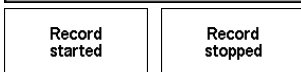
Under the menu item "LOG-REC" the data recording of the normal data logger can generally be activated or deactivated.

4.5.3 Service menu / "Measuring Points
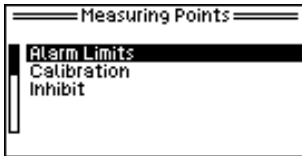
The submenu "Measuring Points" is further subdivided into the three submenus: 1. Alarm Limits, 2. Calibration and 3. Inhibit

4.5.3.1 Measuring Points / "Alarm Limits"
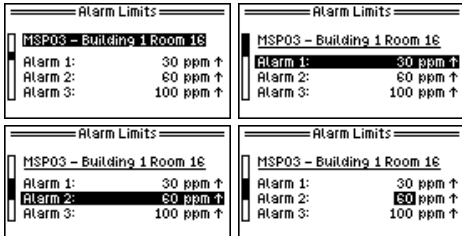
With "Alarm Limits", the limit values for Alarm 1, Alarm 2 and Alarm 3 can be changed within the measuring range after the measuring point has been selected. If the alarm threshold is set to 0.0 (zero), the alarm is switched off.

The alarm direction is marked with an arrow behind the gas unit (exceeding or falling below).

4.5.3.2 Measuring Points / "Calibration"
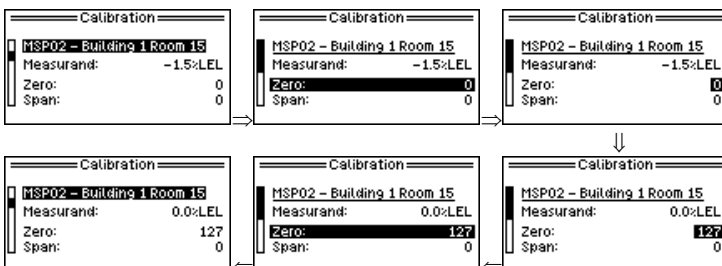
The measured value of the GMA may show small deviations compared to the current signal of a transmitter with analogue interface. With the "Calibration" these small deviations can be compensated.

With "Zero" the lower range value and with "Span" the upper range value can be adjusted by ±1.27 % of the measuring range.

The number which can be changed in the range of -127...0...127 at "Zero" is an additive correction value which changes the measuring value by -1.27 %...0 %...+1.27 % of the measuring range. The number which can be changed at "Span" in the range -127...0...127 is a correction value which changes the normal characteristic curve slope by -1.27 %...0 %...+1.27 % of the measuring range, i.e. a measured value at the end of the measuring range would be changed by this value.

4.5.3.3 Measuring Points / "Inhibit"
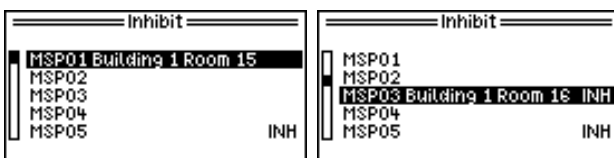
Measuring points can be locked for maintenance purposes (INH=inhibit).
Service work can then be carried out at the measuring points without triggering a gas alarm.

Note: If a measuring point is inhibited, the special condition Maintenance is activated. This means that the maintenance relay remains switched on even during measuring operation. In measuring mode, the yellow LED "SRV/SRQ" then lights up continuously and the collective screen displays "---" for the locked measuring point instead of the measured value and "SRV" instead of the gas unit. In the individual display of the inhibited measuring point, "SRV-INH" is then displayed under Details. The condition is not limited in time. Even if the power supply is interrupted and the GMA is then put back into operation, the status will remain unchanged.

4.5.4 Service menu / "Relay"
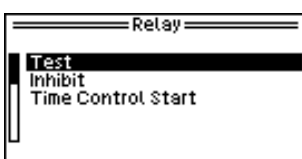
The submenu "Relay" is further subdivided into the three submenus: 1. Test, 2. Inhibit and 3. Time Control Start

4.5.4.1 Relay / "Test"
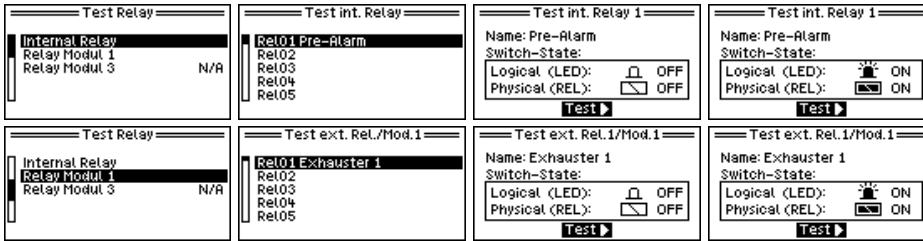
With relay "Test" the switching of internal relays of the GMA200 and of relays on external relay modules can be tested.

4.5.4.2 Relay / "Inhibit"

Single or multiple relays can be inhibited for maintenance purposes (INH=inhibit).
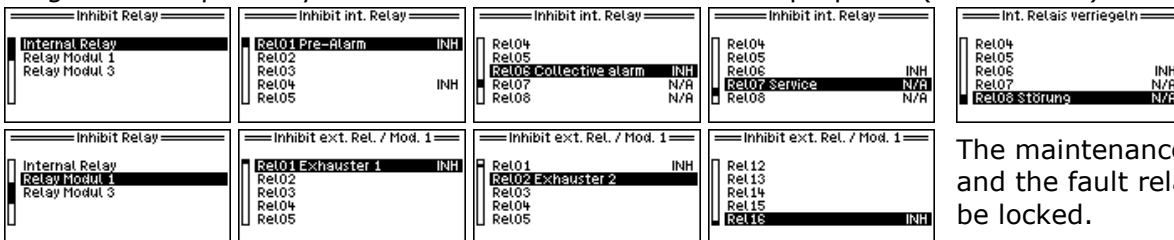
The maintenance relay and the fault relay cannot be locked.

Note: If a measuring point is inhibited, the special condition Maintenance is activated. This means that the maintenance relay is switched on. In measuring mode, the yellow LED "SRV/SRQ" is then permanently lit. In the main menu at Status GMA - Messages it is shown that since this date "At least one relay is latched". The condition is not limited in time. Even if the power supply is interrupted and the GMA is then put back into operation, the status will remain unchanged.

4.5.4.3 Relay / "Time Control Start"
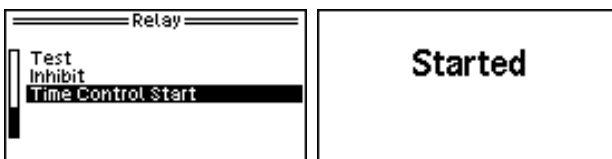
As an option, the GMA200 offers the possibility of time-controlled relay switching. If such a time control has been configured and the "button (service menu)" has been set as start condition in the GMA200Config software, the time control can be started here.

4.5.5 Service menu / "Analogue Outputs"
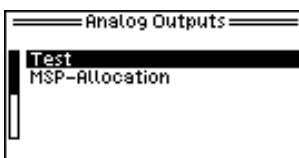
The submenu "Analogue Outputs" is further subdivided into the two sub-items: 1. Test and 2. MSP-Allocation

4.5.5.1 Analog outputs / "Test"
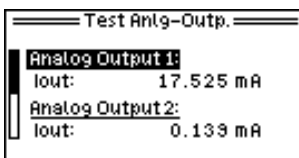
Under "Test Analg-Outp" the two analog outputs can be tested in the range from 0.4 mA to 24.0 mA.

Prerequisite for this is that the DC supply voltage of the GMA200 is in the range 20 V to 30 V (typically 24 Vdc).

4.5.5.2 Analog outputs / "MSP-Allocation"
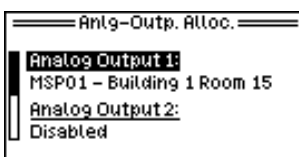
The assignment of the measuring points to the analogue outputs can be set or changed here:

4.5.6 Exit Service Menu

To return from the service menu to the main menu, the ◀ key must be pressed. In order to then switch to the measured value displays in measuring mode, the key has to be pressed again. If settings have been changed in the service menu, the following prompt appears when you exit the service menu:

```
═══Exit═══
SAVE NEW
SETTINGS?
Esc◀    No☐    Yes▶
```

Note:
  Only authorized and qualified personnel may carry out safety-relevant changes.

In order to verify after saving that the setting changes have been accepted as desired, this can be checked by switching back to the service menu. This has to be done in this way, especially after changing security-relevant settings, such as the alarm thresholds.

5   Annex

5.1 Cleaning and Care

External soiling of the housing can be removed with a damp cloth as soon as the unit is disconnected from the mains supply. Do not use solvents or cleaning agents!

5.2 Service and Maintenance

Maintenance and repair includes regular visual inspections, functional checks and system checks as well as the repair of the gas detection system (see DIN EN 60079-29-2 Section 11, DIN EN 45544-4 Section 8 as well as the regulations issued in Germany applicable "DGUV Information 213-056 (Merkblatt T 021 Section 9)" and the "DGUV Information 213-057 (Merkblatt T 023 Section 9)".

5.2.1 Visual Inspection

The visual inspection should be carried out regularly, with a maximum interval of one month, and should include the following activities:

- Check of the operating LED and the status messages,
  "e.g. operating LED "On", alarm and fault LEDs "Off"
- Check for mechanical damage and external soiling

5.2.2 Function Check

The function check can be carried out at intervals that depend on the gas hazard to be monitored. For gas detection systems for toxic gases/vapours and oxygen as well as for gas detection systems for explosion protection, the inspection interval is 4 months in accordance with the requirements of the regulations T 021 and T 023 of the Employer's Liability Insurance Association BG RCI.

It comprises the following activities:

- Visual Inspection according to section 5.2.1 „Visual Inspection"
- Control and evaluation of the measured value displayed
- Triggering of the alarm thresholds
- Triggering of test functions for signalling elements as well as optical and acoustic signal transmitters without triggering switching functions
- Control of saved messages, faults and maintenance requirements

5.2.3 System check (Proof Test)

The system check has to be carried out at regular intervals. The period may not exceed 1 year. It comprises the following activities:
- Functional check according to section 5.2.2 „Function Check"
- Control of all safety functions including the triggering of switching functions.
- Control of the parameterization by target/actual comparison
- Control of the reporting and registration facilities

5.2.4 Repair

The repair includes all maintenance and replacement work. They may only be performed by the manufacturer and by persons authorized by the manufacturer GfG Gesellschaft für Gerätebau mbH. Only original spare parts and original assemblies tested and approved by the manufacturer may be used.

If one of the GMA internal fuses has to be changed (For GMA200-MT6 on the left side F1 for GMA200 or on the right side F2for connected transmitters), the terminal covers have to be removed first. The 9-pole terminal blocks can then be removed with the connected cables. To change a fuse, however, the GMA200 has to be removed from the mounting rail and the housing opened from the rear. In doing so, the ESD protection of the circuit boards must be taken into account.
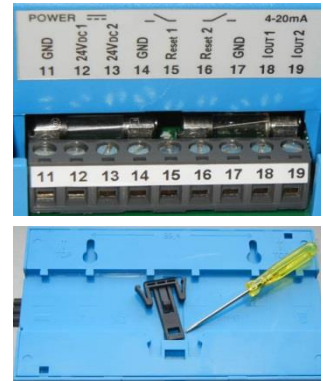
5.3 Spare parts and accessories

	Name	Part No.
1.	36W power supply unit for rail mounting (Input: 85 Vac to 264 Vac Output: 24 Vdc/1.5 A)	1000271
2.	60W power supply unit for rail mounting (Input: 88 Vac to 264 Vac Output: 24 Vdc/2.5 A)	1000272
3.	100W power supply unit for rail mounting (Input: 88 Vac to 264 Vac Output: 24 Vdc/4.2 A)	1000273
4.	GMA200-BC Terminals for GMA bus connector	2200200
5.	microSD card 2GB	2200202
6.	Spare fuse T 500 mA (F1 for GMA200) PU = 10 pieces	2200301
7.	Spare fuse M 1 A (F2 for transmitter supply) PU = 10 pieces	2200302
8.	Ribbon cable for GMA200-MT/-RT (L=22cm)	2200309
9.	Terminal cover for GMA200-MT/-RT (9-hole)	2200310

5.4 Notes on the environmentally friendly disposal of used parts

According to GfG's general terms and conditions, the customer assumes responsibility for the environmentally safe disposal of the device or any device components (such as replaced sensors). In Germany, this is regulated by §§11, 12 ElektroG. On request, GfG in Dortmund can also handle the proper disposal.

5.5 Functional safety and parameters

The safety parameters for the following safety functions have been determined for the gas measurement controllers GMA200-MT6, GMA200-MT16, GMA200-MW4 and GMA200-MW16. When interconnecting with an external relay module GMA200-RT/-RTD, the relevant safety parameters from the operating instructions of the relay module must be taken into account.

Note #1:
This value is only valid within the scope of the Machinery Directive according to EN 62061 or ISO 13489-1.

		Single channel use (1oo1)	Redundant use (1oo2)
	Device type	B	
	MTTR	72 h	
	Proof Test Interval	1 year	
	max. request rate (s.#1)	75 per year	
	Performance level	PL d	PL e
	SIL capability (see #2)	2 or 1	3 or 2
	HFT	0	1 (β-Factor 5 %)
Safety function 1 ➔Analog input (4-20 mA / 0.2-1 mA) ➔Signal processing ➔internal relay switching output of the GMA200-MT/-MW	SFF	90.8 %	
	λ_{SD} [1/h]	1.7×10^{-7}	
	λ_{SU} [1/h]	2.4×10^{-7}	
	λ_{DD} [1/h]	3.8×10^{-7}	
	PFH=λ_{DU} [1/h]	8.0×10^{-8}	4.1×10^{-9}
	PFD$_{avg}$ [1/year]	3.8×10^{-4}	1.9×10^{-5}
	MTTF$_d$ [years]	1427	27843
Safety function 2 ➔ Digital input (RS485) ➔ Signal processing ➔ internal relay switching output of the GMA200-MT/-MW	SFF	97.2 %	
	λ_{SD} [1/h]	3.5×10^{-6}	
	λ_{SU} [1/h]	2.3×10^{-7}	
	λ_{DD} [1/h]	4.0×10^{-7}	
	PFH=λ_{DU} [1/h]	1.2×10^{-7}	6.1×10^{-9}
	PFD$_{avg}$ [1/year]	5.6×10^{-4}	2.9×10^{-5}
	MTTF$_d$ [years]	951	18714
Safety function 3 ➔ Analog input (4-20 mA / 0.2-1 mA) ➔ Signal processing ➔ Signal transmission to external relay module e.g. GMA200-RT/-RTD	SFF	98.1 %	
	λ_{SD} [1/h]	3.5×10^{-6}	
	λ_{SU} [1/h]	2.5×10^{-7}	
	λ_{DD} [1/h]	3.9×10^{-7}	
	PFH=λ_{DU} [1/h]	8.0×10^{-8}	4.1×10^{-9}
	PFD$_{avg}$ [1/year]	3.8×10^{-4}	1.9×10^{-5}
	MTTF$_d$ [years]	1427	27843
Safety function 4 ➔ Digital input (RS485) ➔ Signal processing ➔ Signal transmission to external relay module e.g. GMA200-RT/-RTD	SFF	98.1 %	
	λ_{SD} [1/h]	3.5×10^{-6}	
	λ_{SU} [1/h]	2.4×10^{-7}	
	λ_{DD} [1/h]	4.1×10^{-7}	
	PFH=λ_{DU} [1/h]	8.0×10^{-8}	4.1×10^{-9}
	PFD$_{avg}$ [1/year]	3.8×10^{-4}	1.9×10^{-5}
	MTTF$_d$ [years]	1427	27843
Safety function 5 ➔ Analog input (4-20 mA / 0.2-1 mA) ➔ Signal processing ➔ Digital output (RS485) of the GMA200-MT/-MW	SFF	98.1 %	
	λ_{SD} [1/h]	3.5×10^{-6}	
	λ_{SU} [1/h]	2.5×10^{-7}	
	λ_{DD} [1/h]	3.6×10^{-7}	
	PFH=λ_{DU} [1/h]	8.0×10^{-8}	4.1×10^{-9}
	PFD$_{avg}$ [1/year]	3.8×10^{-4}	1.9×10^{-5}
	MTTF$_d$ [years]	1427	27843
Safety function 6 ➔ Digital input (RS485) ➔ Signal processing ➔ Digital output (RS485) of the GMA200-MT/-MW	SFF	98.1 %	
	λ_{SD} [1/h]	3.5×10^{-6}	
	λ_{SU} [1/h]	2.4×10^{-7}	
	λ_{DD} [1/h]	3.8×10^{-7}	
	PFH=λ_{DU} [1/h]	8.0×10^{-8}	4.1×10^{-9}
	PFD$_{avg}$ [1/year]	3.8×10^{-4}	1.9×10^{-5}
	MTTF$_d$ [years]	1427	27843

Note #2:
According to DIN EN 50402, the SIL-capability of the hardware for safety functions 1, 2 and the GMA200-RT/-RTD depends on the contact load of the relay switching output. The higher value only applies if the relay contact is loaded with a current of 2 A maximum. To limit this maximum current, an external fuse or comparable component has to be used.

Abbreviations:
HFT = Hardware Fault Tolerance
SFF = Safe Failure Fraction
MTTR = Mean Time To Repair
MTTF$_d$ = Mean Time To dangerous Failure
PFH = Probability of dangerous Failure per Hour for high-demand mode
PFD = Probability of dangerous Failure on Demand for low demand mode
$\lambda_{DU, \lambda DD, \lambda SU, \lambda SD}$ = error rates (DU = dangerous undetected, DD = dangerous detected, SU = safe undetected, SD = safe detected)

As dangerous ($\lambda_{DU, \lambda DD}$), errors are also understood which lead to measurement errors of more than the specified measurement tolerances of the GMA. If dangerous (λ_{DD}) or harmless (λ_{SD}) If a fault is detected, this is signalled via the fault relay and, in the case of SF5 and SF6, with fault information via the GMA bus.

5.6 Technical data

Type designation	FOR GMA200-MT6:		FOR GMA200-MT16:
Display & control elements	2.2" graphic display, 5 buttons and buzzer max. 70 dB(A) adjustable 15 status LEDs for alarms, operating and relay states		
Ambient Conditions			
for storage:	-25 °C to +60 °C | 0 % RH to 99% RH (recommended 0 °C to +30 °C | 40 % RH to 60 %RH)		
for operation:	-20 °C to +55 °C | 0 % RH to 99 % RH		
Mounting Location	in the switch cabinet or in the wall housing, indoors		
	on a mounting rail TS35 according to DIN EN 60715		
	up to an altitude of 2000 m above sea level		
Power Supply			
external supply with:	stabilized SELV or PELV power supply		stabilized SELV or PELV power supply
Operating voltage Ue:	24 Vdc (20 Vdc to 30 Vdc permissible		24 Vdc (20 Vdc to 30 Vdc) permissible
Power consumption:	max. 5 W (without transmitter)		max. 5 W
	max. 30 W (with transmitter)		
Fuse:	F1=T 500 mA (for GMA200)		F1=T 500 mA
	F2=M 1 A (for transmitter)		
Transmitter connections			
Supply outputs:	24 Vdc (20 Vdc to 30 Vdc see above)		not possible
	6x 150 mA or Iges = 900 mA		
Analog input signals I_{IN}:	6x 4-20 mA or 0.2-1 mA		16x 4-20 mA or 0,2-1 mA
	Measuring tolerance (#2): ±0.3 % MR @ 4...20 mA or ±1.2 % MR @ 0.2...1 mA (MR=measuring range)		
	Load approx. 50 Ω to 100Ω, Imax = 70 mA permanent / 500 mA short time		
Digital signals TRM bus1+2:	RS485; half duplex; max. 38400 baud		
Measurement Value Processing			
Update rate:	1 s (If there are more than 16 transmitters and relay modules on the same TRM bus and the data transmission is only at 9600 baud, the cycle time is extended from 1.0 to max . 1.3 s, so that the time of 1 s cannot be maintained)		
Adjustment time forRS485 :	Ascent time T50 <2s and T90 <2s Decrease time T50 <2 s and T10 <2 s		
for 4...20 mA:	Ascent time T50<2 s and T90 <4 s Decrease time T50 <2 s and T10 <4 s		
for 0.2...1 mA:	Ascent time T50 <6s and T90 <10s Decrease time T50 <6 s and T10 <10 s		
	(extended by the adjustment times of the transmitters)		
Ready delay:	<40 s (possibly extended by warm-up times of the gas detection transmitters)		
RS485 outputs GMA bus:	RS485; half duplex; max. 230400 baud		
	(for GMA200 relay modules, control centre, PC, PLC or gateway)		
TRM bus1+2:	RS485; half-duplex; max. 38400 Baud (only for GMA200 relay modules)		
Relay outputs Contacts:	8 relays with normally open contact		
Contact load capacity:	3 A / 250 Vac or 3 A / 30 Vdc		
Minimum switching current:	10 mA		
Minimum switching voltage:	5 V		
Switching frequency:	max. 100 per year (per relay contact), valid for SIL applications according to EN 50402		
Insulation clearances:	Basic insulation between the relays: 1&2, 3&4, 5&6, 7&8		
	Double insulation between the relays: 2&3, 4&5, 6&7		
Analogue outputs IOUT1+2:	4-20 mA with linear transfer function (load max. 560 Ω)		
Accuracy:	±0.3 % MR @ 10°C to 30 °C or ±0.8 % MR @ -20°C to 50 °C (MR = measurement/signal range)		
Alarm acknowledgem. inputs			
Reset1+2:	0-3 Vdc (alarm acknowledgement occurs on contact with GND; U_{MAX} = 30 Vdc)		
Data logger (optional)	max. 2 GB microSD card with FAT formatting (FAT16)		
USB connection	Mini B USB socket for device configuration via PC		
Housing Attachment:	on mounting rail TS35 according to EN 60715		
Enclosure protection type:	IP20		
Material:	Plastic		
Weight:	approx. 370 g		
Dimensions (H x W x D):	162 x 97 x 62 mm		
Power cable Cable:	2-4 wires 0.5-1.5 mm² LiYY, NYM (for GMA200 supply)		
	2-4 wires 0.5-1.5 mm² LiYY, LiYCY (for transmitters)		
	2-wire 1x2x0,22 mm² BUS-LD (for GMA bus with length >10 m)		
Terminal blocks:	0.08 mm² to 2.5 mm² cross-section		
Approvals/Tests			
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 III for relay contacts)		
Functional safety:	EN 50402:2017; IEC 61508-1 to -7:2010 (SIL2/SC3)		
Functional safety:	EN 50271:2018; EN 62061:2016; ISO 13849-1:2015		
Metrological suitability:	EN 60079-29-1:2016 (EX); EN 50104:2019 (OX); EN 45544-1/-2/-3:2015 (TOX)		
Service life	20 years		

Note #2: This is only the measuring tolerance of the GMA. The transmitters have additional tolerances.

5.7 EU Declaration of Conformity and Type Examination Certificates

EU Declaration of Conformity | **GfG Gesellschaft für Gerätebau mbH**

GMA200-MT6
GMA200-MT16

Klönnestraße 99
44143 Dortmund
Tel: +49 (231) 564 00-0
Fax: +49 (231) 564 00-895
E-Mail: info@gfg-mbh.com
www.gasmessung.de

Edited: 31.07.2017   Amended: 05.05.2021

GfG Gesellschaft für Gerätebau mbH develops, produces and distributes gas sensors and gas warning devices in accordance with the **Quality Management System:** DIN EN ISO 9001. The production of electrical devices in equipment groups I and II, categories M1, M2, 1G and 2G for gas sensors, gas measuring instruments, gas warning systems in the ignition and flameproof enclosures, increased safety, encapsulation and intrinsic safety and their measuring function is supervised by a quality assurance system monitored by the notified body, DEKRA Testing and Certification GmbH (0158).

The Controller **GMA200-MT6** and **GMA200-MT16** are in compliance with multiple directives, including: **2014/34/EU** (ATEX) for devices and protective systems for proper use in potentially explosive atmospheres, **2014/30/EU** for electromagnetic compatibility, with directive **2014/35/EU** for electrical safety and **2011/65/EU** (RoHS) on the restricted use of certain hazardous substances in electrical and electronic equipment.

For the measurement function   BVS 19 ATEX G 001 X
Labelling   ⟨Ex⟩ II (2) G

CE 0158

The directive 2014/34/EU is observed in compliance with the following standards:
- Gas detectors- Performance requirements of detectors for
  flammable gases   EN 60079-29-1 : 2016
- Electrical apparatus for the detection and measurement of oxygen. Performance
  requirements and test methods   EN 50104   : 2019
- Electrical apparatus for the detection and measurement of combustible gases, toxic
  gases or oxygen. Requirements and tests for apparatus using software and/or digital
  technologies.   EN 50271   : 2018

The EU-Type Examination Certificate was issued by the Notified Body, ID number 0158 (DEKRA Testing and Certification, Dinnendahlstraße 9, D-44809 Bochum).

The directive 2014/30/EU is observed in compliance with the following standard:
- Electrical apparatus for the detection and measurement
  of combustible gases, toxic gases or oxygen   EN 50270   : 2015
  Emitted interference   Type class 1
  Interference immunity   Type class 2

The EMC test laboratory AMETEK CTS Germany GmbH at Kamen has tested and certified the electromagnetic compatibility.

The directive 2014/35/EU is observed in compliance with the following standards:
- Safety requirements for electrical equipment for measurement, control and laboraty 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 observed in compliance with the following standard:
- Technical documentation for the assessment of electrical and electronic products concerning
  the restriction of hazardous substances   EN 50581   : 2012

Dortmund, 05 May 2021

i.V.

B. Siebrecht
QMB

ATEX EU-Kon025-1 3/Siebrecht

Certificate

No.: 968/FSP 1324.01/17

Product tested	Gas Detection Controller	**Certificate holder**	Gesellschaft für Gerätebau mbH Klönnestr. 99 44143 Dortmund Germany

Type designation
GMA200-MT6, GMA200-MT16, GMA200-MW4, GMA200-MW16

Codes and standards
IEC 61508 Parts 1-7:2010   EN ISO 13849-1:2015
EN 50402:2017   IEC 62061:2015

Intended application
The gas detection controllers GMA200-M... comply with the requirements of the product standard EN 50402, IEC 61508 and IEC 62061 for SIL 2 and PL d acc. EN ISO 13849-1. They can be used in a single channel architecture (HFT=0) up to SIL 2 / PL d and in a redundant HFT=1 architecture up to SIL 3 / PL e.

Specific requirements
The instructions of the associated operation manual shall be considered.
In safety applications the fault relay resp. the GMA-status register has to be evaluated in addition to the alarm relay.
In SIL 2 / PL d applications and higher the relay contact current has to be limited to 2 A.
In machinery applications the alarm relays have to be configured following the idle current principle.
Alternatively a redundant power supply may be used. The demand rate of the safety function shall not exceed 75 demands a year.

Valid until 2022-10-04

The issue of this certificate is based upon an examination, whose results are documented in Report No. 968/FSP 1324.01/17 dated 2017-10-04.
This certificate is valid only for products which are identical with the product tested. It becomes invalid at any change of the codes and standards forming the basis of testing for the intended application.

TÜV Rheinland Industrie Service GmbH
Bereich Automation
Funktionale Sicherheit
Am Grauen Stein, 51105 Köln

Köln, 2017-10-04   Certification Body Safety & Security for Automation & Grid   Dipl.-Ing. Stephan Häb

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Translation

1

EU-Type Examination Certificate
Supplement 01

2   Device with a measuring function for explosion protection
Directive 2014/34/EU

3   EU-Type Examination Certificate Number: **BVS 19 ATEX G 001 X**

4   Product: **GMA200**

5   Manufacturer: **GfG Gesellschaft für Gerätebau mbH**

6   Address: **Klönnestraße 99, 44143 Dortmund, Germany**

7   This product and any acceptable variation thereto are specified in the annex to this certificate and the documents therein referred to.

8   DEKRA Testing and Certification GmbH, Notified Body number 0158, in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.
The examination and test results are recorded in the confidential test report PFG-no. 41300419P NI.

9   The Essential Health and Safety Requirements with respect to the measuring function for explosion protection are assured in consideration of:

EN 60079-29-1:2016
EN 50104:2019
EN 50271:2018

10   If the sign "X" is placed after the certificate number, it indicates that the product is subject to the Special Conditions for Use specified in the appendix to this certificate.

11   This EU-Type Examination Certificate relates only to the design and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

12   The marking of the product shall include the following:

⟨Ex⟩ II (2) G

DEKRA Testing and Certification GmbH
Bochum, 2021-04-28

Signed: Kilisch
Managing Director

Page 1 of 3 of BVS 19 ATEX G 001 X / 01   Jobnumber 342264700
This certificate may only be reproduced in its entirety and without any change.

DEKRA Testing and Certification GmbH, Handwerkstr. 15, 70565 Stuttgart, Germany
Certification body: Dinnendahlstr. 9, 44809 Bochum, Germany
Phone +49.234.3696-400, Fax +49.234.3696-401, e-mail DTC-Certification-body@dekra.com

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13   **Appendix**

14   **EU-Type Examination Certificate**

**BVS 19 ATEX G 001 X
Supplement 01**

15   **Product description**

15.1   **Subject and type**

Control unit GMA200

15.2   **Description**

Reason for the supplement:
Retesting according to EN 50104:2019
Modification of the PC-Software GMA200Config

The control unit GMA200, when operated with transmitters with a 0.2-1 mA or 4-20 mA interface or a digital interface, is a fixed system for the measurement of flammable gases or vapours, of oxygen or of toxic gases. The control unit is intended for wall mounting or rail mounting. The control unit is not intended for use in potentially explosive atmospheres.

15.3   **Parameters**

not applicable

15.4   **Measuring function for explosion protection**

This EU-type examination certificate covers:

- Control unit GMA200 with the following versions:
  - Gas detection controller GMA200-MW4
  - Gas detection controller GMA200-MW16
  - Gas detection controller GMA200-MT6
  - Gas detection controller GMA200-MT16
  with software versions V2.10 (GMA200 Main) and V2.10 (GMA200 Display)

- when operated with transmitters with a 0.2-1 mA or 4-20 mA interface (2-wire or 3-wire) the measurement of the flammable gases and vapours which are listed in the EC- or EU-type examination certificate of the transmitter

- when operated with transmitters with a 0.2-1 mA or 4-20 mA interface (2-wire or 3-wire) the measurement of oxygen (measurement of inertisation) according to the EC- or EU-type examination certificate of the transmitter

- use of the following outputs for safety relevant purposes:
  - relays
  - GMA-Bus

- use of the following options and accessories:
  - PC-Software GMA200Config V2.10.20
  - GMA200Visual V1.27.00

The EU-type examination includes the following deviations from the operating conditions required by EN 60079-29-1 or EN 50104, respectively:
- Extended range of temperature at operation (GMA200-MW4 / -MW16):   -20 °C to +55 °C
- Deviating range of temperature at operation (GMA200-MT6 / -MT16):   -20 °C to +50 °C

Page 2 of 3 of BVS 19 ATEX G 001 X / 01   Jobnumber 342264700
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DEKRA Testing and Certification GmbH, Handwerkstr. 15, 70565 Stuttgart, Germany
Certification body: Dinnendahlstr. 9, 44809 Bochum, Germany
Phone +49.234.3696-400, Fax +49.234.3696-401, e-mail DTC-Certification-body@dekra.com

16   Test report

PFG-no. 41300419P NI of 2021-04-28

17   Special Conditions for Use

- When using 4-20 mA transmitters, pay particular attention to the followings:
  - The specifications of the 0.2-1 mA or 4-20 mA interface
  - Behaviour with currents less than 0.2 mA or 4 mA, respectively
  - Behaviour with currents in excess of 1 mA or 20 mA, respectively
- The operation with GfG-transmitters connected to the TRM-bus is permitted but not subject of this EU-type examination certificate with respect to the measuring function of the control unit with such transmitters.
- Configure the alarm with the highest significance for safety as latching for each channel.
- Configure relays for safety-related switching operations in such a way that they cannot be reset while the alarm condition is present.
- Time delayed alarms should not be used for safety related purposes.
  If their use is unavoidable, set the alarm delay time to the minimum value that is feasible for the required operation. Take the maximum possible rate of increase of gas concentration into account when determining the alarm delay time.
- The function "Time control" for relays is not subject of this EU-type examination certificate.
- Measurement of flammable gases or vapours:
  - Activate Over range latching when used with transmitters that may give indications within their measuring range at gas concentrations above the measuring range (Set parameter "Filter time const." to "0").
  - Do not set the parameter "resolution" above 1 % of the upper limit of the measuring range.
  - Do not set the parameter "Tolerance band" above 5 % of the upper limit of the measuring range.
- Measurement of oxygen (measurement of inertisation):
  - Do not set the parameter "Fault message when Measure underrange" below -5 % of the upper limit of the measuring range.
  - Do not set the parameter "resolution" above 1 % of the upper limit of the measuring range and not above 0.1 %(v/v).
  - Do not set the parameter "Tolerance band" above 2 % of the upper limit of the measuring range.

18   Essential Health and Safety Requirements

The Essential Health and Safety Requirements with respect to the measuring function for explosion protection are covered by the standards listed under item 9.

19   Drawings and Documents

Drawings and documents are listed in the confidential test report.

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

DEKRA Testing and Certification GmbH
Bochum, dated 2021-04-28

Managing Director

Translation

1st Supplement

to the Type Examination Certificate

- Gas detectors -

PFG 19 G 002 X

Equipment: GMA200

Manufacturer: GfG Gesellschaft für Gerätebau mbH

Address: Klönnestraße 99, 44143 Dortmund, Germany

The certification body of DEKRA Testing and Certification GmbH certifies that this equipment has been found to comply with the requirements of the standards

EN 50104:2019
EN 45544-1:2015
EN 45544-2:2015
EN 45544-3:2015
EN 50271:2018

with regard to the measuring function for

- oxygen (measurement of oxygen deficiency and enrichment) in the measuring range 0 - 25 %(v/v)
- toxic gases in the measuring range 0.6 % to 100 % of the upper limit of measurement of the used transmitter (apparatus according to EN 45544-2)
- toxic gases in the measuring range 0 % to 100 % of the upper limit of measurement of the used transmitter (apparatus according to EN 45544-3)

On the basis of DIN EN ISO/IEC 17065, this certification includes a type examination. The examination and test results and the design of the equipment are recorded in the test report PFG-Nr. 41300419P NI.

If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the annex to this certificate.

The manufacturer declares the conformity of the manufactured products with the certified design by marking them with the number of this type examination certificate.

DEKRA Testing and Certification GmbH

Bochum, dated 2021-04-28

Signed: Kilisch

Managing Director

Appendix to

1st Supplement to the Type Examination Certificate
PFG 19 G 002 X

Description of the gas detector

The control unit GMA200, when operated with transmitters with a 0.2-1 mA or 4-20 mA interface or a digital interface, is a fixed system for the measurement of flammable gases or vapours, of oxygen or of toxic gases. The control unit is intended for wall mounting or rail mounting. The control unit is not intended for use in potentially explosive atmospheres.

Reason for the supplement:

Retesting according to EN 50104:2019
Modification of the PC-Software GMA200Config

Type of protection

not applicable

Special conditions for use

- When using 0.2-1 mA or 4-20 mA transmitters, pay particular attention to the followings:
  - The specifications of the 0.2-1 mA or 4-20 mA interface
  - Behaviour with currents less than 0.2 mA or 4 mA, respectively
  - Behaviour with currents in excess of 1 mA or 20 mA, respectively
- The operation with GfG-transmitters connected to the TRM-bus is permitted but not subject of this type examination certificate with respect to the measuring function of the control unit with such transmitters
- Configure the alarm with the highest significance for safety as latching for each channel.
- Configure relays for safety-related switching operations in such a way that they cannot be reset while the alarm condition is present.
- Time delayed alarms should not be used for safety related purposes. If their use is unavoidable, set the alarm delay time to the minimum value that is feasible for the required operation. Take the maximum possible rate of increase of gas concentration into account when determining the alarm delay time.
- The function "Time control" for relays is not subject of this type examination certificate.
- Measurement of oxygen:
  - Do not set the parameter "Fault message when Measure underrange" below -5 % of the upper limit of the measuring range.
  - Do not set the parameter "resolution" above 0.1 %(v/v).
  - Do not set the parameter "Tolerance band" above 2 % of the upper limit of the measuring range.

- Operation according to EN 45544-2:
  - GMA200 is suitable for use with 4-20 mA transmitters where the output at the limit value is between 4.48 mA and 12 mA.
  - Do not set the parameter "resolution" above 1 % of the upper limit of measurement and not above 5 % of the limit value. The lower limit of measurement is 0.6 % of the upper limit of measurement in this case. It decreases if the parameter "resolution" is set to a smaller value.
  - Do not set the parameter "Tolerance band" above the lower limit of measurement (calculated for the combination of GMA200 and the connected transmitter).

- Operation according to EN 45544-3:
  - Do not set the parameter "resolution" above 1 % of the upper limit of measurement.
  - Do not set the parameter "Tolerance band" above 5 % of the upper limit of measurement.

Additional Information

- The measuring function of the control unit for flammable gases according to directive 2014/34/EU is subject of the EU-type examination certificate BVS 19 ATEX G 001 X.
- This type examination certificate covers:
  - Control unit GMA200 with the following versions:
    - Gas detection controller GMA200-MW4
    - Gas detection controller GMA200-MW16
    - Gas detection controller GMA200-MT6
    - Gas detection controller GMA200-MT16
    with software versions V2.10 (GMA200 Main) and V2.10 (GMA200 Display)
  - use of the following outputs for safety relevant purposes:
    - relays
    - GMA-Bus
  - use of the following options and accessories:
    - PC-Software GMA200Config V2.10.20
    - GMA200Visual V1.27.00
- The type examination includes the following deviations from the operating conditions required by EN 45544-1 or EN 50104, respectively:
  - Extended range at the test Unpowered Storage: -25 °C to +60 °C
  - Extended range of temperature at operation (GMA200-MW4 / -MW16):   -20 °C to +55 °C
  - Deviating range of temperature at operation (GMA200-MT6 / -MT16):   -20 °C to +50 °C

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

DEKRA Testing and Certification GmbH
Bochum, 2021-04-28

Managing Director