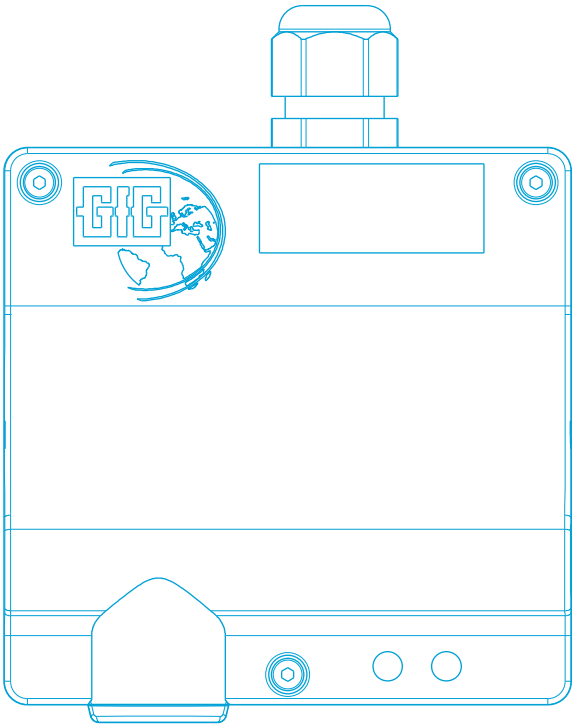
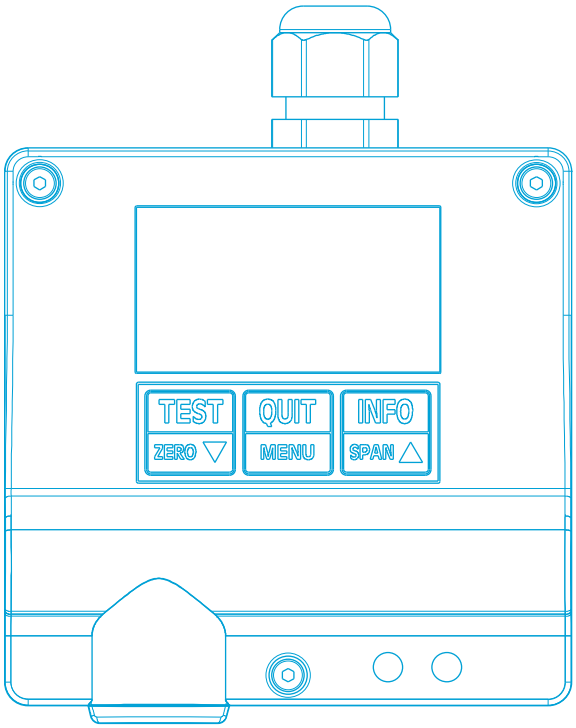
Operation Manual

Transmitter IR22





smart
GasDetection
Technologies

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1 INTRODUCTION

1.1 For your safety

These operating instructions point out the intended use of the product according to the law about making available products on the market (Product Safety Act – ProdSG) and serves to protect the safety and health of people and plants. It must be read and observed by everyone who operates, services, maintains and inspects this product. This product can serve its intended purpose only if it is operated, serviced, maintained and inspected according to the instructions given by GfG Gesellschaft für Gerätebau.
The warranty assumed by the company GfG becomes null and void, if it is not used, cared for, maintained and controlled according to the specifications of the company GfG. The above mentioned does not change the indications about the warranty and liability in the sales and delivery conditions of the company GfG.

1.2 Operating notes

Inspections must be carried out in accordance with the manufacturer's instructions and executed by a fully trained and qualified expert. In Germany, it applies therefore „DGUV (German Social Accident Insurance) Information 213-056 (leaflet T 021 / up to now BGI 836 Paragraph 8.1)“ and „DGUV (German Social Accident Insurance) Information 213-057 (leaflet T 023 / up to now BGI 518 Paragraph 8.1)“.

The function and display of the transmitter has been tested before the delivery. The calibration and adjustment is performed with corresponding test or calibration gases.

This does not release from a calibration and, if applicable, an adjustment after the installation.

The transmitter IR22 is **not** admitted to be used in explosive atmospheres.

CAUTION
The supply voltage must not exceed 30V DC!
This also applies for voltage peaks!

2 GENERAL INFORMATION ABOUT THE TRANSMITTER

2.1 General description

A stationary gas warning system consists of a transmitter and a gas measuring and analysis unit (GMA, not included in the scope of delivery). The transmitter and GMA are connected via a remote measuring cable. The transmitter transforms the gas concentration into an electrical measurement signal and sends it to the analysis unit for further processing.

Optionally, the transmitter IR22 can be equipped with an additional graphic display with operating keys and acoustic beepers. The display has a “green” backlighting during the measurement operation. In case of a malfunction or alarm, the display colour will change to “red” for an optical alarming. In addition, in the display model, a horn for acoustic will be integrated.

Each transmitter of the series 22 has been equipped with two status LEDs, which indicate the operating status of the device. A “green” LED in order to indicate the operational readiness and a “yellow” LED to signal a malfunction or a special status.
The transmitter of the series 22 can either be equipped with an analogous current interface or with a digital RS485 interface. The current interface can output the measuring information with 4-20mA by default or alternatively with 0.2-1mA. The communication of the digital RS485 interface is performed according to the Modbus (RTU) protocol.

The electronic system takes over lots of tasks, which on the one hand facilitate the operation and maintenance and on the other hand considerably increase the operational safety and the measuring accuracy. The transmitter distinguishes itself by:

- Concentration display (for the display model)
- Settings without opening the housing by the push of a button (for the display model)
- Compensation of temperature influences
- Permanent status display (measurement operation, malfunction or special status) on the transmitter

2.2 Measurement method

The gas sensor used in the IR22 transmitter is an infrared sensor. Infrared sensors use the features of gases, to absorb light in certain spectral ranges. At this, infrared light emitted by a source of radiation crosses the measuring section with the measuring gas. With the measuring gas, a weakening of the radiation energy is taking place by absorption in a certain wavelength range. The strength of the absorption depends on the concentration of the gas to be measured and will be collected with an infrared detector. With a second infrared detector the radiation will be collected for a gas independent reference wavelength range. Since the signals collected by the two infrared detectors are not yet proportional to the gas concentration, the gas needs to be calculated by compensating different effects and linearization.

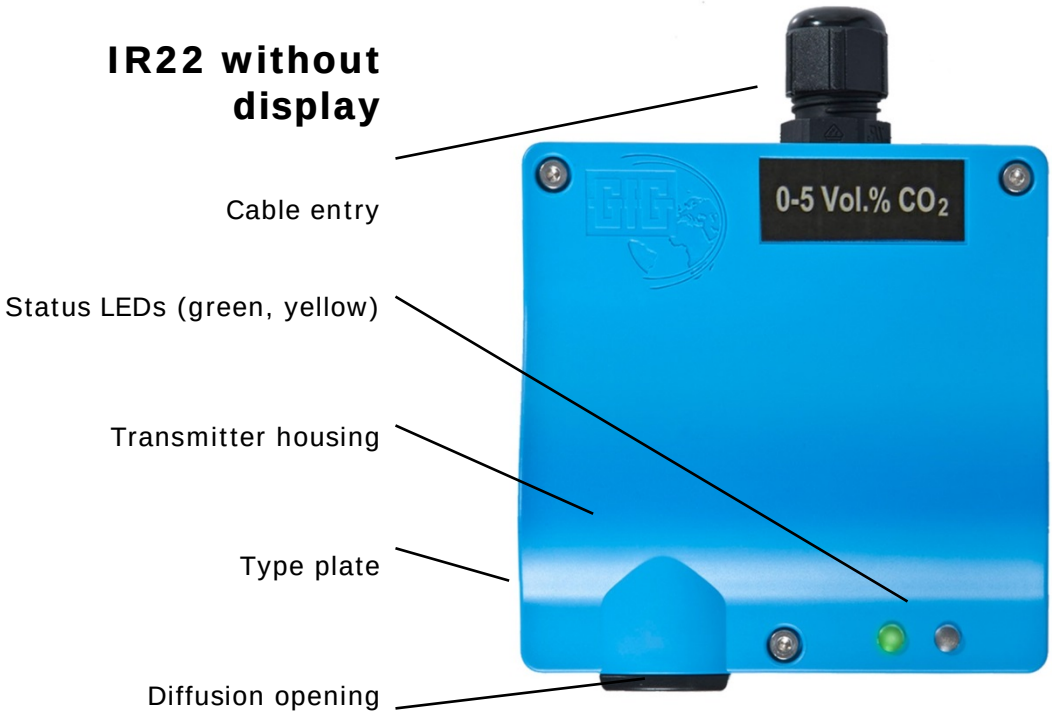
The determined gas concentration is converted by the electronics integrated in the transmitter into a standardized analog current signal (4-20mA or 0.2-1mA) or into a digital bus signal. The infrared measuring principle is characterized by good long-term stability.

2.3 Transmitter behaviour

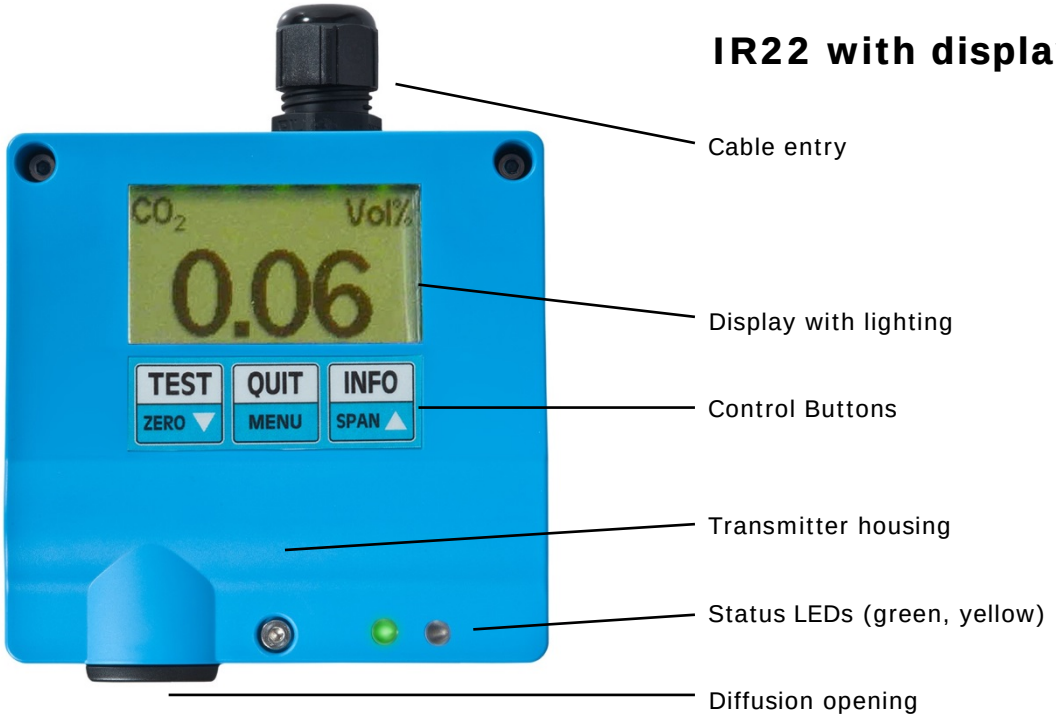
Depending on the type of the measuring gas, the transmitter has different transmission properties. The setting times may be different depending on the measuring gas. The gas display and signal emission of the IR22 is always proportional to the gas concentration.

2.4 Equipment configuration

IR22 without display



IR22 with display



The gas sensor and the transmitter electronic are built-in the transmitter housing. The electronic transforms the measuring signal in a gas concentration and signalises it with an analogous current signal from 4-20mA or from 0.2-1mA or a digital RS485 bus signal in the Modbus RTU protocol. For the display model, gas concentrations and status information are displayed.

The adjustment of the transmitter can be performed with the help of a multimeter and two built-in potentiometers or - if existing - via the display and the control buttons.

3 ASSEMBLY AND INSTALLATION INSTRUCTIONS

3.1 Site of installation

When determining the assembly site, it is important to precisely know the environmental conditions and to take it into consideration for the choice of site. In order to be able to attain representative measuring results, it is necessary to take the ventilation conditions into consideration.

The transmitter needs to be installed in the room so that the gases attain the sensor even in case of an unfavourite ventilation. If necessary, the measuring is performed e.g. with the help of small smoke tubes.

When determining the installation site, it is necessary to make sure that the transmitter is freely accessible for service and calibration works.

Also observe external influences, such as::

- Rainwater, splash water, dripping water, condensate
- the dust content in the atmosphere

The transmitter is mostly protected against the penetration of water and dust. Under very difficult measuring conditions, special accessory can protect the transmitter against damages. The GfG will be glad to inform you about suitable measures.

If the sensor is exposed to environmental conditions which have not been known to the company GfG while planning or delivering the device, the warranty may be null and void.

3.2 Assembly

When determining the installation site, it is necessary to make sure that the transmitter is freely accessible for service and calibration works. The installation position of the transmitter has to be vertical with the sensor pointing downwards.
The transmitter will be connected to the analysis unit according to the connection plan (refer to Connections and terminal allocation). For the assembly, the three Allen screws need to be unscrewed and the housing cover needs to be removed. The housing will be fixed with three screws. The circuit board is located in the housing. The terminals for the connection to the analysis unit are the upper part of the circuit board.

3.3 Installing electrical connections

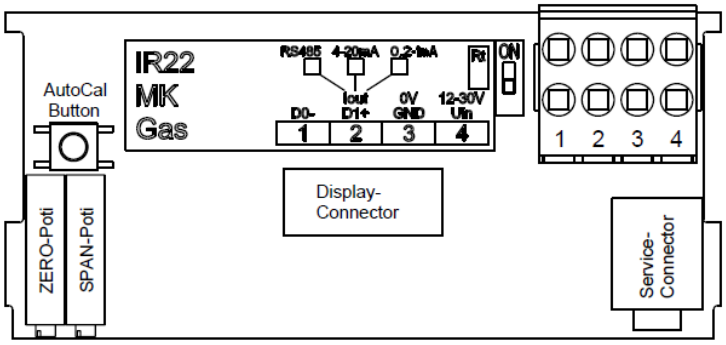
The laying of the cable and the connection of the electrical installation must only be performed by a specialist taking the relevant regulations into consideration. The core cross-section is depending on the length of the connection line and the transmitter model. After the installation, it is necessary to close and screw down the lid of the housing again.

For the analogue data transmission, it is possible to use a cable with the core cross-section of 0.34mm² for short distances of 500m. For long distance, the core cross-section should be 0,75mm².

Circuit diagram:

Terminals for the cable connection
1: Data- D0
2: Data+ D1 / 4-20mA / 0.2-1mA
3: 0V GND
4: 24V DC (12-30V DC)

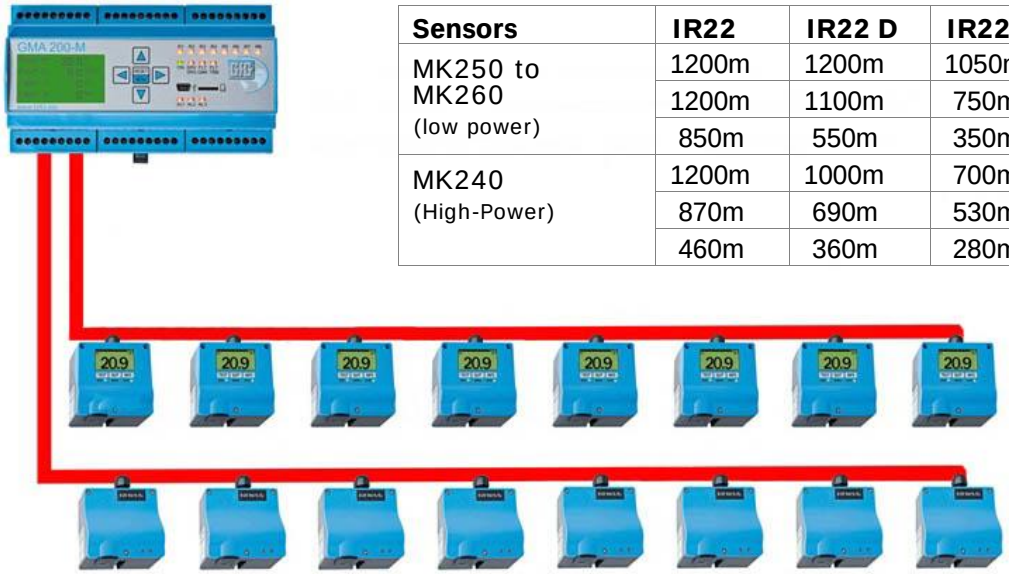
Slide switch (Rt)
Terminating resistor for RS485
(factory setting = OFF)



For digital data transfer via RS485 the bus cabling is depending on different factors. This includes the composition of the bus as a strand or ring, the number of transmitters on the bus, the distance of the individual transmitters from the GMA, the transmitter type / model, the sensor type and, of course, from the bus cable type. It is necessary to check in the individual case, if the

operating voltage is sufficient for the bus model, in order to be able to sufficiently supply even the last transmitter on the transmitter bus. In case of need, the voltage supply needs to be extended by an additional voltage source. The cable length should not exceed 1200m.

In the following example, the maximum cable length for the installation of 8x IR22 each in a distance of 10m is indicated at the end of the bus cable strand. At this, IR22 stands for devices without display, IR22D stands for devices with display and IR22DA stands for devices with display and alarm transmitter.



Sensors	IR22	IR22 D	IR22 DA	Buscable
MK250 to MK260 (low power)	1200m	1200m	1050m	2x2x1,5mm2
	1200m	1100m	750m	2x2x1,0mm2
	850m	550m	350m	2x2x0,5mm2
MK240 (High-Power)	1200m	1000m	700m	2x2x1,5mm2
	870m	690m	530m	2x2x1,0mm2
	460m	360m	280m	2x2x0,5mm2

(2x2x0,5mm2 = 2x2x0,8mm)

4 OPERATING INSTRUCTIONS

4.1 Commissioning

The function and display of the transmitter IR22 will be tested before delivery The adjustment is performed with corresponding test or calibration gases. However, there may be deviations depending on the transport, assembly and environmental conditions.

Therefore, the gas warning system needs to be commissioned and tested by a qualified person.

After switching on, the transmitter needs a few minutes in order to::

- Perform the self-test at which the program and working memory is being checked
- Read and assess the device parameters with simultaneous memory scan
- Read and assess the sensor parameters with simultaneous memory scan
- Run in the sensor

During the initial phase, the memory tests are run in the first seconds.

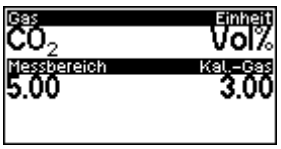
Model with analog current interface (0.2-1mA):
Directly after the switching on, the current interface will emit 0.0mA and after 4 seconds it will emit 0.08mA. At this, the green and red LED are illuminated.

Model with analog current interface (4-20mA):
Directly after the switching on, the current interface will emit 0.0mA and after 4 seconds it will emit 1.6mA. At this, the green and red LED are illuminated.

Model with digital Modbus interface (RS485):
On the Modbus model, you can read “Startup” from the connected analysis unit e.g. GMA200. To that, also refer to the Modbus plant for the TRM22 operating instructions, if required.

Firstly, the information about the Firmware version is displayed on the IR22 display. Then, the measuring range, measuring unit, gas type and calibration gas concentration will be displayed. On the display, the remaining seconds of the start-up phase are counted down.

After the start-up phase of the sensor, the IR22 automatically switches over to the measuring mode.



If a device error is detected during the start phase, the device will switch over to the malfunction mode.

Model with analog current interface (0.2-1mA):
Then the current interface will emit 0.06mA. An error message will be displayed (see displays of special statuses and malfunctions). The yellow malfunction LED is continuously illuminated.

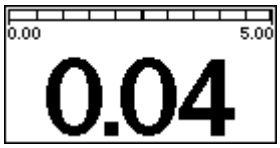
Model with analog current interface (4-20mA):
The current interface will emit 1.2mA. An error message will be displayed (see displays of special statuses and malfunctions). The yellow malfunction LED is continuously illuminated.

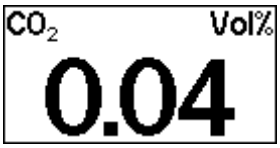
Model with digital Modbus interface (RS485):
In the Modbus model, an error message is displayed on the display of the transmitter and / or the GMA (see displays of special statuses and malfunctions). The yellow malfunction LED is continuously illuminated.

Note:
The first commissioning of the transmitter requires a verification as well as an adjustment of the zero point (ZERO) and subsequently also the sensitivity (SPAN) after the start-up time.

4.2 Measuring mode

During the trouble-free measuring mode, the green operating LED will be continuously illuminated, the yellow malfunction LED would be off. The functionality of the electronics will continuously be monitored by different tests, such as sensor, processor and memory tests. The gas concentration is continuously measured and will be updated every second.





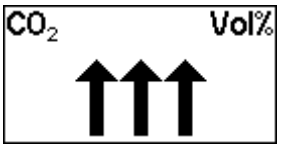
The digital display shows currently detected gas concentration during the measuring mode.

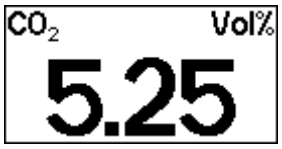
Up to three limit value alarms can be configured on the IR22 with display, signaling is done acoustically and optically in the display with red backlight. An alarm is triggered as soon as the gas concentration exceeds or falls below the set alarm limit value. Depending on the function setting, the alarm reset of the limit value alarms can take place automatically or, in the case of latching alarms, after the alarm limit value has been fallen below, with acknowledgement by pressing the key. QUIT MENU

In the normal measuring mode, above the current gas concentration, a bar graph with a pre-set measuring range which is alternating every 5 seconds with the gas type and the gas unit will be displayed on the display of the transmitter during the measuring mode.

4.2.1 Exceeding the measuring range

If the measuring range is exceeded between 100% and 112% of the measuring range, will be displayed by arrows↑↑↑ which alternate with the measuring value.





Transmitter with analog current interface 0.2-1mA:
The current interface will correspondingly emit a signal in the range from 1.0…1.1mA.

Transmitter with analog current interface 4-20mA:
The current interface will correspondingly emit a signal in the range from 20…22mA.

Transmitter with digital Modbus interface (RS485):
In the Modbus model, the corresponding measured value is displayed alternating with ↑↑↑ on the display of the transmitter and / or of the GMA (see displays of special statuses and malfunctions).

If the measuring range will be exceeded even more significantly by more than 112% continuously represented arrows ↑↑↑ and a rapidly flashing yellow status LED will be displayed.

Transmitter with analog current interface 0.2-1mA:
The current interface will emit 1.1mA.

Transmitter with analog current interface 4-20mA:
The current interface will emit 22mA.

Transmitter with digital Modbus interface (RS485):
In the Modbus model ↑↑↑ are continuously displayed on the transmitter and / or on the GMA (see displays of special statuses and malfunctions).

4.2.2 Undercutting the measuring range

Measured values below the zero point will be displayed as numeric values with a negative sign. If the measured value undercuts 0…-5% of the measuring range, the measured value will be displayed on the display of the transmitter or on the analysis unit (e.g. GMA200).

If the measured value of -5…-7.5% is undercut, arrows ↓↓↓alternating with the measured value are being displayed.

If the measuring signal undercuts the measuring range of -7.5%, the arrows ↓↓↓ will be continuously displayed.

Transmitter with analog current interface 0.2-1mA:
The current interface will correspondingly emit a signal in the range from 0.14…0.2mA.

Transmitter with analog current interface 4-20mA:
The current interface will correspondingly emit a signal in the range from 2.8…4.0mA.

Transmitter with digital Modbus interface (RS485):
In the Modbus model, the corresponding measured value will be represented on the display of the transmitter and / or the GMA (see displays of special statuses and malfunctions).

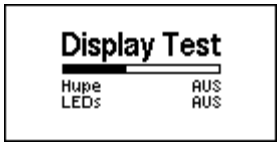
4.2.3 Control buttons

With the operating keys of the transmitter TEST ZERO ▼ QUIT MENU INFO SPAN ▲ it is possible to perform sensor adjustments as well as settings on the menu

4.2.4 Display, LED and horn test [TEST]

In the measuring mode it is possible to trigger a display and LED test by shortly pressing the button TEST ZERO ▼ for the transmitter with display.

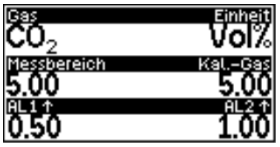
At this, all LEDs will be triggered, all segments of the display are represented and in addition the status LEDs as well as an acoustic signal will be briefly triggered.



4.2.5 Display of operating parameters [INFO]

During the measuring mode, the following important operating parameters are automatically displayed one after another after briefly pressing the button INFO / SPAN ▲ .

- Measuring gas
- Measurement unit
- Measuring range
- Calibration or test gas concentration
- Alarm limit values (with activated alarm function)



These displays are also displayed during the start-up phase of the device.

4.2.6 Sensor service life

The service life of the infrared sensors mainly depends on the ageing of the radiation source and from the changes of the optical surfaces on the sensor. Such changes can be caused by aggressive gases, by a dusty environment or by high humidity at strongly varying temperatures. Such sensor changes can be compensated to a certain extent. The service life to be expected of the sensors used in the IR22 usually amounts to more than 5 years. A sensor needs to be replaced, if its signal quality has worsened so much, that the gas sensitivity can no longer be set due to a too low signal stability.

4.3 Calibration and adjustment

4.3.1 Zero point calibration

For the calibration (control) or adjustment (setting) of the zero point, it is necessary to distinguish between carbon dioxide sensor and other infrared sensors regarding the choice of the zero gas.

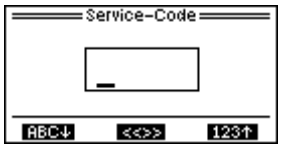
- Carbon dioxide sensors exclusively need to be calibrated or adjusted with 100Vol.% N_2.
- For any other infrared sensor, it is also possible to use fresh air (without disturbing gas components) or in aggressive atmospheres, also synthetic air.

Calibration (control):
To do so, a calibration adaptor will be plugged on the diffusion opening of the transmitter housing. Then the zero gas can be supplied pressure free to the sensor via the calibration adapter with a flow of about 0.5 l/min. If the displayed value deviates from zero, it is possible to readjust the deviation.

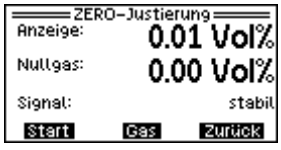
Adjusting the display:
The adjusting of the zero point can be performed in different ways depending on the transmitter model. These options are described below.

4.3.2 Zero point adjustment with display and keyboard [ZERO]

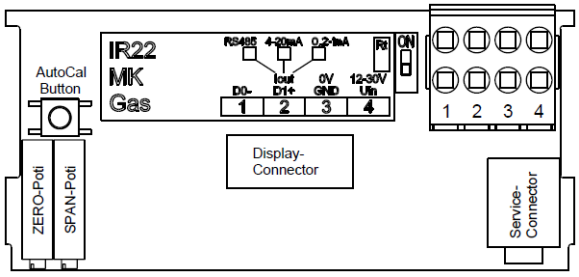
In order to be able to perform the zero-point adjustment, it is necessary to change over to the service code prompt by long pressing the key TEST / ZERO ▼ (>3 sec.). After having entered the standard service code “0011” (factory settings) the program “ZERO adjustment” will be activated. This will be signalised by the flashing of the yellow status LED and for transmitters with analogue interface (4-20mA or 0.2-1mA) by an output signal of 2.4mA or 0.12mA.



Then, the current gas measured value (display) and the pre-set zero gas concentration will be displayed. If the gas measured value no longer amounts to more than 10% of the measuring range, it is possible to start the zero point adjustment by pressing the left button [Start]. If the current gas measured value remains constant during a defined time interval, the new zero point will be taken over and displayed. The program “ZERO adjustment” will be terminated by pressing the right button and the system changes over to the measuring mode.



4.3.3 Zero adjustment with the AutoCal button [ZERO]



For transmitters without display, the zero point adjustment can be most easily performed by pressing the AutoCal button. In order to be able to press this button, it is necessary to remove the transmitter cover.

In order to prepare the adjustment, the AutoCal button needs to be pressed for at least 5 seconds. During this 1st phase (0.-5.sec) the green status LED of 1Hz will flash and is illuminated by 50% each. If the button will be released already during the 1st phase, i.e. too early, it will not be adjusted and the measuring mode will be continued normally.

After the first 5 seconds, the 1Hz flashing will change for another 5 seconds so that the green LED is shortly illuminated (10%). In order to start the zero point adjustment, the button needs to be released during this 2nd phase (5.-10.sec). Then the adjustment process will be signalised by flashing of the yellow status LED and a current output signal of 2.0mA (or 0.1mA). If the measured value remains constant during the defined time interval, the new zero point will be taken over and the measured value will be set to 0.00Vol%. A successful adjustment will be indicated by rapid flashing of the green LED - however, it the adjustment failed, it will be indicated by rapid flashing of the yellow LED. Then, the adjustment process will be automatically terminated.

If the button will be pressed for more than 10 seconds, the AutoCal sensitivity adjustment can be started during the 3rd phase (10.-15.sec), which however would fail due to the missing test gas. If the button is pressed for more than 15 seconds, it will neither be adjusted and the measuring mode will be normally continued.

4.3.4 Zero point adjustment with the ZERO poti

For transmitters without display, the zero point adjustment with opened transmitter cover on the ZERO-Poti can be performed with the help of a small screw driver, a multimeter and with a test cable with service plug (see paragraph 5.5 "Accessories and spare parts"). The test cable must be plugged into the voltage measuring sockets of the multimeter and the service plug must be plugged in the service connector of the transmitter. (Also refer to the note)

As long as the ZERO potentiometer is not turned, a voltage value of 0.2-1V DC can be read from the multimeter, which corresponds proportionally to the current gas measured value in the range of 0-100% of the measuring range.

As long as the ZERO-Poti is not being turned, it is possible to read a voltage value of 0.2-1V DC from the multimeter, which proportionally corresponds to the current gas measuring value in the range from 0-100% of the measuring range.

As soon as the ZERO-Poti is being turned, it is possible to read the set point for the zero point adjustment from the multimeter. This will be signalised by the flashing of the yellow status LED. It is necessary to turn as long until the voltage value of 0.200V is being displayed. As soon as this set point remains unchanged for a longer period of time, the zero point adjustment will be started by the transmitter. The yellow status LED goes out as soon as the adjustment process has been completed.

The zero point adjustment for the display values of up to 25% can be performed with the ZERO-Poti. If the transmitter jumps back to the initial (not adjusted= measured value after having performed the adjustment process, in spite of the correct supply of the calibration gas, it was probably not possible to perform the adjustment successfully due to exceeding the tolerable signal limits or an increased signal noise. This may indicate that the sensor is defective and thus needs to be replaced as soon as possible.

Note:

If for transmitters with analogue interface (4-20mA or 0.2-1mA) no test cable with service plug is available, it is alternatively also possible to directly measure the output current (Iout) between terminal 2 and terminal 3 (GND). During this current measurement, nothing must be connected except for the multimeter which is connected to the terminal 2.2.

4.3.5 Sensitivity calibration

When handling toxic gases, it is necessary to follow special advises for behaviour depending on the used test gas. Please find further information in the corresponding Safety data sheets.

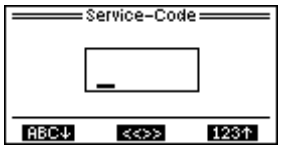
For the calibration (control) or adjustment of the gas sensitivity, a calibration adapter will be connected to the diffusion opening of the transmitter housing. The test or calibration gas (for an oxygen sensor fresh air or synthetic air will be supplied) will be supplied pressure free with a volume flow of about 0.5 $_{l/min}$ to the sensor via the calibration adapter.

The display value will be observed on the display. If the display value deviates from the calibration gas concentration, a sensitivity adjustment is necessary.

Adjusting the display:
Before each adjustment of the sensitivity, the zero point should be controlled and readjusted, if required. The adjustment of the sensitivity can be performed in different ways depending on the transmitter model. Both options are described below.

4.3.6 Sensitivity adjustment with display and keypad [SPAN]

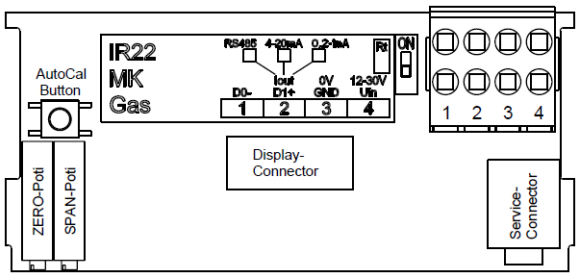
In order to be able to perform the sensitivity adjustment, it is necessary to change over to the service code prompt by long pressing the key INFO SPAN ▲ (>3 sec.). After having entered the standard service code “0011” (factory settings) the program “SPAN adjustment” will be activated. This will be signalised by the flashing of the yellow status LED and for transmitters with analogue interface (4-20mA or 0.2-1mA) by an output signal of 2.4mA or 0.12mA.
Then, the current gas measured value (display) and the pre-set test gas concentration (Cal-gas) will be displayed. After having pressed the centre button [gas] it is possible to change the concentration of the test gas by pressing the left or right button and the changed value can be saved by pressing the centre button.



If the gas measured value amounts to minimum 7% of the measuring range, it is possible to start the sensitivity adjustment by pressing the left button [Start]. As soon as a stable measured value has been collected within a defined time interval, the sensitivity will be adjusted and the new measured value is being displayed. The program “SPAN adjustment” will be terminated by pressing the right button and thus the system changes over to the measuring mode.

4.3.7 Sensitivity adjustment with the AutoCal button [SPAN].

For transmitters without display, if the test gas concentration which is set in the transmitter is known and a test gas with this concentration is present, then it is most easily possible to perform the sensitivity adjustment by pressing the AutoCal button.



In order to be able to press this button, it is necessary to remove the transmitter cover.
In order to prepare the adjustment, the AutoCal button needs to be pressed for at least 10 seconds. During a 1st phase (0.-5.sec) the green status LED flashes with 1Hz and at this it is illuminated with up to 50%. If the button will be released already during the 1st phase it will not be adjusted and the measuring mode will be continued normally. After the 1 st phase, a 2nd phase (5.-10.sec) will follow, during which the flashing changes in a way, that the green LED is only briefly illuminated (10%). If the button would be released during this 2nd phase, then, the zero point adjustment would be started. In particular for CO_2 transmitters, the zero point would be misadjusted if no corresponding zero gas would be used.

However, in order to start the sensitivity adjustment, the button must only be released during the 3rd phase (10.-15.sec). In this case, the 1Hz flashing of the green LED changes in a way that the LED is illuminated considerably longer (90%).

Then the adjustment process will be signalised by flashing of the yellow status LED and a current output signal of 2.0mA (or 0.1mA). If the measured value remains constant during a defined time interval, the sensitivity will be adjusted in a way that the measured value displays the pre-set test gas concentration. A successful adjustment will be indicated by rapid flashing of the green LED - however, it the adjustment failed, it will be indicated by rapid flashing of the yellow LED. Now, it is necessary to remove the test gas. Then, the adjustment process will be automatically terminated.

If the button is pressed even longer than 15 seconds, it will neither be adjusted and the measuring mode will be normally continued.

4.3.8 Sensitivity adjustment with the SPAN potentiometer

For transmitters without display, the sensitivity adjustment with opened transmitter cover on the SPAN-Poti can be performed with the help of a small screw driver, a multimeter and with a test cable with service plug (see paragraph 5.5 "Accessories and spare parts"). The test cable must be plugged into the voltage measuring sockets of the multimeter and the service plug must be plugged in the service connector of the transmitter. (Also refer to the note)

As long as the SPAN-Poti is not being turned, it is possible to read a voltage value of 0.2-1V DC from the multimeter, which proportionally corresponds to the current gas measuring value in the range from 0-100% of the measuring range.

As soon as the SPAN-Poti has been turned, it is possibel to read the set point for the sensitivity adjustment from the multimeter. This will be signalised by the flashing of the yellow status LED. It is necessary to turn as long until the voltage value of e.g. 0.600V (for 50% MB) is being displayed. As soon as this set point remains unchanged for a longer period of time, the sensitivity adjustment will be started by the transmitter. The yellow status LED goes out as soon as the adjustment process is being completed.

If the transmitter jumps back to the initial (not adjusted) measured value after having performed the adjustment process, in spite of the correct supply of the calibration gas, it was probably not possible to perform the adjustment successfully due to exceeding the tolerable signal limits or an increased signal noise. This may indicate that the sensor is defective and thus needs to be replaced as soon as possible.

Note:
If for transmitters with analogue interface (4-20mA or 0.2-1mA) no test cable with service plug is available, it is alternatively also possible to directly measure the output current (Iout) between terminal 2 and terminal 3 (GND). During this current measurement, nothing else must be connected except for the multimeter which is connected to the terminal 2.

4.4 Main and service menu [MENU]

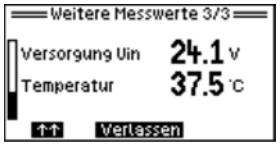
In order to change over to the main menu and then from there to the service menu, it is necessary to press the centre button [MENU] for at least 3 seconds. The access to the main menu is not protected by an access code.

4.4.1 Main menu

In the main menu itself and when changing over to the individual menu items, the transmitter will be in the measuring mode. I.e. The collection and processing of the measuring values and the signal output in the background will work further on. However, there is an exception on the service menu which is described in the following paragraph. The main menu is structured as follows:

Main menu with the options:

- Further measured values
- Transmitter status
- Transmitter Info
- Service menu



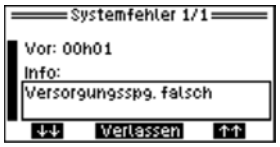
Additional measured values

Display of additional transmitter measured values. By pressing the left button (TEST / ZERO ▼) the following values are displayed sequentially:

- Minimum, maximum and current measured value
  The measured value memory is reset by briefly pressing the right button.
- Mean values for defined time intervals
  Time-weighted mean values (here the last 15 minutes, one hour and 8 hours).
- Supply voltage and temperature

Transmitter status

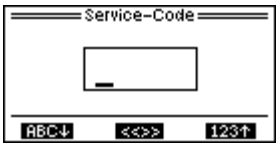
The transmitter status provides information about current system errors, measurement errors, service requirements and events. Behind these groups there are numbers in brackets. These numbers indicate the amount of information available there. Exclamation marks signal active events. Existing messages can be displayed by selecting the corresponding category and inactive messages can be deleted after leaving the detailed view.



Transmitter information

This device overview displays transmitter-specific details such as the firmware version, the device serial number and the sensor type. If an RS485 bus interface is available, the configured baud rate and the bus address are also displayed here.

4.4.2 Service menu



In order to open up the service menu, a special access code needs to be entered. For the standard service menu, the code is “1100”. In an extended service menu, additional functions are also available. The access to this extended service menu is only reserved for the GfG service staff.

The service menu is subdivided as follows:

System settings: Here you will find the general setting options for the RS485 bus interface or the analogue interface, the language, the display contrast, the tolerance band and the horn.

Sensor settings: Here you will find the settings which are necessary for the sensor change as well as the selection of the measuring range.

Alarm settings: Alarm limit values can be configured here.

Measured value simulation: Here it is possible to generate measured values without test gas in order to check the output signal of the interface and the downstream signal processing.

In the following subsections, these settings are described in detail.

4.4.2.1 System settings

If there is an RS485 bus interface on the transmitter, the **bus address** can be set in a range from 1 to 247 (0=inactive). This bus address must only be used once in the same bus segment..

The **bus baud rate** can be set to 9600, 19200 or 38400 bauds. It is set to 19200 bauds by default. For very long bus lines, the baud rate can be reduced to 9600 bauds and for a lot of bus participants it can be increased to 38400 bauds. In the same bus segment, the baud rate always needs to be the same for all bus participants.

The **language** can be set to German or English and is relevant for all display outputs, in particular for the menus.

The **display contrast** can be set from 0 to 100%. This value can vary from one display to another and is generally set to 25...40%.

The tolerance band can be "ON" or "OFF". In the setting "ON" (default), little signal deviations from the zero gas are displayed as 0,0Vol% or 0,0%LEL. The real measured value will only be displayed as soon as the tolerance band is exceeded or undercut. In the setting “OFF”, the real measured value is generally displayed.

The **alarm settings** activates the alarm function and the associated service menu for alarm configuration.

The **horn volume** can be set from 0 to 100%, but it is only relevant, if the transmitter on sit is used for alarming against gas dangers.

The **click sound** can be switched “ON” or “OFF”. In the setting “ON” (default) the internal horn generates a short click sound for each actuation of a key.

If the transmitter is equipped with an analogue 4-20mA (0.2-1mA) interface, then the current interfaces can be adjusted and tested themselves in the extended service menu under **analogue interface.**

Iout Adjustment: Caution !!! The adjustment of the current interface must only be performed with a very accurate current measurement device.

Iout Test: Here the current output can be tested in the range from 0.5 to 24.5mAere, the current output can be tested in the range from 0.5 to 24.5mA. Caution !!! Possibly, connected analysis units do not react on this test level.

4.4.2.2 Sensor settings

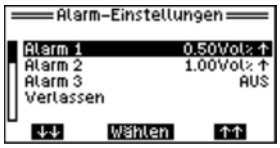
Only in the extended service menu, the following settings concerning the sensor are possible:

Sensor replacement: If the gas sensor is used up and needs to be replaced by a new gas sensor of the same type (MK...), then it is necessary to enter the new gas sensor under this menu item. After having terminated the entry, the calibration data of the old sensor will be deleted and replaced by default values. The zero point and the gas sensitivity of the new gas sensor need to be adjusted in any case.

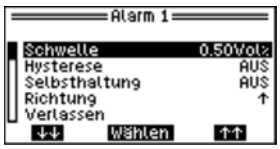
Measuring range: The company GfG will deliver the transmitter already with the measuring range desired by the customer. However, if another measuring range will be required subsequently and if other measure ranges are available for the sensor, then it is possible to select another measurement range under this menu item.

Due to large differences in the measuring range and other types of gas, the calibration data of the current measuring range will not be taken over. I.e., if another measurement range or another type of gas will be selected, it might be necessary to readjust the zero point and the gas sensitivity, if required.

4.4.2.3 Alarm settings

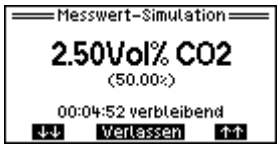


Alarm1 to Alarm3: Selection of the alarm limit values to be configured.



These settings are available for all three alarms:
Threshold: Alarm limit setting.
Hysteresis: More adjustable switch-off hysteresis.
Self-retaining: If self-retaining is activated, the alarm remains active until acknowledgement.
Direction: Setting whether an alarm should be triggered if the alarm threshold is exceeded or not reached.

4.4.2.4 Measured value simulation



With the help of the simulation of the measured value, the interface of the output signal, the transmission of the measured value and the downstream signal processing might be checked. In this way, it is possible to generate time-limited measuring values, unless there is no corresponding test gas available.

Initially, the current real measured value will still be displayed. The simulation mode will only be started after having pressed the left or right button. Above the keyboard labelling, the maximum remaining simulation time will be displayed. If the simulation value has been modified with the left or right button, the remaining simulation time will be set to 5 minutes. It is possible to stop the simulation mode by pressing the centre button. If no button is pressed, the simulation mode will be terminated upon the expiry of the remaining simulation time and the system automatically changes over to the measuring mode.

4.5 Displays and Messages

4.5.1 Overview of the status LED conditions and current output signals

In the following table the different display statuses of the two status LEDs and the current output signals are listed with a reference to their meaning.

Green LED	Yellow LED	Current output	For description, refer to paragraph ...
Off	Flashes at 1Hz	0.0mA	Display of special statuses ... No. 001
Off	On	0.0mA	Display of special statuses ... No. 002
Off	On	1.2mA	Display of special statuses ... No. 102...115
Single pulse every 5s	On	1.2mA	Display of special statuses ... No. 101
Flashes with 1Hz	On	1.6mA	Display of special statuses ... No. 002, 003
On	Flashes with 1Hz	2.0mA	Displays in the service mode... No. 204, 205
On	Flashes with 1Hz	2.4mA	Displays in the service mode... No. 203
On	Flashes with 1Hz	4-20mA	Displays in the service mode... No. 201, 202
On	Single pulse every 5s	2.8-22mA	Displays in the measuring mode No. 309, 310
On	On	2.8mA	Displays in the measuring mode No. 307
On	Off	2.8-22mA	Displays in the measuring mode No. 303...306
On	Flashes with 5Hz	22mA	Displays in teh measuring mode No. 301, 302

4.5.2 Display of special statuses (device start and malfunction)

The statuses are described in the following table, where the yellow fault LED is continuously illuminated and the current 4-20mA current output emits a signal ≤1.6mA.

For the 0.2-1mA current output, the signals in brackets are applicable (≤0.08mA).

Behaviour while starting the device:

No.	display indication	green LED	yellow LED	current output	cause	Note/Explanation
001	Boat V1.12 GfG IR22 Error:Flash	Off	Flashes with 1Hz	0.0mA	An error in the program memory was determined while testing the memory.	Restart the transmitter. In case of another error message, a Firmware update is required.
002	Boat V1.12 Gf G IR22 verify	Off	On	0.0mA	Program and memory tests during the first seconds of device startup	After approx. 4 seconds automatic transfer to the initialisation phase
003	V2.09 Gf G IR22	Flashes with 1Hz	On	1.6mA (0.08mA)	Initialization phase of the transmitter	After approx. 3 seconds automatic transfer to the sensor inlet phase
004	warming XX seconds remaining	Flashes with 1Hz	On	1.6mA (0.08mA)	sensor inlet phase	After the expiry of the time period, automatic transfer to the measuring mode

Behaviour in case of a malfunction:

No.	display indication	green LED	yellow LED	current output	Cause	Note/Explanation
101	Sensor defective	Single pulse of all 5s	On	1.2mA (0.06mA)	The sensor does not react correctly on the gas. Possibly, the sensor is too old.	The sensor needs to be replaced
102	Supply voltage phonily	Off	ON	1.2mA (0.06mA)	The supply voltage of the transmitter is too low or too high.	Check and readjust the voltage supply
103	Malfunction sensor Uk	Off	On	1.2mA (0.06mA)	Sensor operating voltage is not OK.	
104	Fault Sensor Ik	Off	On	1.2mA (0.06mA)	Sensor operating current is not OK.	
105	Temp.signal < MIN Temp.signal > MAX	Off	On	1.2mA (0.06mA)	The temperature measurement is possibly incorrect.	
106	Watchdog error	Off	On	1.2mA (0.06mA)	When testing the external watchdog, a hardware error was determined.	Restart the device Replace the device in case of another error message.
107	FLASH Error	Off	On	1.2mA (0.06mA)	An error in the program memory was determined while testing the memory.	
108	RAM error	Off	On	1.2mA (0.06mA)	An error in the program memory was determined while testing the memory.	
109	EEPROM error 1 EEPROM error 2 EEPROM error 2c EEPROM error 1+2 EEPROM error 1<>2	Off	On	1.2mA (0.06mA)	Error in the parameter memory or when accessing the ext. Parameter memory component.	
110	Wrong PCB type	Off	On	1.2mA (0.06mA)	A wrong type of circuit board an error of the circuit board was determined.	Restart the device Replace the device in case of another error message.
111	Digipoti Error	Off	On	1.2mA (0.06mA)	A hardware error was detected on the digital potentiometer.	
112	ADC error 1 ADC error 2	Off	On	1.2mA (0.06mA)	An error was determined on the analogue/digital converter.	
113	Error in the program sequence	Off	On	1.2mA (0.06mA)	A logical sequence error was determined during the program processing.	
114	Malfunction sensor Ik	Off	On	1.2mA (0.06mA)	The supply voltage of the transmitter is too low/high.	Have the sensor and the electronics checked and replaced by the GfG Service, if required
115	permanent ↓↓↓	Off	On	1.2mA (0.06mA)	The measuring signal undercut the measuring range of the transmitter electronics	

4.5.3 Displays in service mode and during sensor adjustment

The statuses are described in the following table, where the green operation LED is continuously illuminated and the current 4-20mA current output emits a signal of 2.0…2.4mA.
For the 0.2-1mA current output, the signals in brackets are applicable (0.10…0.12mA.

No.	Display indication	Green LED	Yellow LED	Current output	Cause	Note/Explanation
201	Adjustment zero point (ZERO poti)	On	Flashes with 1Hz	4-20mA (0.2-1mA)	The AutoCal program for the zero point adjustment was activated with the ZERO-Poti	The zero-gas setting is performed with the ZERO-Poti
202	Sensitivity adjustment (SPAN poti)	On	Flashes with 1Hz	4-20mA (0.2-1mA)	The AutoCal program for the zero point adjustment was activated with the ZERO-Poti	The calibration gas setting is performed with the SPAN-Poti
203	Menu item	On	Flashes with 1Hz	2.4mA (0.12mA)	Service menu was activated via keyboard	Select the menu item. If no entry is made for one minute, the system automatically returns to the measuring mode
204	Adjustment Zero point	On	Flashes with 1Hz	2.0mA (0.10mA)	Zero point adjustment was activated via the keyboard	AutoCal adjustment of the zero point
205	Adjustment Sensitivity	To	Flashes with 1Hz	2.0mA (0.10mA)	Sensitivity adjustment was activated via the keyboard	AutoCal adjustment of the sensitivity

4.5.4 Displays in the measuring mode

The statuses are described in the following table, where the green operation LED is continuously illuminated and the current 4-20mA current output emits a signal of 2.8…22mA.
For the 0.2-1mA current output, the signals in brackets are applicable (0.14…1.1mA).

No.	Display indication	Green LED	Yellow LED	Current output	Cause	Note/Explanation
301	↑↑↑ permanent	On	Flashes with 5Hz	22mA (1.1mA)	The gas concentration exceeded the measuring range of the transmitter.	
302	↑↑↑ permanent	On	Flashes with 5Hz	22mA (1.1mA)	The gas concentration considerably exceeded the measuring range (Gas≥112,5%MB)	
303	↑ ↑ ↑ Alternating with the measured value	On	Off	20-22mA (1-1.1mA)	Gas concentration has exceeded the measuring range (100...112%MB)	
304	Measured value	On	Off	4-20mA (0.2-1mA)	Trouble-free measuring operation	
305	Measured value	On	Off	3,2-4mA (0.16-0.2mA)	Undercutting the measuring range (-5,0...0,0%MB)	
306	Measured value alternating with ↓↓↓	On	Off	2.8 - 3.2 mA (0.14-0.16mA)	Undercutting the measuring range (-7.5...-5.0%MB)	Zero point adjustment is reasonable
307	Permanent ↓↓↓	On	On	2.8mA (0.14mA)	Undercutting the measuring range (less than −7.5%MB)	Zero adjustment is requiered
309	*Sensor replacement <1 month*	On	Single pulse every 5s	2.8-22mA (0.14-1.1mA)	Expected operating time of the sensor will be attained soon.	Sensor replacement or adjustment will be required
310	*Sensor replacement required*	On	Single pulse every 5s	2.8-22mA (0.14-1.1mA)	Expected operating time of the sensor has been exceeded.	Sensor replacement or adjustment is required

4.5.5 Priority of displays and messages in measuring mode

The displays of statuses of lower priority will be overwritten by displays of higher priority. The statuses of lower priority will not be reset.

Priority	State	For description, refer to paragraph ...
▼	Clear exceeding of the measuring range	Displays in the measuring modeNo. No. 301, 302
	Slight exceeding of measuring range	Displays in the measuring modeNo. No. 303
	Undercutting of the measuring range	Displays in the measuring modeNo. No. 305...307
	Sensor replacement	Displays in the measuring modeNo. No. 309, 310

Sensor error no. 101 and transmitter faults no. 102...115 interrupt the measuring operation with their respective messages.

4.6 Malfunction, cause, remedy

Malfunction	Cause	Remedy
The zero point can no longer be set	Sensor defective	Replace sensor
The Sensitivity can no longer be set	Sensor defective	Replace sensor
The output current has decreased to 0mA	Fuse or electronics defective	Replace the circuit board
	Line interrupted	Re-establish connection

5 ANNEX

5.1 Cleaning and care

External soiling of the transmitter housing can be removed using a cloth dampened with water Do not use solvents or cleaning agents!

5.2 Maintenance and repair

Maintenance and service include regular visual inspections, functional testing and system checks, as well as repairs to the gas warning system. In Germany therefore the „DGUV (German Social Accident Insurance) Information 213-056 (leaflet T 021 / up to now BGI 836 Paragraph 9)“ and „DGUV (German Social Accident Insurance) Information 213-057 (leaflet T 023 / up to now BGI 518 Paragraph 9)“ are applicable.

5.2.1 Visual inspection

Visual inspections should be carried out on a regular basis with a maximum interval of one month and include the following tasks:

- Check the operation display and the status messages,
  e.g. operating display "On", alarm and fault displays "Off"
- Check for mechanical damage and external soiling

5.2.2 Functional testing

Functional testing can be carried out at specific intervals, which depend on the gas hazard being monitored. The intervals between the controls should not exceed 4 months. This maximum control interval is determined in Germany in the sets of rules T 021 and T 023 of the trade association BG RCI..

It includes the following tasks:

- Visual inspection according to section 5.2.1 of these operating instructions
- Testing and evaluation of the measured value displays
- Triggering the alarm thresholds
- Triggering the test functions for display elements as well as optical and acoustic signal transducers, without triggering switching functions
- Inspection of saved messages, faults and maintenance requirements

5.2.3 System check (Proof Test)

The system check must be carried out at regular intervals. The time between intervals should not exceed 1 year. It includes the following tasks:

- Function check according to section 5.2.2 of these operating instructions
- Inspection of all safety functions, including triggering of switching functions.
- Monitoring of parameterisation via target / actual comparison
- Inspection of signalling and registration modules

5.2.4 Repair

This includes all repair and replacement tasks. These tasks should only be carried out by the manufacturer and persons who have been authorised to do so by the manufacturer – GfG Gesellschaft für Gerätebau mbH. Only original spare parts and original modules inspected and approved by the manufacturer should be used.

5.3 Sensor replacement

It is necessary to remove the transmitter cover in order to replace the sensor. At zero current, the electronics with the sensor can be pulled out of the guiding. Then, it is possible to pull off the old sensor and to plug the new sensor. The remaining assembly works are performed in reverse order. It is only allowed to use a sensor of the same type as a replacement sensor, its serial number has to be entered in the service menu of the transmitter after the installation.

5.4 Information on the environmentally sound disposal of used parts

According to section 11 of the General Terms and Conditions of the company GfG, the purchaser of the device agrees to dispose of the device or device components in an environmentally sound manner in line with sections 11 and 12 of the German Electrical and Electronic Equipment Act (ElektroG). If desired, GfG in Dortmund, Germany, can also carry out correct disposal.

5.5 Accessories and spare parts

	Description	Order No.
1.	Calibration adapter for EC22 and IR22	2220200
2.	Test cable with service plug for EC22, CC22, ZD22, CS22 and IR22	2220201
3.	MK250-0 replacement sensor for 0-5Vol% CO_2	2226701
4.	MK251-0 replacement sensor for 0-1Vol% or 10000ppm CO_2	2226702
5.	MK252-0 replacement sensor for 0-25Vol% or 0-50Vol% CO_2	2226703
6.	MK253-0 replacement sensor for 0-2Vol% or 100%UEG $_{C3H8}$	2226710
7.	MK254-0 replacement sensor for 0-5Vol% or 100%UEG CH4	2226720
8.	MK260-0 replacement sensor for 0-10Vol% CO_2	2226704

5.6 Lower explosion limits (LEL) of gases and vapours

LEL values according to DIN EN 60079-20-1:2010			
4,4Vol.% CH_4 methane	(CAS-No.74-82-8)	1,4Vol.% C_4H_{10} butane	(CAS-No.106-97-8)
2.3Vol.% C_2H_4 ethylene	(CAS-No.74-85-1)	1,1Vol.% C_5H_{12} pentane	(CAS-No.109-66-0)
2.4Vol.% C_2H_6 ethan	(CAS-No.74-84-0)	1.0Vol.% C_6H_{14} n-hexane	(CAS-No.110-54-3)
1.7Vol.% C_3H_8 propane	(CAS-No.74-98-6)	3.1Vol.% C_2H_6O ethanol	(CAS No.64-17-5)

5.7 Sensor specification

MK250-0 Infrared sensor for carbon dioxide CO_2			
Measuring range:		0.00...5.00Vol.%	
Resolution:		0,01Vol.%	
Tolerance band:		±0,00Vol.%	
Setting time:		t_{50} < 25sec t_{90} < 50sec t_{10} ≤ 50sec	
Pressure70	...130kPa:	<1.6% of display per 1% change in pressure	(concerning 100kPa)
Humidity0%	...95% RH:	max. ±0.01 vol.% or ±2% of the display	(concerning 50%RH @20°C)*
Temperature	-25...+50°C:	max. ±0.02 vol.% or ±10(15)% of the display	(concerning 20°C)*
Long-term stability	per month:	max. ±0.01 vol.% or ±2% of the display	(under laboratory conditions)*
Expected service life:		> 5 years	

MK251-0 Infrared sensor for carbon dioxide CO_2			
Measuring range:		0,000...1,000Vol.% or 0...10000ppm $_{CO2}$	
Resolution:		0,001Vol.% or 10ppm	
Tolerance band:		±0,000Vol.% or ±0ppm	
Setting time:		t_{50} < 25sec t_{90} < 50sec t_{10} ≤ 50sec	
Pressure70	...130kPa:	<1.6% of the display per 1% pressure change	(concerning 100kPa)
Humidity0%	...95% RH	max. ±0.010 vol.% or ±2% of the display	(concerning 50%RH @20°C)*
Temperature	-25...+50°C:	max. ±0.020 vol.% or ±10(15)% of the display	(concerning 20°C)*
Long-term stability	per month:	max. ±0.010 vol.% or ±2% of the display	(under laboratory conditions)*
Expected service life:		> 5 years	

MK252-0 Infrared sensor for carbon dioxide $_{CO2}$			
Measuring range:		0.0...25.0Vol.% or 0.0...50.0Vol%	
Resolution:		0.1Vol.%	
Tolerance band:		±0,00Vol.%	
Setting time:		t_{50} < 25sec t_{90} < 50sec t_{10} ≤ 50sec	
Pressure70	...130kPa:	<1.6% of the display per 1% pressure change	(concerning 100kPa)
Humidity:		0%...95% RH, non-condensing	
Temperature-25	...+50°C:	max. ±0.5 % by volume or max. ±1 Vol.% or ±10% of the display or ±15% of the display	(concerning 20°C)*
Expected service life:		> 5 years	

MK253-0 Infrared sensor for propane C_3H_8			
Measuring range:	0.0...100.0%UEG	or 0.00...2.00Vol.% C_3H_8	
Resolution:	0.2%UEG	or 0,01Vol.%	
Tolerance band:	±1.0%UEG	or ±0,02Vol.%	
Setting time:	t_{50} < 25sec	t_{90} < 50sec	
Pressure 70...130kPa:	<1.2% of display per 1% change in pressure		(concerning 100kPa)
Humidity 0%...95% RH:	max. ±2.0%LEL or ±15% of the display		(concerning 50% RH @40°C)*
Temperature-25 ...+50°C:	max. ±2,0%LEL or ±10(15)% of the display		(concerning 20°C)*
Expected service life:	> 5 years		

MK254-0 Infrared sensor for methane CH4			
Measuring range:	0.0...100.0%UEG	or 0.00...5.00Vol.% CH4	
Resolution:	0.2%UEG	or 0,01Vol.%	
Tolerance band:	±1.0%UEG	or ±0,05Vol.%	
Setting time:	t50 < 25sec	t90 < 50sec	
Pressure70 ...130kPa:	<1.5% of display per 1% change in pressure		(concerning 100kPa)
Humidity0% ...95% RH:	max. ±2.0%LEL or ±15% of the display		(concerning 50% RH @40°C)*
Temperature- 25...+50°C:	max. ±2,0%LEL or ±10(15)% of the display		(concerning 20°C)*
Cross sensitivities@50% LEL :	1,20Vol.% C_2H_6 ➔ >125%LEL (5,5Vol.%) 0,55Vol.% C_5H_{12} ➔ approx.55% LEL (2,5Vol.%) 0.85vol.% C_3H_8 ➔ approx.90%LEL (4.0vol.%) 2.20vol.% CH_4 ➔ = 50%LEL 1.55vol.% C_2H_6O ➔ approx.80%LEL (3.5vol.%) 0.50vol.% C_6H_{14} ➔ approx.45% LEL (2.0Vol.%) 0.70Vol.% C_4H_{10} ➔ approx.65% LEL (2.9Vol.%) 1.15Vol.% C_2H_4 ➔ approx.20% LEL (0.9Vol.%) They may vary from one sensor to another and depend on the gas concentration.		
Expected service life:	> 5 years		

MK260-0 Infrared sensor for carbon dioxide CO_2			
Measuring range:	0.0...10.0Vol.%		
Resolution:	0,01Vol.%		
Tolerance band:	±0,00Vol.%		
Setting time:	t_{50} < 25sec	t_{90} < 50sec t_{10} ≤ 50sec	
Pressure70 ...130kPa:	<1.6% of display per 1% change in pressure		(concerning 100kPa)
Humidity:	0%...95% RH, non-condensing		
Temperature-25 ...+50°C:	max. ±0.20 vol.% or ±10(15)% of the display		(concerning 20°C)*
Long-term stability per month:	max. ±0.10 % by volume		(under laboratory conditions)*
Expected service life:	> 5 years		

* The greater of the following applies

5.8 Technical data

Type designation:	**IR22**	
Environmental conditions		
Operating temperature:	-25…+50°C	
Storage temperature:	-25...+60°C (recommended 0...+30°C)	
Humidity:	0...95% RH	
Air pressure:	70...130kPa (depending on the sensor)	
Power supply		
Operating voltage:	24V DC (12-30V DC permissible)	
Power consumption:	For RS485 and 0.2-1mA version	4-20mA version
without display ***1**:	typ. 15/18/21mA @24V/18V/12V	max.37/40/43mA @24V/18V/12V
with display ***1**:	typ. 20/25/33mA @24V/18V/12V	max.42/47/55mA @24V/18V/12V
with display+horn ***1**:	max. 30/38/50mA @24V/18V/12V	max. 52/60/72mA @24V/18V/12V
Fuses:	250mA (not replacable)	
Sensors		
Measuring range and Measuring gas:	Depending on the sensor	
Sample gas supply:	Diffusion	
Measurement processing		
Update time:	1s	
Ready delay:	5s plus 60s start-up phase of the sensors (warm-up)	
Display & Controls		
Status LEDs:	Green for operation and yellow for fault or service	
Display, buttons:	2,2″ graphic display and 3 function keys (with display version)	
AutoCal button:	for ZERO and SPAN adjustment (internal)	
Potentiometer:	for ZERO and SPAN adjustment (internal)	
Service connector		
Construction:	3.5mm stereo jack socket (internal)	
Analogue output:	0,2...1,0V corresponding to 0...100% MB for sensor calibration	
Digital input:	For configuration and firmware update	
Signal output		
analogue:	4...20mA (max.load: 400Ω/650Ω/150Ω @24V/18V/12V supply)	
or analogue:	0.2...1mA (max.load: 14K1/9K3/4K5 @24V/18V/12V supply)	
or digital:	RS485; half-duplex; 9600/19200/38400 baud; Modbus protocol, slide switch for 120Ω terminating resistor	
Connecting cables		
Cable glands:	1 or 2 pieces M16x1.5 (for cable diameter 4.5-10mm)	
Connection terminals:	4 pieces (0.08..2.5mm2 conductor cross-section)	
Cable (analogue):	3-wire e.g. LiYY 3x0,34...0,75mm2 or LiYCY	
Cable (digital):	4-wire e.g. LiYY 4x0.50...1.5mm2 or bus line Y(St)Y 2x2x0.8 ***2**	
Housing		
Protection class:	IP54 according to IEC 60529	
Material:	plastic	
Dimensions:	96 x 123 x 49mm (WxHxD) with sensor	
Weight:	125...150g or 170...195g (for display model)	
Approvals / Tests		
Electromagnetic. Compatibility:	DIN EN 50270:2015	Emitted interference: Type class I Interference resistance: Type class II

Declaration to *1: For low-power sensors MK250, MK251, MK252, MK253, MK254 and MK260

Declaration to *2: The bus line Y(St)Y 2x2x0,8 is for the power supply of several bus transmitters via the same cable. only suitable for short cable runs. The possible distance depends on the number and the local distribution of the transmitter on the bus cable. See section 3.3 for more details.

5.9 Declaration of conformity

EU-Konformitätserklärung

Transmitter
IR22

Erstellt: 01.03.2017 Geändert: 31.07.2017

GfG Gesellschaft für Gerätebau mbH

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Die GfG Gesellschaft für Gerätebau mbH entwickelt, produziert und vertreibt Gassensoren und Gaswarnanlagen unter Anwendung eines **Qualitätsmanagementsystems** nach DIN EN ISO 9001.
Überwacht wird die Produktion von elektrischen Betriebsmitteln der Gerätegruppen I und II, Kategorien M1, M2, 1G und 2G für Gassensoren, Gasmessgeräte, Gaswarnanlagen in den Zündschutzarten Druckfeste Kapselung, Erhöhte Sicherheit, Vergusskapselung und Eigensicherheit mit deren Messfunktion mit Hilfe eines **Qualitätssicherungssystems**, überwacht durch die benannte Stelle, DEKRA EXAM GmbH (0158).

Der Transmitter **IR22** entspricht der Richtlinie **2014/30/EU** für die elektromagnetische Verträglichkeit und der Richtlinie **2011/65/EU** (RoHS) zur Beschränkung der Verwendung bestimmter Stoffe in Elektro- und Elektronikgeräten.

Die Richtlinie 2014/30/EU wird unter Berücksichtigung der folgenden Norm eingehalten:

- Elektrische Geräte für die Detektion und Messung von brennbaren Gasen, toxischen Gasen oder Sauerstoff — EN 50270 :2015
  Störaussendung: Typklasse 1
  Störfestigkeit: Typklasse 2

Mit der Prüfung und Bewertung der elektromagnetischen Verträglichkeit wurde das EMV Messlabor AMETEK CTS Germany GmbH in Kamen beauftragt.

Die Richtlinie 2011/65/EU wird unter Berücksichtigung der folgenden Norm eingehalten:

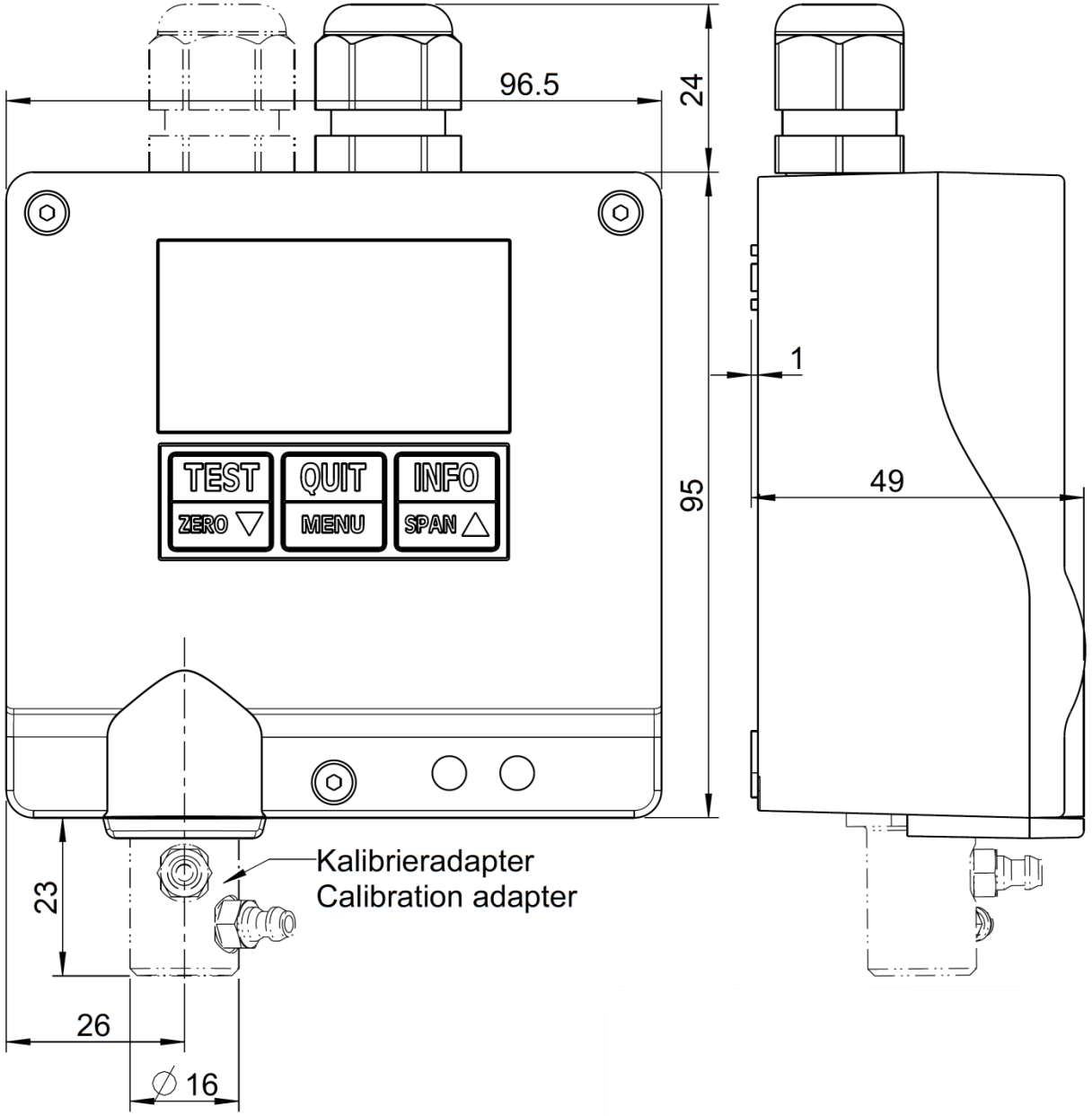
- Technische Dokumentation zur Beurteilung von Elektro- und Elektronikgeräten hinsichtlich der Beschränkung gefährlicher Stoffe — EN 50581 : 2012

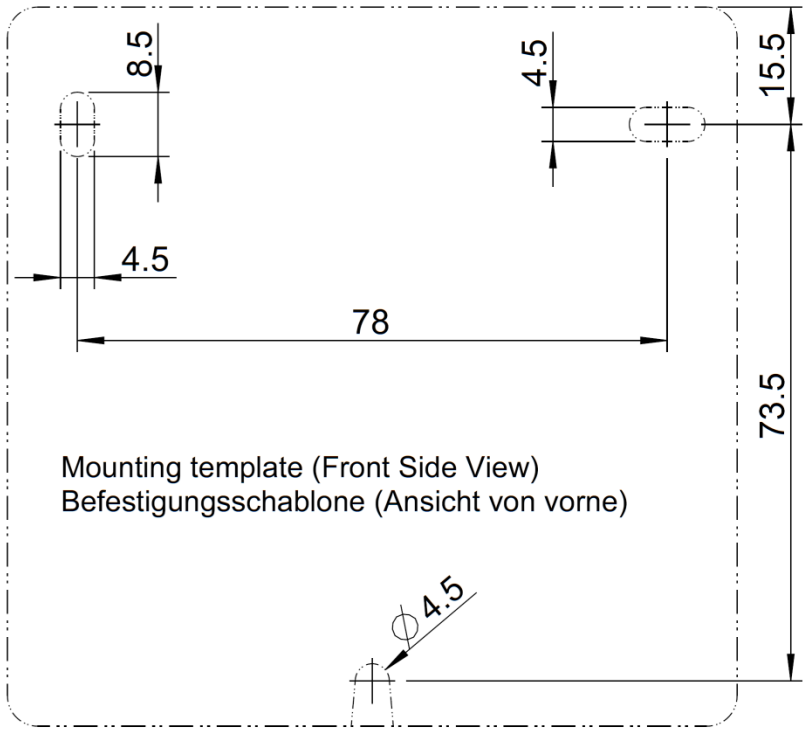
Dortmund, den 14. September 2017

i.V.

B. Siebrecht
QMB

EG-Konf/Si/Siebrecht





Mounting template (Front Side View)
Befestigungsschablone (Ansicht von vorne)