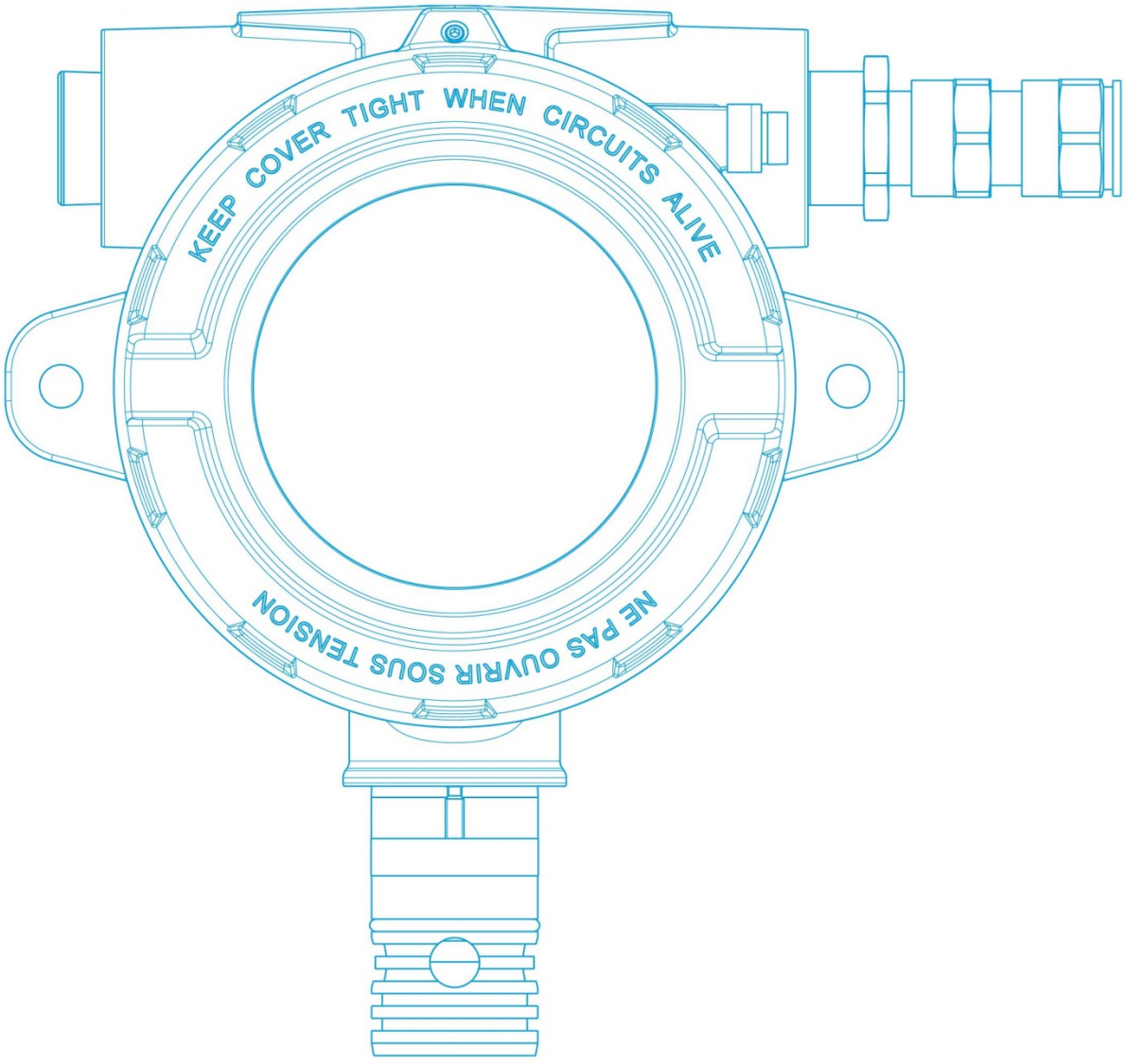
smart GasDetection Technologies

Operations Manual

Transmitter CC33

for the detection of flammable gases and vapours



Translation of the original operations manual

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INFO@GFG-MBH.COM ▌WWW.GASMESSUNG.DE ▌AMTSGERICHT DORTMUND HR B 2742 ▌CERTIFIED IN ACCORDANCE WITH DIN EN ISO 9001:2015 ▌ATEX QM CERTIFIED

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1 INTRODUCTION

1.1 For Your Safety

In accordance with Section 3 of the Product Safety Act (ProdSG), this operating manual refers to the proper use of the product and is designed to prevent hazards. It must be read and observed by everyone who operates services, maintains and inspects 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.

The warranty issued by GfG Gesellschaft für Gerätebau mbH (GfG) shall be void, if it is not used, cared for, maintained and checked in accordance with GfG's specifications. The previously mentioned does not change the statements about the Warranty and Liability in the Sales and Delivery Terms of GfG.

1.2 Area of Use and Application

The transmitter CC33, featuring a pressure-resistant sensor, is used for detecting combustible gases and vapours in ambient air up to the lower explosion limit under atmospheric conditions. The measured values are displayed by a built-in display and transmitted via analogue 4-20mA or digital RS485 interface. For acoustic alarm, the buzzer (horn) approved for the CC33 can optionally be screwed into one of the two threaded holes.

The transmitter CC33 has been tested by DEKRA EXAM GmbH for use in potentially explosive areas. Corresponding EU type-examination certificates according to Directive 2014/34/EU as well as a corresponding IECEx certificate are available.

EU type examination certificate:	BVS 18 ATEX E 087 X	
IECEX Certificate of Conformity:	IECEx BVS 18.0073 X	
CC33 (without buzzer):	Ⓔx II 2G Ex db IIC T6 Gb	-20°C≤Ta≤+55°C
CC33 (with buzzer):	Ⓔx II 2G Ex db ib IIC T4 Gb	-20°C≤Ta≤+55°C
	II 2G Ex db ib IIC T6 Gb	-20°C≤Ta≤+40°C

The measuring function for explosion protection according to Annex II, Paragraph 1.5.5 of Directive 2014/34/EU is not subject of the EU Type Examination Certificate BVS 18 ATEX E 087 X.

1.3 Special Requirements for Safe Usage

According to national regulations, gas warning 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 518 Section 8.1)".

The transmitter has been tested for function and display before delivery. The calibration and adjustment are performed with the appropriate test or calibration gases.
This does not exempt the user from calibration and adjustment after installation.

WARNING: Do not open the housing under voltage if an explosive atmosphere is present !!

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

For maintenance purposes the transmitter may only be operated using the respective magnetic rod for TRM33 transmitters.

2 GENERAL INFORMATION

2.1 General Description

A stationary gas warning system consists of a transmitter and a controller (GMA, not included). Transmitter and GMA are connected by a cable. The transmitter converts the gas concentration into an electrical measuring signal and sends it to the evaluation unit for further processing.

The CC33 transmitter is equipped with a graphic display that has magnetic keys. The display has a "green" backlight in measuring mode. In the event of a fault or alarm, the display colour changes to "red" for a visual alarm.

Each 33 series transmitter has several status LEDs, which indicate the operating status of the device. There are four types of lights: one "green" to indicate operational readiness, one "yellow" to indicate a fault or special condition and two "red" for gas alarms.

The 33 series transmitters can be equipped with either an analogue current interface or a digital RS485 interface. By default, the current interface is output at 4-20mA. The communication of the digital RS485 interface is performed according to the Modbus (RTU) protocol.

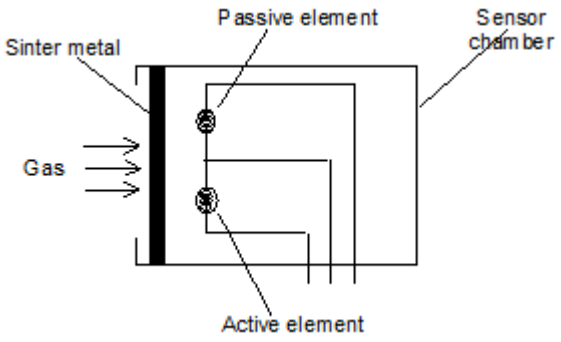
The electronics perform many tasks which simplify operation and maintenance but also considerably increase operational reliability and measuring accuracy. The transmitter is characterized by:

- Concentration display
- Adjustments without opening the housing, with the touch of a button
- Compensation of temperature effects
- Permanent status display (measuring mode, fault or special status) on the transmitter

2.2 Measurement Method

The CC33 works according to Catalytic Combustion (CC) technology (see picture). The gas or vapour-air mixture diffuses through the sintered metal into the measuring chamber. In the measuring chamber there is an active and ~~a~~ passive sensor element. The heated active sensor burns (oxidizes) the incoming sample gas at its catalyst layer. This increases the temperature of the sensor and causes a change in ~~the~~ electrical resistance. This change is the measure of the gas concentration and is converted by the electronics integrated into the transmitter into a standardized analogue current signal (4-20 mA or 0.2-1 mA) or into a digital bus signal.

Catalytic Combustion



The passive sensor element is exposed to the same environmental conditions as the active sensor element and is used to compensate for environmental influences (e.g. temperature changes).

2.3 Functional Limitation with Insufficient Oxygen

It should be noted that the measurement of gas and/or vapour concentrations in the measuring range up to 100% LEL can no longer be carried out accurately if the oxygen concentration is less than 10Vol.%. In this case, the heat tone sensor lacks the oxygen required for "catalytic combustion".

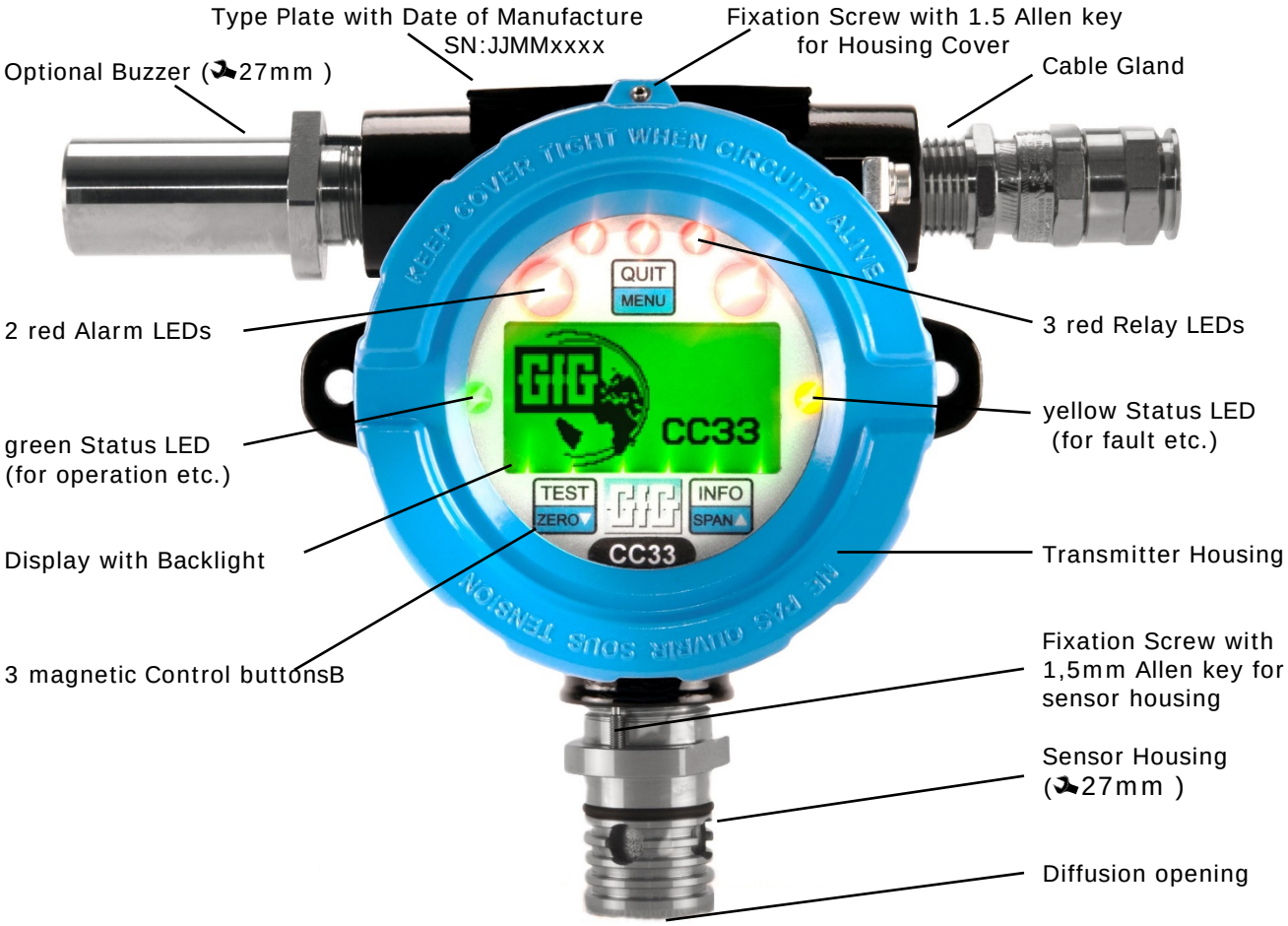
2.4 Indication Errors with Sensor Poisons

Certain substances, which are called "sensor or catalyst poisons", can impair the sensor in its signal performance. The "sensitivity", i.e. the ability of the sensor to emit signals, decreases. Substances of this type include sulphur, lead and silicon compounds. Special attention should be paid to any interfering gases present at the measuring point that could irreversibly impair the function of the gas warning devices. Depending on the type, concentration and duration of exposure, such substances can cause disturbances ranging from a more or less continuous, long-term decrease to a sudden sharp drop in sensitivity.

2.5 Transmitter Performance

Depending on the type of measuring gas, the transmitter has different transmission characteristics. The response times can vary depending on the sample gas. Gas display and signal outputs are always proportional to the gas concentration.

2.6 Device Set-Up



In the upper part of the transmitter housing, there are "conduit" openings on the left and right, into which cable entries, a threaded plug (to close the opening) or an optional buzzer (horn) can be fitted. In the lower part of the transmitter housing, there is an opening into which the sensor housing with sensor is mounted. The transmitter housing contains the transmitter electronics, which converts the measuring signal into a gas concentration, signals limit value violations and sends the measured value as an analogue 4-20mA current signal or as a digital RS485 bus signal.

The transmitter can be adjusted with a magnetic rod by tapping on the respective three control buttons located below and above the display.

3 ASSEMBLY AND INSTALLATION

3.1 Place of Installation and Mounting

Only the transmitter may be installed in the hazardous area. The evaluation unit or the power supply unit must be installed outside.

When determining the installation location, it is important to take into account the exact environmental conditions. To achieve realistic measurement results, the ventilation conditions must also be taken into account.

The transmitter must be installed in the room in such a way that the gases reach the sensor even with unfavourable ventilation. If necessary, a measurement must be made, e.g. with smoke tubes.

When determining the installation location, care must also be taken to ensure that the transmitter is always freely accessible for service and calibration work.

The following external influences should be taken into account:

- Rainwater, splash water, dripping water, condensation
- The dust concentration in the atmosphere

The transmitter must be installed vertically with the sensor pointing downwards. The transmitter housing is fastened to the two outer lugs with 2 flat head screws, which should have a diameter of approx. 6mm. In any case, suitable washers should also be used.

The transmitter is largely protected against ingress of water and dust. Under very difficult measuring conditions, special accessories can protect the transmitter from damage. GfG will be happy to inform you about suitable measures.

If the sensor is exposed to environmental conditions which were not known to GfG at the time of planning or delivery, the warranty may be voided.

3.2 Cable, Cable Entry, Threaded Plug or Buzzer

To ensure that ignition protection class "Ex d" can also be achieved at the cable entry, the **cable** used must be **round and compact**. The particular requirements of IEC 60079-14 section 9.3 must be taken into account. Cables such as H05RN-F, H07RN-F, NYY and NYCY comply with these requirements.

A connection cable of at least 3m length must be used. Otherwise, a specific and appropriately certified cable gland has to be used. (For more information see IEC 60079-14 or EN 60079-14)

Depending on the configuration, one or two cable entries, a threaded plug or an optional buzzer (horn) are screwed into the two upper "conduit" openings of the transmitter housing.

If these components are installed later on, then their NPT thread should be wrapped with 2½-3 windings of Teflon tape before screwing them in. When these components are screwed in, they must be tightened to at least 8 Nm. Certain cable glands must be tightened with 30 or 35 Nm.

Four different cable glands with ATEX and IECEx approval are available for cable entry, depending on the transmitter housing and cable variant. See paragraph 3.3 "Cable Glands for the CC33" for more detailed information.

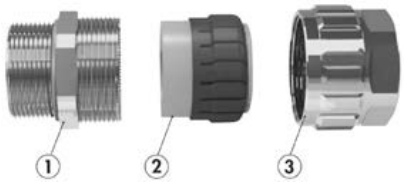
The usage of thread adapters is prohibited.

Depending on the transmitter housing variant, two different types of screw plugs with ATEX and IECEx approval are available (see section 5.5 "Accessories and Spare Parts"). The screw plugs are used to close an unused "conduit" opening of the transmitter housing.

On the buzzer (horn) is a connection cable with a plug which must be inserted into the corresponding buzzer connector within the transmitter. See the connection diagrams in section 3.4 "Electrical Terminal Installation".

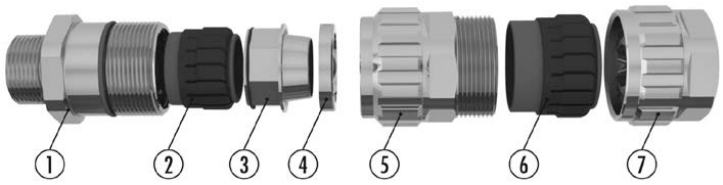
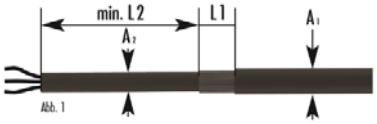
3.3 Cable Glands for the CC33

ATEX and IECEx approved cable gland for aluminium housing with ½" NPT thread
for cables without shield with cable outer diameter of **6-12mm.**

 **GfG-P/N: 3300200**	1. connection pipe (🔧24mm) 2. seal 3. union nut (🔧22mm)

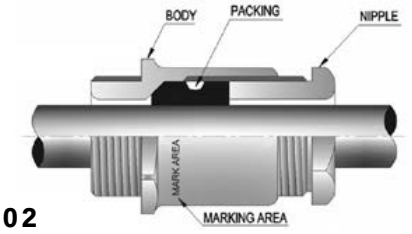
After the cable has been passed through the cable gland, the union nut must be tightened with an open-end wrench to **8 Nm.**

ATEX and IECEx approved cable gland for aluminium housing with ½" NPT thread
for cables with shield and cable outer diameter of **9-16mm** and inner diameter of **6-12mm**

 **GfG-P/N: 3300201**		1. connection nozzle (🔧24mm) 2. inner seal 3. reinforcing cone 4. clamping ring 5. intermediate socket (🔧24mm) 6. outer seal 7. union nut (🔧24mm)
The cable has to be prepared according to the dimensions shown on the right.		L1=20mm L2> 50mm A1=9...16mm A2=6...12mm

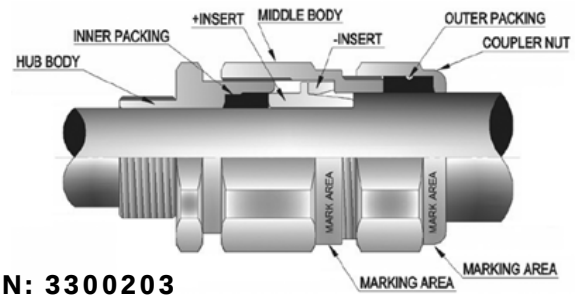
After the cable has been passed through the cable gland and the cable shield has been placed on the armature cone, first the intermediate connecting piece and then the union nut must be tightened with an open-ended spanner to **8 Nm** each.

ATEX and IECEx approved cable gland for stainless steel enclosure with ½" NPT thread
for cables without shield with cable outer diameter of **5-10mm**

 **GfG-P/N: 3300202**	Body/ connection body (🔧25mm) Packing/ gasket Nipple/ pressure nut (🔧19mm)

After the cable has been passed through the cable gland, the pressure nut must be tightened with an open-end wrench to **35 Nm.**

ATEX and IECEx approved cable gland for stainless steel enclosure with ½" NPT thread
for cables with shield and cable outer diameter of **7-16mm** and inner diameter of **5-11mm**

 **GfG-P/N: 3300203**	stroke body (🔧25mm) inner packing +Insert middle body (🔧25mm) -insert outer packing Coupler nut (🔧25mm)

The cable must be prepared in a similar way as above. After passing it through the cable gland and clamping the cable shield between the inserts, first the middle part and then the union nut must be tightened with a spanner to **30 Nm** each.

3.4 Electrical Terminal Installation

The installation of the cables and the connection of the electrical system may only be carried out by a specialist in accordance with the relevant regulations.

In potentially explosive atmospheres, all electrical cables to and from the CC33 transmitter have to be installed in a fixed location. Each opening in the housing wall must be closed either by an approved **screwed and secured cable entry**, with an approved threaded plug or the approved buzzer (horn) for the CC33.

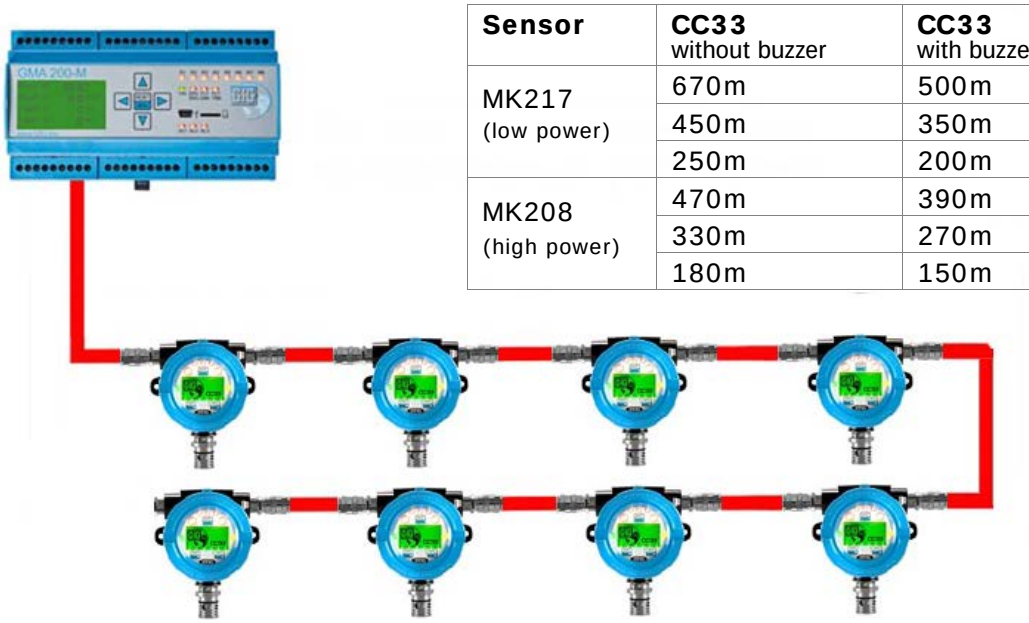
Transmitter CC33 with buzzer (horn):
The user must ensure that, even in the event of a fault, no higher voltage than the maximum voltage $_{Um}$ = 60V DC specified on the nameplate can be applied to the terminals of the CC33.

The wire cross-section depends on the length of the connecting cable and the transmitter version.

For analogue data transmission, a cable with a wire cross-section of 0.75mm² can be used for shorter distances of up to 500m. For longer distances, the wire cross-section must be 1.5mm². The cable length should not exceed 1200m.

For digital data transmission via RS485, the bus cabling depends on various factors. This includes the architecture of the bus as a strand or as a ring, the number of transmitters on the bus, the distance of the individual transmitters from the GMA, the transmitter type/variant, the sensor type and of course the bus cable type. In each individual case, it must be checked whether the operating voltage of the bus version is sufficient to supply the last transmitters on the transmitter bus. If necessary, the power supply must be extended by an additional voltage source. The cable length should not exceed 1200m.

The following example shows the maximum cable lengths for the installation of 8x CC33 at a spacing of 10m at the end of the bus cable. If CC33 with buzzer (horn) is to be operated on the bus, then external terminal boxes are required for the bus wiring.

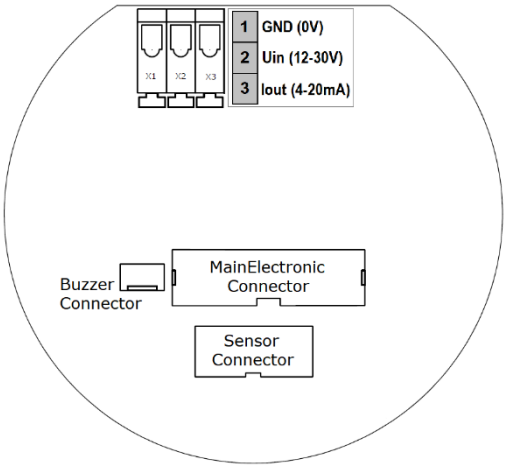


Sensor	**CC33** without buzzer	**CC33** with buzzer	**Cable**
MK217 (low power)	670m	500m	4x1,5mm2
	450m	350m	4x1,0mm2
	250m	200m	4x0,5mm2
MK208 (high power)	470m	390m	4x1,5mm2
	330m	270m	4x1,0mm2
	180m	150m	4x0,5mm2

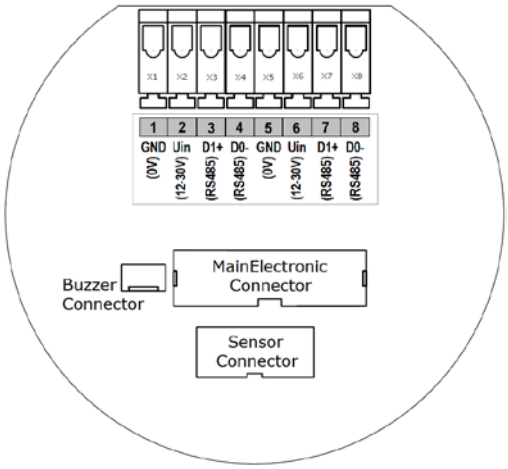
To access the connectors of the transmitter, the housing cover must be unscrewed. For this, the fixing screw for the housing cover must be loosened slightly. After unscrewing the housing cover, the round display electronics including the vertical circuit board must be removed. The lower part of the housing contains another circuit board with the terminals for the connection to the controller. According to the connection diagram of the respective transmitter version, the transmitter or bus connection cable and/or the relay connection cable are connected there.

Wiring diagrams

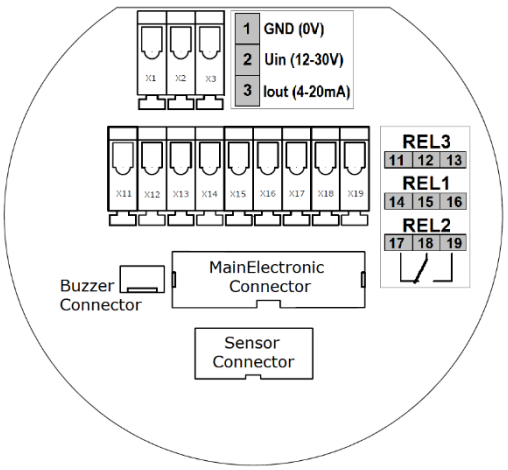
with 4-20mA interface without relay



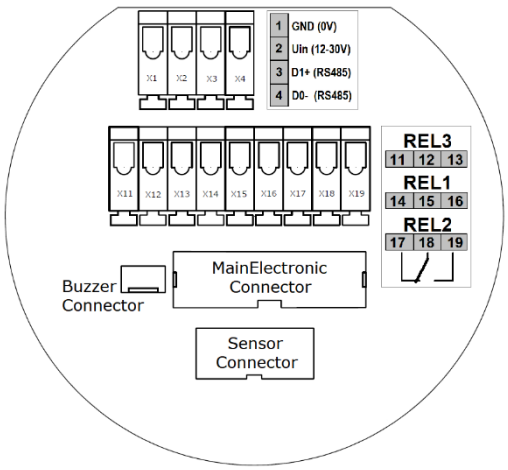
with RS485 interface without relay



with 4-20mA interface and relay



with RS485 interface and relay



If equipotential bonding of the housing is required, the **equipotential bonding terminal** on the top of the housing can be used for this purpose.

Potential equalisation must be carried out with a conductor cross-section of 4mm2 .

After installation, the housing cover must be screwed back on and secured.

4 OPERATING INSTRUCTIONS

4.1 Commissioning

The transmitter CC33 is tested for function and display before delivery. Adjustment is performed with the appropriate test or calibration gases. There may be deviations depending on the transport, installation and ambient conditions. The gas detection system must, therefore, be put into operation by a qualified person and checked for function.

After switching on, the transmitter needs 1-2 minutes for:

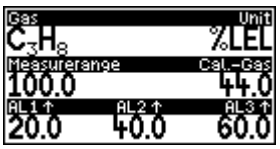
- The self-test, during which the program and working memory are checked
- Reading and evaluation of device parameters with simultaneous memory check
- Reading and evaluation of sensor parameters with simultaneous memory check
- The sensor warm-up

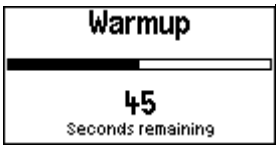
During the first seconds, the memory tests are run.

Version with analogue current interface (4-20mA):
Directly after switching on, the current interface delivers 0.0mA and after 4 seconds 1.6mA. The green and yellow LEDs are on.

Version with digital Modbus interface (RS485):
In the Modbus version, "Startup", for example, can be read on the connected evaluation unit GMA200. For further reference please refer to the Modbus appendix of the TRM33 operations manual.

The CC33 display shows the firmware version information first. Then the measuring range, unit of measurement, gas type and calibration gas concentration are displayed. The remaining seconds of the start-up phase are counted down in the display. The CC33 automatically switches to measurement mode after the sensor warm-up phase.





If a device error is detected in the start phase, the device switches to fault mode.

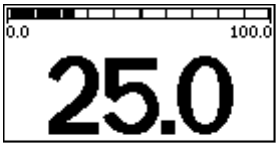
Version with analogue current interface (4-20mA):
The current interface outputs 1.2mA. An error message is shown in the display.
(see Displaying Special States and Malfunctions).
The yellow fault LED lights up permanently.

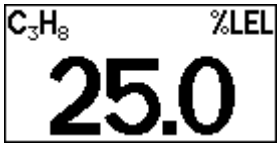
Version with digital Modbus interface (RS485):
In the Modbus version, an error message is shown in the display of the transmitter and/or the GMA (see indications of special states and malfunctions).
The yellow fault LED lights up permanently.

Note:
The first operation always requires an adjustment of the zero point (ZERO) after its warm-up time and subsequently a sensitivity check or calibration (SPAN).

4.2 Measuring mode

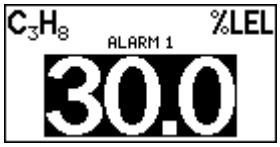
The green operating LED is permanently on and the yellow fault LED is off in undisturbed measuring mode. The functionality of the electronics is constantly monitored by various tests, such as sensor, processor and memory tests. The measurement of the gas concentration takes place continuously and is updated every second.





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

Up to three limit value alarms can be configured on the CC33; the signal is given acoustically and optically in the display with red background lighting. An alarm is triggered as soon as the gas concentration exceeds or falls



below the set alarm limit. Depending on the function setting, the alarm reset of the alarm thresholds can take place automatically or in the case of self-holding alarms, with acknowledgement by pressing the QUIT MENU button.
If an alert is enabled, the CC33 immediately recognizes when the sensor signal exceeds the limit value and, if necessary, provides a visual indication on the display.

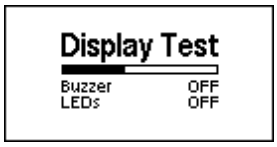
> In normal measuring mode, the display of the transmitter shows a bar graph with the current gas concentration and a set measuring range, and the type and unit of gas are also displayed in 5-second intervals.

4.2.1 Magnetic Operation Keys

The transmitter's operating keys TEST ZERO ▼ QUIT MENU INFO SPAN ▲ can be used to access key functions, retrieve information, or make sensor adjustments and settings via the menu. Depending on the material of the transmitter housing, an appropriate magnetic rod is required for its operation.

4.2.2 Display Test [TEST]

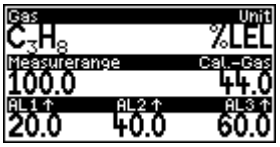
In measuring mode, a display and LED test can be triggered on the transmitter by briefly pressing the magnetic button TEST ZERO ▼. All LEDs are activated, all segments of the display are displayed and, if a buzzer is present and activated, an acoustic signal tone is also triggered.



4.2.3 Display of Operating Parameters [INFO]

During measurement operation, the following important parameters can be displayed automatically one after the other by briefly pressing the magnetic button INFO SPAN ▲.

- Measuring Gas
- Measuring Unit
- Measuring Range
- Calibration or test gas concentration
- Alarm Thresholds (with activated alarm function)



These displays also appear during the device startup phase.

4.2.4 Limit value alarm

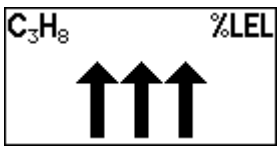
Three threshold alarms can be configured on the CC33. An alarm is triggered as soon as the gas concentration exceeds or falls below the set alarm limit. Depending on the function setting, the alarm reset of the threshold alarms can take place automatically or with an acknowledgement in the case of self-retaining alarms.

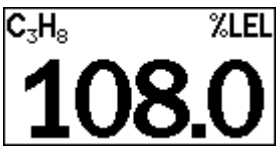
The CC33 indicates the threshold alarms optically, with corresponding content in the graphic display, through the red alarm LEDs and the red display backlight.

By pressing the key QUIT MENU, a latching alarm can only be reset after the alarm limit has fallen below the threshold.

4.2.5 Exceeding the Measuring Range

Exceeding the measuring range between 100% and 112% is indicated in the display by arrows ↑↑↑ alternating with the measured value.

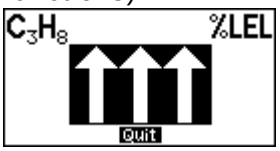




Transmitter with analogue current interface 4-20mA:
The current interface outputs a signal in the range 20...22mA according to the measured value.

Transmitter with digital Modbus interface (RS485):
In the Modbus variant, the display of the transmitter and/or the GMA shows the corresponding measured value alternating with ↑↑↑ (see indications of special states and malfunctions).

An exceeding of more than 112% of the measuring range is indicated in the display by permanent arrows ↑↑↑ and a fast flashing yellow status LED.



Transmitter with analogue current interface 4-20mA:
The current interface outputs 22mA.

Transmitter with digital Modbus interface (RS485):
In the Modbus version, the display of the transmitter and/or the GMA permanently shows ↑↑↑ (see indication of special states and malfunctions).

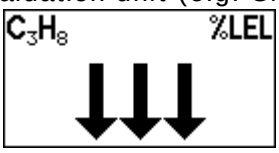
For safety reasons, the heat sensor of the CC33 is de-energized when the measuring range is clearly exceeded, since there is a danger of explosion and the measuring signal would become smaller at higher concentrations (ambiguity). The arrows in the display of the transmitter and the rapid flashing of the yellow status LED remain until this status is acknowledged.

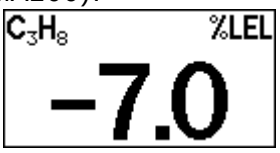
Only if it is guaranteed that there is no combustible gas present, this condition may be eliminated by pressing the middle magnetic button [QUIT] using a magnetic rod and approving the following question "Fresh air at the sensor?" with [YES].

4.2.6 Measuring Range Underflow

Measurement values below the zero point are displayed as a numerical value with a negative sign. If the measured value falls below 0...-5% of the measuring range, the measured value is still shown on the display of the transmitter or on the evaluation unit (e.g. GMA200).

If the measured value falls below -5.0 to -7.5%, arrows ↓↓↓ alternate with the measured value in the display of the transmitter.





If the measuring signal falls below the measuring range of -7.5%, the arrows ↓↓↓ appear permanently in the display.

Transmitter with analogue current interface 4-20mA:
The current interface outputs a signal in the range 2.8...4.0mA corresponding to the measured value.

Transmitter with digital Modbus interface (RS485):
In the Modbus version, the corresponding measured value is shown in the display of the transmitter and/or the GMA (see indications of special states and malfunctions).

4.2.7 Sensor life

Catalytic Combustion sensors have a limited service life. The expected service life of the sensors used in the CC33 is approx. 5 years, depending on the operating conditions. When the expected lifetime is reached, the transmitter indicates that the sensor should be replaced at the next maintenance. The red illuminated display then shows a corresponding message and the yellow fault LED lights up briefly every 5 seconds. This has no influence on the measuring operation and the remaining service life of the sensor.

4.3 Calibration and Adjustment

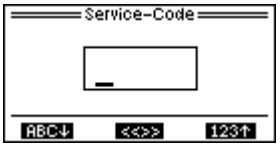
4.3.1 Zero Point Calibration

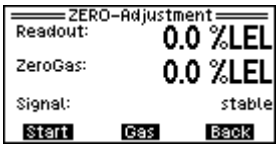
When calibrating (checking) or adjusting (setting) the zero point, unpolluted fresh air (without interfering gas components) or; in a polluted atmosphere; synthetic air can be used as zero gas.

Calibration (check):

In this case, a calibration adapter must be screwed to the sensor housing. Via the calibration adapter, the zero gas can then be fed to the sensor without pressure at a flow rate of approx. 0.5 l/min. If the displayed value deviates from zero, the deviation can be readjusted as described below.

4.3.2 Zero point adjustment with the magnetic rod [ZERO].





In order to carry out the zero point adjustment, it is necessary to change to the service code query by pressing the key TEST / ZERO ▼ (>3 sec.). After entering the standard service code "0011" (factory setting), the "ZERO adjustment" program is activated. This is indicated by flashing of the yellow status LED and for transmitters with an analogue 4-20mA interface by an output signal of 2.4mA.

The display now shows the current measured gas value (display) and the set zero gas concentration. If the gas reading is not more than 25% of the measuring range, the zero adjustment can be started with the left button [Start]. If the current gas measured value remains constant during a defined time interval, the new zero point is accepted and displayed. With the right button, the "ZERO adjustment" program can be terminated again and changed to measuring mode.

If zero point adjustment was not possible because the current gas reading is more than 25% of the measuring range due to a strong drift, the zero point can only be adjusted by qualified service personnel using the extended service code "0055" (factory setting) even with a deviation of up to 35% of the measuring range. It must be ensured that the sensor is in fresh air free of measuring gas or that zero gas is supplied to the sensor.

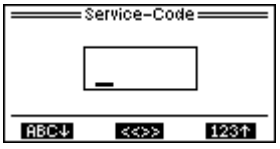
4.3.3 Sensitivity calibration

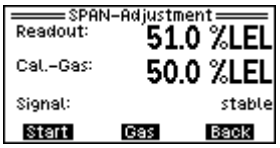
Since most flammable gases and vapours also have toxic properties, special instructions must be observed depending on the test gas used. Information on this can be found in the relevant safety data sheets.

The zero point should be checked and readjusted if necessary before each adjustment of the sensitivity. To calibrate (check) or adjust the gas sensitivity, a calibration adapter must be screwed onto the sensor housing. The test or calibration gas (fresh air or synthetic air in the case of an oxygen sensor) is supplied to the sensor via the calibration adapter without pressure and with a volume flow of approx. 0.5 $^{l}/_{min}$.

The display shows the value indicated. If the display value deviates from the calibration gas concentration, sensitivity adjustment is necessary. The procedure is described in the following section.

4.3.4 Sensitivity Calibration with the magnetic rod [SPAN]



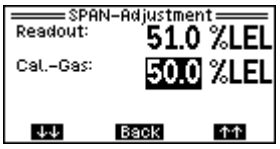


In order to carry out the sensitivity adjustment, it is necessary to switch to the service code query by pressing the key INFO / SPAN ▲ (>3 sec.). After entering the standard service code "0011" (factory setting), the "SPAN adjustment" program is activated. This is indicated by flashing of the yellow status LED and, for transmitters with an analogue 4-20mA interface, by an output signal of 2.4mA.

The display now shows the current measured gas value (display) and the set test gas concentration (cal. gas).

After pressing the middle button [Gas], the test gas concentration can be changed with the left or right button and stored with the middle button.

If the gas measured value is at least 7% of the measuring range, the sensitivity adjustment can be started with the left button [Start]. As soon as a stable measured value is recorded in a defined time interval, the sensitivity is adjusted and the new measured value is displayed. With the right button, the "SPAN adjustment" program can be terminated again and thus changed to measuring mode.

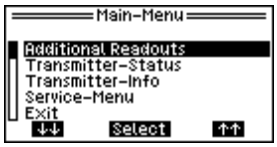


4.4 Main and Service Menu [MENU]

To switch to the main menu and from there to the service menu, press the central [MENU] button for at least 3 seconds. There is no access code.

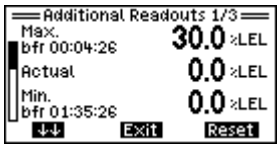
4.4.1 Main Menu

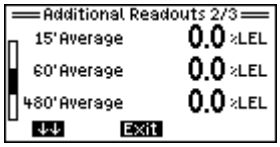
In the main menu itself and when changing to the individual menu items, the transmitter remains in measuring mode. This means that the measured value acquisition, processing and signal output continue to function in the background. There is one exception in the service menu, which is described in the next section. The main menu is structured as follows:

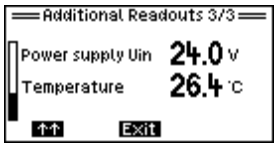


Main Menu with the options:

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



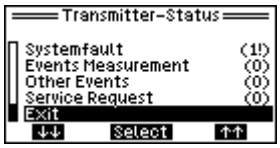




Further Measured Values

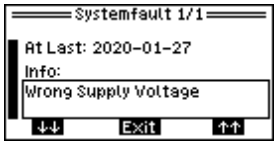
View of additional transmitter readings. With the left button (TEST / ZERO ▼)the following values are displayed one after the other:

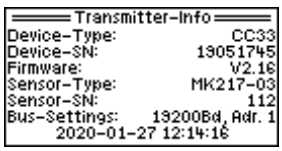
- Minimum, Maximum and Current Measured Values
  The measured value memory is reset by briefly pressing the right button.
- Average Values with Configured Time Intervals
  Time-weighted mean values (here the last 15 minutes, one hour and 8 hours).
- Supply Voltage and Temperature



Transmitter Status

The Transmitter Status allows current system errors, measurement errors, service requirements and events to be retrieved. These groups are followed by numbers in brackets. These numbers indicate the number of information available there. Exclamation marks indicate active events. Existing messages can be displayed by selecting the corresponding category and inactive messages can be deleted after leaving the detailed display.

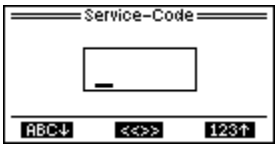




Transmitter Information

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 access the Service Menu, a special code must be entered. For the standard service menu, the code it „1100“. Additional functions are available in an extended service menu. Access to this extended service menu is reserved for GfG service personnel only.

The Service Menu is divided as follows:

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

Sensor Settings: Here you will find the settings necessary for changing the sensor as well as the measuring range selection.

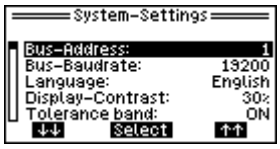
Alarm Settings: Alarm thresholds are configured here.

Relay Settings: Relay functions are configured here.

Measured Value Simulation: Here measured values can be generated without test gas to check the output signal interface and the downstream signal processing.

These setting options are described in more detail in the following subsections.

4.4.2.1 System Settings



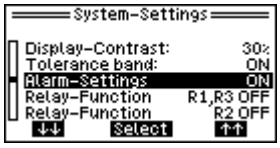
If the transmitter has an RS485 bus interface, the **Bus Address** can be set in the range from 1 to 247 (0=inactive). This bus address must not be used more than once in the same bus segment.

Bus Baud Rate can be set to 9600, 19200 or 38400 baud. By default it is set to 19200 Baud. For very long bus lines, the baud rate can be reduced to 9600 baud and increased to 38400 baud if there are a lot of bus subscribers. In the same bus segment, the baud rate must always be set the same for all bus participants.

Language can be set to German or English and is relevant for all display outputs, especially for the menus.

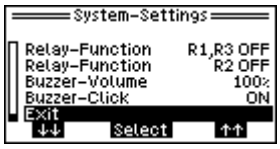
Display Contrast can be adjusted from 0 to 100%. This value can vary from display to display and is usually set to 25...40%.

Tolerance Band can be "ON" or "OFF". When set to "ON" (default), minor signal deviations from zero gas are displayed as 0ppm(Vol%) or from fresh air as 20.9Vol% O2. The real measured value is only displayed when the tolerance band is exceeded or not reached. In the "OFF" setting, the real measured value is always displayed.



Alarm Settings activates the alarm function and the corresponding service menu for alarm configuration.

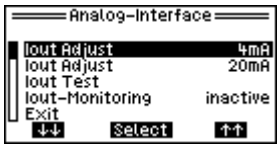
Relay Function activates the relay functionality and the associated service menu for configuring the installed relays R1-R3.



Note: The settings "Buzzer Volume" and "Buzzer Click" are only available if the horn (buzzer) is actually installed and "Relay function R2" is deactivated. The "relay function R2" can only be activated together with "relay function R1, R3".

Buzzer Volume can be set from 0 to 100%, but is only relevant if the transmitter is used on-site to alert against gas hazards.

Buzzer click can signal the activation of the magnetic operating buttons.



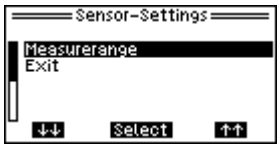
If the transmitter has an analogue 4-20mA interface, the current interface can be adjusted and tested in the extended service menu under **Analog Interface.**

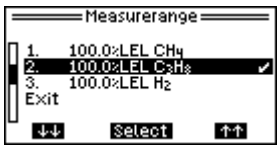
Iout Adjustment: Warning!!! The adjustment of the current interface may only be carried out with the aid of a very precise current meter.

Iout Test: Here the current output can be tested in the range from 0.5 to 24.5mA. Warning!!! Connected controllers may react to these test levels.

Iout Monitoring: The output analogue signal of the 4-20mA current interface can be monitored by the transmitter. As soon as the current output signal is outside the tolerance for three seconds, a fault is output at the transmitter when monitoring is activated (see chapter "4.5.2 Displaying Special States"). In this case, an attempt is made to output 1.2mA on the current interface. The fault is not reset until the current interface value again lies within the tolerance for three seconds in a row. The monitoring can be deactivated if necessary, e.g. if the transmitter is operated without an external evaluation unit.

4.4.2.2 Sensor Settings



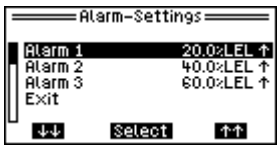


The following sensor-related settings are only possible in the extended service menu:

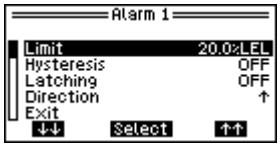
Measuring Range: The transmitter is delivered by GfG with the measuring range desired by the customer. If, however, a different measuring range is subsequently desired and further measuring ranges are available for the sensor, then a different measuring range can be selected under this menu item.

Due to the different gas types, the calibration data of the previous measuring range are not used. If a different measuring range or a different gas type is selected, the zero point and the gas sensitivity have to be readjusted.

4.4.2.3 Alarm Settings



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



These settings are available for all three alarms:

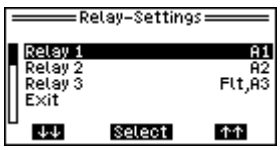
Threshold: Alarm limit setting.

Hysteresis: More adjustments to the switch-off.

Latching: 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 Relay Settings



Relay1 to Relay3: Selection of the relay to be configured with the following abbreviations of the relay setting.

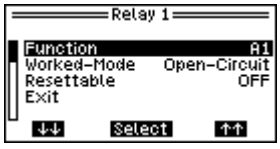
A1, A2, A3: Turning on Alarm 1, Alarm 2 and/or Alarm 3

Rst: Re-settable on alarm acknowledgement

Flt: Switching in case of transmitter fault

Inv: Closed-circuit current principle

Note: The "Relay 2" setting is only available if "Relay Function R2" is activated.



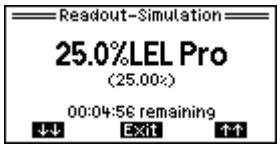
The following settings are available for all installed relays:

Function: Setting whether the relay should switch in case of alarms (A1, A2, A3) and/or faults (FLT).

Operating Principle: Normally closed or open.

Re-Setting: In the activated state, an alarm acknowledgement also resets the relay state (e.g. with an external horn).

4.4.2.5 Measured Value Simulation



The measured value simulation can be used to check the output signal interface, the measured value transmission and the downstream signal processing. Time-limited measured values can thus be generated without the need for a corresponding test gas.

Initially, the display still shows the current real measured value. The simulation mode is only started by pressing the left or right button. The maximum remaining simulation time is then displayed above the keyboard label. If the simulation value is changed with the left or right key, the remaining simulation time is reset to 5 minutes. The simulation mode can be terminated by pressing the middle button. If no key is pressed, the simulation mode is terminated after the remaining simulation time has elapsed and automatically switched to measurement mode.

4.5 Indications and Notifications

4.5.1 Overview of Status LED States and Current Output Signals

The following table lists the different display states of the two status LEDs and the current output signals with reference to their meanings.

Green LED	Yellow LED	Current output	Description see section ...	
From	Flashing at 1Hz	0.0mA	Displaying special states...	Nr. 001
Off	To	0.0mA	Displaying special states...	Nr. 002
Off	To	1.2mA	Displaying special states...	Nr. 102...114
Off	To	1.2mA	Displaying special states...	Nr. 101
Flashing at 1Hz	To	1.6mA	Displaying special states...	Nr. 002, 003
To	Flashing at 1Hz	2.0mA	Displays in service mode ...	Nr. 204, 205
To	Flashing at 1Hz	2.4mA	Displays in service mode ...	Nr. 203
To	Single pulse every 5s	2.8-22mA	Displays in measuring mode	Nr. 309
To	To	2.8mA	Displays in measuring mode	Nr. 307, 308
To	Off	2.8-22mA	Displays in measuring mode	Nr. 303...306
To	Flashing at 5Hz	22mA	Displays in measuring mode	Nr. 301, 302

4.5.2 Display of Special States (device start and fault)

The following table describes the states in which the yellow fault LED lights up permanently and the 4-20mA current output emits a signal ≤1,6mA.

Response to device start:

No.	Display indication	Green LED	Yellow LED	Current output	Cause	Note/Explanation
001	Boat V1.20 GfG CC33 Error:Flash	Off	Flashing at 3.3Hz	0.0mA	An error was detected in the program memory during the memory test	Reboot the transmitter. Firmware update necessary if error message is displayed again
002	Boat V1.20 GfG CC33 Verify	Off	On	0.0mA	Program and memory tests in the first seconds of device startup	Automatic transition after approx. 4 seconds into the initialization phase
003	V2.16 GfG CC33	Flashing at 1Hz	On	1.6mA	Initialization phase of the transmitter	Automatic transition after approx. 3 seconds into the sensor run-in phase
004	Warm-up XX seconds remaining	Flashing at 1Hz	On	1.6mA	Sensor start-up phase	Automatic transition after the time has elapsed to the measuring mode

Response to malfunction:

No.	Display indication	green LED	yellow LED	Current output	Cause	Note/Explanation
101	Sensor defective	Single pulse every 5s	An	1.2mA	Sensor no longer responds correctly to gas. Possibly the sensor is too old.	Sensor must be replaced
102	Supply voltage wrong	Off	An	1.2mA	The supply voltage of the transmitter is too low or too high.	Check and readjust power supply
103	Sensor Uk incorrect	Off	An	1.2mA	Heating voltage for the sensor is faulty.	
104	Sensor Ik < MIN Sensor Ik > MAX	Off	An	1.2mA	Heating current for the sensor is too low or too high.	
105	Temp. signal < MIN Temp. signal > MAX	Off	An	1.2mA	Temperature measurement is probably faulty.	
106	Watchdog error	Off	An	1.2mA	A hardware error was detected when testing the external watchdog.	Restart the device. If the error message appears again, replace the device.
107	FLASH Error	Off	An	1.2mA	An error was detected in the program memory during the memory test.	
108	RAM error	Off	An	1.2mA	During the memory test a faulty working memory was detected.	
109	EEPROM error 1 EEPROM error 2 EEPROM error 2c EEPROM error 1+2 EEPROM error 1<>2	Off	An	1.2mA	Error in the parameter memory or when accessing the external parameter memory block.	
110	Incorrect PCB type	Off	An	1.2mA	An incorrect PCB type or a PCB error was detected.	
111	Digipoti error	Off	An	1.2mA	A hardware error was detected with the digital Potentiometer.	
112	ADC error 1 ADC error 2	Off	An	1.2mA	An error was detected on the analogue/digital converter.	
113	Program flow error	Off	An	1.2mA	A logical sequence error was detected during program execution.	
114	Iout Error	Off	An	1.2mA	The value of the current output signal read back is not within the tolerance.	Check the 4-20mA signal and wiring.

4.5.3 Displays in service mode and during sensor adjustment

The following table describes the states in which the green operating LED lights up permanently and the 4-20mA current output emits a signal of 2.0...2.4mA.

No.	Display Indication	Green LED	Yellow LED	Current output	Cause	Note/Explanation
203	Menu item	On	Flashing at 1Hz	2.4mA	Service menu was activated via keyboard	Select menu item. If no entry is made for five minutes, automatic return to measuring mode
204	Adjustment Zero-point	On	Flashing at 1Hz	2.0mA	Zero-point adjustment was activated via keyboard	AutoCal adjustment of the zero point
205	Adjustment Sensitivity	On	Flashing at 1Hz	2.0mA	Sensitivity adjustment was activated via keyboard	AutoCal adjustment of the sensitivity

4.5.4 Displays in Measuring Mode

The following table describes the states in which the green operating LED lights up permanently and the 4-20mA current output emits a signal of 2.8...22mA.

No.	Display indication	green LED	yellow LED	Current output	Cause	Note/Explanation
301	↑↑↑ permanent	On	Flashing at 5Hz	22mA	The gas concentration has exceeded the measuring range of the transmitter electronics. **Uncertainty !!!**	Attention Danger of explosion! Measures see page 8-9 **Self-holding alarm**.
302	↑↑↑ permanent	On	Flashing at 5Hz	22mA	The gas concentration has clearly exceeded the measuring range (Gas≥112,5%MB) **Uncertainty!!!**	Attention Danger of explosion! Measures see page 8-9 **Self-holding alarm**.
303	↑ ↑ ↑ alternating with measured value	On	Off	20-22mA	The gas concentration has exceeded the measuring range. (100...112%MB)	Attention Danger of explosion!
304	Measured value	On	Off	4-20mA	Trouble-free measuring operation	
305	Measured value	On	Off	3.2-4mA	Under range of the measuring range (−5,0...0,0%MB)	
306	Measured value in alternation with ↓↓↓	On	Off	2.8-3.2mA	Under range of the measuring range (−7,5...-5,0%MB)	Zero-point adjustment is useful
307	Permanent ↓↓↓	On	On	2.8mA	Under range of the measuring range (under −7,5%MB)	Zero-point adjustment is useful
308	Permanent ↓↓↓	On	On	2.8mA	The measuring signal has fallen below the measuring range of the transmitter electronics.	Zero-point adjustment is necessary and check sensitivity
309	*Sensor change required*	On	Single pulse every 5s	2.8-22mA	Expected operating time of the sensor exceeded.	Sensor change or adjustment required

4.5.5 Priority of displays and messages in measuring mode

The displays of states with lower priority are overwritten by the displays with higher priority. The states with lower priority are not reset.

Priority	Status	Description see section ...
▼	Clear over range of measuring range (**ambiguity)**	Displays in measuring mode Nr. 301, 302
	slight exceeding of measuring range	Displays in measuring mode Nr. 303
	Under range	Displays in measuring mode Nr. 305...308
	sensor change	Displays in measuring mode Nr. 309

Sensor error no. 101 and transmitter faults no. 102...113 interrupt the measuring operation with their respective messages.

4.6 Error, Cause, Solution

Error	Cause	Remedy
Zero-point can no longer be set	Sensor defect	Replace sensor
Sensitivity can no longer be adjusted	Sensor defect	Replace sensor
Output current has dropped to 0mA	Fuse or electronics defective	Replace printed circuit board

	Line interrupted	Reconnect

5 ANNEXE

5.1 Cleaning and care

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

5.2 Maintenance and Repair

The maintenance and repair includes the regular visual inspection, the function check and the system check as well as the repair of the gas warning system. In Germany the following applies "DGUV Information 213-057 (Merkblatt T 023 / previously BGI 518 Section 9)".

5.2.1 Visual Inspection

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

- Control of the operating display and status messages,
  e.g. operating display "On", alarm and fault display "Off".
- Check for mechanical damage and external contamination

5.2.2 Functional Check

The function check can be carried out at intervals depending on the gas hazard to be monitored. The intervals between the checks should not exceed 4 months. In Germany, this maximum inspection interval is specified in the regulations T 023 of the BG RCI.

It comprises the following activities:

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

5.2.3 System Check

The system check must be carried out at regular intervals. The period may not exceed 1 year. It comprises the following activities:

- Function check according to section 5.2.2 of this operating manual
- Control of all safety functions including the triggering of Switching functions.
- Control of the parameterization by target/actual comparison
- Inspection of the reporting and registration facilities

5.2.4 Repair

The service includes all repair and replacement work. They may only be carried out by the manufacturer and by persons authorized by the manufacturer GfG. Only original spare parts and original assemblies tested and approved by the manufacturer may be used.

5.3 Sensor Replacement

WARNING: Do not open the housing under voltage if an explosive atmosphere is present !!

A plug connection must be disconnected in the transmitter to change the sensor. To access this section within the transmitter, the housing cover must be removed. For this purpose, the fixing screw (1.5 Allen key) of the housing cover must be loosened slightly. After unscrewing the housing cover, the round display unit together with the vertical main electronics must be removed. The lower part of the housing contains the circuit board with the sensor connector (see connection diagram in section**Fehler! Verweisquelle konnte nicht gefunden werden.** "**Fehler! Verweisquelle konnte nicht gefunden werden.**"). This plug connection, with the ribbon cable leading to the sensor, must be disconnected. After that the sensor housing including the sensor can be unscrewed with the aid of an open-ended spanner (SW27mm). Here, too, the fixing screw (1.5 Allen key) of the sensor housing must first be loosened slightly. Be careful when unscrewing the sensor housing, to ensure that the ribbon cable does not become snagged.

The plug with the ribbon cable can now be removed from the old sensor and plugged onto the new sensor with the same polarity. The sensor label serves as an orientation. Before assembly, the NPT thread of the new sensor housing should be wrapped with 2½-3 windings of Teflon tape. Afterwards the assembly can be done in reverse order.

First, the loose end of the ribbon cable is inserted into the opening. Then the sensor housing is screwed back onto the transmitter housing and tightened with approx. 8 Nm. The loose end of the ribbon cable can then be plugged back into the SensorConnector on the circuit board. When attaching the round display unit together with the main electronics, the raised fixing bolt helps. Then the housing cover is screwed tight again. The housing cover and the sensor housing must be secured again (1.5 Allen key). After the transmitter is put back into operation, the new smart sensor is automatically recognized. Normally, the zero-point and gas sensitivity of the new sensor must then be adjusted. This is described in section 4.3 "Calibration and Adjustment".

5.4 Information on Environmentally Compatible Disposal of Old Parts

According to the general terms and conditions of GfG, the purchaser of the device assumes the obligation to dispose of the device or device components in an environmentally compatible manner in accordance with Sections 11, 12 ElektroG. Upon request, proper disposal can also be carried out by GfG in Dortmund.

5.5 Accessories and Spare Parts

	Designation	**Item no.**
1.	Flow adapter for the transmitters CC33, CC28, CC22ex	2800202
2.	Windbreak	2800204
3.	Cable gland for aluminium housing with ½" NPT thread **for cables without shield** with cable outer diameter of **6-12mm**	3300200
4.	Cable gland for aluminium housing with ½" NPT thread **for cables with shield** and cable outer diameter of **9-16mm**	3300201
5.	Cable gland for stainless steel housing with ½" NPT thread **for cables without shield** with cable outer diameter of **5-10mm**	3300202
6.	Cable gland for stainless steel housing with ½" NPT thread **for cables with shield** and cable outer diameter of **7-16mm**	3300203
7.	Threaded plug for aluminium housing with ½" NPT thread	3300204
8.	Threaded plug for stainless steel housing with ½" NPT thread	3300205
9.	Buzzer/Horn for CC33 transmitter	3300206
10.	Magnetic rod for aluminium housing (AL)	3300207
11.	Magnetic rod for stainless steel housing (SS)	3300208
12.	MK208-3 Spare sensor for 0..100% LEL flammable gases and vapours	on request
13.	MK217-3 Replacement sensor for 0..100%LUEG H2/CH4/C3H8	on request

5.6 Lower Explosion Limits (LEL) of Gases and Vapours

LEL values according to DIN EN 60079-20-1:2010					
4,0Vol.% H_2	Hydrogen	(CAS No.1333-74-0)	15.0Vol.% NH_3	Ammonia	(CAS No. 7664-41-7)
4.4Vol.% CH_4	Methane	(CAS No. 74-82-8)	10.9Vol.% CO	Carbon monoxide	(CAS No. 630-08-0)
4.0Vol.% C_nH_m+..	natural gas	(CAS No. 68410-63-9)	6.0Vol.% CH_4O	Methanol	(CAS No. 67-56-1)
2.4Vol.% C_2H_6	Ethane	(CAS No.74-84-0)	3,1Vol.% C_2H_6O	Ethanol	(CAS 64-17-5)
2.3Vol.% C_2H_2	Acetylene	(CAS No 74-86-2)	2.7Vol.% C_2H_6O	Dimethyl ether	(CAS No. 115-10-6)
2.3Vol.% C_2H_4	Ethylene	(CAS No 74-85-1)	3.1Vol.% $C_3H_6O_2$	Methyl acetate	(CAS No.79-20-9)
2.0Vol.% C_3H_6	Propene	(CAS No. 115-07-1)	2.7Vol.% $C_3H_6O_2$	Ethyl formate ETF	(CAS No 109-94-4)
1.7Vol.% C_3H_4	Propyne	(CAS 74-99-7)	2.5Vol.% C_3H_6O	Acetone	(CAS No.67-64-1)
1.7Vol.% C_3H_8	Propane	(CAS No 74-98-6)	2.0Vol.% C_3H_8O	Isopropanol	(CAS No.67-63-0)
1.4Vol.% C_4H_{10}	butane	(CAS No 106-97-8)	2.0Vol.% $C_4H_8O_2$	Ethyl acetate	(CAS 141-78-6)
1.1Vol.% C_5H_{12}	Pentane	(CAS 109-66-0)	1.5Vol.% C_4H_8O	Methyl ethyl ketone MEK	(CAS No 78-93-3)
1.2Vol.% C_6H_6	Benzene	(CAS 71-43-2)	1,7Vol.% $C_4H_{10}O$	Diethyl ether	(CAS 60-29-7)
1.0Vol.% C_6H_{12}	Cyclohexane	(CAS No. 110-82-7)	1.4Vol.% $C_4H_{10}O$	n-Butanol	(CAS 71-36-3)
1.0Vol.% C_6H_{14}	n-Hexane	(CAS No 110-54-3)	1.2Vol.% $C_6H_{12}O$	Methyl isobutyl ketone MIBK	(CAS No 108-10-1)
0,85Vol.% C_7H_{16}	Heptane	(CAS No 142-82-5)	1.0Vol.% C_7H_8	Toluene	(CAS No 108-88-3)
0,80Vol.% C_8H_{18}	n-octane	(CAS No. 111-65-9)	1,0Vol.% C_8H_{10}	Xylene	(CAS No 1330-20-7)
0,70Vol.% C_9H_{20}	n-Nonan	(CAS 111-84-2)			

5.7 Sensor Specification

MK208-3 Catalytic combustion sensor for combustible gases and vapours

Detection range / Resolution		0...100 %LEL / 0.5 %LEL			or 0...4 vol.% NH3 / 0.05 vol.% NH3			
Response time	t_{50}:	≤ 5s (CH_4),	≤ 5s (C_3H_8), ***1**		with draft shield:	≤ 8s (CH_4),	≤ 8s (C_3H_8), ***1**	
	t_{90}:	≤ 9s (CH_4),	≤10s (C_3H_8), ***1**		with draft shield:	≤15s (CH_4),	≤17s (C_3H_8), ***1**	
Pressure	80...110 kPa:	max. ±3% of the detection range or ±7% of the display (with respect to 100kPa) ***3**						
Humidity	5%...90% r.h:	max. ±5% of detection range or ±10% of display (with respect to 50% r.h. and 40°C) ***3**						
Temperature	-25...+55°C:	max. ±5% of the detection range or ±15% of the display (with respect to 20°C) ***3**						
Cross sensitivities		Methane - Measuring range (#)***2**.			Propane - Measuring range ***2**.		Nonane - Measuring range (#)***2**.	
	at 50% LEL:	2,20 Vol.% CH_4 :	**=100%**		0,85 Vol.% C_3H_8 :	**= 100%**	0,35 Vol.% C_9H_{20} :	**= 100%**
		2.00 Vol.% H_2 :	ca.131%		2.00 vol.% H_2 :	ca.160%	2.00 Vol.% H_2 :	ca.328%
		1.25 Vol.% C_3H_6O:	ca. 97%		1.25 vol.% C_3H_6O:	ca.111%	1.25 Vol.% C_3H_6O:	ca.231%
		1.15 Vol.% C_2H_4 :	ca. 96%		2.20 vol.% CH_4 :	ca.107%	2.20 Vol.% CH_4 :	ca.224%
		0.85 Vol.% C_3H_8 :	ca. 96%		1.15 vol.% C_2H_4 :	ca.101%	1.15 Vol.% C_2H_4 :	ca.213%
		1.10 Vol.% $C_4H_8O_2$:	ca. 92%		1.10 vol.% $C_4H_8O_2$:	ca. 95%	0.85 Vol.% C_3H_8 :	ca.210%
		1.00 Vol.% C_3H_8O:	ca. 87%		1.00 vol.% C_3H_8O:	ca. 93%	1.10 Vol.% $C_4H_8O_2$:	ca.201%
		0.85 Vol.% $C_4H_{10}O$:	ca. 87%		0.85 vol.% $C_4H_{10}O$:	ca. 87%	1.00 Vol.% C_3H_{8O}:	ca.193%
		0.50 Vol.% C_6H_{14}:	ca. 74%		0.50 vol.% C_6H_{14}:	ca. 69%	0.85 Vol.% $C_4H_{10}O$:	ca.180%
		0.55 Vol.% C_7H_8:	ca. 72%		0.55 vol.% C_7H_8:	ca. 67%	0.50 Vol.% C_6H_{14}:	ca.143%
		0.35 Vol.% C_9H_{20}:	ca. 57%		0.35 vol.% C_9H_{20}:	ca. 49%	0.55 Vol.% C_7H_8:	ca.132%
	at 2 Vol.% NH_3:	2.00 Vol.% NH_3:	ca. 57%		2.00 vol.% NH_3:	ca. 49%	2.00 Vol.% NH_3:	ca.100%
Special features:		This sensor is not suitable for the detection of hydrogen and for ~~the~~ use in hydrogenous areas. The sensor responds to hydrogen, but is only suitable for warning of this gas. Permanent exposure to hydrogen may result in a permanently rising signal.						
Expected lifetime:		5 years						

MK217-3 Catalytic combustion sensor for combustible gases and vapours

Detection range / Resolution		0...100 %LEL / 0.5 %LEL						
Response time	t_{50}:	≤ 5 s (CH_4), ≤ 7 s (C_3H_8), ***1**			with draft shield:	≤ 9 s (CH_4),	≤ 9 s (C_3H_8), ***1**	
	t_{90}:	≤10 s (CH_4), ≤12 s (C_3H_8), ***1**			with draft shield:	≤18 s (CH_4),	≤21 s (C_3H_8), ***1**	
Pressure	80...110 kPa:	max. ±3% of the detection range or ±7% of the display (with respect to 100kPa) ***3**						
Humidity	5%...90% r.h:	max. ±5% of detection range or ±15% of display (with respect to 50% r.h. and 40°C) ***3**						
Temperature	-10...+40°C:	max. ±5% of the detecction range or ±15% of the display (with respect to 20°C) ***3**						
Cross sensitivities		Methane - detection range (#) ***2**.			Propane - detection range ***2**.		Hydrogen - detection range (#)***2**	
	at 50%LEL:	2,20 Vol.% CH_4 :	**= 100%**		0.85 Vol.% C_3H_8 :	**= 100%**	2.00 Vol.% H_2:	**= 100%**
		2.00 Vol.% H_2 :	ca.115%		2.00 Vol.% H_2 :	ca.188%	2.20 Vol.% CH_4 :	ca. 86%
		0.85 Vol.% C_3H_8 :	ca. 65%		2.20 Vol.% CH_4 :	ca.162%	0.85 Vol.% C_3H_8 :	ca. 53%
Special features:		If the sensor was exposed to a gas concentration that was clearly above 100% LEL, the zero point and the sensitivity of the sensor must be checked after this concentration has decayed.						
Expected lifetime:		5 years						

Explanation:

to *1: For other gases, longer response times are valid, especially for Nonane.

to *2: The cross sensitivities can vary depending on sensor and are dependent on gas concentration and age of sensor. Other combustible gases, which are not listed, are expected to cause an increase of signal.

to *3: This specification is valid for methane and propane.

5.8 Technical data

Type Designation:	**CC33**	
Environmental Conditions		
Operating Temperature:	-20…+55°C or +40°C (Ex-protection- and sensor-dependent)	
Storage Temperature:	-25...+60°C (recommended 0...+30°C)	
Humidity:	5...95%r.H. (sensor-dependent)	
Air pressure:	80...120kPa (sensor-dependent)	
Power Supply		
Operating Voltage:	24V DC (12-30V DC admissibly)	
max. error Voltage:	60V DC (with buzzer)	
Power Consumption:	for RS485 version	4-20mA version
without buzzer with MK217:	typ. 48/58/82mA @24V/18V/12V	max.70/80/104mA @24V/18V/12V
with MK208:	typ. 65/84/123mA @24V/18V/12V	max.87/106/145mA @24V/18V/12V
with buzzer with MK217:	max.60/77/113mA @24V/18V/12V	max.82/99/135mA @24V/18V/12V
with MK208:	max.80/103/152mA @24V/18V/12V	max.102/125/174mA @24V/18V/12V
Fuses:	250mA (not exchangeable)	
Sensors		
Measuring Range and Measuring Gas:	Sensor-dependent	
Measuring principle:	Catalytic Combustion	
Measuring Gas Supply:	Diffusion	
Display & Controls		
Status-LEDs:	1x 5mm green	for operation (left of display)
	1x 5mm yellow	for fault or service (right of the display)
	3x 5mm red	for relay or buzzer (top)
Alarm-LEDs:	2x 10mm red for	gas alarm (left and right above the display)
Display:	2,2″ graphic display	
Buttons:	3 function buttons (can only be operated with a magnetic rod)	
Service Connector		
Design:	3.5mm stereo jack socket (internal)	
Digital input:	for configuration and firmware update	
Signal Output		
analogue:	4...20mA (ACDC capable)	
	max. load: 800Ω/800Ω/500Ω @12V/18V/24V supply	
or digital:	RS485; Half-Duplex; max. 38400 Baud; Modbus RTU protocol,	
	slide switch for 120Ω Terminating resistor,	
Connection Cable		
Cable Glands:	1 or 2 pieces (see section 5.5 "Accessories and Spare Parts")	
Connection Terminals:	3, 8, 12 or 17 pieces depending on the version (for 0.08...2.5mm2 conductor cross-section)	
Cable (analog):	3-core e.g. 3x0.5 / 3x0.75 / 3x1.5mm2 (see also Section3.2 "Cables...")	
Cable (digital):	4-core e.g. 4x0.5 / 4x0.75 / 4x1.5mm2 (see also Section3.2 "Cables...")	
Housing		
Protection:	IP67 when using a thread seal (e.g. with Teflon tape)	
	IP54 without additional thread sealing	
Material:	Die-cast aluminium or stainless steel	
Dimensions:	169 x 145 x 128mm (HxWxD) with sensor	
Weight:	1.60kg @Die-cast aluminium housing	
	3.13kg @Stainless steel housing	
Approvals / Tests		
Ignition Protection Classification:	⟨Ex⟩ II 2G Ex db IIC T6 Gb	-20°C≤Ta≤+55°C (without Buzzer)
	⟨Ex⟩ II 2G Ex db ib IIC T4 Gb	-20°C≤Ta≤+55°C (with Buzzer)
	⟨Ex⟩ II 2G Ex db ib IIC T6 Gb	-20°C≤Ta≤+40°C (with Buzzer)
Electromagnetic Compatibility	DIN EN 50270:2015	Interference emission: Type class I Interference immunity: Type class II

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EU Declaration of Conformity

CC33

Edited: 07.01.2019 Amended:

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

The transmitter **CC33** complies with directive **2014/34/EU** (ATEX) for devices and protective systems for proper use in potentially explosive atmospheres, directive **2014/30/EU** for electromagnetic compatibility and with directive **2011/65/EU** (RoHS) on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

For electrical explosion protection	BVS 18 ATEX E 087 X	
Labelling	⟨Ex⟩ II **2G** Ex db IIC T6 Gb	without Buzzer
	⟨Ex⟩ II **2G** Ex db ib IIC T4/T6 Gb	with Buzzer

The directive 2014/34/EU is complied considering the following standards:

- General requirements	EN 60079-0	:2012 +A11 :2013
- Flameproof enclosure "d"	EN 60079-1	:2014
- Intrinsic safety "i"	EN 60079-11	:2012

The rating of the danger of ignition was done and documented. The EC-Type Examination Certificate was issued by the notified body with ID number 0158 (DEKRA EXAM, Dinnendahlstraße 9, D-44809 Bochum).

The directive 2014/30/EU is complied considering the following standard:

- Electromagnetic compatibility - Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen	EN 50270	: 2015
Emitted interference	Type class 1	
Interference immunity	Type class 2	

The AMETEK CTS Europe GmbH at Kamen has tested and certified the electromagnetic compatibility.

The directive 2011/65/EU is complied considering the following standard:

- Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances	EN 50581	: 2012

Dortmund, 02 April 2019

i.V. B. Siebrecht

B. Siebrecht
QMB

ATEX EU-Konf02/Siebrecht

DEKRA

Translation

EU-Type Examination Certificate

2 **Equipment intended for use in potentially explosive atmospheres Directive 2014/34/EU**

3 EU-Type Examination Certificate Number: **BVS 18 ATEX E 087 X**

4 Product: **Transmitter type CC33**

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

6 Address: **Klönnestr. 99, 44143 Dortmund, Germany**

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

8 DEKRA EXAM 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 Report No. BVS PP 18.2178 EU.

9 The Essential Health and Safety Requirements are assured in consideration of:

EN 60079-0:2012 + A11:2013	**General requirements**
EN 60079-1:2014	**Flameproof enclosure "d"**
EN 60079-11:2012	**Intrinsic Safety "i"**

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 2G Ex db IIC T6 Gb** **without Buzzer**
II 2G Ex db ib IIC T4/T6 Gb **with Buzzer**

DEKRA EXAM GmbH
Bochum, 2018-11-16

Signed: Jörg Koch — Certifier

Signed: Ute Hauke — Approver

DAkkS

DEKRA EXAM GmbH, Dinnendahlstrasse 9, 44809 Bochum, Germany,
telephone +49.234.3696-105, fax +49.234.3696-110, zs-exam@dekra.com

13 **Appendix**

14 **EU-Type Examination Certificate**
BVS 18 ATEX E 087 X

15 **Product description**

15.1 **Subject and type**

Transmitter type CC33

15.2 **Description**

The gas measuring device Transmitter type CC33 consists of a sensor with a sintered element and a device housing, both designed in the type of protection Flameproof Enclosure "d". It can be optionally equipped with a buzzer in type of protection Intrinsically Safe "i" protection and is used to measure flammable gases in potentially explosive atmospheres in the temperature classes T4 and T6.

The gas measuring device Transmitter type CC33 consists of a housing made of stainless steel or aluminum with built-in electronics and a pellistor-sensor behind a sintering element. The sintered element ensures the type of protection Flameproof Enclosure "d" with simultaneous test gas supply.

On the opposite side of the housing, the requirements of type of protection Flameproof Enclosure "d" are met by a conductor bushing with encapsulation. The sensor head is screwed in with the NPT ¾ " thread in a housing type of protection Flameproof Enclosure "d" to house the measuring electronics and the terminals for connecting the supply voltage and field devices.

Listing of all components used referring to older standards

Subject and type	Certificate	Standards
Universal instrument housing type XD-SLwin	FTZU 07 ATEX 0002U Supplement No.3	EN 60079-1:2007

15.3 **Parameters**

15.3.1 Electrical parameters

Rated Voltage		DC	15 -30	V
Rated Current		DC	150	mA
Maximal Voltage (with buzzer)	U_m	DC	60	V

15.3.2 Ambient temperature range

The following combinations are possible:

-20 °C ≤ T_a ≤ +55 °C	without Buzzer	Temperature class "T6"
-20 °C ≤ T_a ≤ +40 °C	with Buzzer	Temperature class "T6"
-20 °C ≤ T_a ≤ +55°C	with Buzzer	Temperature class "T4"

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telephone +49.234.3696-105, fax +49.234.3696-110, zs-exam@dekra.com

16 **Report Number**

BVS PP 18.2178 EU, as of 2018-11-16

17 **Special Conditions for Use**

The measuring function according to Annex II, section 1.5.5 of the directive 2014/34/EU is not part of these EU-Type Examination Certificate.

18 **Essential Health and Safety Requirements**

The Essential Health and Safety Requirements are covered by the standards listed under item 9.

19 **Drawings and Documents**

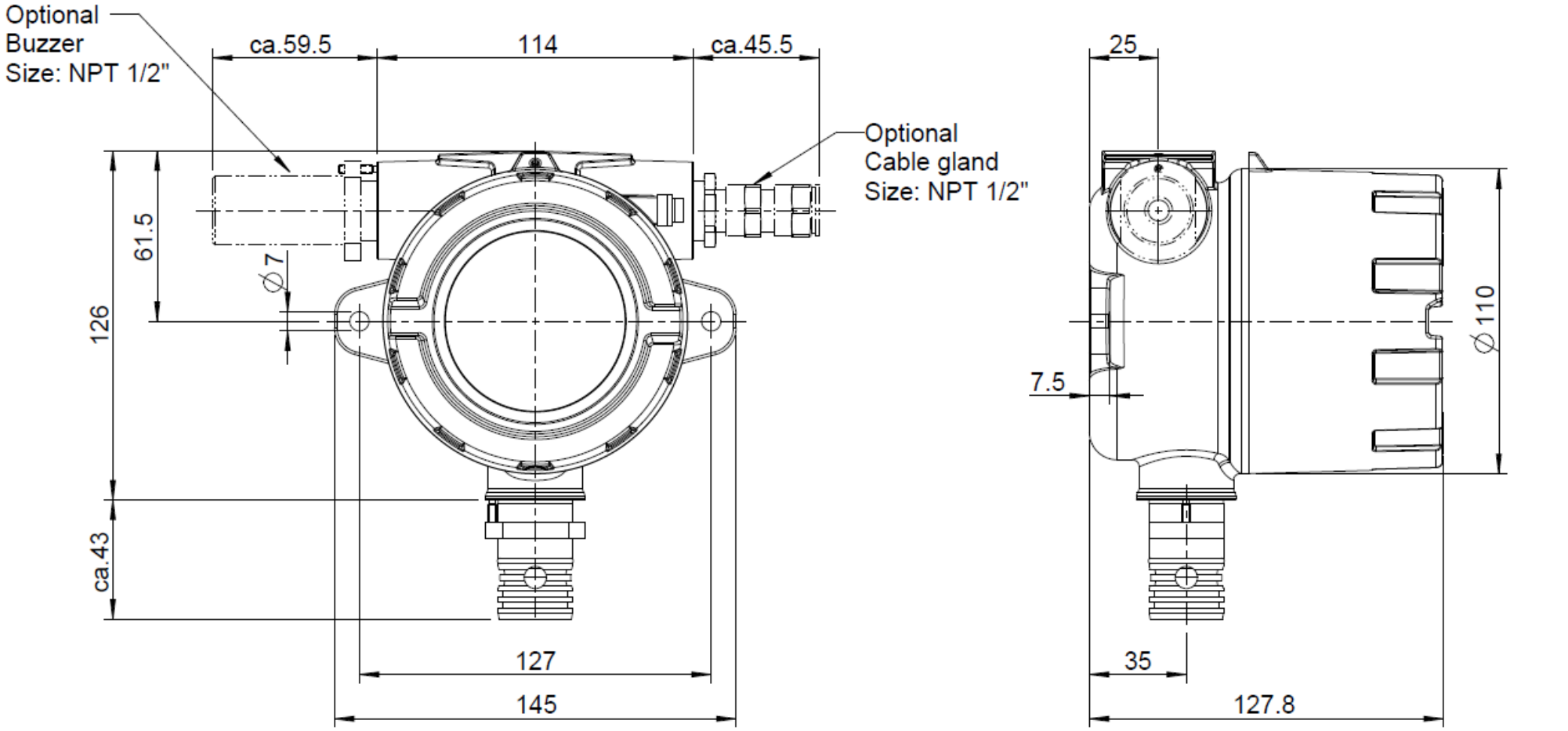
Drawings and documents are listed in the confidential report.

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 EXAM GmbH
Bochum, dated 2018-11-16
BVS-Ld/Mu A 20170483

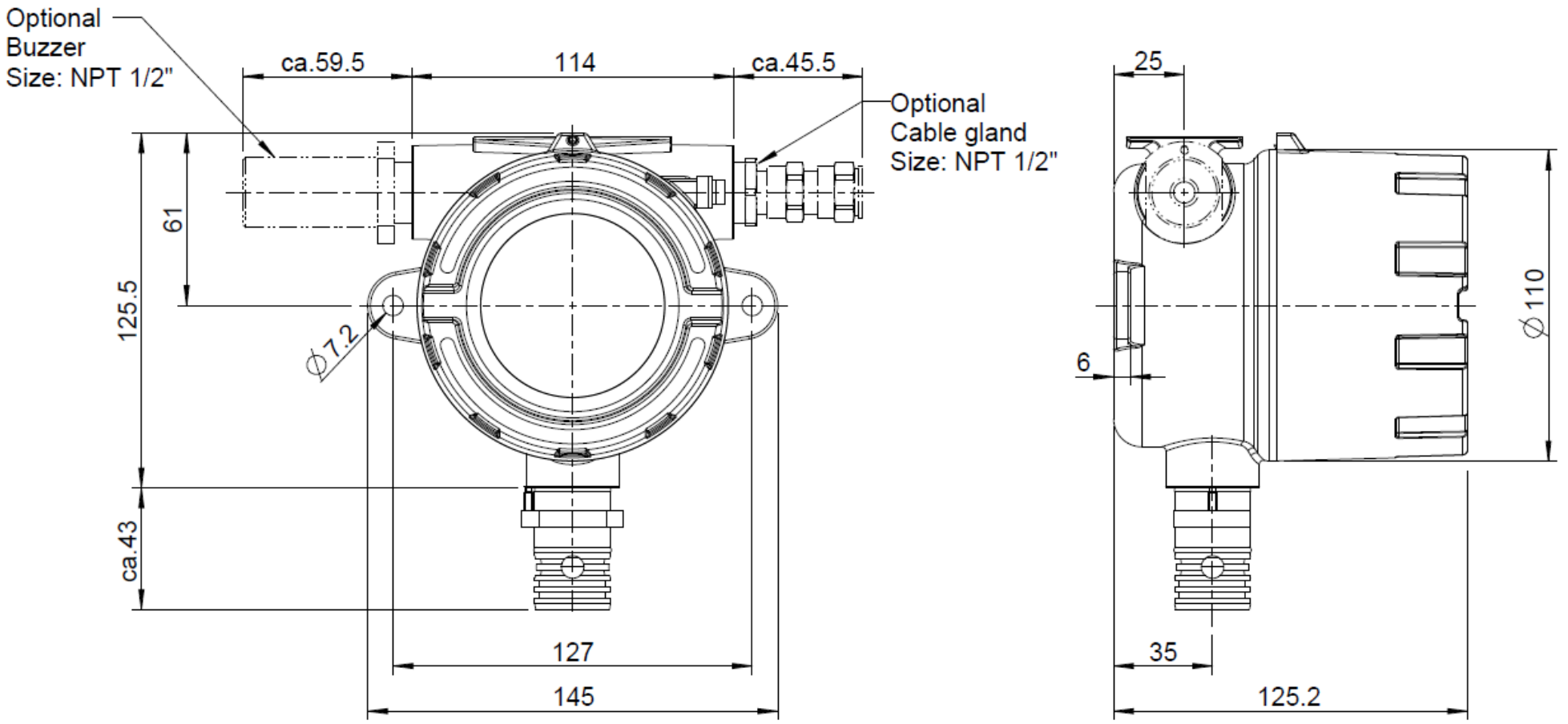
Certifier Approver

DEKRA EXAM GmbH, Dinnendahlstrasse 9, 44809 Bochum, Germany,
telephone +49.234.3696-105, fax +49.234.3696-110, zs-exam@dekra.com



Weight: max. 1,8kg

General Tolerance ISO 2768 - m	Material: -						Scale: 1:2
Rev.	Changes	Date	Name	Date	Name	Verified	Title: CC33 (Aluminium housing) Package dimensions and mounting template
				2018-05-23	Leonhardt	Böttger	
				Adhere to protection note ISO 16016 Schutzvermerk ISO 16016 beachten			
				GfG Gesellschaft für Gerätebau mbH Klönnestr.99, D - 44143 Dortmund			Document-No.: 233-005.51 Page 1 of 1
							Replaces: Replaced by:



Weight: max. 3,4kg

General Tolerance ISO 2768 - m	Material: -						Scale: 1:2
Rev.	Changes	Date	Name	Date	Name	Verified	Title: CC33 (stainless steel housing) Package dimensions and mounting template
				2018-05-23	Leonhardt	Böttger	
				Adhere to protection note ISO 16016 Schutzvermerk ISO 16016 beachten			
				GfG Gesellschaft für Gerätebau mbH Klönnestr.99, D - 44143 Dortmund			Document-No.: 235-005.52 Page 1 of 1
							Replaces: Replaced by: