



GfG Instrumentation

Transmitter **CC 28** Operation Manual

Transmitter for flammable gases and vapors



Content

	Page
For your Safety	2
Operational Hints	2
General Description	3
Detection Principle	3
Design	4
Mounting Position of Transmitter	5
Mounting	6
Installation of Electrical Connections	6
Placing in Operation	7
Detection Mode	7
Check and AutoCal Adjustment of Zeropoint (ZERO)	9
Check and AutoCal Adjustment of Sensitivity (SPAN)	11
Service Menu and Extended Service Menu	12
Sensor Replacement	16
Transmission Characteristics	18
Special Status and relevant Error Messages	19
Messages in detection mode	20
Messages in service mode and during calibration	20
Situation of Status LED's and Output	21
Priority of displays and messages in detection mode	21
Placing into Operation and Maintenance	22
Service, Inspection, Calibration and Adjustments	22
Regular Function Tests	22
Repair	22
Function Restrictions depending on Oxygen Concentration	23
Display Irritation due to Sensor Poisons	23
Trouble Shooting	23
Lower Explosion Limits (LEL) of Gases subject to Function Test	23
Spare Part List	24
Accessories	24
Connection Diagram CC 28 - with 4 .. 20 mA Output	25
Terminal Diagram MWG CC28	26
Sensor specification	27
Technical Data	28
Annex	30
Internal Memory CC28	30
EC-Type Examination Certificate	31
Declarations of Conformity	33

Warning:

The supply voltage must never exceed 30 V DC, not even in case of voltage peaks!

For your Safety

According to the law about technical working media, this manual points out the proper use of the product and serves to prevent dangers. It must be carefully read by all individuals who have or will have the responsibility for operating, using, servicing, maintaining and controlling this product. Like any piece of complex equipment, this product will do the job designed to do, only, if it is operated, used, serviced, maintained and controlled in accordance with GfG's instructions. The warranties made by GfG Instrumentation with respect to the product are voided, if it is not operated, used, serviced, maintained and controlled as per GfG's instructions. The above does not alter statements regarding GfG Instrumentation's warranties and conditions of sale and delivery.

Operational Hints

According to the relevant national regulations, gas warning instruments have to pass a function test, done by a specialist, after having been installed but before put in operation. Before shipment, the transmitter has passed a function and display test, being calibrated with suitable test gases. **This does not, however, overrule the obligation of placing in operation with test gas after the installation.**

The transmitter CC28 (including CC28 D and CC28 DA) is approved for the use in explosion endangered areas and is subject to an EC-Type Examination Certificate issued by DEKRA EXAM GmbH, according to directive 94/9/EG with the following


Certificate: BVS 04 ATEX E 132 X

Labeling: II 2G Ex demb [ib] IIC T4 -20°C ≤ Ta ≤ +50°C

For the use in explosion endangered areas, with a measuring function for explosion protection, the DEKRA EXAM GmbH issued an EC-type examination certificate for the transmitter as per directive 94/9/EG.

Certificate: BVS 05 ATEX G 001 X

The test was based on the standards DIN EN 60079-29-1 "Electrical apparatus for detection and measurement of combustible gases – General requirements and test methods" and DIN EN 50271 "Electrical apparatus for detection and measurement of combustible gases – Requirements for the operational behavior of apparatus of group II with a detection range up to 100 % of the Lower Explosion Limit" and the DIN EN 50271 "Electrical devices for the detection and measurement of combustible gases, toxic gases or oxygen – Requirements and testing for warning devices using software and/or digital technology".

	The EC-Type Examination Certificate BVS 05 ATEX G 001 X includes the following sensors, gases and detection ranges:	
MK208-1, MK217-1	0 ... 100 %LEL	CH ₄ (Methane), C ₃ H ₈ (Propane)
MK208-1	0 ... 100 %LEL	C ₂ H ₄ (Ethylene), C ₃ H ₈ O (Isopropanol), C ₃ H ₆ O (Aceton), C ₄ H ₈ O ₂ (Ethylacetate), C ₆ H ₁₄ (Hexane), C ₄ H ₁₀ O (Diethylether), C ₉ H ₂₀ (Nonane), C ₇ H ₈ (Toluene)
MK217-1	0 ... 100 %LEL	H ₂ (Hydrogen)
MK208-1	0 ... 4,00 %Vol.	NH ₃ (Ammonia)

The functions marked (#) in this operation manual have not been part of the function and EC Type Examination Certificate BVS 05 ATEX G 001 X.

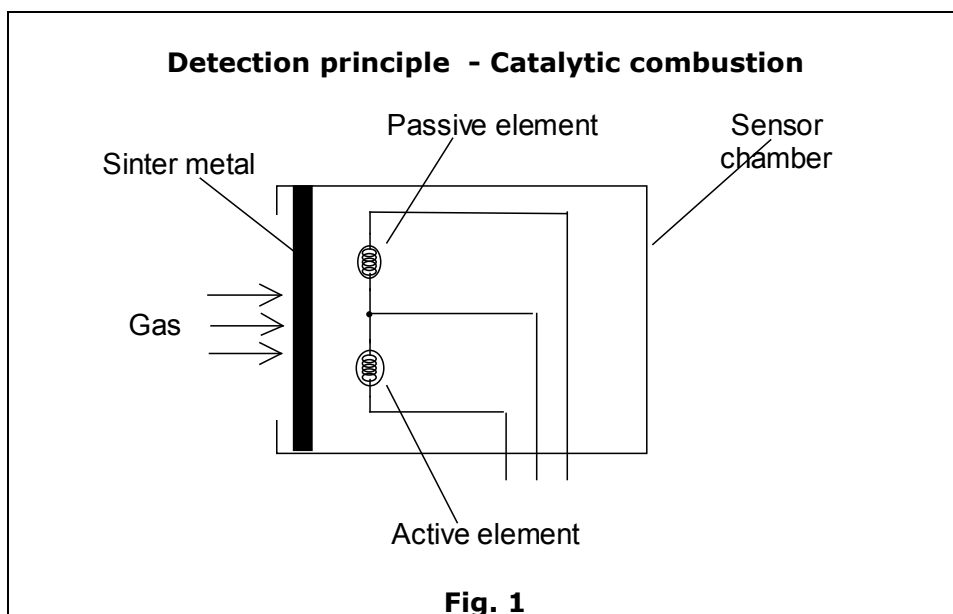
General Description

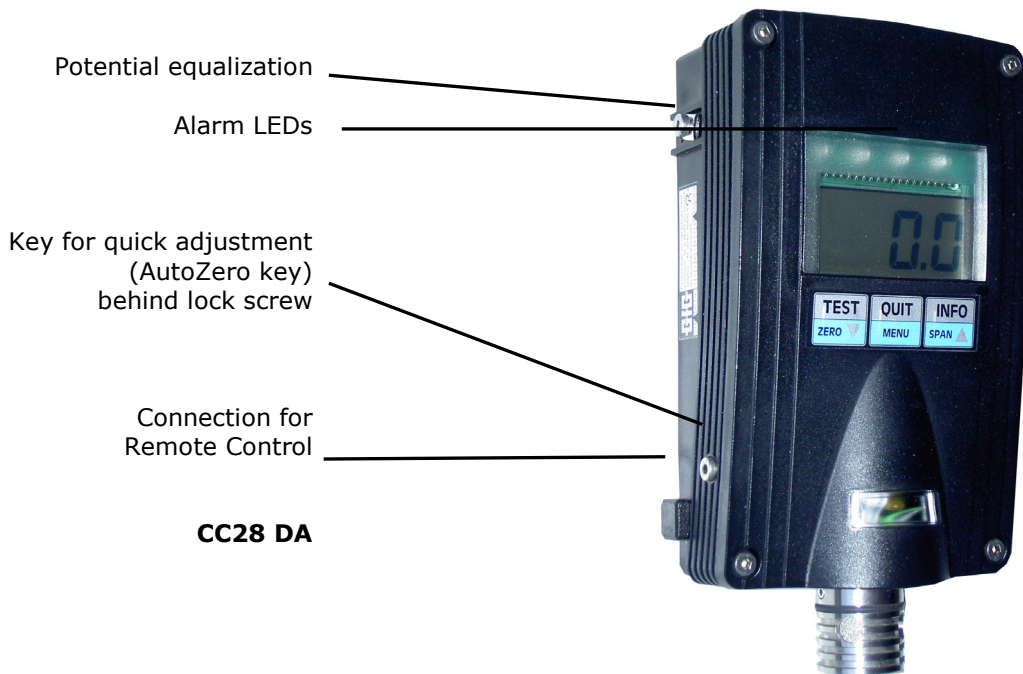
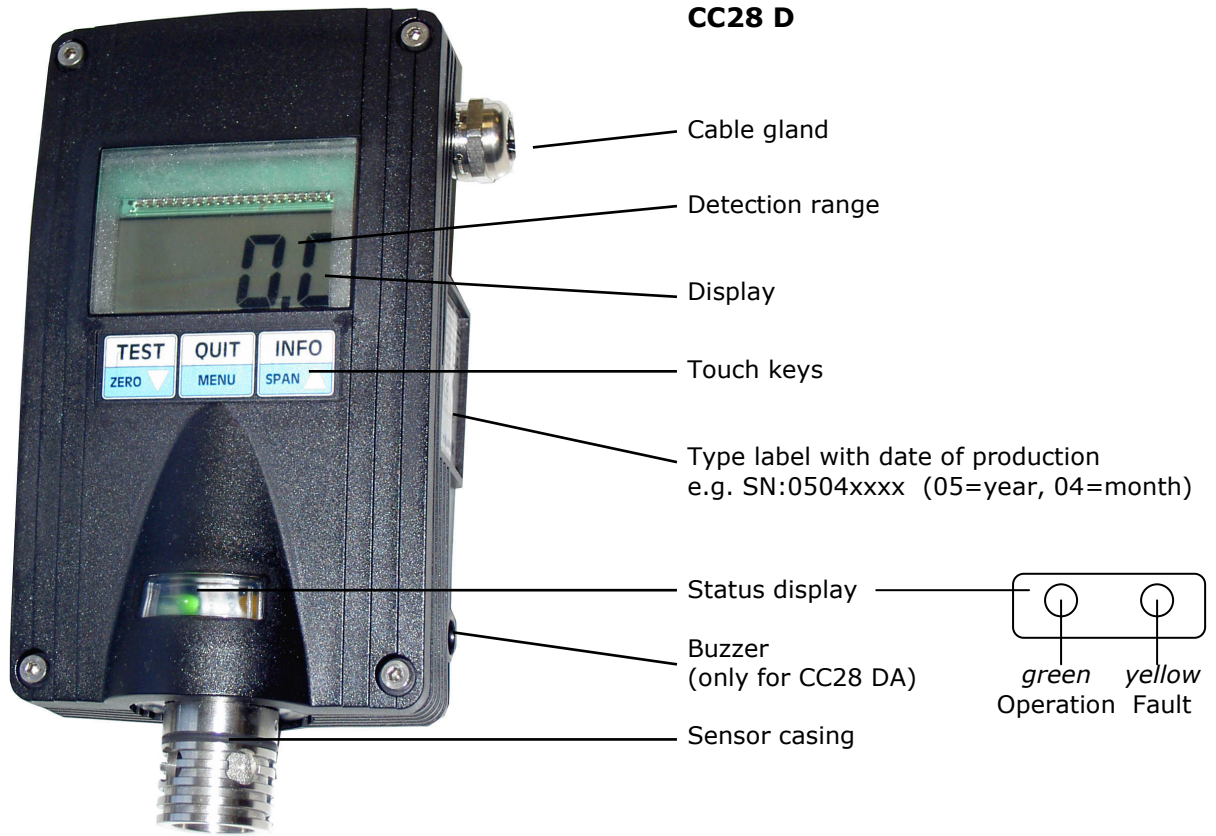
A fixed gas monitoring system consists of a transmitter and a controller (GMA), which are connected by means of cable. The transmitter converts the gas concentration into an electrical signal and transmits it over the cable to the controller for further processing. Compared to the transmitter CC28, the model CC28 D provides an additional display, while the CC28 DA features a display and a visual and audible alarm. The comprehensive electronics allow easy operation and maintenance and also increases the operational safety and accuracy. The special features of the transmitter are:

- Indication of concentration at display or at remote control
- Adjustment by means of touch keys or remote control, without opening of casing
- Compensation of temperature effects.
- Ex-Approval for use at temperatures from -20 to +50°C
- Function Approval for use at temperatures see sensor specification
- Smart Sensor system – sensor replacement by means of plug-in, pre-calibrated sensor
- Permanent status display (operation/fault) at transmitter

Detection Principle

The CC28 is operated on the detection principle "catalytic combustion" (fig. 1). The gas/vapor-air mixture enters the sensor chamber by diffusion through the sinter filter. Inside the sensor chamber there are an active and a passive sensor filament. The heated active sensor burns (oxidizes) the entering gas at its catalytic layer. This increases the temperature at the sensor and results in a change of the electrical resistance, which is the measure for the gas concentration. The passive (reference) sensor is exposed to the same ambient conditions as the active (detection) filament and is used for compensation of environmental effects (e.g. temperature changes).





The type label shows the transmitter type. The sensor enclosure includes the sensor and the sensor card, which carries the components for the sensor circuitry. For adjustment of electrical zeropoint and sensitivity you can use either the built-in display or the remote control RC2. A secured key at the left side of the transmitter allows a quick zero setting. The electronics on the main p.c.board converts the sensor signal into a linear output signal of 4 .. 20 mA.



Always connect the remote control RC2 only for servicing a transmitter without display.

The remote control RC2 may be used in explosion endangered areas.

They keys, functions and display of the remote control RC2 are identical with those of the transmitter.



Mounting Position of Transmitter



As per EN60079-0 table 8 for devices of group II the casing has been tested with an impact energy of 4 Joule (low degree of mechanical danger). Protect the casing against very hard impacts.

It is essential to exactly know the ambient conditions, which have to be taken into consideration before deciding on the mounting position. To achieve representative measurement results, take care of

- **the room ventilation and**
- **the gas density.**

Install the transmitter at a place where the gases pass the sensor even in case of bad ventilation. If necessary, use a smoke cartridge to check. If the transmitter has to be installed at a position, where flow rates can be >3.0m/s, a wind protection is necessary. Generally a gas supply to the transmitter from below (sensor side) should be avoided. Should the gas flow come from below, however, the displayed value may increased beyond the tolerance as per EN60079-29-1. Most combustible gases and vapors are subject to a higher density than air, the transmitter is to be installed close to the floor. For lighter gases, with a lower density than air, the transmitter is being mounted close to the ceiling. A few gases have a density which is similar to that of air. For these gases the transmitter should be mounted at the breathing height of approx. 1.5 m over the floor. The following chart shows the relative density of some gases and vapors. More detailed information is available on request.

Gas/Vapor	relative gas density compared with air	Recommended mounting position
Hydrogen, methane and ammonia	lighter	close to ceiling
Ethylene, ethane, acetylene, methanol	about same	at breathing height
Propane, butane, hexane, nonane, propanol, toluene, ethyl acetate, acetone, diethyl ether, all other organic solvents and fuel mixtures	heavier	close to floor

Furthermore, take the following into consideration as well:

- **Rain water, hose water, dripping water, condensate and**
- **dust in the atmosphere.**

The transmitter is to a great extent protected against the ingress of water and dust (IP64). Special accessories are available to provide additional protection for very difficult conditions. Please contact GfG for detailed information.



Warranty may be voided, if the sensor is exposed to ambient conditions which were unknown to GfG during planning, production or delivery.

Mounting

When deciding on the position for the transmitter, make sure that it is always accessible for service and maintenance. The transmitter must be mounted with the sensor showing to the floor.

For connecting the transmitter to the controller refer to the connection diagram (page 25). For mounting the transmitter remove the four special screws and take the casing top off. Fix the casing by means of two screws.

The printed circuit board inside the casing is potted in epoxy resin (encapsulation "m"). The side-mounted terminals (increased safety "e") are used for connecting the controller.

Installation of Electrical Connections

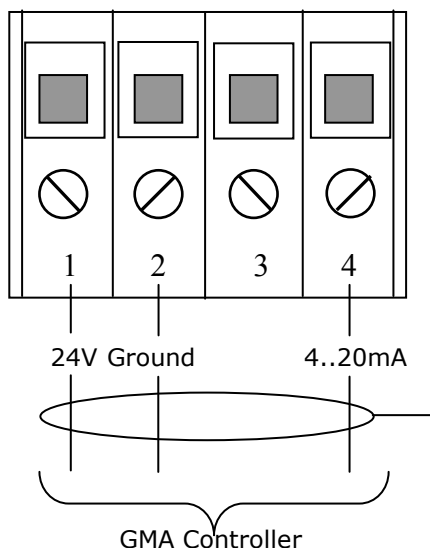
Procurement of cable and electrical connections must be done by a specialist only, obeying the applicable regulations. Always use shielded cable (e.g. LIYCY 3 x 1.5 mm²). The cross section of the cable depends on the cable length. For short distances up to 200 m it may be sufficient to use 0.75 mm² instead of 1.5 mm². For longer distances the cross section must be 1.5 mm². The cable length must not be more than 1000 m.

The shield is fixed to the M16x1.5 screwing. In case the transmitter is mounted to an electrically conductive background (e.g. steel grinder), a potential equalization is to be effected. If the transmitter is installed in a room which is subject to Ex-regulations, make sure that only the transmitter is installed in this area. The gas monitoring power supply and controller must be installed in a non-hazardous location.

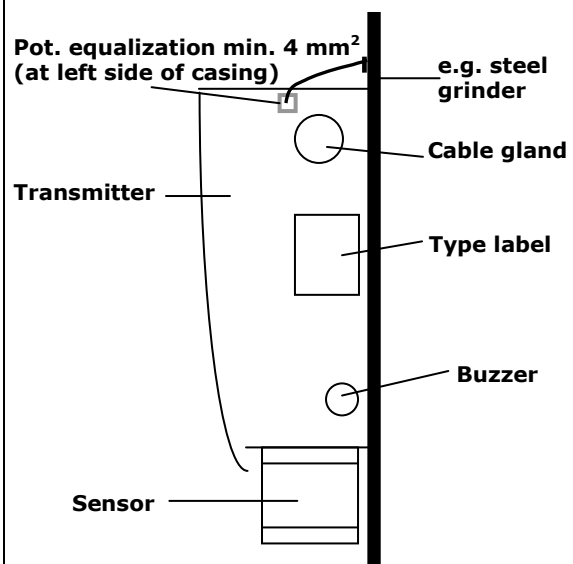


**The transmitter must be installed and opened in gas-free atmosphere only.
The transmitter must only be opened when de-energized.**

Terminal diagram



Potential equalization



In case the transmitter is not operated on a GMA controller, the operational voltage of the mains unit must not exceed 30 V DC.

Fix the casing top with the four special screws after installation.



The user must make sure that even in case of failure the voltage at the transmitter terminals does not exceed the max. fault voltage U_m indicated on the type label.
 $U_m = 250 \text{ V AC}$ or $U_m = 45 \text{ V DC}$

Placing in Operation

The transmitter CC28 has passed quality control for correct operation and display before delivery. The calibration was carried out with the appropriate test gases. Depending on transport, mounting and ambient conditions however variations may occur. Therefore the gas warning system has to be taken into operation and function checked by the manufacturer or by a professional which is authorized by the manufacturer, according to BGV B6 (former VBG61-gases), and BG RCI guideline T023.

After having been turned on, the unit needs a few minutes for:

- the self-test, checking the program and the working memory,
- entering and evaluating of transmitter parameters with simultaneous memory check,
- entering and evaluating of sensor parameters with simultaneous memory check,
- warming-up the sensor.

Within 6 seconds during the warm-up period the transmitter checks the memory first. The current interface provides 0 mA and both the yellow and the green LED are lit. Then the output signal turns to 1.6 mA, the fault LED lights up and the operation LED flashes slowly. The display reads LoAd, then AdJ. Once this is completed, the display of the CC28 D and CC28 DA resp. of the remote control RC2 at the CC28 reads the unit, the type of gas, the detection range, the alarm thresholds and the calibration gas concentration one after the other. If the automatic reset of the ambiguity alarm is activated, this is indicated last, and the fault LED flashes rapidly.

Once the warm-up is completed after 2 minutes, the CC28 turns to detection mode automatically. During this period the display reads a countdown of the seconds from 120. If a fault is recognized during this time, the transmitter turns to fault mode. The current interface provides 1.2 mA and the display indicates a fault message (SYS Err.). The status and fault LEDs are lit constantly. The alarm LEDs and the display illumination will flash alternately. Once the sensor has been replaced after a sensor fault (SEnS Err.), the transmitter is automatically restarted. In case of sensor replacement adhere to the safety notes for electrical connections in explosion endangered areas (see page 6).

Note:

After the initial placing into operation resp. after a sensor replacement it might be possible that the value falls below or exceeds the detection range (“----“ resp. “-----“). In this case the zeropoint of the transmitter must be corrected by starting the automatic zeropoint adjustment (ZERO). Should SCAL Err. occur (resettable), re-calibrate the sensor (SPAN) or, if necessary, enter the service menu to adapt the detection range of the sensor to the hardware. Allow a warm-up time of at least 30 minutes before you check the zeropoint. Once the warm-up is completed, the display should read 0. Otherwise activate the (automatic) zeropoint adjustment (AutoCal adjustment see page 11).

Detection Mode

In detection mode the display shows the current gas concentration.

The display reading is always identical with the display of the remote control connected!

The detection is provided by continuous monitoring. Exceeded thresholds (only for model CC28 DA) and ambiguous sensor signals are recognized immediately and reported visually by the CC28. Features of the electronics like parameter memory or sensor function are

permanently monitored. During trouble-free operation the green LED "ON" is lit, the yellow fault LED is not lit.



To indicate that the CC28 is in detection mode the display alternates every minute to unit and type of gas.

Falling Below Detection Range

Values below the zeropoint are indicated as figures with negative sign. Depending on the measurement value the current interface provides outputs between 4.0 and 2.8 mA.

Deviations of the detection range by – 7.5% or more are indicated by the permanently lit fault LED and the display reading "----" alternating with the negative value. The current interface provides a permanent output of 2.8 mA.

Deviations of the detection range by – 25.0% or more are indicated by the permanently lit fault LED and the display reads permanently "----".

In case of deviations beyond the detection range of the transmitter circuitry the current interface provides an output of 1.2 mA and permanently reads "----".

Exceeding Detection Range


Detection ranges which are exceeded between 100 % and 112 % are indicated by "----" in the display, alternating with the measured value. Depending on the measurement value the current interface provides outputs between 20 and 22 mA.

Should 112 % be exceeded, the unit activates the ambiguity alarm. The display flashes "----" and the current interface provides an output of 22 mA.


Touch Keys

The functions of the touch keys at the transmitter and at the remote control is identical. The same applies to the display at the CC28 D and CC28 DA and the remote control.

Check of Display, LED and Buzzer

Press  briefly in detection mode to activate the check of the display and LEDs. All LEDs are activated for 2 seconds, and all segments of the display (8.8.8.8) are shown. For the CC28 DA the alarm LEDs and the buzzer are activated additionally.

Display of Operational Parameters

During detection mode press key  briefly for the automatic indication of the following operational parameters one after the other.


This order of readings will also appear after turning the transmitter on.

	Display / Example	Meaning of display
1a	LEL	Measuring unit (indication in % LEL)
1b	VOL	Measuring unit (indication in Vol.%)
2	CH4	Type of gas
3	SCAL 100	Detection range (full scale in "measuring unit")
4	CGAS 80.0	Calibration gas concentration (value in "measuring unit")
5	A1 20.0	Alarm threshold (value in "measuring unit")
6	A2 40.0	Alarm threshold (value in "measuring unit")


Value in "measuring unit" means that the displayed figure stands for either % LEL or Vol.%. Reading in Vol.% applies only to the gas ammonia.

Alarm Threshold (only for type CC28 DA)

The CC28 DA provides two alarm thresholds. An alarm is triggered, if the gas concentration exceeds the preset limit value (adjustment in service menu). Exceeded thresholds are indicated by means of the LED bar over the display, the display illumination and a buzzer. When the first threshold (A1) is exceeded, the display illumination and the LED bar are alternating in low frequency. The display reads the correct measurement value and A1 alternately.

Exceeding the second threshold (A2) activates the display illumination, the LED bar and the buzzer alternating in high frequency. The display reads the current measurement value and A2 alternately. Resetting the threshold alarms can be done automatically or manually, i.e. non-latching or latching alarms, depending on the function setting in the service menu. The function of the buzzer is fixed and cannot be changed: Activation by alarm 2, automatic reset when the concentration has fallen below the second threshold, always resettable. Pressing key  allows to reset a latching alarm, if the gas concentration has fallen below the alarm threshold.

Ambiguity Alarm

Due to the detection principle it might be possible that a very high gas concentration dissipates the oxygen in the cell, thus resulting in a lack of oxidation and a reduced signal, although the sensor is exposed to a gas concentration which is clearly above its detection range. For avoiding false signal evaluation, the CC28 provides a warning from ambiguous sensor signals. This alarm is triggered by exceeding of 112.0% LEL and by recognition of a defined rise of signal (Delta Alarm). The ambiguity alarm is indicated by the fault LED flashing quickly. The CC28 DA additionally activates the display illumination, the LED bar and the buzzer, alternating in high frequency. The display also flashes "-----" (also refer to Exceeding Detection Range). On principal the ambiguity alarm is latching and can only be reset by pressing key  (or by pressing the AutoZero key at models without display). The measurement value must be within the detection range.



The transmitter cannot recognize when the danger of an explosive gas mixture resp. of an even higher gas concentration has ended. The end of a gas hazard has to be checked with a portable detector which was already turned on outside the hazardous area.

Should such an alarm be triggered by a high gas concentration, make sure to check the zeropoint and the sensitivity of the sensor, once the alarm was reset. Take into consideration that zeropoint and sensitivity may vary considerably during the first few days.

Sensor Life

Catalytic combustion sensors are subject to a limited lifetime. The expected lifetime of the sensor used in the CC28 for combustible gases is approx. 3 to 5 years, depending on operational conditions. A few months before the lifetime expires, the transmitter indicates that the sensor has to be replaced with the next service. The message is indicated by the fault LED flashing regularly and by the alternating reading of CHnG SEnS and the measurement value. If the sensor is not being replaced within the next few months, the transmitter turns off the detection mode, when the sensor is exhausted. The current interface provides an output of 1.2 mA, the yellow fault LED lights up and the green operational LED shortly flashes in intervals.

Fault

A fault of the transmitters is indicated by the constantly lit yellow fault LED, the current interface provides 1.2 mA an error message is shown in the display (SyS Err. or SEnS Err.).

Fault report is given, if:

- the sensor or the circuitry in the transmitter is defective;
- the sensor is missing;
- the self-test of the unit recognizes a failure.

For further causes see "Special Status and relevant Error Messages" on page 19. After the fault is cured, the yellow fault LED expires.

Check and AutoCal Adjustment of Zeropoint (ZERO)

A prerequisite for this check is atmospheric air without disturbing, resp. interfering gas components. In polluted atmospheres you may alternatively use zero gas, which is free from combustible components and interfering matters. Supply the zero gas to the sensor without pressure by means of the flow adapter, at a flow rate of approx. 0.5 l/min. Once the type of gas has been changed or the sensor has been replaced, the zeropoint must be adjusted correctly. If

the detection mode shows a deviation from 0 the zeropoint has to be corrected as well. When the reading is constant the adjustment can be done using the AutoCal feature. The AutoCal program automatically adjusts the zeropoint signal.

Conditions

The automatic zeropoint adjustment by means of the AutoZero key or with the standard access code 0011 is only possible, if the currently displayed value is max. 25 %LEL.

Expert users have the possibility to activate the zeropoint adjustment even for a display of 35 %LEL by entering the access code 0055. This access code should only be used by trained safety personnel of the customer.

Should the current zeropoint indication be higher than a value of 35 %LEL but it is for sure that this value is not gas induced, the sub-menu info of the service menu indicates a temporarily valid (max. 1 hour) code (CodE), which allows the activation of the zeropoint adjustment without any limitations.

Note:





If the last mentioned measure becomes necessary, this might be caused by a faulty sensor, which should be replaced as soon as possible.

Execution

When the user presses the AutoZero key at a transmitter without display he cannot see whether the measurement value is within the allowed tolerance band for zeroing (i.e. < 25 %LEL). Should the measurement value be higher than 25 %LEL when the AutoZero key is pressed, the transmitter remains in detection mode – to be identified by the fact that the fault LED is not lit. In this case the zeropoint adjustment is only possible by means of the remote control.


For quick adjustment by means of the secured AutoZero key at the left side of the casing remove the lock screw and press the key for at least 3 seconds. This switches the current output to 2.0 mA, the fault LED flashes slowly, and step 3 below is started automatically.


When using the keypad at the display or at the remote control, follow the order below:

1. Press key  for at least 3 seconds to activate the program.
During the whole procedure the current interface provides 2.0 mA and the fault LED flashes slowly. The display shortly reads CodE.
2. Enter the numeric access code 0011 (resp. 0055). Use keys  and  to change the figure at the current position, then confirm by means of key .
3. After correct entering the display shows alternating the current measurement value and the reading Z_{Ero}. When the measurement value remains constant for a defined time interval, the display changes to read Z_{Ero} and AdJ for a few seconds, and the hardware internally regulates its zeropoints. Once the regulation is completed successfully, the new zeropoint is set, the AutoCal program is automatically terminated with the display reading SAVE, and the transmitter returns to detection mode.

Notes:

If the current measurement value is beyond the allowed tolerances for the relevant access code, the display reads FAIL shortly in step 3, and the transmitter returns to detection mode.

The AutoCal program can be shortened by long-term pressing key  or the AutoZero key, while the measurement value is checked for constancy. Then the hardware starts to regulate/adjust the zeropoint directly.


For leaving the AutoCal program without zeropoint adjustment, press key  or the AutoZero key briefly. The display shortly reads ESC.



Once the quick adjustment is completed, remember to screw the lock screw and its gasket in again to its stop!


The following error message may occur during zeropoint adjustment:

Display	Meaning	Fault LED
CAL Err.2	Gas signal is unstable.	flashing quickly
CAL Err.3	Zeropoint is beyond the allowed tolerance range.	

All error message have to be confirmed with  or with the AutoZero key at the left side of the casing. After confirmation the transmitter returns to detection mode without zeropoint adjustment.

Check and AutoCal Adjustment of Sensitivity (SPAN)

For calibration of a transmitter without display you need the remote control RC2.





Press key  briefly to read the currently set calibration gas concentration as %LEL (for ammonia as Vol.%) of the parameter (CGAS). The value of the test gas concentration should, if possible, be 20% above the main alarm threshold.





Many combustible gases are also toxic. Handling toxic gases requires special safety precautions.

For checking, resp. adjusting the display sensitivity (span) a calibration adapter has to be attached to the sensor holder. Via this adapter the calibration gas can be supplied to the sensor at atmospheric pressure with a flow of approx. 0.5 l/min., while the display has to be observed. Is there a deviation between the displayed value and the actual calibration gas concentration a span calibration is necessary. If the reading is constant the adjustment can be done using the AutoCal feature. The AutoCal program automatically adjusts the measuring signal to the calibration gas. Follow the order below:

→ **Before a calibration is started, make sure that the sensor is free from calibration gas (display □).**


1. Press key  for at least 3 seconds to activate the AutoCal program. During the whole procedure the current interface provides 2.0 mA and, the fault LED flashes slowly. The display shortly reads CodE.
2. Now enter the numeric access code 0011. Use keys  and  to change the figure at the current position, and confirm by means of key .
3. After correct entering, the display shows the current measurement value and the message SPAn alternately. The transmitter now waits for a clear rise of concentration. When the measurement value remains constant during a defined time interval (after a fixed time of 2 minutes), the value is used to update the sensitivity (display SAVE). This updates the calibration data successfully. The transmitter, however, does not return to detection mode yet, since the presently supplied test gas concentration would activate an alarm. The transmitter remains in calibration mode until it recognizes a falling gas concentration and then a stabilization of the display value. The display alternately reads ZERo and the current measurement value. Once the value has stabilized, the transmitter returns to detection mode. If the unit does not notice a reduced gas concentration resp. a stabilized measurement value, it returns to detection mode after max. 3 minutes.

At any time the AutoCal program can be shortened by long-term pressing key . The display shortly reads SAVE and the measurement value is accepted directly as the sensitivity update.

To leave the AutoCal program without sensitivity adjustment, press key  only briefly. The display shortly reads ESC.

The following error messages may occur during the adjustment:

Display	Meaning	Fault LED
CAL Err.1	No rise of test gas concentration noted.	flashing quickly
CAL Err.2	Test gas signal is unstable.	
CAL Err.3	Sensitivity is beyond the allowed tolerance range.	

The error messages have to be confirmed with key . The transmitter returns to detection mode without new calibration. The calibration procedure has to be repeated.

Service Menu and Extended Service Menu

Activation of service menu

The service menu allows to select and to change all important parameters of the CC28. Entering the service menu interrupts the detection mode; the transmitter turns to service mode, and the alarms are de-activated. The special status "Service" is indicated by the fault LED flashing slowly and by a current output signal of 2.4 mA. If you do not hit any key within one minute, the transmitter automatically leaves the service mode and returns to detection mode.



All parameters changed in the service menu refer to the currently set type of gas !

Should you wish to change type of gas and parameters, set the new type of gas first, before parameter changes for this gas can become effective.

The service menu can be called in two different extensions.

The standard service menu is activated with code 1100. It allows to adjust the calibration gas concentration and, with model CC28 DA, all values which are related to alarms.







The extended service menu is activated with code 5050. It allows to also change the type of gas, full scale and ambiguity alarm. This code should only be used by specially trained safety personnel.







For transmitters with function test (labeling BVS 05 ATEX G 001 X): The extended service menu allows adjustments which may become the function test void !

If the full scale value of 100 % LEL is changed to a different value, or if the gas is changed from a certified gas (see page 2) to a non-certified one, the function test becomes invalid.

When using the keypad at the display or at the remote control follow the order below:

1. Press key  for at least 3 seconds. The transmitter turns to service mode. The display shortly reads CodE.
2. Enter the numeric code 1100 (resp. 0055). Use keys  and  to change the figure at the current position and confirm with key .
3. After correct entering the menu display reads GAS. Use keys  and  to select the other menu points.

To activate a selected menu point press key  briefly. For parameter adjustment use keys  and . For leaving the menu point briefly press key  again.

	Display of menu point	Description	Remark
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 5px;">INFO</div> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 5px;">SPAN ▲</div> <div style="display: flex; align-items: center; margin: 10px 0;"> <div style="border-left: 1px solid black; border-right: 1px solid black; height: 100px; margin-right: 5px;"></div> <div style="font-size: 2em; margin-right: 5px;">↑</div> </div> <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="border-left: 1px solid black; border-right: 1px solid black; height: 100px; margin-right: 5px;"></div> <div style="font-size: 2em; margin-right: 5px;">↓</div> </div> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 5px;">TEST</div> <div style="border: 1px solid black; padding: 2px; width: fit-content;">ZERO ▼</div>			
	info	Indication of software version, serial number and "Code" for ruling code	
	F2	Setting of alarm function 2	only visible and changeable for model CC28 DA
	<input type="checkbox"/> F1	Setting of alarm function 1	
	<input type="checkbox"/> H2	Setting of hysteresis for alarm 2	
	<input type="checkbox"/> H1	Setting of hysteresis for alarm 1	
	<input type="checkbox"/> A2	Setting of alarm threshold 2	
	<input type="checkbox"/> A1	Setting of alarm threshold 1	
	CGAS	Setting of calibration gas concentration	
	SCAL	Setting of full scale deflection	changeable only in extended menu.
	GAS	Change of gas	
	SAVE	Leaving the service menu with storing of the changed parameters	
	ESC	Leaving the service menu without storing of the changed parameters	

Menu point GAS – Change of type of gas (only possible in extended menu)

This function allows to select explicitly all parameters for different types of gas, which are stored in the sensor. You can see only those gases which the sensor is scheduled for.

1. Activate of menu point GAS.
2. The display shows the presently set type of gas.
This reading can also be selected in the standard service menu.
3. Use keys

TEST
ZERO ▼

 and

INFO
SPAN ▲

 to set the gas.
In the standard service menu the display shortly reads FAiL and then the presently set type of gas (step 2).
4. Select the desired type of gas and confirm by pressing key

QUIT
MENU

 briefly.
5. The CC28 is re-starting (rSEt) (only for selection of a different gas).

If the type of gas has been changed several times before the user returns to a gas which was already parameterized before, the transmitter takes over those parameters which were stored by the user before. If the type of gas has been changed and after a restart, the stored standard parameters (see table on page 30) are taken over for a type of gas which is selected for the first time. When the type of gas was changed, the zeropoint has to be adjusted in any case by means of the AutoCal function. The sensitivity of the sensor for the new gas is to be checked as well and to be adjusted by means of the AutoCal function, if necessary.

The different gases will be indicated either as shown in the list below.

Display	Gas
Actn	Aceton
But.	n-Butane
btoL	Butanol
Bton	2-Butanon
C2H2	Acetylene
C2H4	Ethylene
C2H6	Ethane
C3H4	Propyne
C3H6	Propylene
C3H8	Propane
C6H6	Benzene

Display	Gas
C7H8	Toluene
CH4	Methane
c.Hen	Cyclohexane
dEE.	Diethyl ether
dNE.	Dimethyl ether
EtAc	Ethyl acetate
EtoL	Ethanol
H2	Hydrogen
Hen.	Hexane
HPE.	Heptane
38	Natural Gas

Display	Gas
i.but	Iso-Butane
NEAc	Methyl acetate
NEoL	Methanol
Nib.	MIBK
nH3	Ammonia
Non.	Nonane
Oct.	Octane
Pnt.	Pentane
Prol	2-Propanol
yLoL	Xylene
56	Carbon Monoxide

Menu point SCAL \square – Adjustment of full scale deflection (only possible in extended menu)

The detection range can be set to 50, 75 or 100 % LEL. The detection range for ammonia (4 Vol.%) cannot be changed.

Follow the 5 steps described below:

1. Activate menu point SCAL.
2. The display shows the presently set full scale value.
In the standard service menu the display reads "100" for 100 % LEL.

3. Use keys \square and \square for parameter adjustment.

In the standard service menu the display shortly reads FAiL and then the current value (step 2).

4. For leaving menu point SCAL press key \square briefly.
5. If necessary, store the parameter (SAVE).






Notes:

The EC-Type Examination Certificate BVS 05 ATEX G 001 X is only valid for a detection range with a full scale of 100 %LEL resp. 4.00 %Vol. NH₃. The change of the detection range is mainly a change of the current output. The standardized output signal of 4 – 20 mA is used for the new, reduced detection range. The display indication does not change. A detection range of 0 – 50 % LEL results in the figures from 0 to 50.0 in the display (i.e. the reading remains at % LEL).

Overrange and underrange refer to a percentage of the detection range, i.e. with a detection range of 0 – 50 % LEL the ambiguity alarm is triggered at approx. 56 % LEL ! Alarm thresholds are indicated in % LEL (not in % of detection range) ! After a reduction of the detection range make sure that the alarm thresholds are checked and, if necessary, corrected. If alarm thresholds were adjusted to a value beyond the new full scale deflection, they are automatically set to the current full scale value. Should the circuitry recognize that the currently set detection range cannot be monitored any longer (sensor too sensitive for the measurement circuit, see also SCAL Err.), the display turns automatically to the highest possible value when entering this menu point.




Menu point CGAS – Adjustment of calibration gas concentration

The calibration gas concentration can be set within the range of 10 % – 105 % of the current detection range.

1. Use key  to select menu point CGAS.
2. The display reads the currently set value for the calibration gas concentration in % LEL (for ammonia in Vol.%).
3. Use keys  and  to set the parameter.
4. Press key  briefly to leave menu point CGAS.
5. If necessary, store the parameter: Select menu point SAVE and confirm with .

Menu point A1, A2 – Adjustment of alarm thresholds (only visible at model CC28 DA)

The alarm thresholds can be set throughout the detection range; A1, however, cannot be set to a higher value than A2. Setting a threshold to 0 de-activates the alarm. A2 can only be set to 0 when A1 was also set to 0 before.

1. Activate menu point A1 resp. A2.
2. The display reads the presently set value for the alarm threshold.
3. Use keys  and  to set the parameters .
4. Press key  briefly to leave menu point A1 resp. A2.
5. If necessary, store the parameter (SAVE).

Notes:

The buzzer in model CC28 DA is always connected to alarm 2.

Menu point H1, H2 – Adjustment of hysteresis (only visible at model CC28 DA)




This function allows to adjust the hysteresis, i.e. the difference between activation and de-activation of the alarm thresholds. The setting of the parameter is done in % LEL and is restricted to max. 5 % LEL (for ammonia in Vol.%, max. 0.2 Vol.%).

Example:

At a CC28 with the detection range 0 .. 100 % LEL the hysteresis for alarm 1 was set to 4.0, i.e. the alarm de-activation point for the alarm is 4 % LEL below the alarm threshold.

This results in the following alarm triggering:




Alarm 1	= 10 % LEL
Alarm activation	≥ 10 % LEL
Hysteresis H1	3 % LEL
Alarm de-activation	≤ 7 % LEL

1. Activate menu point H1 resp. H2.
2. The display reads the presently set value for the alarm hysteresis.
3. Use keys  and  to set the parameter.
4. Press key  briefly to leave menu point H1 resp. H2
5. If necessary, store the parameter (SAVE).

Menu point F1, F2 – Adjustment of alarm functions (only visible at model CC28 DA)

1. Activate menu point F1 resp. F2.
2. The display reads the presently set code for the alarm function.

Display	Alarm for exceeded threshold ...
n S	non-storing (= non-latching), not resettable (# at alarm 2)
S C	storing (= latching), resettable when fallen below

3. Use keys  and  for setting the parameter.
4. Press key  briefly to leave menu point F1 resp. F2.
5. If necessary, store the parameter (SAVE).

Note:

The buzzer function at model CC28 DA is fixed to: "Alarm for exceeded threshold, non-latching, resettable even during existing alarm conditions".


The EC-Type Examination Certificate BVS 05 ATEX G 001 X is valid at alarm 2 only if set to "S C" storing (=latching).

Menu point inFo – Indication of sensor type (MK number), sensor serial number, software version, serial number and code


1. Activate menu point inFo.
2. One after the other the display reads the MK number (S.tyP xxx.x), the sensor serial number (S.nr xxxx), the software version (SoFt xxxx), the 8-digit serial number of the transmitter in 2 parts (F.nr_ xxxx F.nr_ xxxx) and a code (CodE xxxx).

The figure indicated as CodE is a (only temporarily valid) code, which allows the activation of the zeropoint adjustment without any limitations (refer to Check and AutoCal Adjustment of Zeropoint).

Menu point ESC – Leaving the service menu without storing

1. Select menu point ESC.
2. Press key  briefly to leave the service menu without storing of parameter changes.

Menu point SAVE – Leaving the service menu with with storing

1. Select menu point SAVE.
2. Press key  briefly to leave the service menu with storing of parameter changes.

Notes:

When the type of gas is changed, confirming the menu point activates the storing immediately and enables the parameters for this type of gas.

Apart from this exception you can change several parameters one after the other without storing in between. One collective storing procedure at the end of the settings saves all parameters which have been changed in the service menu.

Sensor Replacement



The sensors MK 208-1, MK 217-1 and 219-1 are supplied with an EEPROM which stores the sensor data (serial number etc.), the calibration data and the adjustable types of gases. The sensors are fit to the transmitter by means of a plug connector. For replacing the sensor unscrew the allen screw side-mounted at the impact protection (see picture on page 4 sensor casing). Open the transmitter casing and use suitable tool to push the sensor downward. The new sensor slides in the casing from below; the sensor label must show forward. The


transmitter provides a lock against rotation, which makes sure that the sensor always fits properly. Once the sensor is locked in place, secure it with the allen screw. When opening the casing take note of the safety measures in Ex areas (see page 6). Once the sensor has been removed, the yellow fault LED lights up and the current output signal falls to 1.2 mA. At model CC28 D and DA the display reads SEEnS Err.1, and at the CC28 DA the alarm LEDs flash slowly.

When the new sensor has been fit, the transmitter does an automatic re-start. The display reads rSet and then tEst (memory test; current output signal of 0 mA). Then the warm-up period is started: The display reads LoAd, the green LED flashes and the current interface provides an output signal of 1.6 mA. If all data of the new sensor match the stored data for the measurement task, the transmitter turns automatically from warm-up to detection mode. Since the hardware zeropoints of the different sensors resp. sensor types may differ considerably, a sensor replacement must always be followed by a zeropoint adjustment ZERo (see page 10). There are no restrictions for the first zeropoint adjustment after a sensor replacement. Zeroing is even possible at values far beyond the detection range (“-----“ resp. “-----“).

Possible error messages CHEC GAS or CHEC SCAL

CHEC GAS During the warm-up period the transmitter recognizes, if the new sensor is not specified for the gas which is set as the measurement gas. The green LED turns from flashing slowly to a twin flash (2 short flashes). The yellow fault LED remains lit, the current output still provides 1.6 mA, and the display reads CHEC GAS. If the transmitter is to detect that gas which has been set, the sensor is to be replaced by a cell which is suitable for this gas (e.g. sensor MK 217-1 by sensor MK 208-1).

Should you want to use the new, different sensor anyway (e.g. as a preliminary solution), you may press key  (longer than 3 seconds) in fault status and enter the acces code 5050 to enter the extended service menu (see page 12); menu point GAS (appears immediately after the code) shows the types of gases the new sensor is specified for. If the user selects a type of gas and confirms his choice by pressing key , the transmitter is converted to this gas and re-started. Then the zeropoint ZERo and the sensitivity SPAn have to be set for the new type of gas (see page 9-11).

CHEC SCAL New sensors, no matter for which gas, are always pre-set to the detection range of 0 – 100 % LEL. During the warm-up period the transmitter recognizes, if the detection range which was set last, and the pre-setting of the sensor for the measurement gas do not match. The green LED turns from flashing slowly to a twin flash (2 short flashes). The yellow fault LED remains lit, the current interface still provides 1.6 mA, and the display reads CHEC SCAL. For check and, if required, change of the detection range setting directly from the fault status, you may press key  (longer than 3 seconds) and enter the code 1100 or 5050 to enter the service mode (see page 12), which allows to do the adjustment under menu point SCAL. After leaving the menu with SAVE the warm-up procedure is continued.

Example:

If the detection range SCAL was set to 50 % or 75 %, a new and unused sensor will cause the display to read CHEC SCAL If the transmitter is set to 100%, but the fit sensor had already been used in another unit which was set to 50 % or 75 %, the display will also read CHEC SCAL.

Notes:

After the sensor was put into operation for the very first time, or when the sensor has been replaced, the transmitter may indicate an overrange resp. underrange (“-----“ resp. “-----“). In this case the automatic zeropoint adjustment (ZERO) has to be activated to correct the zeropoint.

Should SCAL Err. occur (resettable), the sensor must be re-calibrated (SPAN) or, if necessary, the detection range of the sensor must be adapted to the hardware in the service menu. Allow a warm-up time of at least 30 minutes before you check the zeropoint. Once the warm-up is completed, the display should have stabilized to read 0. Otherwise activate the (automatic) zeropoint adjustment (Adjustment see page 10).



Once the sensor was replaced (no matter which service and adjustment interval is being considered), you have to effect a complete service and adjustment according to DIN EN 60079-28-2 para. 8.9. Check and adjustment of zeropoint and sensitivity is to be done as described (pages 9-10).

Transmission Characteristics


Depending on the type of gas the transmitter is subject to different transmission characteristics. Different gases may show different response times. The transmission signal is always proportional to the gas concentration.

Special Status and relevant Error Messages




The table below describes those special status which cause the yellow fault LED to be lit permanently. For a better diagnosis of a transmitter without display you should either read the error messages below from the remote control RC2 or analyse the values from the current output.

No	Display	green LED	yellow LED	Output	Cause	Action
01	"tEst"	On	On	0 mA	Memory test when booting the system	finishes automatically after 6 seconds
02	"LoAd" Operational para. "AdJ"	flashing	On	1,6 mA	Bootng the system at start or after change of gas (see page 7)	turns to sensor warm-up automatically
03	Countdown of seconds	flashing	On	1,6 mA	Sensor warm-up period	finishes automatically after 120 seconds.
10	"tEst" flashing	Off	glows	0 mA	Too low supply voltage	increase supply voltage
11	"CHnG" "SEnS"	flashing shortly (single flash)	On	1,2 mA	Sensor lifetime expired	Replace sensor
12	"CHEC" "GAS"	Twin flash	On	1,2 mA	After sensor replacement: Sensor is not specified for the gas	Replace sensor again or select different gas; see page 16 „Sensor Replacement“
13	"CHEC" "SCAL"	Twin flash	On	1,2 mA	After sensor replacement: Detection range setting of sensor and transmitter do not match for the gas	Check and, if necessary, change detection range SCAL See page 16 „Sensor Replacement“
14	"SyS" "Err.1"	Off	On	1,2 mA	Fault during RAM access	Re-start transmitter. If error is reported again, replace transmitter
15	"SyS" "Err.2"	Off	On	1,2 mA	Fault during ROM access	Re-start transmitter. If error is reported again, replace transmitter
16	"SyS" "Err.3"	Off	On	1,2 mA	Fault during EEPROM access (internal)	Re-start transmitter. If error is reported again, replace transmitter
17	"SyS" "Err.4"	Off	Off	1,2 mA	<i>Reserved</i>	Re-start transmitter. If error is reported again, replace transmitter
18	"SyS" "Err.5"	"SyS" "Err.S"	On	1,2 mA	Fault during regulation of sensor voltage	Re-start transmitter. If error is reported again, replace transmitter
19	Off	Off	On	1,2 mA	Fault during regulation of hardware zeropoint	
20	"Sys" "Err.1"	Off	On	1,2 mA	Temperature measurement is not plausible	
21	"SEnS" "Err.1"	"SEnS" "Err.1"	On	1,2 mA	Sensor is missing	Fit sensor (automatic re-start)
22	"SEnS" "Err.2"	Off	On	1,2 mA	Fault during EEPROM access (sensor)	Replace sensor (automatic re-start)
23	"SEnS" "Err.3"	Off	On	1,2 mA	Wrong sensor/parameter memory	
24	"Adv" "Err.1"	Off	On	1,2 mA	Error A/D converter (sensor voltage)	Re-start transmitter. If error is reported again, replace transmitter.
25	"Adv" "Err.2"	"Adv" "Err.2"	On	1,2 mA	Error A/D converter (NTC)	Re-start transmitter. If error is reported again, replace transmitter.
26	"Adv" "Err.3"	Off	On	1,2 mA	Error A/D converter (sensor current)	Re-start transmitter. If error is reported again, replace transmitter.

Messages in detection mode

No	Display	green LED	yellow LED	Output	Cause	Action
30	“-----” permanent	On	flashing quickly	22 mA	Gas concentration has exceeded detection range of transmitter electronics. Ambiguity alarm!	Caution Explosion hazards! Latching alarm. Measures see page 8 and 9
31	“-----” flashing	On	flashing quickly	22 mA	Overrange (> 112 %) Ambiguity alarm!	Caution Explosion hazards! Latching alarm. Measures see page 8 and 9
32	Value alternating with “-----”	On	Off	20–22 mA	Overrange (between 100 % and 112 %)	Caution Explosion hazards!
33	Value alternating with “A2”	On	Off	4–20 mA	Gas concentration has reached resp. exceeded the 2.alarm threshold.	Reduce gas concentration! Latching alarm as standard.
34	Value alternating with “A1”	On	Off	4–20 mA	Gas concentration has reached resp. exceeded the 1.alarm threshold.	Reduce gas concentration! Non-latching alarm as standard.
35	Value alternating with “SCAL” “Err.”	On	Off	4–20 mA	Cautionary warning message: Hardware/sensor combination cannot recognize full scale deflection	Reset with  a) Re-calibrate sensor (SPAN) b) Adapt resp. Reduce detection range in service menu.
36	Value alternating with “CHnG” “SEnS”	On	flashing shortly (single flash)	4–20 mA	Cautionary warning message: End of sensor life within the next few months	Replace sensor during next service
37	Value	On	Off	4–20 mA	Normal detection mode	
38	Value	On	Off	2.8–4 mA	Detection range is deviated between -7.5% and 0.0%	
39	Value alternating with “-----”	On	On	2.8 mA	Detection range is deviated between -8.0% and -25.0%	Adjust zeropoint
40	“-----” permanent	On	On	2.8 mA	Detection range is deviated < -25.0%	Adjust zeropoint and sensitivity
41	“-----” permanent	On	On	1.2 mA	Measuring signal has fallen below detection range of transmitter electronics.	Adjust zeropoint and sensitivity

Messages in service mode and during calibration

42	Menu point	On	flashing	2.4 mA	Service menu has been activated by keys or by remote control RC2	Select menu point Will return to detection mode automatically, if no entry is made within 1 minute
43	“ZEro”	On	flashing	2.0 mA	AutoCal-Adjustment of zeropoint in process (activated by key pad, RC2 or by AutoCal-Key)	Will be completed automatically after successful adjustment
44	“SPAn”	On	flashing	2.0 mA	Calibration activated by keys or RC2	Will be completed automatically after successful adjustment
45	“CA.” “Err.1”	On	flashing quickly	2.0 mA	During AutoCal adjustment of sensitivity no rise of calibration gas concentration was recognized	Reset with  a) Check gas supply b) Wait for request for adjustment before supplying gas
46	“CAL” “Err.2”	On	flashing quickly	2.0 mA	During AutoCal adjustment no stable zero gas resp. calibration gas concentration was recognized	Reset with  Stabilize gas supply
47	“CAL” “Err.3”	On	flashing quickly	2.0 mA	The zero point resp. the sensitivity is beyond the range of tolerance	Reset with  a) Check zero resp. calibration gas and repeat procedure. b) Eventually replace sensor.

In detection mode the messages listed in the second column are indicated alternating with the measurement value. The readings described in No.33 and 34 are only applicable for model CC28 DA. The readings described in No.35 and 36 are cautionary warning messages. The transmitter remains in detection mode, and there is no immediate action required by the user. The status described in No.32 and 38 refer to a de facto extension of the detection range from 4–20 mA to the range 2.8–22 mA, for showing measurement values "close" to the original detection range. This generates a tolerance range around the 4–20 mA signal, before a special status occurs.


Situation of Status LED's and Output

The following table shows for a transmitter without display the different indications of the two status LEDs and the output signals with their meanings. For the zeropoint adjustment (if display > 25 % LEL), for adjustments to enter the service menu on a transmitter without display the remote control RC2 is obligatory.

green LED	yellow LED	Output	Description see chapter...
On	On	2,8 mA	Page 20 "Messages in detection mode" No.39, 40
On	On	1,2 mA	P.20 "Messages in detection mode" No.41
On	On	0 mA	P.19 "Special Status and relevant Error Messages" No.01
On	flashing quickly	22 mA	P.20 "Messages in detection mode" No.30, 31
On	flashing quickly	2,0 mA	P.20 "Messages in service mode..." No.45-47
On	Flashing slowly	2,4 mA	P.20 "Messages in service mode..." No.42
On	Flashing slowly	2,0 mA	P.20 "Messages in service mode..." No.43, 44
On	Single flashes	4–20mA	P.20 "Messages in detection mode" No.36
On	Off	20–22mA	P.20 "Messages in detection mode" No.32
On	Off	4–20mA	P.20 "Messages in detection mode" No.(33, 34), 35, 37
On	Off	2,8–4mA	P.20 "Messages in detection mode" No.38
flashing	On	1,6 mA	P.19 "Special Status and relevant Error Messages" No.02, 03
Twin flash	On	1,2 mA	P.19 "Special Status and relevant Error Messages" No.12, 13
Single flash	On	1,2 mA	P.19 "Special Status and relevant Error Messages" No.11
Off	On	1,2 mA	P.19 "Special Status and relevant Error Messages" No.14-26

Priority of displays and messages in detection mode

The displays of situations with low priority will be substituted for displays with higher priorities (the situations with low priority will not be deleted).

Priority	Situation	Description see chapter...
	Ambiguity	Page 20 "Messages in detection mode" No.30, 31
	A/D converter fault	P.19 "Special Status and relevant ..." No.24-26
	(minor) overrange	P.20 "Messages in detection mode" No.32
	Alarm2	P.20 "Messages in detection mode" No.33
	Alarm1	P.20 "Messages in detection mode" No.34
	Detection range deviation	P.20 "Messages in detection mode" No.38-40
	"SCAL-Error" (Warning)	P.20 "Messages in detection mode" No.35
	Sensor Replacement (Warning)	P.20 "Messages in detection mode" No.36

System- and sensor errors (P. 19 No. 11 and No. 14-23) will interrupt the detection mode with its messages. In case of a prior ambiguity alarm the status LEDs and the output will still indicate it and the new special status will be indicated only by the LCD display.

Placing into Operation and Maintenance

Make sure that DIN EN 60079-29-2 "Guideline for choice, installation, use and maintenance of apparatus for detection and measurement of combustible gases or oxygen" as well as the relevant national regulations are adhered to. For Germany this means the "Explosion Protection Regulations", guideline T023 (BGI 518) "Gas warning Apparatus for Explosion Protection – Use and Operation" and "BGR 500, Teil 2, Kapitel 2.33" (formerly known as: UVV-Gase, BGV B6, VGB 61).

After installation and during the initial placing into operation gas warning equipment have to be checked for function by an expert (see DIN EN 60079-29-2 section 8.9).

Maintenance comprises inspection, service, calibration and adjustment as well as the regular function tests and repair.

Service, Inspection, Calibration and Adjustments

Inspection should include a visual check of the gas warning equipment (for Germany see guideline T023, chapter 9).

- Mechanical damage
- Soiling by dust
- Condensate by moisture
- Protective devices for transmitter
- Diffusion inlet of transmitter
- Gas sampling system, gas processing system (if existing)

Service and inspection comprise all measures which are necessary to keep the original proper working condition of the gas warning system. The inspection intervals must not exceed 4 months (see DIN EN 60079-29-2 chapter 11 and in Germany guideline T023, chapter 9.2 and 9.3)

- Zeropoint
- Sensitivity with calibration gas
- Triggering of alarm thresholds
- Response time
- Messaging functions visually and audibly
- Failure messages

It is recommended to entrust GfG service with this task.

Regular Function Tests

Depending on the ambient conditions gas warning systems may behave differently. It is important, therefore, to do a daily visual check particularly during the first few days after the initial placing into operation.

In addition to the maintenance work the function of the gas warning system has to be checked in regular intervals. This interval must not exceed 1 year (for Germany see guideline T023, chapter 9 and "BGR 500, chapter 2.33" formerly known as: UVV gase, BGV B6, VGB 61).

Checks are to be effected by an expert, and the result have to be confirmed in writing.

Repair

Repair comprises all repair and replacement work. It must only be done by the manufacturer and by persons who are authorized by the manufacturer – i.e. by GfG Instrumentation, Inc. Only original spare parts and original assemblies are allowed to be used, which are tested and authorized by the manufacturer.

Function Restrictions depending on Oxygen Concentration

Take note, that the measurement of gas and/or vapor concentrations in the range up to 100 % LEL cannot be done accurately, if simultaneously the oxygen concentration is less than 10 Vol. %. In this case the pellistor suffers from a lack of oxygen necessary for the "catalytic combustion".

The Ex approval is not valid for using the transmitter in oxygen enriched atmospheres with concentrations of more than 25 Vol.% oxygen.

Display Irritation due to Sensor Poisons

Certain parameters, known as "sensor or catalyst poisons", may affect the signal behavior of the sensor. The "sensitivity", i.e. the capability to emit signals, is being reduced. Sensor poisons are e.g. sulphur, lead and silicon vapors. Usually these components are found very rarely or in very low concentrations only.

Please draw your special attention to any interfering gases, which might be present at your detection place and which might affect the proper functioning of your gas monitoring system. Depending on the type of gas and its concentration, this affect may result in failures like a more or less steady, long-term loss of sensitivity or even to a sudden and considerable drop of sensitivity (see also DIN EN 60079-29-2).

Trouble Shooting

Failure	Cause	Solution
Zeropoint cannot be adjusted	Sensor is faulty	Replace sensor
Sensitivity cannot be adjusted	Sensor is faulty	Replace sensor
Output current is fallen to 0 mA	Fuse is blown Line is interrupted	Replace fuse Re-connect



Lower Explosion Limits (LEL) of Gases subject to Function Test

Gas	Formula	LEL as per EN 61779 Function test	LEL as EN60079-20-1 or per data base Chemsafe
Methane	CH ₄	4.4 Vol%	4.4 Vol%
Propane	C ₃ H ₈	1.7 Vol%	1.7 Vol%
Hexane	C ₆ H ₁₄	1.0 Vol%	1.0 Vol%
Nonane	C ₉ H ₂₀	0.7 Vol%	0.7 Vol%
Toluene	C ₆ H ₅ -CH ₃	1.1 Vol%	1.0 Vol%
Aceton	CH ₃ -CO-CH ₃	2.5 Vol%	2.5 Vol%
Hydrogen	H ₂	4.0 Vol%	4.0 Vol%
Ethylene	CH ₂ =CH ₂	2.3 Vol%	2.3 Vol%
Diethyl ether	C ₂ H ₅ -O-C ₂ H ₅	1.7 Vol%	1.7 Vol%
Ethyl acetate	CH ₃ -COO-C ₂ H ₅	2.2 Vol%	2.0 Vol%
Isopropanol	CH ₃ -CHOH-CH ₃	2.0 Vol%	2.0 Vol%
Ammonia	NH ₃	15.0 Vol%	15.0 Vol%

Spare Part List

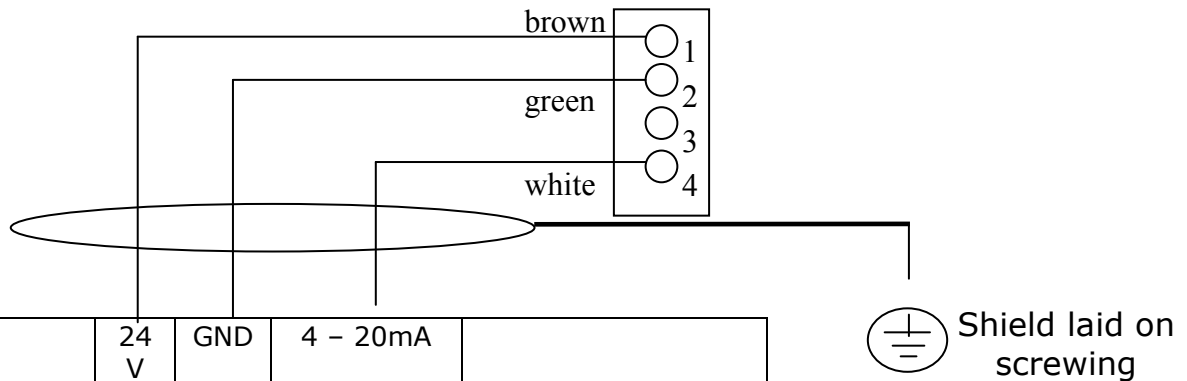
	Part-No.
Cap and minor parts for 5 units	2800301
Casing top screws for 5 units	2800302
Casing bottom for CC28	2800303
Casing top with display for CC28 D and CC28 DA	2800304
Casing bottom without buzzer for CC28 and CC28 D	2800305
Casing bottom with buzzer for CC28 DA	2800306
Main module without alarm (Um=45V) for CC28 and CC28 D	2800307
Main module without alarm (Um=250V) for CC28 and CC28 D	2800308
Main module with alarm (Um=45V) for CC28 DA	2800309
Main module with alarm (Um=250V) for CC28 DA	2800310
Display module without alarm for CC28 D	2800311
Display module with alarm for CC28 DA	2800312
MK 208-1 Spare sensor for 0...100%LEL combustible gases	2800750
MK 219-1 Spare sensor for 0...50%LEL H ₂ /CH ₄ /C ₃ H ₈ (#) combustible gases	2800760

Accessories

	Part No.
Remote control RC2	2800201
Calibration adapter (flow rate 0.5 l/min ±0.1 l/min)	 2800202
Wind protection	 2800204

Spare parts and accessories should be stored at an ambient temperature of 0 - 86° F (0 - 30°C). Storing time should not exceed 5 years. For storage of spare sensors make sure that the ambient atmosphere is free from aggressive media and sensor poisons.

Connection Diagram CC 28 - with 4 .. 20 mA Output

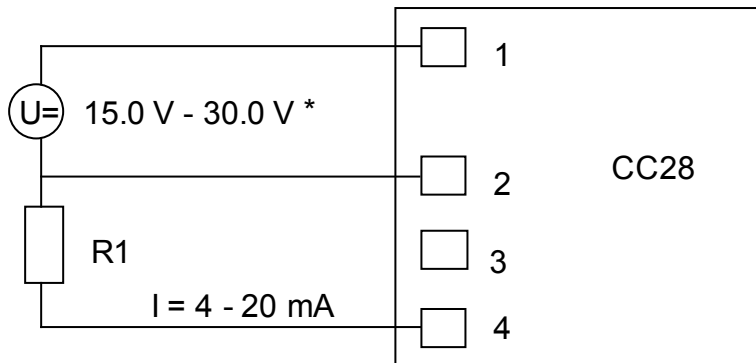


	24 V	GND	4 - 20mA	
GMA101	5	1	2	
GMA100	5	1	2	with motherboard from 1997
GMA104	55 58 61 64	53 56 59 62	54 57 60 63	connection to multiplexer
GMA301	5	1	2	
GMA304	55 58 61 64	53 56 59 62	54 57 60 63	connection to multiplexer
GMA41	28	29	30	
GMA81 (A)	1	2	3	
GMA43	19 22 25	20 23 26	21 24 27	connection of up to 3 transmitters
GMA44 and GMA84	19 22 25 28	20 23 26 29	21 24 27 30	connection of up to 4 transmitters
GMA88	19 : 40	20 : 41	21 : 42	connection of up to 8 transmitters

For connection to the GMA ... controller please refer to the operation manual of the relevant GMA.

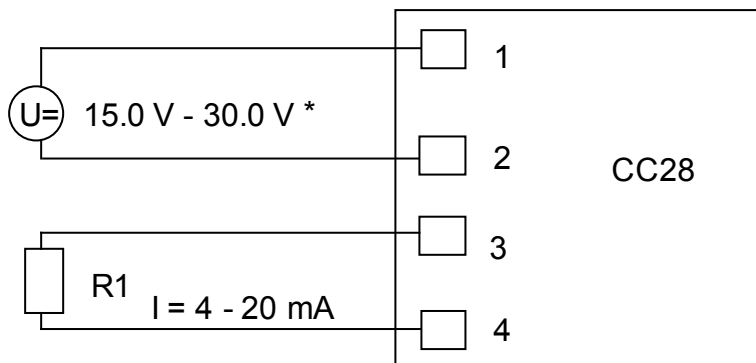
Terminal Diagram MWG CC28

3 – wire connection



Max. load 150 Ohm

4 – wire connection



Max. load 150 Ohm

*** A voltage exceeding the max. allowed value of 30 V DC (even short-term voltage peaks) will blow the protective fuse.**

Sensor specification

MK208-1 Catalytic combustion sensor for combustible gases and vapors (according to EN 60079-29-1)

Detection range/Resolution	0...100 %LEL / 0,5 %LEL	or 0...4 Vol.% NH ₃ / 0,05 Vol.% NH ₃
Response time	t ₅₀ : ≤ 5 s (CH ₄), ≤ 5 s (C ₃ H ₈), *1 t ₉₀ : ≤ 9 s (CH ₄), ≤ 10 s (C ₃ H ₈), *1	with wind protection: ≤ 8 s (CH ₄), ≤ 8 s (C ₃ H ₈), *1 with wind protection: ≤ 15 s (CH ₄), ≤ 17 s (C ₃ H ₈), *1
Flow rate	0...6m/s: max. ±3% of detection range or ±10% of display (regarding to 0 m/s) *2, *4	
Pressure	800...1100 hPa: max. ±3% of detection range or ±7% of display (regarding to 1000 hPa) *4	
Humidity	5%...90% r.F.: max. ±5% of detection range or ±10% of display (regarding to 50% r.F. and 40°C) *4	
Temperature	-25...+55°C: max. ±5% of detection range or ±15% of display (regarding to 20°C) *4	
Cross sensitivities	<u>Methane – Measuring</u> <u>Propane – Measuring</u> <u>Nonane – Measuring</u> at 50%LEL: <u>range (#)^{*3}.</u> <u>range^{*3}.</u> <u>range (#)^{*3}.</u>	
	2,20 %Vol. CH ₄ : 2,00 %Vol. H ₂ : 1,25 %Vol. C ₃ H ₆ O: 1,15 %Vol. C ₂ H ₄ : 0,85 %Vol. C ₃ H ₈ : 1,10 %Vol. C ₄ H ₈ O ₂ : 1,00 %Vol. C ₃ H ₈ O: 0,85 %Vol. C ₄ H ₁₀ O: 0,50 %Vol. C ₆ H ₁₄ : 0,55 %Vol. C ₇ H ₈ : 0,35 %Vol. C ₉ H ₂₀ : 2,00 %Vol. NH ₃ :	0,85 %Vol. C ₃ H ₈ : 2,00 %Vol. H ₂ : 1,25 %Vol. C ₃ H ₆ O: 2,20 %Vol. CH ₄ : 1,15 %Vol. C ₂ H ₄ : 1,10 %Vol. C ₄ H ₈ O ₂ : 1,00 %Vol. C ₃ H ₈ O: 0,85 %Vol. C ₄ H ₁₀ O: 0,50 %Vol. C ₆ H ₁₄ : 0,55 %Vol. C ₇ H ₈ : 0,35 %Vol. C ₉ H ₂₀ : 2,00 %Vol. NH ₃ :
Special notes:	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	

MK217-1 Catalytic combustion sensor for combustible gases and vapors (according to EN 60079-29-1)

Detection range/Resolution	0...100 %LEL / 0,5 %LEL	
Response time	t ₅₀ : ≤ 5 s (CH ₄), ≤ 7 s (C ₃ H ₈), *1 t ₉₀ : ≤ 10 s (CH ₄), ≤ 12 s (C ₃ H ₈), *1	with wind protection: ≤ 9 s (CH ₄), ≤ 9 s (C ₃ H ₈), *1 with wind protection: ≤ 18 s (CH ₄), ≤ 21 s (C ₃ H ₈), *1
Flow rate	0...6m/s: Max. ±3% of detection range or ±10% of display (regarding to 0 m/s) *2, *4	
Pressure	800...1100 hPa: Max. ±3% of detection range or ±7% of display (regarding to 1000 hPa) *4	
Humidity	5%...90% r.F.: Max. ±5% of detection range or ±15% of display (regarding to 50% r.F. and 40°C) *4	
Temperature	-10...+40°C: Max. ±5% of detection range or ±15% of display (regarding to 20°C) *4	
Cross sensitivities	<u>Methane – Measuring</u> <u>Propane – Measuring</u> <u>Hydrogen – Measuring</u> at 50%LEL: <u>range (#)^{*3}.</u> <u>range^{*3}.</u> <u>range (#)^{*3}.</u>	
	2,20 %Vol. CH ₄ : 2,00 %Vol. H ₂ : 0,85 %Vol. C ₃ H ₈ :	0,85 %Vol. C ₃ H ₈ : 2,00 %Vol. H ₂ : 2,20 %Vol. CH ₄ : 0,85 %Vol. C ₃ H ₈ :
Special notes:	When the sensor was exposed to a gas concentration which was considerably higher than 100%LEL, the zeropoint and the sensitivity of the sensor have to be checked, once the gas concentration has disappeared.	
Expected lifetime:	5 years	

MK219-1 Catalytic combustion sensor for combustible gases and vapors (#)	
Detection range/Resolution	0...50 %LEL / 0,2 %LEL
Response Time	t ₅₀ : ≤ 5 s (CH ₄), ≤ 7 s (C ₃ H ₈), *1 with wind protection: ≤ 9 s (CH ₄), ≤ 9 s (C ₃ H ₈), *1 t ₉₀ : ≤ 10 s (CH ₄), ≤ 12 s (C ₃ H ₈), *1 with wind protection ≤ 18 s (CH ₄), ≤ 21 s (C ₃ H ₈), *1
Flow Rate	0...6 m/s: max. ±5% of detection range or ±10% of display (regarding to 0 m/s) *2, *4
Pressure	80...110 kPa: max. ±5% of detection range or ±7% of display (regarding to 100kPa) *4
Humidity	5%...90% r.F.: max. ±5% of detection range or ±15% of display (regarding to 50% r.F. and 40°C) *4
Temperature	-10...+40°C: max. ±5% of detection range or ±15% of display (regarding to 20°C) *4
Cross Sensitivities	<u>Methane – Detection</u> <u>Propane – Detection</u> <u>Hydrogen – Detection</u>
at 50%LEL:	range *3. range *3. range *3
	2,20 Vol.% CH ₄ : 0,85 Vol.% C ₃ H ₈ : 2,00 Vol.% H ₂ :
	2,00 Vol.% H ₂ : 2,00 Vol.% H ₂ : 2,20 Vol.% CH ₄ :
	0,85 Vol.% C ₃ H ₈ : 2,20 Vol.% CH ₄ : 0,85 Vol.% C ₃ H ₈ :
Special notes::	When the sensor was exposed to a gas concentration which was considerably higher than 100%LEL, the zeropoint and the sensitivity of the sensor have to be checked, once the gas concentration has disappeared.
Expected lifetime:	5 years

*1 For other gases longer response times are valid, especially for nonane.

*2 At flow rates >3 m/s a wind protection is necessary. Generally it should be avoided that the gas is supplied to the transmitter from below (sensor side).

*3 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.

*4 This specification is valid for methane and propane.

Technical Data

Transmitter CC28

Transmitter type:	CC28 ; CC28 D and CC28 DA
Sensor type:	MK 208-1, MK 217-1 and MK 219-1
Expected sensor life:	5 years - for normal industrial applications (see sensor specification)
Gas:	Combustible gases and vapors, e.g. Methane, Propane, Hexane, Nonane (see test report)
Detection range:	e.g. 0 .. 100 % LEL respectively 0...50 %LEL (see test report)
Response time:	see sensor specification
Alarm:	only CC28 DA: visual and audible (90dB @ 10cm)
Detection principle:	Catalytic combustion
Gas supply:	Diffusion or via flow adapter (flow rate 0.5±0.1 l/min)
Supply voltage:	15 .. 30 V DC
Max. supply current:	150 mA
Max. fault voltage:	250 V AC resp. 45 V DC (see type label)
Output current:	4 .. 20 mA (max. load 150 Ohm)

Climate Conditions

Short-term storage temperature:	-25 .. +60°C
Recommended storage temp.:	0 .. +30°C
Operational temperature (ambient):	-20 .. +50°C for use in Ex-hazardous areas -25 .. +55°C for use in non-Ex areas see Sensor specification in case of using of MK217
Humidity range:	5 .. 90% r.h.
Atm. Pressure range:	800 .. 1200 hPa
Flow rate:	0 to 6 m/s (>3 m/s with wind protection, mounting position see page 6)

Casing

Stability:	Protect the casing against very hard impacts (> 4 J)
Casing material:	anti-static compound
Dimensions:	100 x 167.5 x 55 mm (WxHxD) (H with sensor: 193 mm)
Weight:	approx. 800 g (with display)
Protection:	IP64
Cable gland:	screwing M16 x 1.5 max. cross section 3 x 1.5 mm ²
Cable type and length:	LIYCY 3 x 0.75 mm ² for up to 200 m or LIYCY 3 x 1.5 mm ² for up to 1000 m

Approvals and Certificates

Labelling:	II 2G C 0158
Ignition protection classification:	Ex demb [ib] IIC T4 -20°C≤Ta≤+50°C
EC-Type Examination Certification:	BVS 04 ATEX E 132 X (electrical Ex-Protection)
Function test:	BVS 05 ATEX G 001 X (measuring function)
EMC test:	EN 50270
Radio shielding:	Type class I
Interference resistance:	Type class II

Annex

Internal Memory CC28

Every transmitter is pre-programmed with the data of the most important gases and their additional parameters. In most cases, therefore, the user does not need to change the configuration. The following information is stored in the internal memory of the transmitter:

Gas	Formula	Unit	CGAS (test gas)	A1 (Alarm 1)	A2 (Alarm 2)	H1 (Hyst. A1)	H2 (Hyst. A2)	F1 (Funct. A1)	F2 (Funct. A2)
Methane	CH ₄	%LEL	45.5	20.0	40.0	1.0	1.0	NS	SC
Ethane	C ₂ H ₆	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
Propane	C ₃ H ₈	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
Butane	C ₄ H ₁₀	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
Pentane	C ₅ H ₁₂	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
Hexane	C ₆ H ₁₄	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
Heptane	C ₇ H ₁₆	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
Octane	C ₈ H ₁₈	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
Nonane	C ₉ H ₂₀	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
Iso-Butane	(CH ₃) ₃ CH	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
Cyclohexane	C ₆ H ₁₂	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
Ethylene (Ethene)	H ₂ C=CH ₂	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
Propylene (Propene)	H ₂ C=CH-CH ₃	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
Acetylene (Ethine)	HC≡CH	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
Propine	HC≡C-CH ₃	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
Hydrogen	H ₂	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
Benzene	C ₆ H ₆	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
Toluene	C ₆ H ₅ -CH ₃	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
Xylene	C ₆ H ₄ -(CH ₃) ₂	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
Methanol	CH ₃ OH	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
Ethanol	C ₂ H ₅ OH	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
Iso-Propanol (2-Propanol)	CH ₃ -CHOH-CH ₃	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
2-Butanol	CH ₃ -CHOH-C ₂ H ₅	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
Dimethyl ether	CH ₃ -O-CH ₃	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
Diethyl ether	C ₂ H ₅ -O-C ₂ H ₅	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
Aceton	CH ₃ -CO-CH ₃	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
2-Butanon (MEK)	CH ₃ -CO-C ₂ H ₅	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
Methyl acetate	CH ₃ -COO-CH ₃	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
Ethyl acetate	CH ₃ -COO-C ₂ H ₅	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
Methylisobutylketone (MIBK)	CH ₃ -CO-CH(CH ₃) ₂	%LEL	50.0	20.0	40.0	1.0	1.0	NS	SC
Ammonia (0 – 4 Vol.%)	NH ₃	Vol.%	3.0	1.0	3.0	0.1	0.1	NS	SC

If the transmitter is operated with a sensor for which no data are entered yet in this list, defined settings are being used. The user can adapt these settings individually and store them in the transmitter.

EC-Type Examination Certificate



Description

The transmitters may also be modified according to the test documents provided with the pertinent test and assessment report.
The transmitters listed on page 1 have been tested according to the standards below.

The transmitters type CC28 * and type EC28 * serve the purpose of detecting toxic gases and oxygen in a stationary mode in atmospheric conditions.
For types CC28 *, EC28, EC28 D, EC28 DA, EC28 B, EC28 DB, EC28 DAB, EC28 R, EC28 DR and EC28 DAR, the transmitter enclosure is manufactured to meet the requirements of protection type 'c', Increased Safety. The transmitter is equipped with non-intrinsically safe terminals for the supply and the output signal circuits; furthermore, it comes with a module designed to meet the requirements of both protection types, Intrinsic Safety 'i' and Encapsulation 'm', and, depending on the type, with intrinsically safe interfaces, display units and buzzers.

The transmitter type CC28 * has a sensor attached to it which meets the requirements of protection type Flameproof Enclosure 'd'; this transmitter is suitable for an ambient temperature range of -20 °C up to +50 °C.
The transmitter type EC28 * has a sensor attached to it which meets the requirements of protection type Intrinsic Safety 'i'; this transmitter is suitable for an ambient temperature range of -20 °C up to +50 °C.

The maximum default voltage U_m for transmitters of type CC28 *, EC28, EC28 D, EC28 DA, EC28 B, EC28 DB, EC28 DAB, EC28 R, EC28 DR and EC28 DAR is 45V AC or 250V AC when connected to the non-intrinsically safe terminals, depending on the type.
The appropriate U_m is stated on the type label of each variant.

The intrinsically safe transmitters type EC28 i and type EC28 Di are manufactured with the same enclosure. Additionally, the transmitter is connected to the intrinsically safe supply and output signal circuits (4-20 mA) by terminals.

The Essential Health and Safety Requirements of the modified equipment are assured by compliance with:

EN 60079-0:2006	General requirements
EN 60079-1:2007	Flameproof enclosure
EN 60079-7:2007	Increased safety 'c'
EN 60079-11:2007	Intrinsic safety 'i'
EN 60079-18:2004-B1	Encapsulation 'm'
EN 60079-26:2007	Equipment Group II Category 1G

The marking of the equipment shall include the following:

II 2G Ex demb [ib] IIC T4
for type CC28, CC28 D, CC28 DA

II 2G Ex emb [ib] IIC T4
for type EC28, EC28 D, EC28 DA, EC28 B, EC28 DB, EC28 DAB, EC28 R, EC28 DR, EC28 DAR

II 1G Ex ia IIC T4
for type EC28 i, EC28 Di

Page 2 of 4 to BVS 04 ATEX E 132 X / N3

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Parameters

1 Electrical data for the transmitter
Type CC28 *, EC28, EC28 D, EC28 DA, EC28 B, EC28 DB, EC28 DAB, EC28 R, EC28 DR und EC28 DAR

1.1 Non-intrinsically safe supply circuit

Type CC28 *, EC28, EC28 D, EC28 DA, EC28 R, EC28 DR, EC28 DAR
Connected via terminals X1 and X2

Type EC28 B, EC28 DB, EC28 DAB
Connected via terminals X1, X2, X5 and X6

Rated supply voltage	up to	30	VDC
Maximum voltage	U_m	DC 45 or AC 250	V

The maximum voltage U_m is stated on the label.

1.2 Non-intrinsically safe signal circuit (4 up to 20 mA)

Type CC28 *
Connected via terminals X3, X4

Type EC28, EC28 D, EC28 DA, EC28 R, EC28 DR, EC28 DAR
Connected via terminals X4 and X2

Type EC28 B, EC28 DB, EC28 DAB
Connected via terminals X3, X4, X7 and X8

Rated signal voltage	up to	30	VDC
Maximum voltage	U_m	DC 45 or AC 250	V

The maximum voltage U_m is stated on the label.

1.3 Non-intrinsically safe relay contact circuit (change-over contact)

Type EC28 R, EC28 DR, EC28 DAR
Connected via X6 up to X8

Rated switch voltage	up to	30	VDC
Maximum switch voltage	U_m	DC 45 or AC 250	V

The maximum voltage U_m is stated on the label.
Maximum short circuit current of power source 1 A

1.4 Intrinsically safe potential-free opto-coupling interface, connected by four-pole plugs

Type CC28 *, EC28, EC28 D, EC28 DA, EC28 B, EC28 DB, EC28 DAB, EC28 R, EC28 DR and EC28 DAR
Only used to switch on the control set type RC2 (BVS 04 ATEX E212)

2 Electrical data for transmitter type EC28 i and type EC28 Di

2.1 Intrinsically safe supply and signal circuit, connected via terminals X1 and X2

Maximum input voltage	U_i	DC	30	V
Maximum internal capacitance	C_i	negligible		
Maximum internal inductance	L_i	negligible		

2.2 Intrinsically safe potential-free opto-coupling interface, connected by four-pole plugs

Only used to switch on the control set type RC2 (BVS 04 ATEX E212)

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3 Thermal data

Ambient temperature range -20 °C up to +50 °C

Special conditions for safe use

The enclosure of the transmitters type CC 28 *, EC28, EC28 D, EC28 DA, EC28 B, EC28 DB, EC28 DAB, EC28 R, EC28 DR and EC28 DAR meets the requirements for the low degree of mechanical hazards according to EN60079-0:2006 paragraph 26.4.2; thus it may only be used in such low-hazard areas or in areas where it is protected against mechanical hazards.

The measuring function for explosion protection is not subject of this supplement.

Test and assessment report

BVS PP 04.2119 EG as of 05.10.2009

DEKRA EXAM GmbH
Bochum, dated 3rd October 2009

Signed: Simanski

Certification body

Signed: Dr. Eickhoff

Special services unit

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.

44809 Bochum, 29.01.2010
BVS-Rip/Ar E 0093/10

DEKRA EXAM GmbH

Certification body

Special services unit

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Translation 3rd Supplement

(Supplement in accordance with Directive 94/9/EC Annex III number 6)

to the EC-Type Examination Certificate BVS 04 ATEX E 132 X

Equipment: Transmitter type CC28 * and type EC28 *

Manufacturer: Gesellschaft für Gerätebau mbH

Address: 44143 Dortmund, Germany

Subject and type

Transmitter

Type	Connection type / Functionality	Marking
CC28	without display	II 2G Ex demb [ib] IIC T4
CC28 D	with display	II 2G Ex demb [ib] IIC T4
CC28 DA	with display and alarm LED	II 2G Ex demb [ib] IIC T4
EC28	4-20 mA, 1-wire bus	II 2G Ex emb [ib] IIC T4
EC28 D	4-20 mA, 1-wire bus, display	II 2G Ex emb [ib] IIC T4
EC28 DA	4-20 mA, 1-wire bus, display, alarm LED and buzzer	II 2G Ex emb [ib] IIC T4
EC28 B	RS485, 2-wire bus	II 2G Ex emb [ib] IIC T4
EC28 DB	RS485, 2-wire bus, display	II 2G Ex emb [ib] IIC T4
EC28 DAB	RS485, 2-wire bus, display, alarm LED and buzzer	II 2G Ex emb [ib] IIC T4
EC28 R	4-20 mA, 1-wire bus, relay	II 2G Ex emb [ib] IIC T4
EC28 DR	4-20 mA, 1-wire bus, relay, display	II 2G Ex emb [ib] IIC T4
EC28 DAR	4-20 mA, 1-wire bus, relay, display, alarm LED and buzzer	II 2G Ex emb [ib] IIC T4
EC28 i	4-20 mA (intrinsically safe)	II 1G Ex ia IIC T4
EC28 Di	4-20 mA (intrinsically safe), display	II 1G Ex ia IIC T4

Page 1 of 4 to BVS 04 ATEX E 132 X / N3

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Translation
1st Supplement

(Supplement in accordance with Directive 94/9/EC Annex III number 6)

to the EC-Type Examination Certificate
BVS 04 ATEX E 132 X

Equipment: Transmitter type CC 28 *
Manufacturer: Gesellschaft für Gerätebau mbH
Address: 44143 Dortmund, Germany

Description
The transmitter type CC 28 * can be modified according to the descriptive documents as mentioned in the pertinent test and assessment report

The Essential Health and Safety Requirements of the modified equipment are assured by compliance with:

EN 50014:1997 + A1 - A2 General requirements
EN 50018:2000 + A1 Flameproof enclosure 'd'
EN 50019:2000 Increased safety 'e'
EN 50020:2002 Intrinsic safety 'i'
EN 50028:1987 Encapsulation 'm'

The marking of the equipment shall include the following:

II 2G EEx dem [ib] IIC T4

Test and assessment report
BVS PP-04.2119 EG as of 11.04.2005

EXAM BBG Prüf- und Zertifizier GmbH
Bochum, dated 11. April 2005

Signed: Dr. Jockers

Signed: Dr. Eickhoff

Certification body

Special services unit

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.

44809 Bochum, 20.03.2007
BVS-Rip/Ar E 0336/07

EXAM BBG Prüf- und Zertifizier GmbH

Certification body

Special services unit

Page 1 of 1 to BVS 04 ATEX E 132 X / N1
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(13) Appendix to

EC-Type Examination Certificate

BVS 05 ATEX G 001 X

(14) 15.1 Subject and type
transmitter type CC 28 (without display), CC 28D (with display) and CC 28DA (with display and alarm signalers)

15.2 Description

The transmitter type CC 28 * is a fixed device for the measurement of combustible gases or vapours mixed with air. A 4-20 mA interface serves for power supply and transmission of the measured value.

15.3 Parameters

see EC-type examination certificate BVS 04 ATEX E 132 X

(16) Test and assessment report

PFG-no. 41300105P dated 17/06/2005
EC-type examination certificate BVS 04 ATEX E 132 X dated 22/07/2004
1st supplement to the EC-type examination certificate BVS 04 ATEX E 132 X dated 11/04/2005

(17) Special conditions for safe use

The following special properties have to be considered at operation of the transmitter:

- Incident air flows from the bottom shall be avoided.
- The wind protection shall be used at air velocities of 3 m/s or above.
- Increased measured values can occur after the upper limit of the measuring range has been exceeded. The transmitter shall be inspected and, if necessary, calibrated afterwards. The advices of EN 50073 shall be considered.
- The sensor MK218-1 is not suitable for operation in environments where acetone is steadily present. When steadily exposed to acetone the sensitivity of the sensor will be significantly reduced.

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.

44809 Bochum, 20. June 2005
PFG-Kie

EXAM BBG Prüf- und Zertifizier GmbH

Certification body

Special services unit

page 3 of 3 to BVS 05 ATEX G 001 X
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Translation

EC-Type Examination Certificate

(1) - Directive 94/9/EC -
(2) Equipment and protective systems intended for use
in potentially explosive atmospheres

(3) BVS 05 ATEX G 001 X

(4) Equipment: transmitter type CC 28*
(5) Manufacturer: Gesellschaft für Gerätebau mbH
(6) Address: D-44143 Dortmund

(7) The design and construction of this equipment and any acceptable variation thereto are specified in the schedule to this type examination certificate.

(8) The certification body of EXAM BBG Prüf- und Zertifizier GmbH, notified body no. 0158 in accordance with Article 9 of the Directive 94/9/EC of the European Parliament and the Council of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.
The examination and test results are recorded in the test report PFG-no. 41300105P.

(9) The Essential Health and Safety Requirements with respect to the measuring function for explosion protection are assured by application of:

EN 61779-1:2000 + A11:2004
EN 61779-4:2000
EN 50271:2001

This EC-type examination certificate covers for operation with sensor MK 208-1 the measuring function for methane, propane, ethylene, n-hexane, n-nonane, acetone, 2-propanol, ethyl acetate, toluene and diethyl ether in the measuring range 0 - 100 % LEL and for ammonia in the measuring range 0 to 4 % (v/v).

This EC-type examination certificate covers for operation with sensor MK 217-1 the measuring function for methane, propane, and hydrogen in the measuring range 0 - 100 % LEL.

This EC-type examination certificate covers for operation with sensor MK 218-1 the measuring function for methane, propane, ethylene, n-hexane, n-nonane, acetone, 2-propanol, ethyl acetate, toluene, diethyl ether and hydrogen in the measuring range 0 - 100 % LEL and for ammonia in the measuring range 0 to 4 % (v/v).
This EC-type examination certificate covers transmitters with software-version 2.4.1.

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

page 1 of 3 to BVS 05 ATEX G 001 X
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(11) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to Directive 94/9/EC.
Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

II 2G EEx dem [ib] IIC T4

EXAM BBG Prüf- und Zertifizier GmbH
Bochum, dated 20. June 2005

Signed: Jockers

Signed: Bredenbröcker

Certification body

Special services unit

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EC- Declaration of Conformity GfG Gesellschaft für Gerätebau mbH

CC 28
CC 28 D
CC 28 DA

Klönnestrasse 99
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E-Mail: info@gfg-mbh.com
www.gfg.biz



Edited: 12.08.2004 Amended:28.06.2005

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 : 2000 - Certificate- Register No. 0410030302-.

Subject to supervision by means of a **quality system** -Certificate No. BVS 03 ATEX ZQS / E 187- issued by the notified body, EXAM BBG Prüf- und Zertifizier GmbH, 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 ignition protection classes explosion- proof encasing, increased safety, encapsulation and intrinsical safety, as well as their measuring function.

The transmitter **CC 28 (D,DA)** complies with **directive 94/9/EC** for devices and protective systems for proper use in explosion endangered areas (ATEX- directive) and with **council directive 89/336/EEC** for electromagnetic compatibility.

For electrical explosion protection
For the measurement function
Labelling

BVS 04 ATEX E 132 X
BVS 05 ATEX G 001 X
⊕ II 2G EEx dem [ib] IIC T4
CE⁰¹⁵⁸

The guidelines have been complied with under consideration of the standards mentioned below:

▪ **Electrical explosion protection**

- Electrical apparatus for potentially explosive atmospheres.
General requirements EN 50014 1997 + A1 – A2
- Flameproof enclosure „d“ EN 50018 2000 + A1
- Increased safety „e“ EN 50019 2000
- Intrinsic safety „i“ EN 50020 2002
- Encapsulation “m“ EN 50028 1987

▪ **Safe and accurate measuring function**

- Electrical apparatus for the detection and measurement of flammable gases –
General requirements and test methods EN 61779-1 2000 + A11 2004
Performance requirements for group II apparatus indicating a volume fraction up to
100% lower explosive limit. EN 61779-4 2000
- Electrical apparatus for the detection and measurement of combustible gases, toxic
gases or oxygen. Requirements and tests for apparatus using software and/or digital
technologies. EN 50271 2001

▪ **Electromagnetic compatibility**

- Electrical apparatus for the detection and measurement of combustible gases, toxic
gases and oxygen. EN 50270 1999 (2000-01) Amendment (2000-10)
Radio shielding type class 1
Interference resistance type class 2

The evaluation of the basic safety and health requirements has been done, documented and filed by a notified body with register no. 0158 (EXAM BBG Prüf- und Zertifizier GmbH, Dinnerdahlstraße 9 D-44809 Bochum).
The EMC testing laboratory EM TEST GmbH, Kamen has been charged with testing and evaluation of the electromagnetic compatibility.

Always adhere to the safety notes of the operation manual 197-000.12.

Dortmund, 28.06.2005

.....
MBA H.J. Hübner
President CEO

ATEX EG-Kor03401 Rische

SIL-Declaration of Conformity GfG Gesellschaft für Gerätebau mbH

CC28
CC28D
CC28DA

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 Fax: +49 (231) 516313
 E-Mail: info@gfg-mbh.com
 www.gasmessung.de
 www.gfg.biz

Issued: 2009-12-16 Changed:

The transmitter **CC 28 (D, DA)** complies with the following European Standards for Functional Safety:

Functional safety of electrical/electronic/programmable electronic safety-related systems
EN 61508-1:2001

Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen - Requirements and tests for apparatus using software and/or digital technologies
EN 50271:2001

The following parameters for single channel and dual channel use of transmitter **CC28 (D, DA)** have been determined:

	Single channel use	Redundant use
Safety function	Explosion protection	
Melting range	0 – 100 % LEL	
SIL level hardware	2	3
SIL level software	1	1
Proof Test Interval	according to EN 50271	
Device type	1 year	B
HFT	0	1
SFF	92.69	10 %
β factor	—	10 %
PFD	4.72×10^{-4} (per year)	4.74×10^{-5} (per year)
λ_{di}	1.06×10^7 (per h)	1.06×10^7 (per h)
λ_{sd}	2.77×10^7 (per h)	2.77×10^7 (per h)
λ_{su}	1.03×10^5 (per h)	1.03×10^5 (per h)
λ_{sd}	2.80×10^3 (per h)	2.80×10^3 (per h)
MTTR	24 h	

The calculation of the parameters was done by GWW GasWarn Dr. Wenker GmbH, and the accuracy of the statement is confirmed by the conformity statement of GWW GasWarn Dr. Wenker GmbH as independent expert.

Always consider the following Operational conditions and safety notes of the operation manual 197-000.12.

Dortmund, 15 March 2010

H. J. ...
 President/CEO

SIL-Declaration of Conformity GfG Gesellschaft für Gerätebau mbH

CC28
CC28D
CC28DA

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 www.gasmessung.de
 www.gfg.biz

Issued: 2009-12-16 Changed:

Operational Conditions

The SIL level of the transmitter in combination with the determined error rate is only valid, if the following operational conditions are adhered:

The transmitter must be mounted in a position which is suitable for the detection task, must be properly connected to a controller and must be put into operation by the manufacturer GfG or by an authorised representative.

Error reports of 2.8 mA as "fault low" and 22 mA as "fault high" must be recognized as transmitter failure by the used controller. This is automatically made sure when controllers are used which are produced by GfG Gesellschaft für Gerätebau mbH.

The ambient conditions e.g. referring temperature, humidity and pressure, which are stated in the manufacturer's documentation, have to be observed.

According to the manufacturer's statements the transmitter has to be regularly serviced by an expert and must be calibrated with a certified test gas.

It must be made sure that the transmitter does not come into contact with traces of one of the following catalyst poisons:

- Silicone vapours (e.g. in polishing or impregnation agents, silicone greases, softeners)
- organic phosphorous compounds (e.g. herbicides or insecticides), halogen compounds (e.g. anorganic or organic chlorine or fluorine compounds)
- Sulphur compounds (e.g. hydrogen sulfide or sulphur-organic compounds)

If one of the mentioned catalyst poisons is expected to be present, a different detection principle, e.g. an infrared detector, should be used.

If none of the mentioned catalyst poisons is expected in the environment but cannot be excluded expressively, a new installed system has to be calibrated with test gas in very short time intervals. The intervals may then be prolonged according to bulletin BGI 518 of the Association of Workers' Compensation Insurance Carriers (= bulletin T 023 of BG-Chemie).

Annual Proof Test

At least once a year a Proof Test of the complete safety chain has to be effected. For the transmitter the Proof Test is equivalent to a system check according to the Ordinance on Industrial Safety and Health and includes the regular calibration / adjustment without additional requirements.



GfG Instrumentation

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