

COLORED LIGHT STROBE / HORN

Two Field Selective Tone & dBA Level with Selective Strobe.

CSH24W

INDOOR ONLY

Wall Mount

COLORED LIGHT STROBE

Exclusive Field Selective Strobe Low / High.

CSL24W

INDOOR ONLY

Wall Mount

INSTALLATION INSTRUCTIONS



LISTED

Fire Protective Visual Signaling Appliance.
Audible Signaling Appliance for Fire Alarm Service.

Description

AMSECO's UL listed Colored Light Strobe series, CSH24W Select-a-Horn/strobe and CSL24W Select-A-strobe series are designed to provide audible and visual signals for Fire Alarm Protection Systems and notification signals for the Purpose of life safety and property protection. They meet or exceed NFPA/ANSI standards and UL464/UL1638.

CSH24W combines a selective 2 tone horn with a colored light Select-A-Strobe. The horn provides a continuous tone or temporal pattern (code3) tone when constant voltage from a Fire Alarm Control Panel is applied. Each tone has two dBA levels (High and Low) selected by jumper. The colored light strobe can be selected either Low or High by a selectable switch located on the front housing.

The CSH24W audible/visual signals can be connected either independently or in unison. The horn can be silenced while the strobes remain flashing, Refer to the wiring diagram Fig.1, or dBA refer to Table 1.

INST. SHT. No.CSL/CSH-24W0001 : SH24W153075-H1019 S050930a

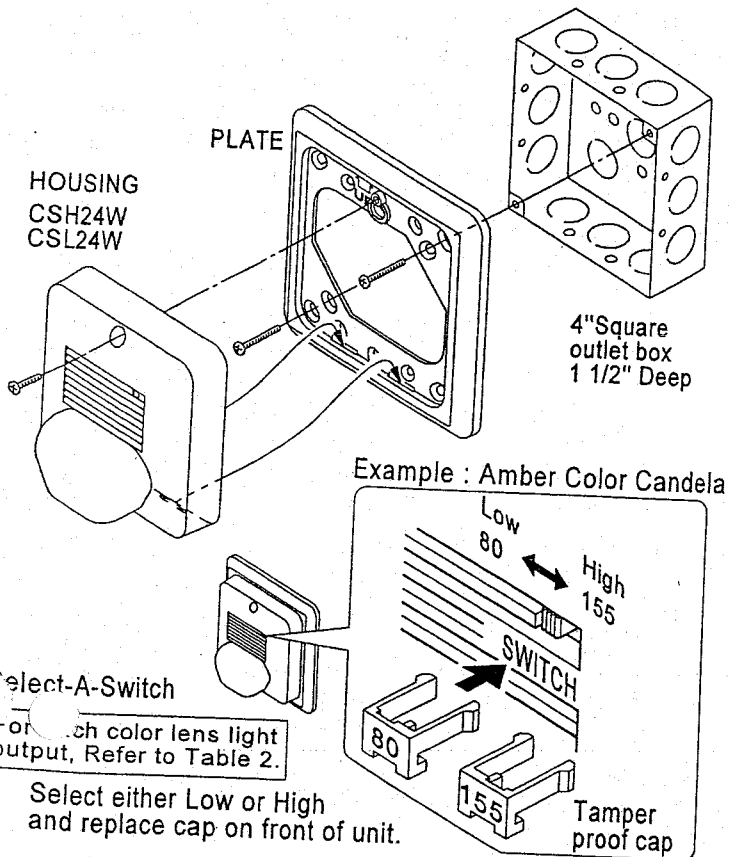
The colored light strobe CSL24W is in compliance with UL1638 visual signaling appliances that is ideal for any occupancy requiring visual notifications appliances per applicable building or fire code or wherever dependable alarms are required. The color is available in Amber, Blue, Green, Red and White. The light output candela ratings vary depending on the Lens color. Refer to the light output Table 2.

The CSH24W/CSL24W series are polarized and have screw terminals for IN/OUT wiring connections using #12 to #18 AWG wires.

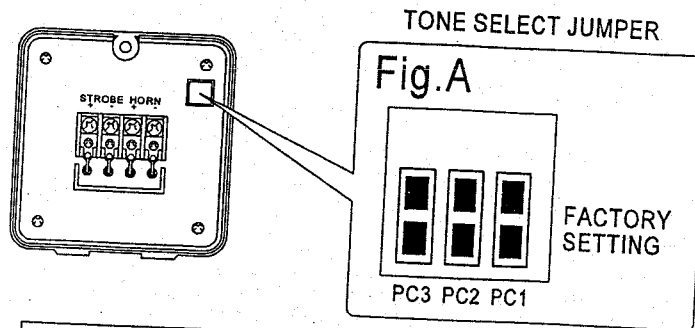
In those instances where AMSECO two or more horns and/or strobes are connected and requires a synchronized code 3 temporal pattern and/or a synchronized strobe flash, all models can be synchronized when used in conjunction with AMSECO UL listed Sync Module SMD10-3A to meet the latest code.

Note1 : Installation must comply in accordance with applicable standards such as NFPA 72, ANSI 117.1, UL1638, UL464, Canadian Electrical Code, part 1, and all state local codes.

Installation



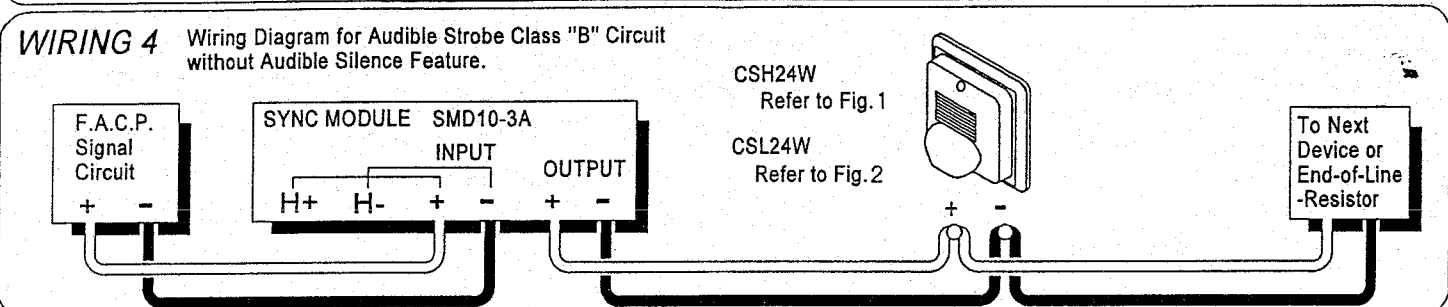
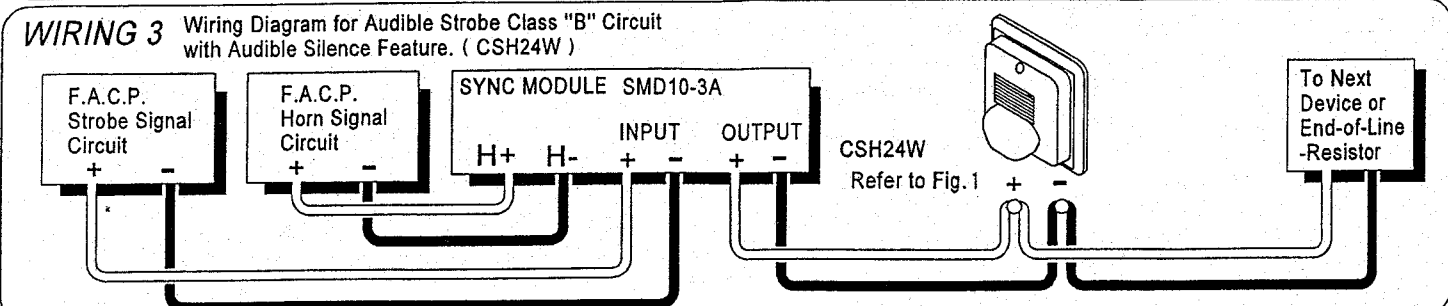
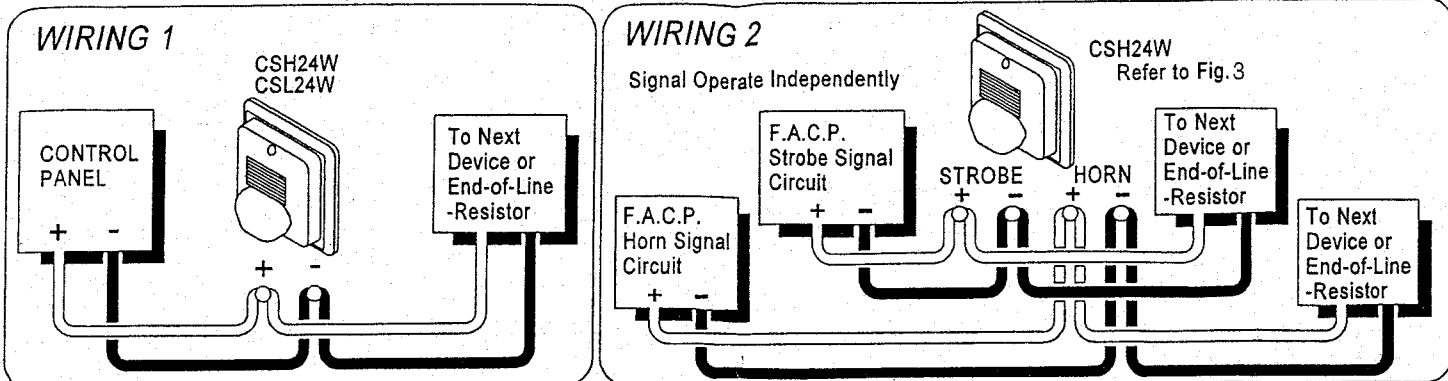
Locate the Tone Select Jumper as shown in Fig.A. For tone selection, set the jumper as shown in Fig.B. Select strobe light output Low/High by the Select-A-Switch located on the front housing. Make sure you place the tamper proof cap provided showing the candela rating. Connect all wires appropriately as shown in the wiring diagram.



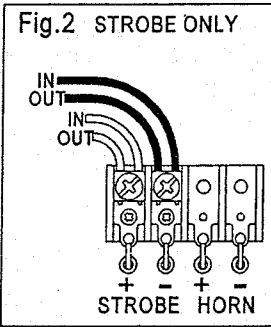
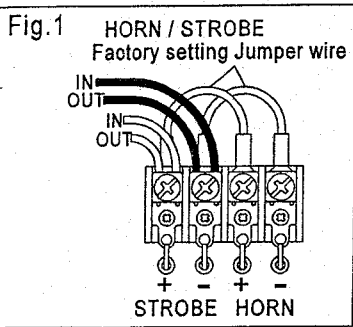
| Fig.B | JUMPER | PC3 PATTERN | PC2 TONE | PC1 VOLUME |
|-------|--------|--------------|--------------------|------------|
| | | NON TEMPORAL | ELECTRO MECHANICAL | HIGH |
| | | TEMPORAL | 3000Hz | LOW |

Wiring Diagram

Wiring (Rear view) Observe Polarity Use both terminals (or leads) for connection. Break wire run to provide electrical supervision.



Refer to the SMD10-3A Sync Module instruction manual for Class "A" wiring or other application diagrams.

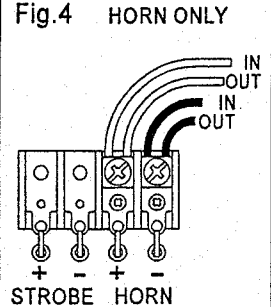
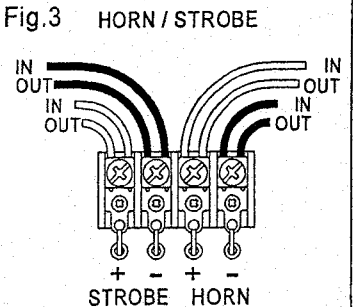


For a synchronization system, the maximum number of strobe lights that can be connected to a listed Fire Alarm Control Panel is 30 (Low cd, 16 ~33VDC) or 18 (High cd, 16~33V FWR) , 22 (Low cd, 16 ~33VDC) or 13 (High cd, 16~33V FWR) . (Use AMSECO Sync module SMD10-3A)
 The maximum wire impedance between any adjacent strobe lights is 5.6 ohm.

$$\text{MAX. WIRE DISTANCE (IN FEET)} = \frac{(\text{PANEL VOLTAGE-APPLIANCE MIN. VOLT}) \times \text{WIRE CONDUCTIVITY}}{\text{TOTAL CURRENT DRAW}}$$

| WIRE | CONDUCTIVITY |
|-------|--------------|
| 18AWG | 60 |
| 16AWG | 95 |
| 14AWG | 153 |
| 12AWG | 244 |

Includes wire to and from appliance.
 CAUTION: Applies only to regulated supplies. Assumes all appliances are at the end of wire run (worst case) .



WARNING
 High voltage may be present inside the light assembly even though power is not connected. If access to the component board is required (removal or replacement) , the capacitor must be discharged by touching a wire to both ends of the flashtube.

*DO NOT ATTEMPT TO TOUCH OR MOVE THE ASSEMBLY UNTIL THE CAPACITOR HAS BEEN DISCHARGED.
 *INDOOR USE ONLY.
 INST. SHT. No.CSL/CSH-24W0001 : SH24W153075-H1019 S050930b

Specifications

TABLE 1

☐ = 1 ☐ = 0

■ Horn & Strobe
CSH24W

| | |
|-----------------------------|--|
| Voltage | 24V |
| UL designation | Regulated 24 DC/FWR |
| Operating Voltage Range | 16~33 VDC 16~33 VFWR |
| Flash Rate | 60 times / min. |
| Light Output Select | Low High |
| Sync module (SMD10-3A) | Available |
| Operating Temperature Range | 32~120° F (0~49° C) |
| Material | Housing : A.B.S. Lens : Polycarbonate |
| Construction | INDOOR USE |

| PC3 Pattern | PC2 Tone | PC1 Volume | P3 | P2 | P1 | Max. RMS Operating Current (mArms) | | Min. Sound Output (dBA@10ft per UL464) | | | |
|----------------------|-----------------------|--------------------|--------------------|--------------------|------|------------------------------------|------------------|--|-----|-----|----|
| | | | | | | Regulated 24 DC | Regulated 24 FWR | | | | |
| Horn & Strobe Low | NON-TEMP. | ELECTRO MECHANICAL | HIGH | 1 | 1 | 1 | 112 | 145 | 83 | | |
| | | | LOW | 1 | 1 | 0 | 109 | 142 | 74 | | |
| | | 3000 Hz | HIGH | 1 | 0 | 1 | 118 | 153 | 84 | | |
| | | | LOW | 1 | 0 | 0 | 106 | 139 | 74 | | |
| | | TEMPORAL | ELECTRO MECHANICAL | HIGH | 0 | 1 | 1 | 112 | 145 | 79 | |
| | | | | LOW | 0 | 1 | 0 | 109 | 142 | 69 | |
| | 3000 Hz | | HIGH | 0 | 0 | 1 | 118 | 153 | 80 | | |
| | | | LOW | 0 | 0 | 0 | 106 | 139 | 70 | | |
| | Horn & Strobe High | | NON-TEMP. | ELECTRO MECHANICAL | HIGH | 1 | 1 | 1 | 158 | 207 | 83 |
| | | | | | LOW | 1 | 1 | 0 | 155 | 204 | 74 |
| | | 3000 Hz | | HIGH | 1 | 0 | 1 | 164 | 215 | 84 | |
| | | | | LOW | 1 | 0 | 0 | 152 | 201 | 74 | |
| TEMPORAL | | ELECTRO MECHANICAL | | HIGH | 0 | 1 | 1 | 158 | 207 | 79 | |
| | | | | LOW | 0 | 1 | 0 | 155 | 204 | 69 | |
| | | 3000 Hz | HIGH | 0 | 0 | 1 | 164 | 215 | 80 | | |
| | | | LOW | 0 | 0 | 0 | 152 | 201 | 70 | | |
| | | Horn only | NON-TEMP. | ELECTRO MECHANICAL | HIGH | 1 | 1 | 1 | 57 | 91 | 83 |
| | | | | | LOW | 1 | 1 | 0 | 42 | 44 | 74 |
| 3000 Hz | | | | HIGH | 1 | 0 | 1 | 70 | 68 | 84 | |
| | | | | LOW | 1 | 0 | 0 | 36 | 38 | 74 | |
| TEMPORAL | ELECTRO MECHANICAL | | | HIGH | 0 | 1 | 1 | 57 | 91 | 79 | |
| | | | | LOW | 0 | 1 | 0 | 42 | 44 | 69 | |
| | 3000 Hz | | HIGH | 0 | 0 | 1 | 70 | 68 | 80 | | |
| | | | LOW | 0 | 0 | 0 | 36 | 38 | 70 | | |

| Strobe Light only | Max. RMS Operating Current (mArms) | |
|-------------------|------------------------------------|------------------|
| | Regulated 24 DC | Regulated 24 FWR |
| Low | 88 | 127 |
| High | 134 | 184 |

NOTE : The low volume setting are not suitable to use for Fire Alarm Public Mode, (Suitable for General and Private Modes only).

■ Strobe Light
CSL24W

| | Max. RMS Operating Current (mArms) | |
|------|------------------------------------|------------------|
| | Regulated 24 DC | Regulated 24 FWR |
| Low | 83 | 120 |
| High | 128 | 175 |

Light Output Dispersion

Colored Lens Light Output

TABLE 2

| WHITE COLOR HOUSING MODEL | RED COLOR HOUSING MODEL | Lens Color | Light Output on Axis (cd) | | | | | |
|---------------------------|-------------------------|------------|---------------------------|-----|-----|------|-----|-----|
| | | | Low | | | High | | |
| | | | 16V | 24V | 33V | 16V | 24V | 33V |
| CSH24W-AW CSL24W-AW | CSH24W-AR CSL24W-AR | Amber | 75 | 80 | 83 | 145 | 155 | 160 |
| CSH24W-BW CSL24W-BW | CSH24W-BR CSL24W-BR | Blue | 40 | 45 | 46 | 79 | 86 | 88 |
| CSH24W-GW CSL24W-GW | CSH24W-GR CSL24W-GR | Green | 79 | 90 | 90 | 154 | 173 | 172 |
| CSH24W-RW CSL24W-RW | CSH24W-RR CSL24W-RR | Red | 35 | 38 | 40 | 68 | 74 | 76 |
| CSH24W-WW CSL24W-WW | CSH24W-WR CSL24W-WR | White | 27 | 30 | 31 | 53 | 58 | 60 |

Light output measurement rating is calculated

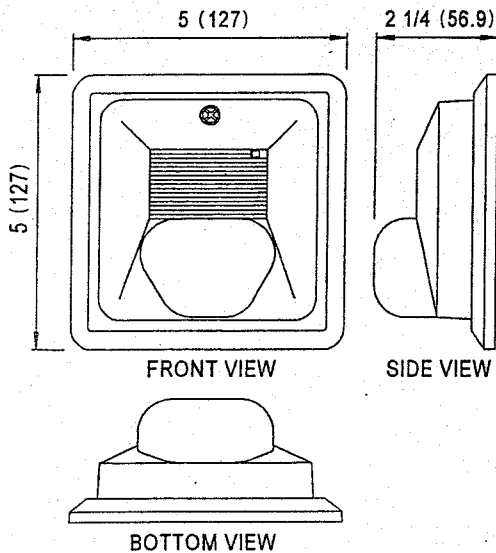
UL1638 - Visual Signaling Appliances - Private Mode Emergency and General Utility Signaling.

Sound Output Dispersion

CSH24W

| Degrees | Horizontal | Vertical |
|---------|------------|----------|
| +90 | -6 dB | -3 dB |
| +60 | -2 dB | -2 dB |
| +30 | -1 dB | -1 dB |
| 0 | 0 dB | 0 dB |
| -30 | -1 dB | -3 dB |
| -60 | -2 dB | -5 dB |
| -90 | -6 dB | -6 dB |

Dimensions : inch (mm)



PACKAGE INCLUDES

- * #8-32×1" screws 2pcs.
- * Tamper proof cap 2pcs.
- * Alert decals 2sheets
- * Light output label 1sheet

We recommend use of this product in accordance with installation instructions provided in this manual.

INST. SHT. No.CSL/CSH-24W0001 : SH24W153075-H1019 S050930d



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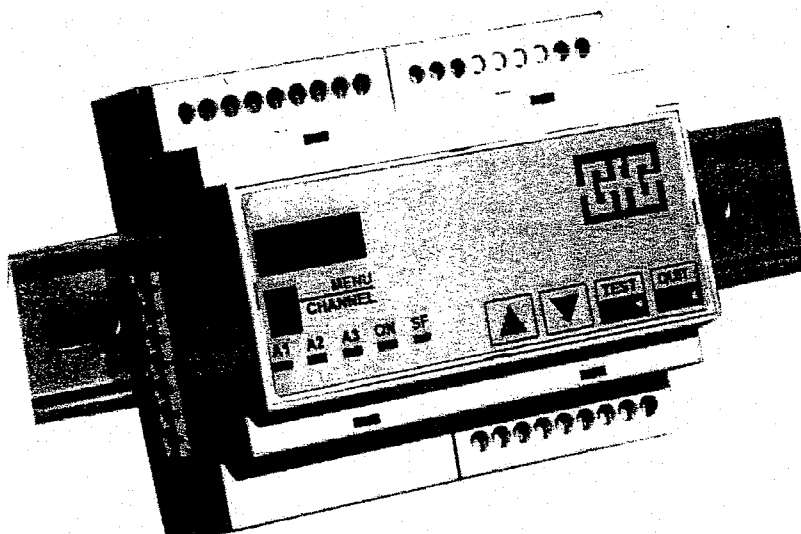
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GMA41

Operation Manual



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Introduction

Each detection point of your fixed gas monitoring system consists of a transmitter and a control module GMA41, which are connected by means of a transmitter cable. The GMA41 provides the power supply for the connected transmitter and receives and processes the sensor signals. Depending on the transmitter type, it monitors the ambient air for the presence of toxic or combustible gases and vapors or for its oxygen content.

The GMA41 offers a variety of features, which allow adapting the gas monitoring system to your specific requirements:

- Reading of linear measurement values in a 3-digit display
- Menu display
- 3 variably adjustable alarm thresholds
- Peak value memory
- Adjustable relay functions: NC / NO contact, open-circuit / closed circuit
- Alarm hystereses prevents "flickering" of relays
- 4 - 20 mA analog output signal.

The GMA41 continuously provides information on the measured gas concentration, exceeded alarm thresholds and its operational status. As soon as the gas concentration exceeds one of the three pre-set levels, the GMA41 gives a warning by means of the LED displays and controls the relevant alarm relays. In addition to this, the GMA41 provides the measurement value as an analog output signal for further evaluation. The GMA41 is easy to operate and maintenance-free. Should unexpected failures or system faults occur, the comprehensive failure recognition allows a quick and specific service.

Application and Purpose

In combination with the connected transmitter, the GMA41 forms a fixed gas monitoring system for continuous measurement of the gas concentration and for the warning from combustible gases and vapors in the LEL range, toxic gases and oxygen in the ambient air.

The function and accuracy of the GMA41 have been tested by "DMT-Deutsche Montan Technologie GmbH, Prüflaboratorium für Grubenbewetterung" for the use as a warning system for hazards from explosive gas mixtures. The test was based on DIN EN 50054 "Electrical apparatus for finding and measuring combustible gases - General requirements and test methods" and DIN EN 50057 "Electrical apparatus for finding and measuring combustible gases - Requirements of the operational behavior of Group II devices with a detection range up to 100 % of the Lower Explosion Limit" and prEN 50271 "Electrical apparatus for detection and measurement of combustible gases, toxic gases or oxygen. Requirements and tests for warning devices, which use software and/or digital technology". The tests included the listed standard detection ranges. The functions marked (#) have not been part of the function test.

The following standard ranges have been tested:

| Gas No. | Gas | | Detection range |
|---------|----------------------------------|----------|-----------------|
| 59 | CH ₄ | Methane | 0 .. 100 %LEL |
| 81 | C ₃ H ₈ | Propane | 0 .. 100 %LEL |
| 72 | C ₉ H ₂₀ | n-Nonane | 0 .. 100 %LEL |
| 40 | C ₂ H ₅ OH | Ethanol | 0 .. 100 %LEL |

Function test: PFG-Nr. 41300500

For your Safety

According to § 3 of the law about technical working media, this manual points out the proper use of the product and serves to prevent dangers. As any piece of complex equipment, the GfG GMA41 will do the job designed to do, only, if it is used and serviced in accordance with the manufacturer's instructions. All individuals who have or will have the responsibility for using and servicing this product must carefully read this manual.

The warranties made by GfG with respect to the product are voided, if the adjustment of functions or parameters is changed without GfG's permission. They are also voided, if the product is not used and serviced in accordance with the instructions in this manual. Please protect yourself and your employees by following them. The above does not alter statements regarding GfG's warranties and conditions of sale and delivery.



Essential Notice:

For the parameter setting of the supplied GMA41 please refer to the test report. Modification of functions or parameters may affect the approval. GfG service is always at your disposal for adapting the monitoring system to your specific requirements.

Important for LEL Monitoring

If you use catalytic combustion (CC) transmitters for LEL monitoring, and if a suitable range has been adjusted on your GMA41 controller, please note the following: Due to the detection principle you cannot differ between sensor signals in the LEL range and signals for very high concentrations (e.g. > 20 Vol.% CH₄). This is why the GMA41 keeps an overrange signal stored, even if the transmitter sends lower signals in the meantime. This status is characterized by all gas and failure alarms being activated and by the display indicating the overrange situation (see page 7).



Do not press the QUIT button to reset the stored alarm status, before you have made sure that the gas concentration at the transmitter does no longer exceed the LEL range. Use a portable or fixed detector, for example, with a range from 0 to 100 Vol.-% to check.

Distinguishing the Types of GMA41

| GMA Type | Transmitter Type | Built-in 230V mains unit | Supply voltage | Bus system |
|---------------|---------------------------|--------------------------|--------------------|------------|
| GMA41 | All | no | 24 V DC | no |
| GMA41 EC (#) | EC 24, EC 25 (0.2 .. 1mA) | yes | 230 V AC / 24 V DC | no |
| GMA41 B | All | no | 24 V DC | yes |
| GMA41 ECB (#) | EC 24, EC 25 (0.2 .. 1mA) | yes | 230 V AC / 24 V DC | yes |

The voltage supply of the controllers GMA41 EC and GMA41 ECB is specially designed for operating an electrochemical sensor. For all other transmitters you have to use the controllers GMA41 or GMA41 B. The pluggable bus system of the controllers GMA41 B and GMA41 EC B allows for easy interlinking up to 6 GMAs. The following signals are fed in the bus system:

- 24 V supply voltage
- Signal for alarm 1, alarm 2, alarm 3, fault

The key-operated switch can only be operated in combination with the GMA41 B or GMA41 ECB.

Detection Mode

Front View GMA41

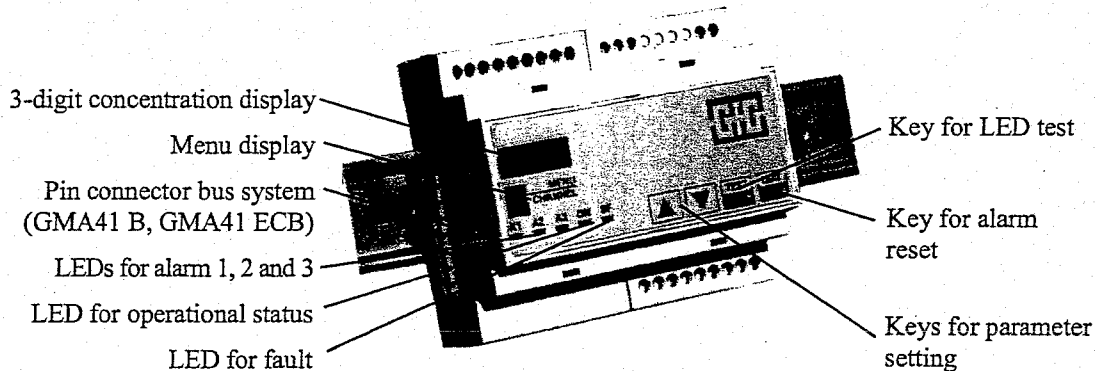


Fig. 1

Function Description

Turning On

Note: Information for putting into operation, see “putting into operation”.

After having turned the system on, the GMA 41 needs a warm-up time of a few minutes for:

- the self test, which checks functions, memory (ROM and RAM) and parameter memory (approx. 15 seconds),
- the warm-up of the transmitter connected
(for detailed information please refer to the operation manual of your transmitter).

During the warm-up period the GMA41 displays the detection range, the detection unit, measurement gas and the alarm thresholds one after the other. The LED „ON“ flashes alternately with the measurement display and the LED „S F“ is lit, i.e. the fault alarm is active. Alarm thresholds are not activated during the warm-up period. When the GMA41 re-starts after a mains failure, the gas alarms are only evaluated, once the warm-up is completed. After the warm-up the GMA41 automatically turns to detection mode.

Detection Mode

In detection mode, the green LED „ON“ is lit. If the 3-digit display is activated, it reads the currently measured gas concentration. All gases are measured continuously, and exceeded limit values are noticed and signaled immediately. Electronic functions like parameter memory and transmitters are monitored permanently and the transmitter cable is checked for short circuit and parting of the cable.

When operating transmitters with signal output 4..20 mA or 0.2..1 mA, which are calibrated for methane, propane (no linear sensor signal) or ethanol and n-nonane (linear sensor signal “standard”), the following display values occur:





Sensor signal

| Input | | Display | | |
|---------|---------|------------------|------------------|-------------------|
| I in mA | I in mA | Methane % LEL | Propane % LEL | Standard % LEL |
| 0.20 | 4.0 | 0 | 0 | 0 |
| 0.24 | 4.8 | 9 | 5 | 5 |
| 0.28 | 5.6 | 18 | 9 | 10 |
| 0.32 | 6.4 | 25 | 14 | 15 |
| 0.36 | 7.2 | 31 | 19 | 20 |
| 0.40 | 8.0 | 36 | 24 | 25 |
| 0.44 | 8.8 | 41 | 29 | 30 |
| 0.48 | 9.6 | 46 | 34 | 35 |
| 0.52 | 10.4 | 50 | 38 | 40 |
| 0.56 | 11.2 | 54 | 43 | 45 |
| 0.60 | 12.0 | 58 | 48 | 50 |
| 0.64 | 12.8 | 62 | 53 | 55 |
| 0.68 | 13.6 | 66 | 58 | 60 |
| 0.72 | 14.4 | 70 | 63 | 65 |
| 0.76 | 15.2 | 74 | 69 | 70 |
| 0.80 | 16.0 | 79 | 74 | 75 |
| 0.84 | 16.8 | 83 | 79 | 80 |
| 0.88 | 17.6 | 87 | 84 | 85 |
| 0.92 | 18.4 | 91 | 89 | 90 |
| 0.96 | 19.2 | 96 | 95 | 95 |
| 1.00 | 20.0 | 100 | 100 | 100 |

Peak Value Memory

The controller GMA41 provides a peak value memory. Depending on the gas measured by the connected transmitter it stores either the maximum or the minimum value. The peak value memory is not activated during the warm-up time.

| Gas | Peak Value Memory |
|-------------|-------------------|
| Oxygen | Minimum value |
| Comb. gases | Maximum value |
| Toxic gases | Maximum value |


Press key  to indicate the peak value in the display. Measuring and warning functions are still working while the peak value is indicated. Press keys  and  simultaneously to reset the memory to the present measurement value. Once you release key , the controller returns to the standard display.

Check of Display and Parameter



During the test the measurement and warning functions are not activated!


LED Test

In detection mode, shortly press key  to activate the LED test of the GMA41 controller.



Fault LED is not tested → only in service menu!


Display of Detection Range and Alarm Thresholds


For the display of the detection range and the alarm threshold, keep key  pressed for approx. 5 seconds. The LED „ON“ flashes and the display reads the below mentioned parameters one after the other:

| | Display, e.g. | LED ON – flashes, additionally lit: | Description of Display |
|---|---|-------------------------------------|------------------------|
| 1 | 100 | | Detection range |
| 2 | UEG, LEL, ppm, ppb | | Detection unit |
| 3 | CH ₄ , NH ₃ , O ₂ GfG-Gas No. | | Gas |
| 4 | 20 (value in det. range) | A1 | 1. Threshold alarm |
| 5 | 40 (value in det. range) | A2 | 2. Threshold alarm |
| 6 | 40 (value in det. range) | A3 | 3. Threshold alarm |

Once these readings are complete, the GMA41 automatically turns to detection mode.

Alarm



The GMA41 provides 3 threshold alarms, which are activated as soon as the gas concentration exceeds or falls below the alarm threshold. An activated alarm is indicated by means of the relevant alarm LED. Press key  or activate the external reset (see Technical Data) to acknowledge the alarm.

| Alarm | Relevant Alarm LED |
|---|--------------------|
| has been activated | Flashes |
| has been activated and acknowledged by pressing key  | lights permanently |

Together with the alarm LEDs the GMA41 activates the relevant alarm relay and, for the models with bus system, the logical outputs. The standard setting for the switching functions is shown below:

| Alarm | Function | Resettable during Alarm | Resettable after Alarm | Remark |
|-------|--------------|-------------------------|------------------------|--|
| 1 | Non-latching | No | self-resetting | |
| 2 | Latching | No | yes | |
| 3 | Latching | Yes | yes | Same threshold as alarm 2, meant as horn alarm |

Overrange Memory

In case the detection range is exceeded by more than 10 %, the GMA41 activates the fault indication in addition to the 3 gas alarms. The display reads . When operating transmitters for the monitoring of 0..100%LEL, all alarms and the fault indication are latching, i.e. they can only be reset by pressing key , when the gas concentration has fallen below the full scale value.



Please see: “ Important for LEL Monitoring”

The switching functions can be set for the three alarms individually, GfG service can assist you with this.. For other settings than the standard ones please refer to the test report.

Remarks concerning Alarm Functions:

Exceeding / Deviating Alarm

If the reduction of the measured gas concentration means a hazardous situation, e.g. oxygen deficiency, the alarm is a deviating one. Exceeding alarms indicate a dangerous situation caused by rising gas concentrations, e.g. toxic and combustible gases.

Latching / Non-latching Alarm

A latching alarm remains valid until it is reset externally, e.g. by pressing key **QUIT MENU** at the GMA41. A non-latching alarm resets automatically, when the gas concentration falls below or exceeds the pre-set threshold.

Early Recognition of Gas Alarm – Delta Alarm (Catalytic Combustion Transmitter)

This function is only standard available for the use of catalytic combustion transmitters. Should you wish to activate this function for other transmitters as well, please call your GfG service.

The delta alarm is meant for early recognizing of hazards caused by sudden gas concentrations. The alarm activation is defined by the rise of gas concentration within a certain time. As soon as the gas concentration rises by 25 % of the full-scale deflection within 1.6 seconds (see fig. 2), the GMA41 indicates **overrange**.



Please see: “ Important for LEL Monitoring”

For the activation of the delta alarm the gas concentration does not need to reach the pre-set alarm threshold. The Delta Alarm is an additional warning to the three thresholds for alarm 1, alarm 2 and alarm 3, which keep their standard functions..

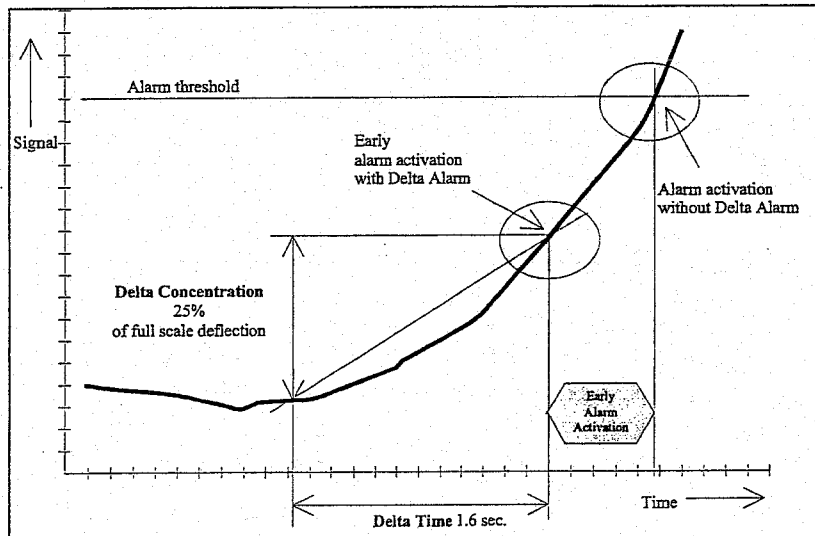


Fig. 2

Time Delay of Alarms (#)

This function, which is not activated in the standard setting, allows delaying the activation of the alarm (fig. 3). Should you wish to activate this function, please call your GfG service.

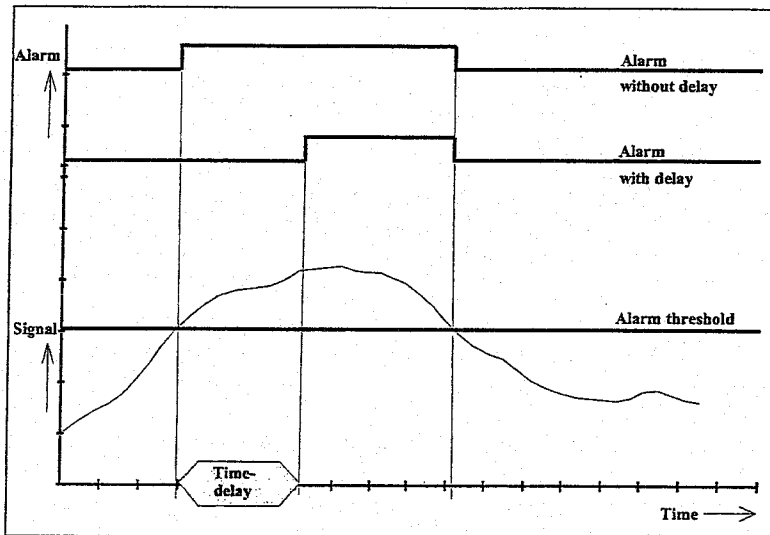


Fig. 3

The time delay prevents a warning from gas concentrations only exceeding the threshold for a very short time. It can be set from 0 to 2 minutes. For safety reasons the time delay should be kept as short as possible, and must not be activated in case of time-critical monitoring tasks.

Fault

In case of failure the yellow LED „S F“ lights up and the fault relay and the logic output are activated. A fault is signaled, if:

- the cable between Transmitter and GMA41 is cut;
- the sensor or the circuit of the transmitter is faulty;
- the zeropoint is deviated;
- the detection range is exceeded (together with alarm activation);
- the CPU self-monitoring is faulty.

As soon as the fault is repaired, the yellow LED “S F” goes out, the fault relay and the logic output deactivate and the GMA41 returns to standard detection mode.

Relays

The GMA41 provides 4 relays:

- 3 alarm relays for controlling external alarm devices,
- 1 fault relay for signaling of failures.

The switching behavior of the relays is the same as for alarm or fault signals. Every relay can be operated as NC or NO contact in closed or open circuit systems. For the switching functions as NC and NO relays you will find contact clamps. In the standard setting all 4 relays are NO contacts. The alarm relays are standard operated as open circuit system; the fault relay is a closed circuit. This results in the below mentioned switching functions:

In the standard setting the switching functions of the relays are as follows:

| Relays for: | The relay switches: | | | | | | | |
|-------------|----------------------------|----------------------------|------------------------|---------------------------|-----------------------|--------------------------|--------------------|----------------------------------|
| | in detection mode (no gas) | during gas alarm not reset | during gas alarm reset | after gas alarm not reset | after gas alarm reset | in case of mains failure | in case of failure | in case of gas alarm and failure |
| Alarm 1 | | | | | | | | |
| Alarm 2 | | | | | | | | |
| Alarm 3 | | | | | | | | |
| Fault | | | | | | | | |



It is essential to take note of the switching behavior of the relays when connecting external devices. In the standard setting alarm 3 (buzzer relay) can be reset even during gas alarm!

For special settings of the relay switching functions please contact your GfG service.

Service

Display of Transmitter Signal

Press key and after approx. 2 seconds the GMA41 displays the signal received from the transmitter in mA (0.2 .. 1 mA for transmitters with 0.2-1 mA output and 4 .. 20 mA for transmitters with 4-20 mA output). This function allows checking the zeropoint of the transmitter at the GMA41.

Indication of Transmitter in Service Mode



This function is only available for Transmitter CC24 EX (type 243x II), CS24 EX and EC25.

The transmitters CC24 EX, CS24 EX, EC25 provide a service switch. When this is activated during maintenance (see operation manual for the transmitter), the GMA41 automatically turns to fault indication. Alarm signals are being suppressed.

Activation of Service Menus




The 4..20 mA voltage output continuously reads the actual measurement value!

The service menus allow to select and to change all important parameters of the GMA41.

A security code protects the service menus A and B from accidental maladjustment and unauthorized access. Adhere to the following procedure to enter the service menus:


1. Press key then key and keep both keys pressed, until „SER“ is read in the display.
2. Use keys and to enter the security code.

| | Security Code | Adjustments |
|--------|---------------|---|
| Menu A | 11 | Alarm thresholds and adjustment |
| Menu B | 222 | Deactivation points of alarm thresholds |

3. Press key  to confirm the entered security code.





The GMA41 turns to the selected service menu

or













Press key  to return to detection mode.








In the service mode the gas alarms are locked. The GMA41 switches to fault. The LEDs "ON" and „S F“ light up, the fault relay is activated.

Adjustments in Service Mode

The display of the GMA41 reads the set parameters. The menu display indicates the menu point, where the displayed parameter value can be found. Use keys  and  to scroll forward and back. For changing of parameters use keys  and .

Survey of Menu Points

|   Menu A | Description | Display, e.g. | Parameter Setting |
|---|------------------------|-----------------------------|--|
|  | Relay test | r 1 | |
| The menu starts with "G 1" | | | |
|  | Detection unit | LEL, ppm | Display only |
|  | Gas | CH4, NH3, O2 or GfG-Gas No. | |
|  | Threshold Alarm 1 | Value in detection range | Adjustment with  and  |
|  | Threshold Alarm 2 | Value in detection range | |
|  | Threshold Alarm 3 | Value in detection range | |
|  | Zeropoint adjustment | 0 | |
|  | Sensitivity adjustment | Value in detection range | |

|   Menu B | Description | Display, e.g. | Parameter Setting |
|---|-------------------|--------------------------|--|
|  | Threshold Alarm 1 | Value in detection range | Adjustment with  and  |
|  | Threshold Alarm 2 | Value in detection range | |
|  | Threshold Alarm 3 | Value in detection range | |

Check of Relays and Logical Outputs

The display of the GMA41 reads "rL". The relays and logic outputs can be switched, one after the other, by pressing the keys Δ and ∇ . The relevant LEDs for alarm and fault indicate, which relay (and which logical output) was activated. When you set up this menu all alarms are deleted and afterwards newly set.

Setting of Alarm Thresholds

1. Activate service menu A.
2. Use keys $\text{TEST MENU} \Delta$ and $\text{QUIT MENU} \nabla$ to select menu point $R1$, $R2$ or $R3$ for the alarm threshold to be set.
3. Set the new alarm threshold by means of keys Δ and ∇ .
4. Store the parameters (see storing of changed parameters).

| Adjustable alarms | |
|--------------------------|---|
| Highest alarm | Lowest alarm |
| End of measurement range | Begin of measurement range + Hysteresis |

Check and Adjustment of Zeropoint

1. Supply zero gas to the transmitter or make sure, that the ambient air is free from interfering gases. Zero gas is a test gas, which is free from combustible or any other interfering components. For details about the gas supply please refer to the operation manual of your transmitter.
2. Wait until the display value is stable. The zeropoint must be adjusted, if the display is different from "0".

Use key ∇ to check the transmitter signal. An adjustment of the zeropoint is only possible, if the transmitter signal is within a tolerance band:

For a transmitter with 0.2 ... 1 mA: Tolerance of 0.15 ... 0.34 mA

For a transmitter with 4 ... 20 mA: Tolerance of 3 ... 6.8 mA

(Depending on the transmitter, slightly different tolerances are possible.)



If the transmitter signal is out of the tolerance band, the zeropoint has to be adjusted at the transmitter first! For details please read the operation manual of the transmitter!

3. Activate service menu A.
4. Use keys $\text{TEST MENU} \Delta$ and $\text{QUIT MENU} \nabla$ to select menu point 0 .
5. Press ∇ key for 3 seconds to adjust the zeropoint
The adjustment of the zero point was successful, when the value „0“ is flashing in the display.
If the display is not flashing, the transmitter signal is out of tolerance and has to be adjusted at the transmitter first. Please adhere to the operation manual of your transmitter.
6. Disconnect the zero gas from the transmitter. In case of an oxygen transmitters wait until the displayed gas concentration exceeds the threshold alarm.
7. Store the parameter.

After the zeropoint adjustment, the sensitivity needs to be checked and eventually adjusted.

Check and Adjustment of Sensitivity

Note: Before checking the sensitivity, make sure that the zeropoint is set correctly.

The GMA41 allows checking and adjusting the sensitivity by means of the peak value memory. This memory is activating automatically, when the menu point 0 is turned on for 2.5 minutes. The GMA41 indicates the activated peak memory by a flashing display.

Check and Adjustment of Sensitivity without Peak Memory

1. Activate service menu A.

2. Use keys **TEST MENU** and **QUIT MENU** to select menu point **□**.
3. Supply test gas to the transmitter. For details about the gas supply please refer to the operation manual of your transmitter.
4. Wait until the display value is stable. The sensitivity must be adjusted, if the displayed value is different from your test gas concentration.
5. Use keys **△** and **▽** to set the parameter value to the concentration of your test gas.
6. Disconnect the test gas supply from the transmitter. In case of transmitters for toxic or combustible gases wait until the displayed gas concentration falls below the threshold alarm.
7. Store the parameter.

Check and Adjustment of Sensitivity with Peak Memory

This adjustment uses the possibility of the GMA41 to store the peak signal value measured during the duration of the test gas supply. The store peak values can be used as sensitivity point. Fig. 4 below shows this procedure.

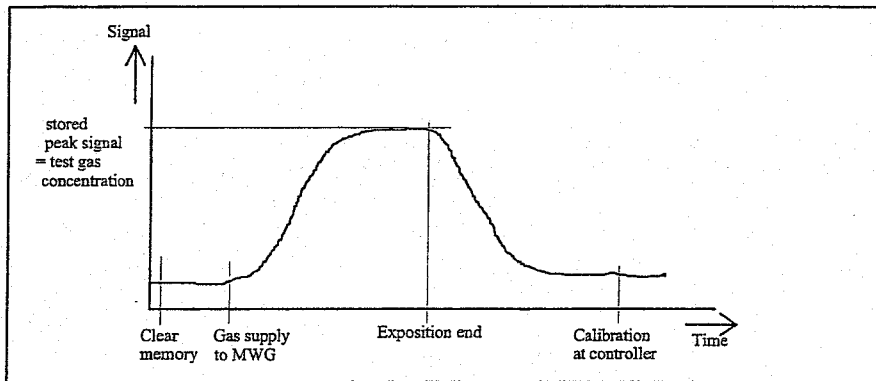


Fig. 4

1. Activate service menu **A**.
2. Use keys **TEST MENU** and **QUIT MENU** to select menu point **□**.
3. After 1.5 minutes supply test gas to the transmitter and make sure that the gas is constantly supplied for at least 3 minutes. For details about the gas supply please refer to the operation manual of your transmitter.
4. Disconnect the test gas source from the transmitter.
5. Use keys **△** and **▽** to set the parameter value to the test gas concentration.
6. Store the parameter.

Alarm Threshold Hysteresis

This function allows adjusting the hysteresis (point of deactivation) of the alarm thresholds. For exceeding alarms this point can be set from the start of the detection range up to two digits below the alarm threshold. For deviating alarms the deactivation point can be set from two resolution units above the alarm threshold up to the end of the detection range. The parameter setting is done in the unit of the gas to be measured.

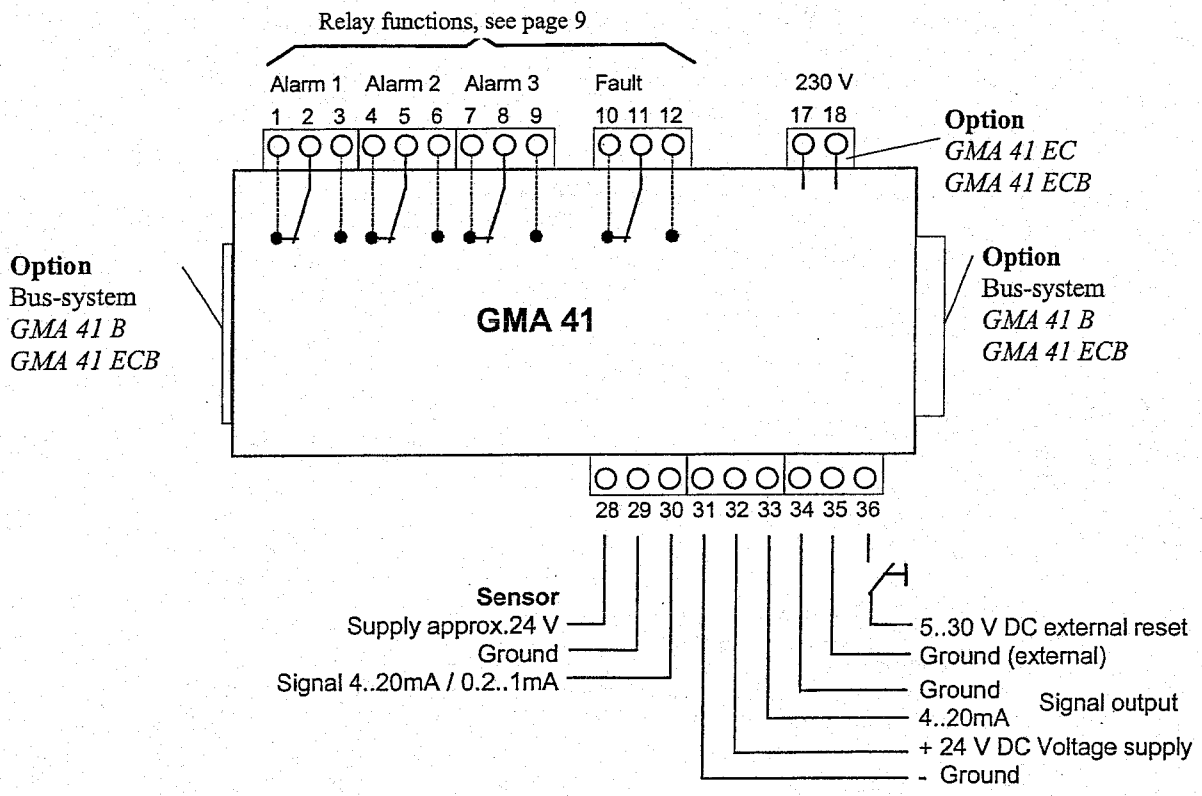
Example:

The hysteresis of a controller, which monitors gas in the LEL range, was set to 18 % LEL for alarm 1, 36 % LEL for alarm 2 and 54 % LEL for alarm 3. This results in the following alarm activations:

| | Alarm 1 | Alarm 2 | Alarm 3 |
|---------------------------|------------|------------|------------|
| Alarm threshold | = 20 % LEL | = 40 % LEL | = 60 % LEL |
| Alarm activation | ≥ 20 % LEL | ≥ 40 % LEL | ≥ 60 % LEL |
| Alarm deactivation | ≤ 18 % LEL | ≤ 36 % LEL | ≤ 54 % LEL |

Adjustment of deactivation point:

Terminal Plan - GMA41



Technical Data

| | | |
|---|--|---|
| Gas Monitor GMA41 | for mounting on DIN rail | |
| Type: | GMA41, Software version 2.03 | |
| Dimensions: | 106 x 90 x 58 mm (WxHxD), without Bus-system | |
| Power supply | | |
| Operational voltage: | <i>GMA41, GMA41B</i> | 24 V DC |
| | <i>GMA41 EC, GMA41 ECB</i> | 230 V / 50Hz or 115 V / 60 Hz or 24 V DC |
| Current consumption: | max. 150 mA at 24 V DC max. 2.6 W at 230 V and 115 V | |
| Primary fuse: | <i>GMA41 EC, GMA41 ECB</i> | T 0.08 A |
| Secondary fuse: | <i>GMA41 EC, GMA41 ECB</i> | T 0.50 A |
| Climate Conditions | | |
| for operation: | 0 to +55 °C, 0 to 99 % r.h., 700 to 1300 hPa 0 to +40 °C with built-in mains unit (<i>GMA41 EC</i> (#) and <i>GMA41 ECB</i> (#)) | |
| recommended storage conditions for GMA41, accessories, spares: | -25 to +50 °C, 0 to 99 % r.h. | |
| Transmitter connection | | |
| Transmitter connection: | 2-, 3-wire transmitter | |
| Voltage supply output: | 20 V DC max. 250 mA | |
| Input signals: | 4 .. 20 mA, 0.2 .. 1 mA | |
| Output signals | | |
| Analog outputs for meas. value: | 4 .. 20 mA, max. load 300 Ω (T90 = 18 seconds) | |
| Display and activation of alarm | T 90 < 3 seconds | |
| Sensor signal display: | 0.12 .. 1 mA Max. deviation: | < 0,2 mA ± 0,04 mA 0.2 .. 0.5 mA ± 0.02 mA > 0.5 mA + 0.05 mA |
| | 2,4 .. 20 mA Max. deviation: | < 4 mA ± 0,8 mA 4 .. 10 mA ± 0.4 mA > 10 mA + 1 mA |
| Relays: | max. switch voltage 250 V AC 50/60 Hz or 250 V DC max. switch current 4 A AC/DC max. switch performance 1000 VA AC or depending on voltage 50 .. 200 W DC Relay outputs and mains entry are operation insulated | |
| Logical outputs | 4 open collector outputs for alarm 1, alarm 2, alarm 3, fault Operation only on safety low voltage Max. switch voltage: 30 V Max. switch current: 100 mA | |
| External reset: | High active from 3 .. 24 V DC (input resistance 11kΩ) | |
| DIN rail mounting: | DIN EN 50022 | |
| Safety | | |
| Protection: | DIN 40050 - IP -20 | |
| Protective separation: | by safety transformer | |
| <i>GMA41 EC, GMA41 ECB</i> | Type: BV EI 306 2064 | 2.6VA PRI 230V / SEC 18 V 50 - 60Hz |
| Protective insulation: | as per EN 61010 up to over voltage category III and soiling degree 2 | |
| Tests | | |
| EMV Test | according EN 50270: 1999 type 2 EN 50054: 1998 | |
| Function test | Deutsche Montan Technologie GmbH (DMT) PFG-No. 41300500 (tested detection range: see page 3) | |

Applicational Hints from test report PFG-No. 41300500

The controller GMA 41 (Versions GMA 41 and GMA 41 B), produced by Gesellschaft für Gerätebau mbH, Dortmund, is, if operated with transmitter CC 0238 Ex or transmitter with 0.2 .. 1 mA or 4 .. 20 mA signal output, based on the measurement results and remarks of test report PFG-No. 41300500P, suitable for detecting methane, propane, ethanol and n-nonane in a gas-air mixture in the detection range 0 .. 100 % LEL, if its characteristics and its version complies with the documentation specified in the test report PFG-No. 41300500P, if it is operated properly and if the following points are adhered to:

- The controller is only allowed to operate with transmitters with signal output 0.2 .. 1 mA, resp. 4 .. 20 mA, which have been function tested by an acknowledged testing authority. The applicational hints of the respective aptitude test report, respectively the conditions of the safety report are to be complied with.
- The operation manual given to and tested by PFG is to be adhered to in all details. When operating the gas detector, make sure that the specific operational conditions are met.
- Before using the gas detector please check, if the response times are short enough to trigger the alarm so quickly, that hazardous situations will be avoided. If necessary, the alarm thresholds are to be set to a considerably lower concentration than standard.
- The information sheet T 023 of the "Bundesgenossenschaft der chemischen Industrie (4)" (confederation of the chemical industry) is to be complied with.
- For correct use as a warning instrument for explosive atmosphere the current nationwide accepted value for the LEL is to be used (5), (6).
- For triggering of safety controls only latching alarms may be used, which cannot be reset during alarm conditions. The alarm A3 may only be used for additional external alarm devices, like horns.
- Is the device exposed to vibrations one has to reckon with short-term fault reports on the relay outputs.
- Fault warnings and alarms have to be displayed (e.g. as collective alarm) audibly and visibly on a 24-hour occupied place.
- The controllers are to carry a durable type label, which gives information about the manufacturer, type and the serial number and is marked with:
"PFG-Nr. 41300500"
Other regulations for marks, particularly as per ElexV are untouched. With this type label the manufacturer confirms, that the controllers comply with the characteristics and the technical specifications described in this report. Any controller not carrying this type label does not comply with the present report.
- On request, a complete printout of this report and of the test report PFG-No. 41300500P is at the user's disposal.

Annex

The mains units mentioned in the annex are not subject to the function test PFG.

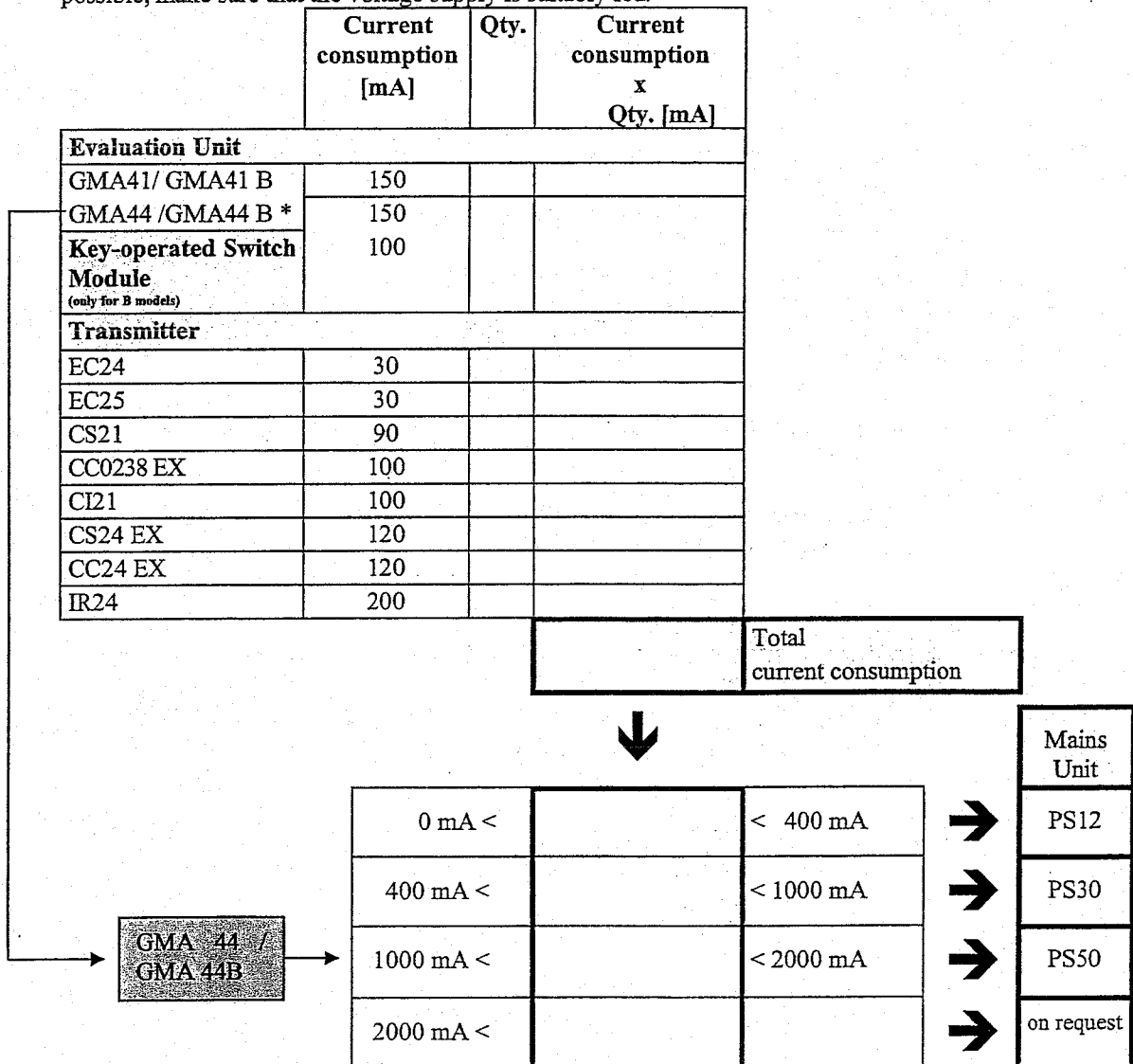
Selection of the proper Mains Unit for GMA41 Configurations

Depending on the requested monitor configuration you have to select a mains unit from a choice of three performance classes.

1. Select your specific monitor configuration (type and quantity of controllers and transmitters).
2. Add the individual current consumptions of the controllers and transmitters.
3. Compare the result with the chart below and select the suitable mains unit.

Please note:

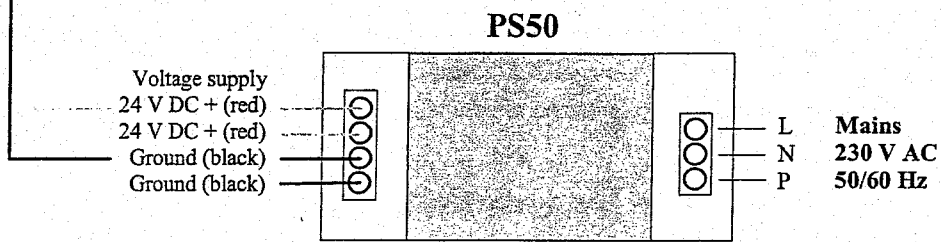
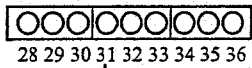
- Only the following transmitters can be attached to a GMA41 EC, 41 ECB and 44 EC, 44 ECB: Transmitter EC24 or EC25.
- Only transmitters of the same type and for the same gas can be attached to a GMA 44.
- **If a GMA 44 is used, always select mains unit PS 50 (or higher)**
- To keep the voltage reduction resulting from the combination of several controllers (≥ 6) as low as possible, make sure that the voltage supply is suitably fed.



* GMA 44 / GMA 44B requires mains unit PS 50 or higher.

Connection Diagram of Mains Units

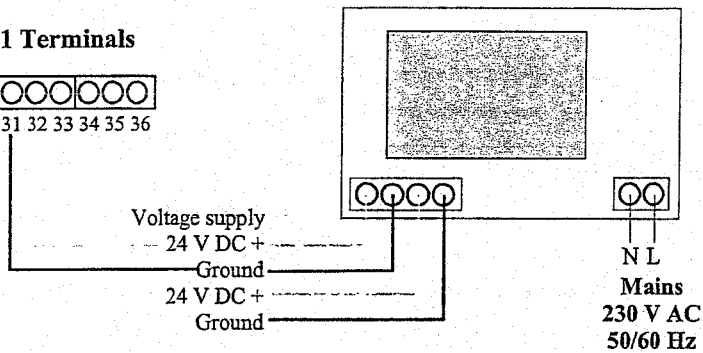
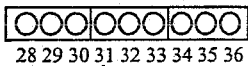
GMA 41 Terminals



The mains unit PS 50 comes complete with 2 x 0.5 m cable *red* and 2 x 0.5 m cable *black*, so the supply can be effected at two places.

PS12 / PS30








GMA 41 Terminals



As the PS 50, the mains units PS12 and PS30 also allow the supply to be effected at two or more places.




Technical Data of Mains Units

| Type | PS12 Mains units (not stabilized) | PS30 | PS50 Stabilized control mains unit |
|---------------------------------|---|------------------|--|
| Dimensions (WxHxD): | 106 x 76 x 64 mm | 106 x 76 x 85 mm | 225 x 65 x 43.5 mm |
| Weight: | 445 g | 898 g | 464 g |
| Input | | | |
| Primary voltage: | 230 V / 50Hz | | |
| Primary fuse: | T 0.08 A G | T 0.315A G | |
| Output | | | |
| Secondary voltage | 30 .. 21 V | 27 .. 20 V | 24 V |
| Secondary current | 0 .. 400 mA | 0 .. 1000 mA | 0 .. 2000 mA |
| Power: | 8.4 VA | 20 VA | 48 VA |
| Secondary fuse: | T 0.50 A | T 1.00 A | internal overload protection |
| Climate Conditions | | | |
| for operation: | -10 ... +55 °C / 0 ... 99 % r.h. / 700 ... 1300 hPa | | -10 ... +55 °C / 20 ... 90 % r.h. / 700 ... 1300 hPa |
| Recommended storage conditions: | 0 ... 30 °C, 20 ... 80 % r.h. | | |
| DIN rail mounting: | DIN EN 50022 | | |
| Safety | | | |
| Protection: | DIN 40050 – IP –20 | | |
| Protective separation: | By means of safety transformer EI 48 V11419 12.0VA EI 60 V11505 30.0VA PRI 230V / SEC 20 V PRI 230V / SEC 21 V 50 - 60Hz 50 - 60 Hz. | | |
| Protective insulation: | As per EN 61010 up to overvoltage category III and soiling degree 2 | | |
| Safety standards: | DIN EN 61558 | | UL 1950 EN 60950 VDE 0160 |


1. Activate service **menu B**.
2. Use keys  and  to select menu point ,  or  for the alarm deactivation point to be set.
3. Use keys  and  to adjust the new deactivation point.
4. Store the parameter.


Storing of Changed Parameters and Leaving the Service Mode

All changes done in the service mode have to be stored:

1. Press keys  and  simultaneously to activate the memory function.
The display reads „Sto“.
2. **Confirm storage:** Press key  to confirm the storage of the parameter.
The GMA41 stores all changed parameters and returns to detection mode.

or

No storage: Press key , and the GMA41 returns to detection mode without storing the changed parameters.

 You can change several parameters one after the other, without storing them individually. Once you have set all parameters, one storage confirmation is sufficient to store all changed parameters.

Maintenance

After the installation of a gas warning system and before putting it into operation, a function test must be carried out. The maintenance of a gas warning system contains, according to the „Guidelines for Explosion Protection“, and the „UVV-Gases“ the inspection, service, calibration and adjustment, regularly function tests and the maintenance.

In the DIN EN 50073 “information sheet for selection, installation, usage and maintenance of devices for detection and measurement of combustibles or oxygen”, information sheet T 023 “Gas warning devices for explosion protection – Usage and Operation“ and the UVV-gases “accident protection regulations for gases” the responding measures are laid down.

Inspection, maintenance, calibration and adjustment

During the inspection examinations of the gas measurement systems shall be carried out (see information sheet T 023, section 8.1).

- Pollution by dust
- Condensation by humidity
- Protective equipment for transmitters
- Diffusion inlet for the transmitter

Maintenance and adjustment describe those measures, which retain the nominal status of the gas warning system. They shall be checked in regular inspection intervals. Inspection intervals should not exceed 4 months (see information sheet T023, section 8.2, 8.3 and DIN EN 50073, Section 6.4.3).

- Zeropoint
- Sensitivity
- Activation of alarm thresholds
- Response time
- Alarm output visible and audible
- Fault report

Regular function tests

Additionally to the maintenance the function of the gas warning system has to be examined regularly. The function tests may not exceed a period of one year (see information sheet T023, Section 8.5 and UVV-gases § 56).

Overhaul

Overhaul describes all repairs and exchange of components. This has to be done by the manufacturer or persons authorized by him. Only those spare parts and structural components that have been tested and approved by GfG may be used for exchange.

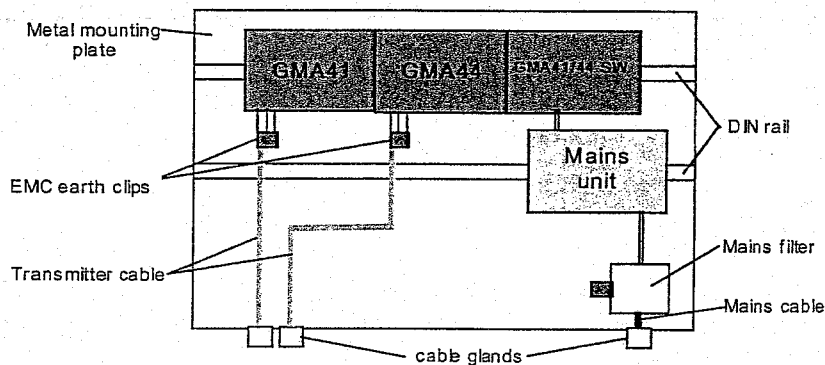
We recommend a regular function test, calibration and to call GfG's service for the regular maintenance.

Influence of Interfering Gases and Oxygen

Interfering gases, oxygen surplus and oxygen deficiency may affect the measurement of gases by the transmitter. Please adhere to the operation manual of your transmitter.

Instruction for Installation

The GMA41 controller must not be installed in hazardous areas. It shall preferably be vibration-free installed. The transmitter and the mains supply are connected according to the terminal diagram. Make sure that the shield of the transmitter cable is already grounded close to the terminals of the GMA41 on the metal mounting plate, e.g. by means of EMC earth clips.



Wiring example

Inside the wall mount casing or the cabinet the transmitter cable should be laid separately from other control and mains cable. The mains supply for the GMA41 is generally to be fed over a mains filter (e.g. FN 610). This filter should also be mounted and grounded on a metal mounting plate close to the cable entry. Once the GMA41 is mounted into a casing and all transmitters, control groups and the mains supply are connected, an expert can put the system into operation. For installation and putting into operation of the transmitters please see the operation manual of your transmitter

Putting into Operation

After installation gas warning systems have to be tested for faultless functioning, be adjusted and put into operation, by an expert. The testing and adjustment shall be carried out in accordance with the manufacturer's operation manual. They are only allowed to be carried out by an expert (see information sheet T 023 8/99, section 6.3, as well as DIN EN 50073, Section 6.4.1).

Please call GfG's service, or an expert authorized by GfG for putting into operation.

Transmitter Cable

The GMA41 controller and the transmitter are connected by means of a shielded transmitter (data) cable (LiYCY). The cross section of the cable cores depends on the current consumption of the transmitter and on the cable length (see connection diagram in the manual's annex). Even with the maximum cable lengths the specific power supply for the transmitter has to be guaranteed. For detailed information please refer to the operation manual of your transmitter.

Accessories

Key-operated Switch Module The module GMA41/44 SW allows to control a collective alarm. In addition to this, it provides the possibility of alarm suppression, e.g. during service or maintenance.

GMA41/44 SW (#):

Remarks concerning the Technical Safety of the GMA41

Contact Protection

Mains supply and relay contacts of the GMA41 provide insulation distances of 3 mm, i.e. they are designed for 250 V operational insulation. In case a contact is operated on a contact-critical potential, the contacts close to it are also considered as contact-critical. According to contact protection the contacts are not considered to be separated safely. Resulting from this, the same applies to the relay contacts of a controller operated on 230 V. Here an operational insulation has been provided as well. The insulation of the secondary circuit from the primary circuit and the relay contacts complies with the requirements for contact protection. Distances of 6.5 mm ensure a safe separation. The secondary circuit operates on extra-low safety voltage.

Trouble Shooting

| Failure | Cause | Solution |
|--|--|---|
| LED "S F" lights up, display „EEP“ | - System error, fault in parameter memory | - Re-start of system - Call GfG service |
| LED "S F" lights up, LED „ON“ flashes | - System is in warm-up period, alarm suppression is still active | - Wait until warm-up period is over |
| LEDs do not light up | - Faulty voltage supply, defective fuse or mains unit | - Ensure proper voltage supply |
| Sensor signal, but gas-free atmosphere | - Incorrect calibration, incorrect zeropoint adjustment | - Adjust the zeropoint, calibrate |
| Display - - - LED „S F“ lights up | - ADC overrange - stored overrange - short circuit at the transmitter cable | - If there is a gas-free atmosphere at the transmitter, you can reset the stored measurement value check transmitter cable/renew - check transmitter cable/renew |
| Display - - - LED „S F“ lights up | - Display deviation (< -99) - ADC range deviation - Cable cut - Zeropoint deviation by 25% signal output 4..20 mA = 3 mA 0,2 mA = 0,15 mA - Service-signal / transmitter - short circuit at the transmitter cable | - Check calibration of transmitter and GMA controller - Check transmitter cable - Check calibration of transmitter and GMA controller Check service key - Check transmitter cable |

Service Address

For additional questions on the product or in case of failure and problems please contact:

GfG Instrumentation, Inc.
1194 Oak Valley Drive
Suite 20
Ann Arbor, Mi. 48108
Phone: 734-769-0573
Fax: 734-769-1888
E-Mail: info@gfg-inc.com
Web: www.gfg-inc.com

GMA41 - Gas List

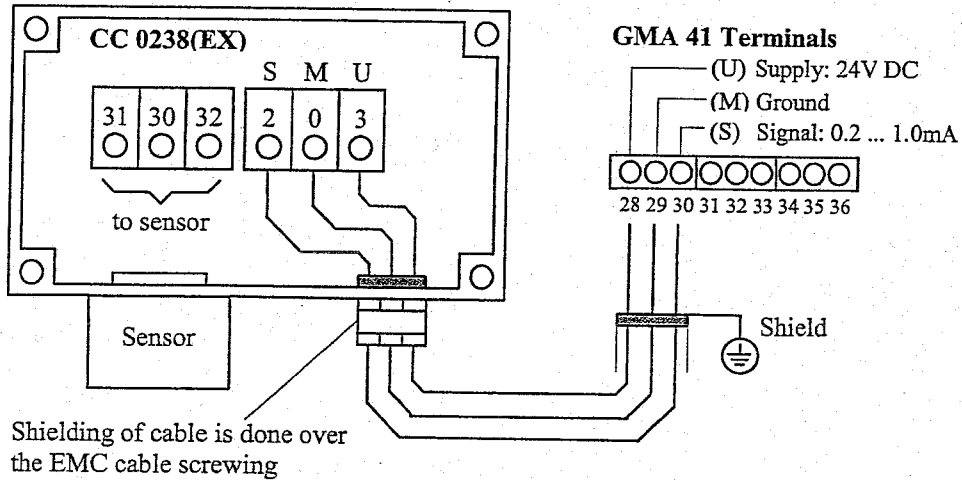
| Gas Nr. | Gas | Chemical Formula | GMA Nr |
|---------|-------------------------------|---|------------------|
| 1 | Acetone | CH ₆ O | 1 |
| 2 | Acetonitrile | C ₂ H ₃ N | 2 |
| 3 | Acetylene | C ₂ H ₂ | 3 |
| 4 | Acrylnitrile | C ₃ H ₃ N | 4 |
| 5 | Aminopropane | C ₃ H ₉ N | 5 |
| 6 | Ammonia | NH ₃ | nh3 |
| 7 | Amyl alcohol | C ₅ H ₁₂ O | 7 |
| 8 | Benzine 60/95 | Mixture | 8 |
| 9 | Benzine 80/110 | Mixture | 9 |
| 10 | Benzine (fuel) | Mixture | 10 |
| 11 | Benzene | C ₆ H ₆ | 11 |
| 12 | Comb. gases and vapours | Mixture | 12 |
| 13 | Bromotrifluoromethane (Halon) | C Br F ₃ | 13 |
| 14 | Butadien - 1.3 | C ₄ H ₆ | 14 |
| 15 | n-Butane | C ₄ H ₁₀ | but. |
| 16 | i-Butane | (CH ₃) ₃ CH | 16 |
| 17 | Butanol - 1 | C ₄ H ₁₀ O | 17 |
| 18 | Butanon - 2 | C ₄ H ₈ O | 18 |
| 19 | n-Butylacetate | C ₆ H ₁₂ O ₂ | 19 |
| 20 | i-Butylacetate | C ₆ H ₁₂ O ₂ | 20 |
| 21 | n-Butyl alcohol | C ₄ H ₁₀ O | 21 |
| 22 | 1-Butylene | C ₄ H ₈ | 22 |
| 23 | Chlorine | Cl ₂ | CL2 |
| 24 | Chloromethane | CH ₃ Cl | 24 |
| 25 | Hydrogen chloride | HCl | HCL |
| 26 | Hydrogen cyanide | HCN | hcn |
| 27 | Cyclohexane | C ₆ H ₁₂ | 27 |
| 28 | Cyclopentan | C ₅ H ₁₀ | 28 |
| 29 | Cyclopropane | C ₃ H ₆ | 29 |
| 30 | Dichlordifluoromethane (R12) | C Cl ₂ F ₂ | 30 |
| 31 | 1.1 Dichlorethane | C ₂ H ₄ Cl ₂ | 31 |
| 32 | Dichlorfluoromethane (R21) | CH Cl ₂ F | 32 |
| 33 | Dichloromethaen | CH ₂ Cl ₂ | 33 |
| 34 | 1.2 Dichloropropane | C ₃ H ₆ Cl ₂ | 34 |
| 35 | Diethylamine | C ₄ H ₁₁ N | 35 |
| 36 | Dimethylether | C ₂ H ₆ O | 36 |
| 37 | Epichlorhydrin | C ₃ H ₅ Cl O | 37 |
| 38 | Natural gas (H+L) | Cn Hm, N ₂ | 38 |
| 39 | Ethane | C ₂ H ₆ | 39 |
| 40 | Ethanol | C ₂ H ₅ OH | Eol. |
| 41 | Ethyl acetate | C ₄ H ₈ O ₂ | 41 |
| 42 | Ethyl alcohol | C ₂ H ₆ O | 42 |
| 43 | Ethylen | C ₂ H ₄ | 43 |
| 44 | Ethylen oxide | C ₂ H ₄ O | 44 |
| 45 | FAM-Benzine | Mixture | 45 |
| 46 | Jet fuel 40/180 | Mixture | 46 |
| 47 | Formaldehyde | CH ₂ O | 47 |
| 48 | Frigen 22 | CH Cl F ₂ | r22 |
| 49 | Helium | He | 49 |
| 50 | Heptane | C ₇ H ₁₆ | 50 |
| 51 | n-Hexane | C ₆ H ₁₄ | 51 |
| 52 | i-Hexane | C ₆ H ₁₄ | 52 |
| 53 | Hexanon-2 | C ₆ H ₁₂ O | 53 |
| 54 | Isobutyl acetate | C ₆ H ₁₂ O ₂ | 54 |
| 55 | Carbon dioxide | CO ₂ | CO ₂ |
| 56 | Carbon monoxide | CO | CO |
| 57 | Coke gas | CO, CH ₄ , H ₂ | 57 |
| 58 | Air | N ₂ , O ₂ , CO ₂ | 58 |
| 59 | Methane | CH ₄ | CH ₄ |
| 60 | Methanol | CH ₄ O | 60 |
| 61 | Methyl acetate | C ₃ H ₆ O ₂ | 61 |
| 62 | Methyl alcohol | CH ₃ OH | 62 |
| 63 | Methylbutylketone | C ₆ H ₁₂ O | 63 |
| 64 | Methyl chloride | CH ₃ Cl | 64 |
| 65 | Methylene chloride | CH ₂ Cl ₂ | 65 |
| 66 | Methyl-i-butylketone | C ₆ H ₁₂ O | 66 |
| 67 | Methylethylketone | C ₄ H ₈ O | 67 |
| 68 | Methylglycol | C ₃ H ₈ O ₂ | 68 |
| 69 | Methylmethacrylate | C ₅ H ₈ O ₂ | 69 |
| 70 | Methylpropanol | C ₄ H ₁₀ O | 70 |
| 71 | Monochlordifluoromonobrom. | C Br Cl F ₂ | 71 |
| 72 | n-Nonane | C ₉ H ₂₀ | non. |
| 73 | i-Octane | C ₈ H ₁₈ | 73 |
| 74 | n-Octane | C ₈ H ₁₈ | 74 |
| 75 | i-Pentane | C ₅ H ₁₂ | 75 |
| 76 | n-Pentane | C ₅ H ₁₂ | 76 |
| 77 | Pentanon-2 | C ₅ H ₁₀ O | 77 |
| 78 | Penten-1 | C ₅ H ₁₀ | 78 |
| 79 | Pentyl acetate | C ₇ H ₁₄ O ₂ | 79 |
| 80 | Perchloroethylene | C ₂ Cl ₄ | 80 |
| 81 | Propane | C ₃ H ₈ | Pro. |
| 82 | Propanol-2 | C ₃ H ₈ O | 82 |
| 83 | i-Propyl acetate | C ₅ H ₁₀ O ₂ | 83 |
| 84 | n-Propyl acetate | C ₅ H ₁₀ O ₂ | 84 |
| 85 | n-Propyl alcohol | C ₃ H ₈ O | 85 |
| 86 | i-Propyl alcohol | C ₃ H ₈ O | 86 |
| 87 | Propylene | C ₃ H ₆ | 87 |
| 88 | Propylenedichloride-1.2 | C ₃ H ₆ Cl ₂ | 88 |
| 89 | Oxygen | O ₂ | O ₂ |
| 90 | Sulfur dioxide | SO ₂ | SO ₂ |
| 91 | Sulfurhexafluoride | SF ₆ | 91 |
| 92 | Hydrogen sulfide | H ₂ S | H ₂ S |
| 93 | Town gas | CO, CH ₄ , H ₂ | 93 |
| 94 | Nitrogen dioxide | NO ₂ | no ₂ |
| 95 | Nitrogen monoxide | NO | no |
| 96 | Styrene | C ₈ H ₈ | 96 |
| 97 | Tetrachloroethane | C ₂ Cl ₄ | 97 |
| 98 | Toluene | C ₇ H ₈ | 98 |
| 99 | 1.1.1-Trichloroethane | C ₂ H ₃ Cl ₃ | 99 |
| 100 | Trichloroethylene | C ₂ HCl ₃ | 100 |
| 101 | Trifluoromethane (R23) | CH F ₃ | 101 |
| 102 | Vinyl acetate | C ₄ H ₆ O ₂ | 102 |
| 103 | Vinyl chloride | C ₂ H ₃ Cl | 103 |
| 104 | Hydrogen | H ₂ | H ₂ |
| 105 | Water gas | H ₂ , CO, CH ₄ | 105 |
| 106 | Xylene | C ₈ H ₁₀ | 106 |
| 107 | Ozone | O ₃ | 107 |

Chart 1 - GfG-Gas List

Terminal Diagram of Transmitters

Transmitter CC0238 EX

The CC sensor is designed as a 3-wire transmitter. The supply voltage and the 0.2 - 1 mA output signal use the same ground line. Cable type: e.g. LiYCY 3 x 0.75 mm² (up to 200 m).

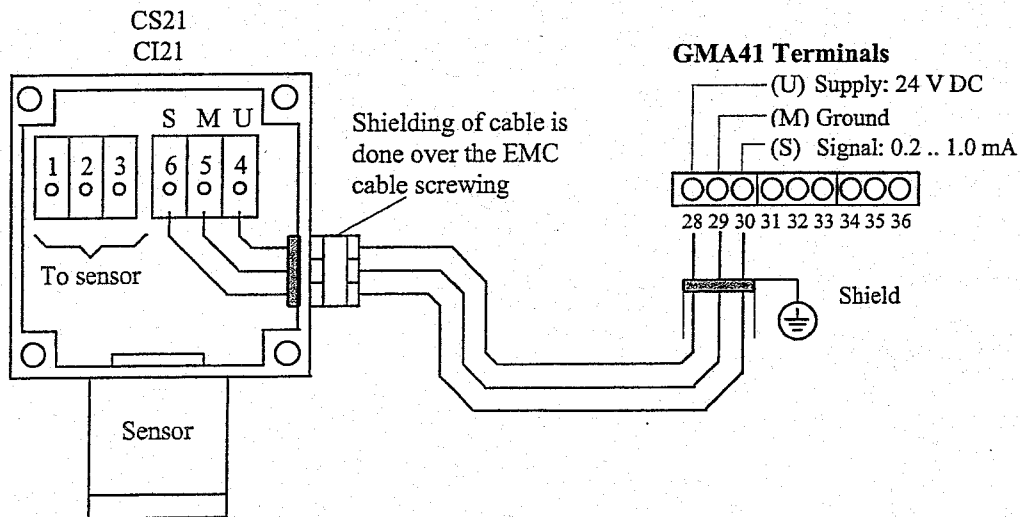


Transmitter CS21 and CI21

These sensors are designed as 3-wire transmitters.

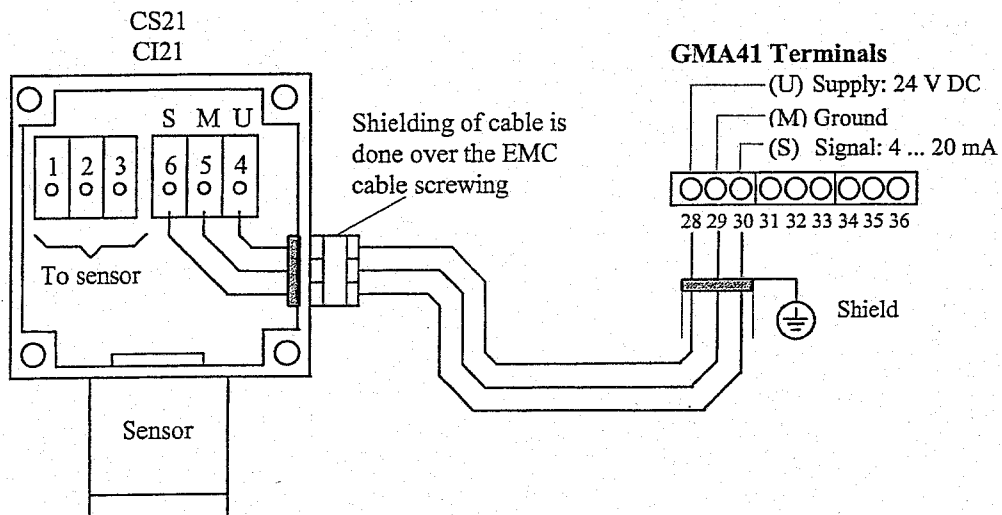
0.2 – 1 mA output signal

The supply voltage and the 0.2 – 1 mA output signal use the same ground line. Cable type: e.g. LiYCY
3 x 0.75 mm² (up to 200m)



4 – 20 mA output signal

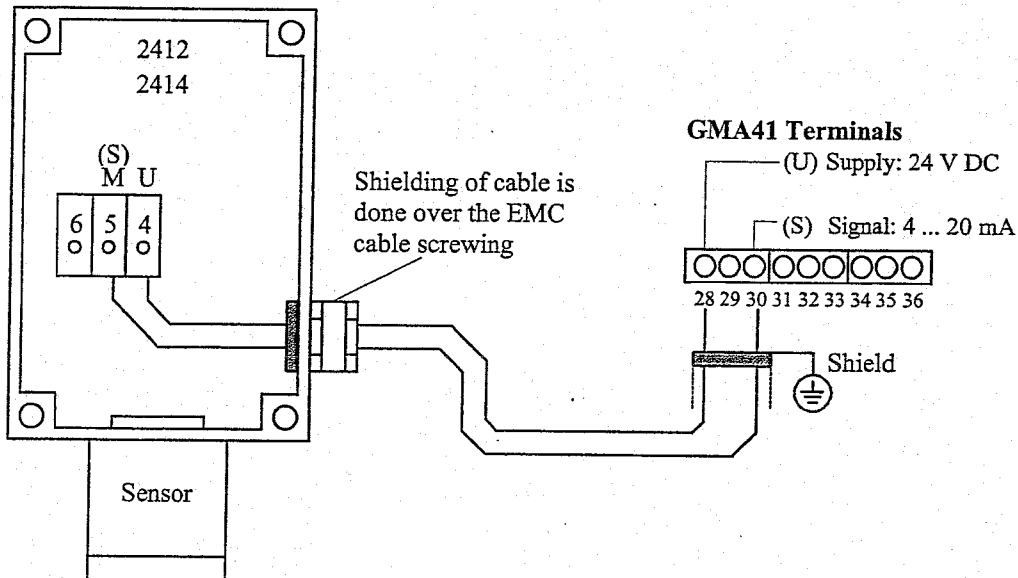
The supply voltage and the 4 – 20 mA output signal use the same ground line.



Transmitter EC24 (models MWG 2412, 2414, 2411 and 2413)

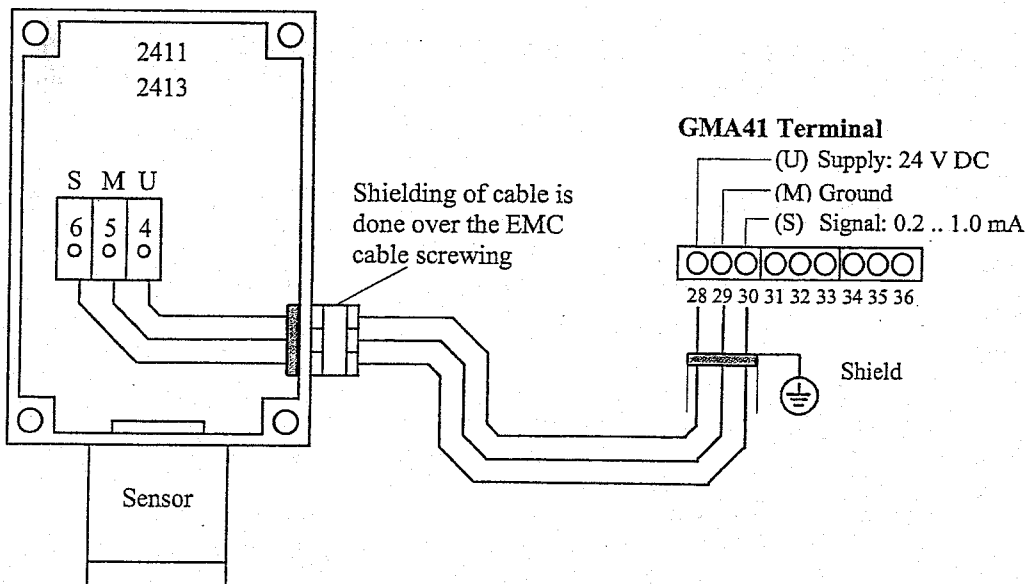
4 – 20 mA output signal

The EC models MWG 2412 and MWG 2414 are designed as 2-wire transmitters. The 4 – 20 mA output signal is provided via the supply line.



0.2 – 1 mA output signal

The EC models MWG 2411 and MWG 2413 are designed as 3-wire transmitters. The supply voltage and the 0.2 – 1 mA output signal use the same ground line.



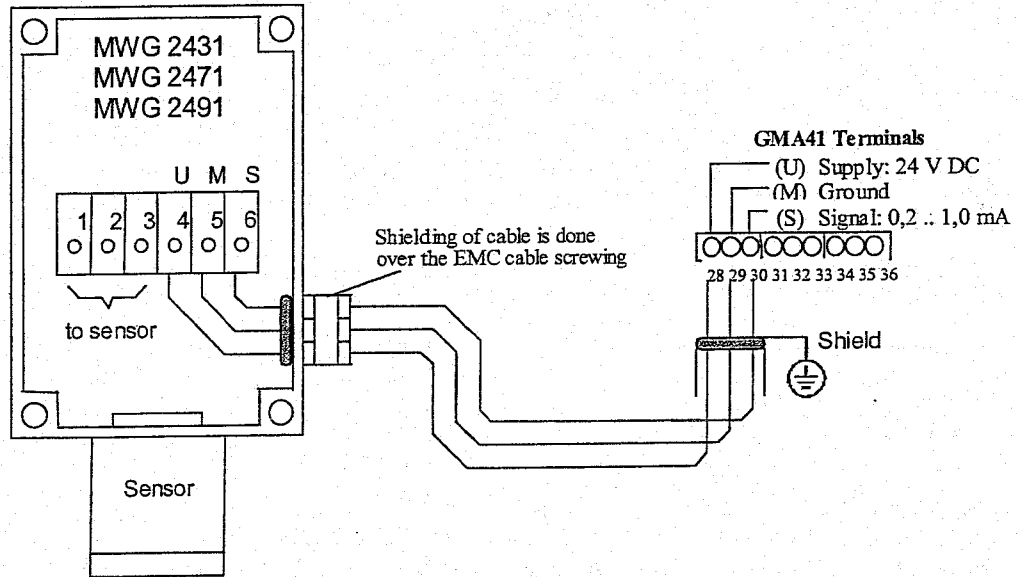
Transmitter CC24 EX (models MWG 2431 and 2432)

Transmitter CS24 EX (models MWG 2471 and 2472)

Transmitter IR 24 (models MWG 2491 and 2492)

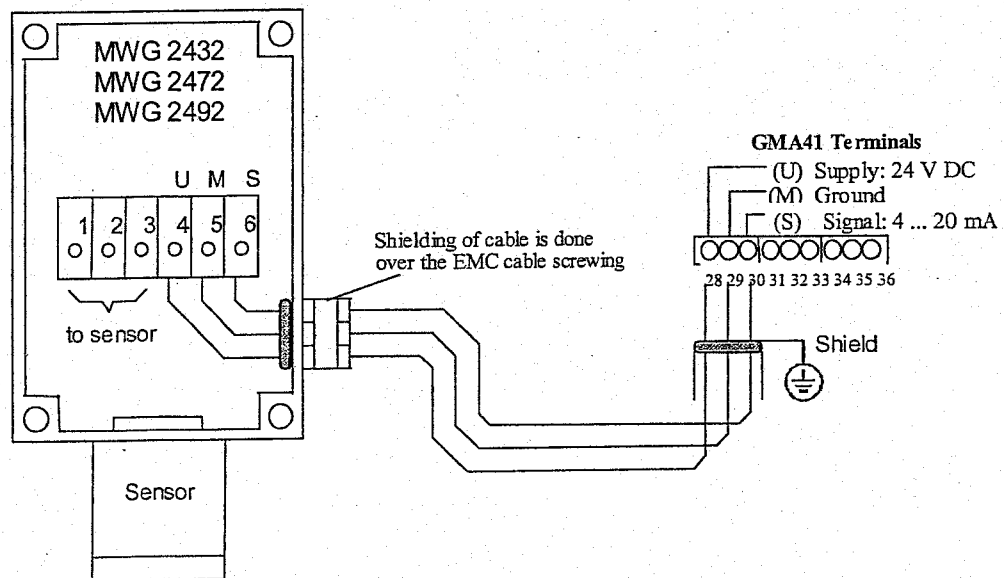
0.2 – 1 mA output signal

The Transmitters CC model MWG 2431, the CS model MWG 2471 and the infrared transmitter MWG 2491 are designed as 3-wire transmitters. The supply voltage and the 0.2 - 1mA output signal use the same ground line.



4 – 20 mA output signal

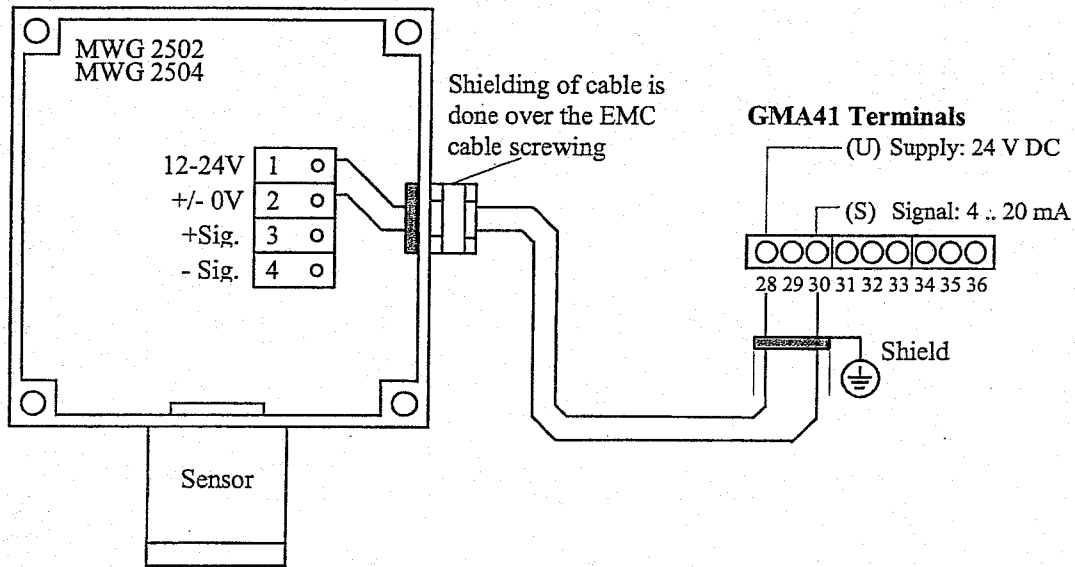
The CC model MWG 2432, the CS model MWG 2472 and the infrared transmitter MWG 2492 are designed as 3-wire transmitters. The supply voltage and the 4 – 20 mA output signal use the same ground line.



Transmitter EC25 (models MWG 2502, 2504, 2501 and 2503) without Ex-barrier

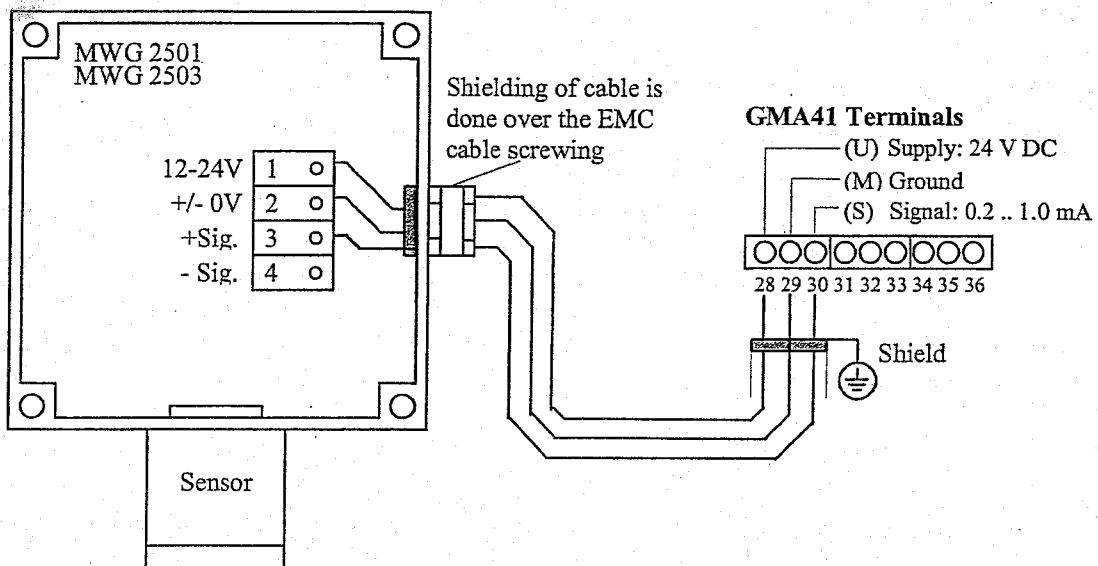
4 - 20 mA output signal

The EC models MWG 2502 and MWG 2504 are designed as 2-wire transmitters. The 4 – 20 mA output signal is provided via the supply line.

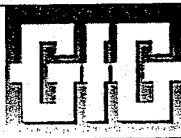


0.2 – 1 mA output signal

The EC models MWG 2501 and MWG 2503 are designed as 3-wire transmitters. The supply voltage and the 0.2 – 1 mA output signal use the same ground line.



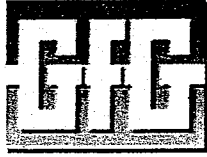
**Worldwide Supplier of Gas Detection
Solutions**



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email: info@gfg-inc.com

File: GMA41-7-28-06, Edition 26, July 2006

GfG reserves the right of modification



GfG Instrumentation

Worldwide Manufacturer of Gas Detection Solutions

O₂ Transmitter

ZD 21

Operation Manual

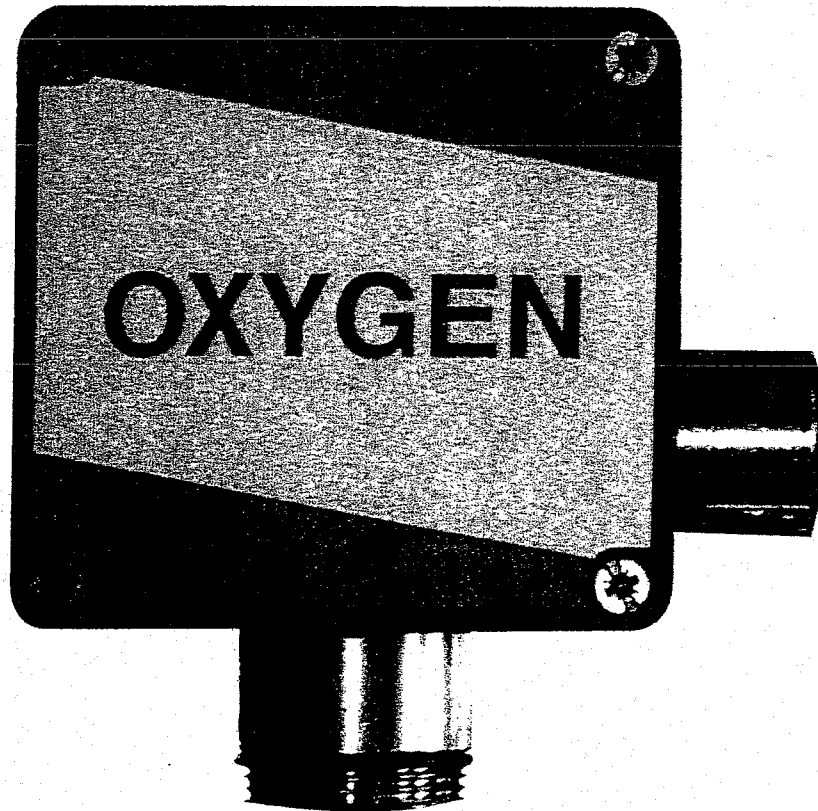


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For your safety

As any piece of complex equipment, the GfG transmitter ZD21 will do the job designed to do, only, if it is used and serviced in accordance with the manufacturer's instructions. Please protect yourself and your employees by following them. This manual must be carefully read by all individuals who have or will have the responsibility for using and servicing this product. The warranties made by GfG with respect to the product are voided, if the adjustment of functions or parameters is changed without GfG permission. They are also voided, if the product is not used and serviced in accordance with the instructions in this manual. Failures or false alarms caused by interfering gases or electrical signals are not part of the warranty obligation. The above does not alter statements regarding GfG warranties and conditions of sale and delivery.

General description

A fixed gas monitoring system consists of the transmitter (MWG) and a controller (GMA), which are connected by means of cable. The transmitter converts the unit for the gas concentration into an electrical signal and transmits it over the cable to the controller.

Fixed Gas Detection System

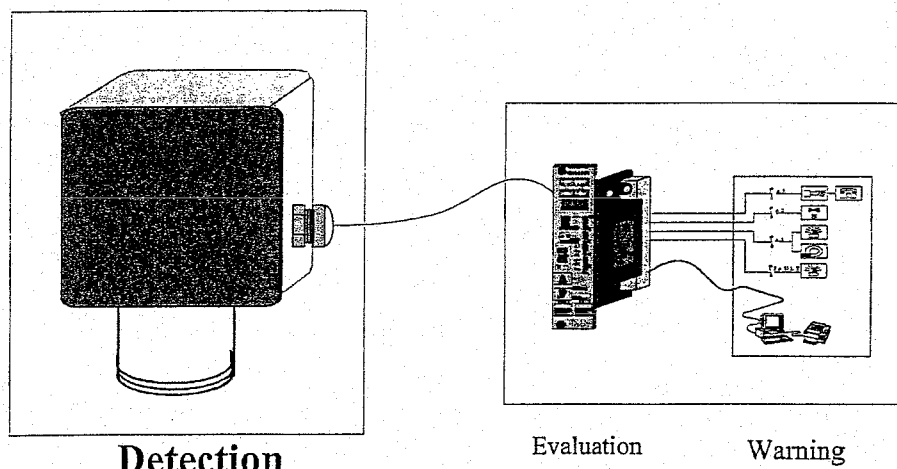


Fig. 1

The ZD21 is an "intelligent" transmitter. The comprehensive electronics allows easy operation and maintenance and also increases the operational safety and accuracy. The ZD21 is characterized by the following features:

- Easy calibration at site.
- Compensation of temperature effects.
- Long sensor life.

Detection principle

The ZD21 contains an amperometric oxygen sensor, which is based on an electrochemical oxygen pump cell made from zirconia. Once a voltage is connected to the cell, oxygen ions are pumped from the cathode to the anode. Since the cathode is covered by a gas diffusion barrier, increasing voltage results in a saturation current, which is the measure for the oxygen concentration in the ambient air. Using this principle of detection yields good selectivity and results in long-term stability of the sensor.

Operational notes

Before shipment, the ZD21 passes a function and display test, being calibrated with suitable test gases. **This does not, however, overrule the obligation to arrange for another function test after putting the transmitter in operation.**

Design

The design of the ZD21 is shown in fig. 2. The sensor is mounted in the sensor support (pos. 5). The gas enters the sensor chamber through the diffusion inlet (pos. 6). The casing (pos. 2) includes a resin encapsulated p.c.board with electronic components. The electronics convert the measurement signal into the output of 0.2 .. 1 mA or 4 .. 20 mA, which is supplied to the controller by means of cable.

ZD21 – Design

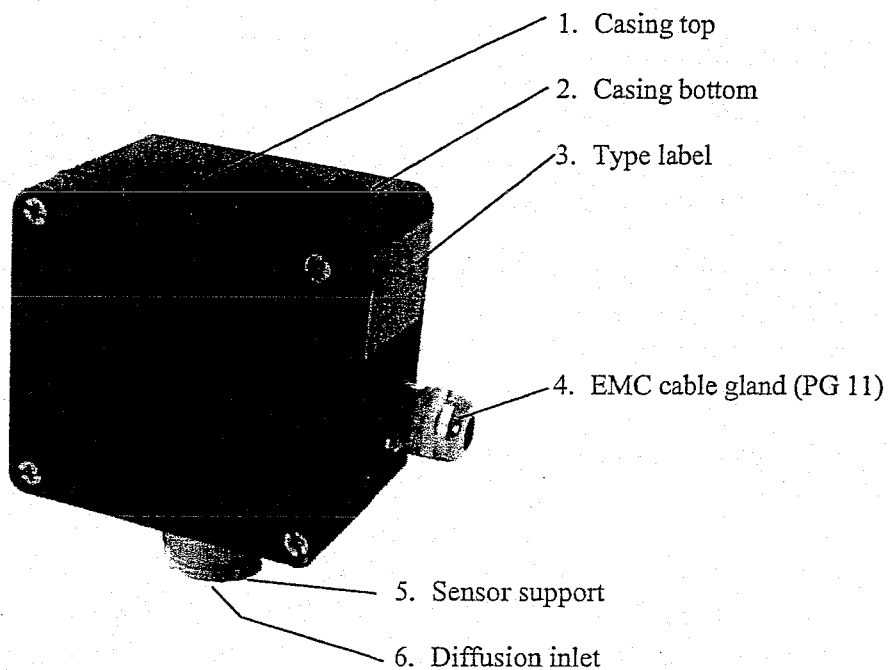


Fig. 2

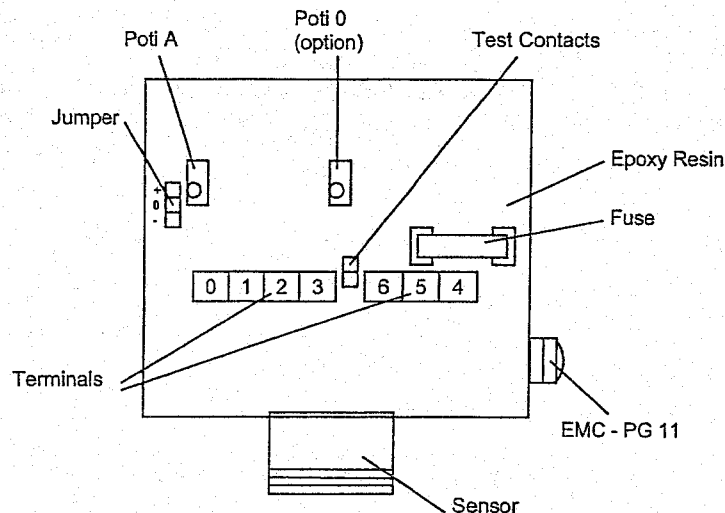


Fig. 3 / Schematic

Mounting Position

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**,
- the **gas density**, and
- the **danger highlights**.

Install the ZD21 at a place where the gases pass the sensor even in case of bad ventilation. If necessary, use a smoke cartridge to check.

Furthermore, take the following into consideration as well:

- **Ambient temperature**,
- **Rain water, hose water, dripping water, condensation and**
- **Dust** in the atmosphere.

The ZD21 is to a great extent protected against the entering of water and dust (IP 54). Special accessories are available to provide additional protection for very difficult conditions. Please contact GfG for detailed information.



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

When deciding on the position for the transmitter, make sure that it is always accessible for service and maintenance. It is recommended to mount the ZD21 with the sensor facing down to the floor. A different mounting position, however, does not affect the sensor accuracy.

Mounting

For connecting the ZD21 refer to the connection diagram (also refer to the terminal diagram of your GMA controller). For mounting the transmitter remove the four lock screws and lift the casing top off. Fix the casing by means of two screws through the relevant borings. The printed circuit board with electronic components inside the casing is potted in epoxy resin.



The ZD 21 comes equipped with a protective cap on the sensor. Do not remove this cap until immediately prior to applying power to the transmitter.

The protective cap must be reinstalled whenever power is not applied to the ZD 21.



In order for the ZD 21 to properly detect O₂, the protective cap must be removed.

Once the ZD 21 is properly installed and under power it has a heater that helps to keep the sensor clear from most contaminants in the environment.



If maintenance is being performed in the area, the protective cap must be used.

Failure to follow these instructions may cause damage to the sensor and will void the warranty.



The ZD21 is not certified for use in hazardous areas

Installation of Electrical Connections

Procurement of cable and electrical connections must be done by a specialist only, obeying the applicable regulations. A shielded 3-core cable has to be used (e.g. LIYCY 3 x 1.5 mm²). The cross section of the cable depends on the cable length. For short distances (max. 200 m) it may be sufficient to use 0.75 mm² instead of 1.5 mm².

Note: Shielding is effected over the EMC cable screwing.

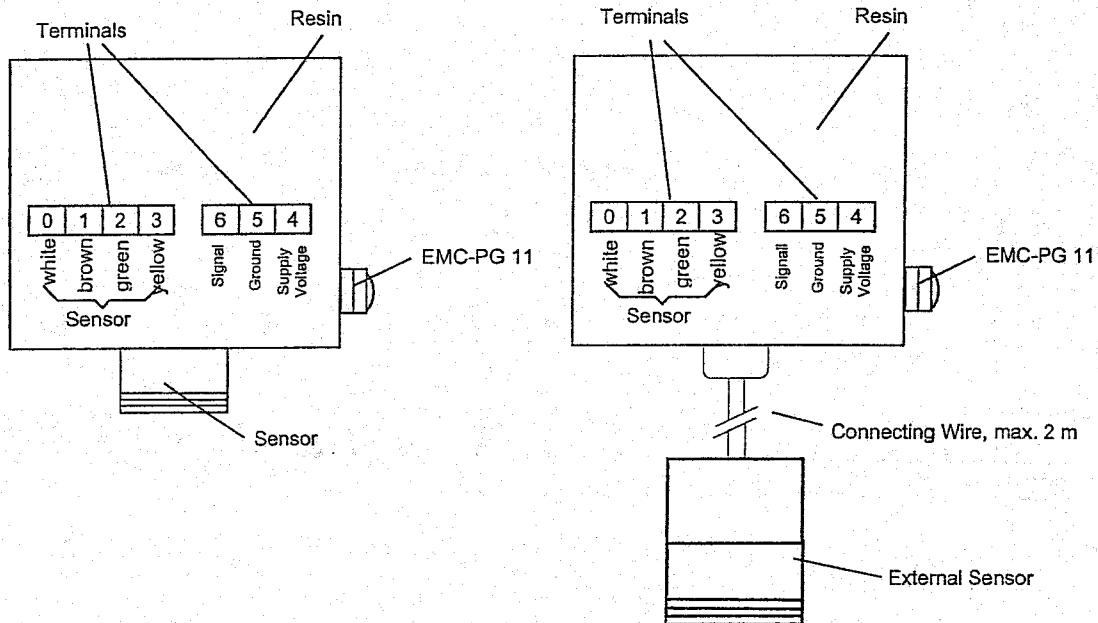


Fig. 4

The supply voltage for the transmitter (terminal 4) is 10...32 V DC.

Once the installation is completed, close the casing top and fix it with the screws.

Putting into Operation

Once the ZD21 is installed, a skilled person can put it into operation. Before shipment, the ZD21 has been calibrated and tested after a specific warm-up time for several days. When connecting to a controller (power supply), allow approx. 15 - 30 minutes to warm-up the transmitter before checking the sensitivity. **In case you replace the sensor, adjust the jumper of the transmitter according to the specification on the new sensor.**

Check of Electrical Zero point

The ZD21 is calibrated and tested before shipment. Certain deviations, however, are possible due to transport, mounting and ambient conditions.

Inside the ZD21 there are two test contacts (fig. 3) to check the electrical output signal. The voltage at the test contacts can be measured by means of a multimeter.

After the warm-up time of approx. 30 minutes, the signal must be approx. 200mV for zero gas *. This corresponds to an output current of 0.2 mA (0.2 .. 1 mA interface) respectively 4 mA (4 .. 20 mA interface).

In case of deviation you can correct the value by turning potentiometer **O**.

Alternatively, for example when using a GMA controller, you can check the zero point signal at the controller. After the warm-up time of approx. 30 minutes, you can read the zero point voltage at the controller resp. check with a voltmeter (please read the operation manual of your GMA controller).

Check of Sensitivity

To check the sensitivity of the ZD21 fix a calibration adapter to the diffusion inlet of the transmitter. Then select a suitable test gas, taking into consideration, which gas has been used for initial calibration of the transmitter. You can see this information and the basic adjustment from the test report.

Use a multimeter to check the output signal by measuring the voltage at the test contacts. The voltage is proportional to the output current. 200mV correspond to an output current of 0.2 mA (0.2 .. 1 mA interface) resp. 4 mA (4 .. 20 mA interface). 1000mV correspond to an output current of 1 mA (0.2 .. 1 mA interface) resp. 20 mA (4 .. 20 mA interface).

In case of deviation you can correct the value by turning potentiometer **A**.

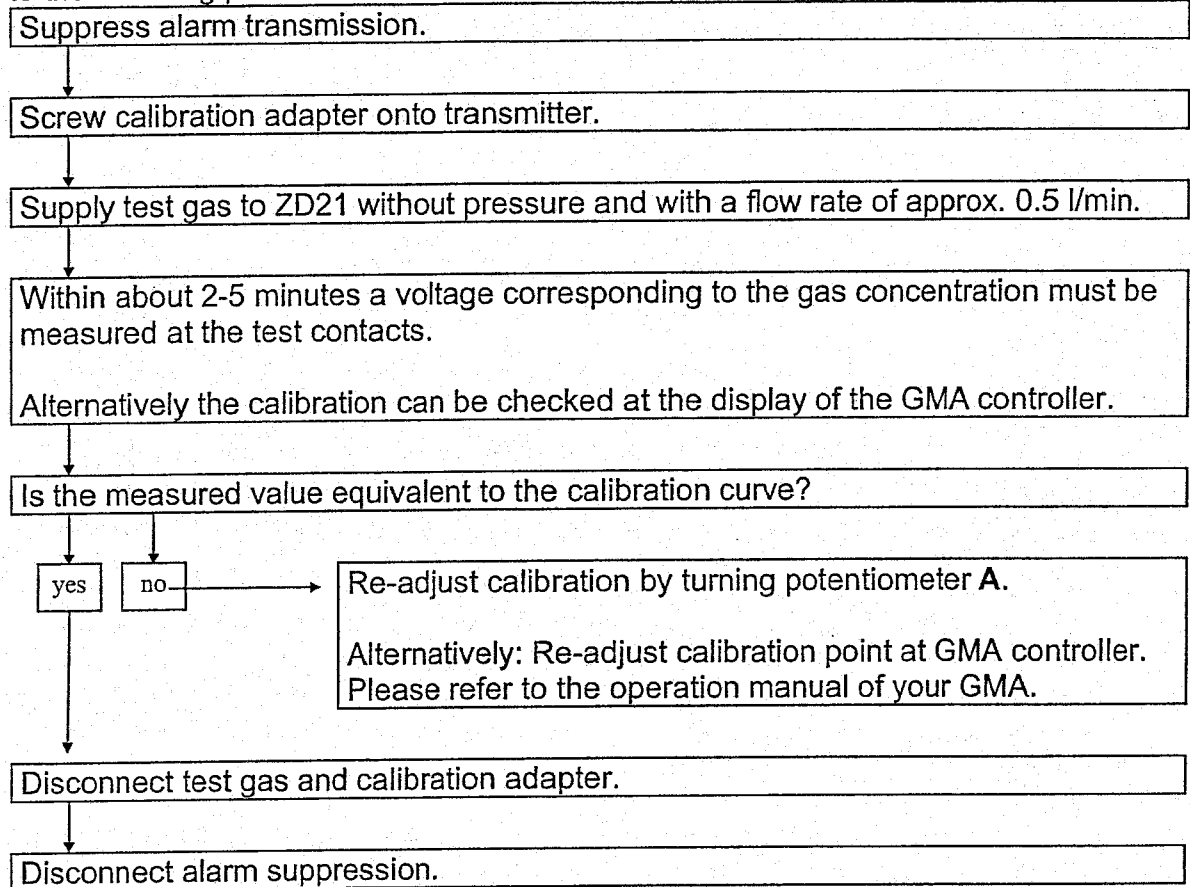
Alternatively, for example when using a GMA controller, you can check the transmitter signal at the GMA. After the warm-up time of approx. 30 minutes you can read the signal voltage at the controller or check it with a voltmeter (please read the operation manual of your GMA). Should you notice a deviation, you can correct it at the GMA.

* 100 Vol.-% N₂

For measurement accuracy it is important to set the calibration point for the second alarm threshold accurately.

When using dry test gas a slower response time of the sensor has to be taken into account.

Adhere to the following procedure to check the sensitivity:



Service

According to the German "Regulation for Explosion Protection", "UVV-Gase" and DIN 31051, service stands for maintenance, inspection and repair of gas warning equipment. Regulation T023 of "BG Chemie" describes the relating measures, among others requesting a regular function check.

This function check means:

- Check with alarm gas concentration
- Check of zero point and sensitivity (calibration)
- Check of response time
- Check of gas sampling and gas processing system (if any)
- Check of alarm signal activation
- Check of failure alarm

The check must be done by an expert, who has to report the result in written form. Generally the function check intervals should not exceed 16 weeks. The function check shall be done before putting the system into operation, and it should be repeated at least once a year.

Service Address

For additional questions on the product or in case of failure and problems please contact:

GfG Instrumentation, Inc.
1194 Oak Valley Drive
Suite 20
Ann Arbor, Mi. 48108
Phone: 734-769-0573
Fax: 734-769-1888
E-Mail: info@gfg-inc.com
Web: www.gfg-inc.com

Maintenance and Inspection

With maintenance and inspection the proper and planned status of the gas detection system is controlled. The ZD21 does not require special maintenance, nevertheless a few points should be obeyed.

Depending on the ambient conditions, gas detection systems may show a different behaviour. Therefore, it is important to perform a visual check every day, particularly during the first few days after putting into operation.

- Check of pump assembly and gas processing system (if any).
- Check of gas supply for soiling (for correct measurement the gas supply to the sensor must not be blocked).
- Sensors are subject to ageing and exhausting processes. Depending on their type and on their exposure to gas they are more or less used. A sensitivity check can only be done with a suitable test gas after certain periods of time. The sensitivity calibration is an expert calibration and is usually performed by GfG service or by authorized persons.

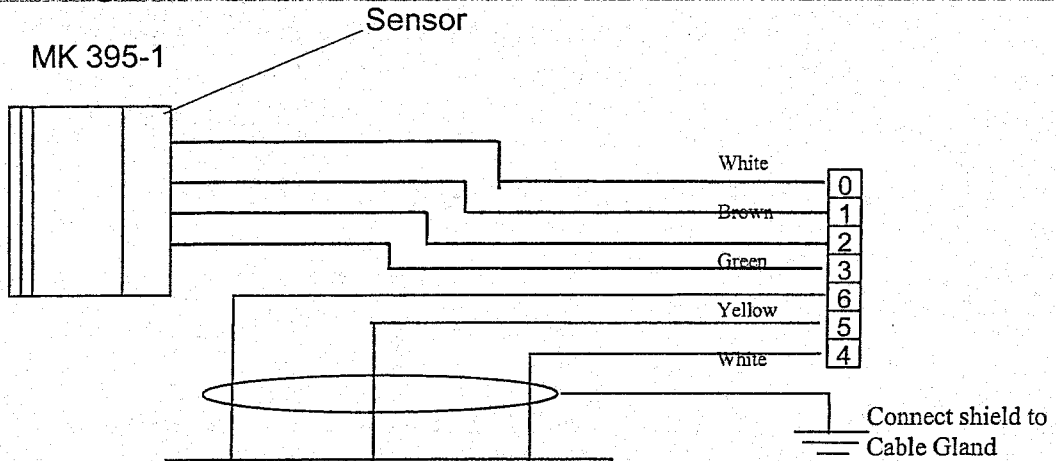
Trouble Shooting

| Failure | Reason | Solution |
|-----------------------------------|--|--|
| Zero point cannot be adjusted | Faulty sensor | Replace sensor |
| Full scale value cannot be set | Faulty sensor | Replace sensor |
| Output current has fallen to 0 mA | Defective fuse Defective electronics Cable cut | Replace fuse Replace pc board Check connection |

Accessories

| | Part No. |
|---------------------|----------|
| Calibration Adapter | 2000209 |

Connection Diagram ZD21



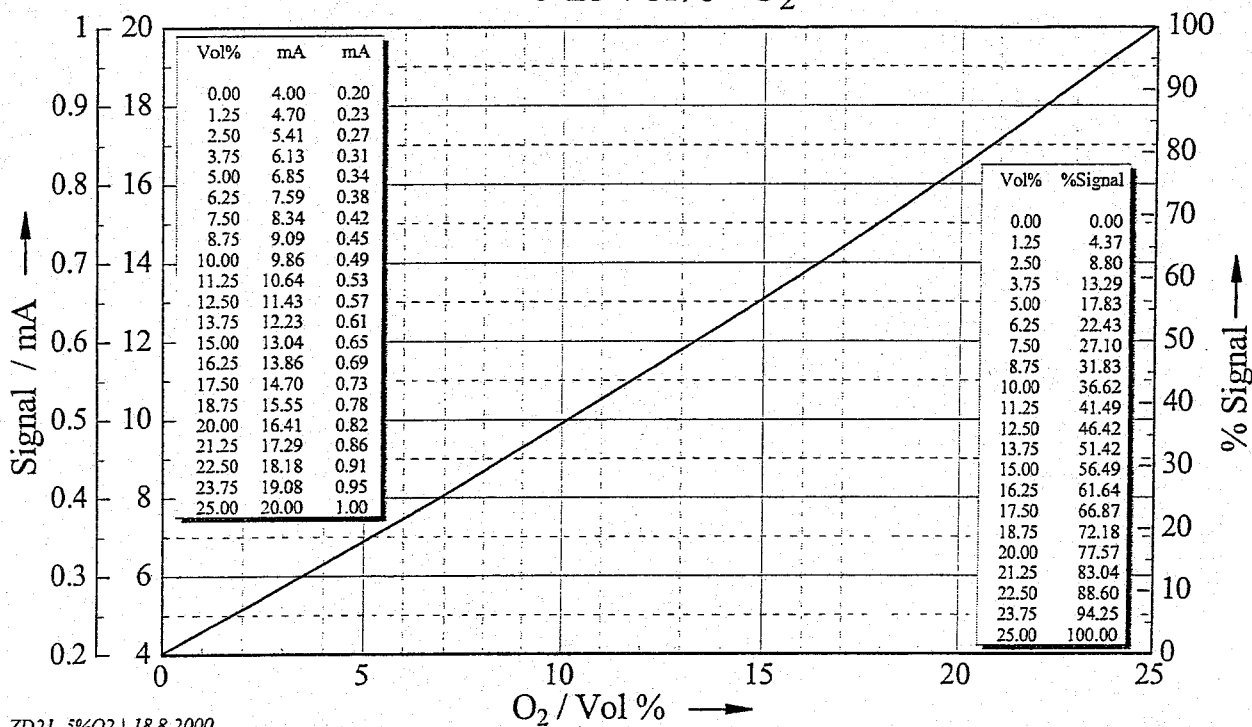
| | 4-20 mA | GND | 20V / 24V | |
|-----------|---------|-----|-----------|--|
| GMA300 | 2 | 1 | 5 | |
| GMA011 | 2 | 1 | 5 | |
| GMA100 | 2 | 1 | 5 | with motherboard from 1997 (blue) |
| GMA100 | 2 | 0 | 3 | with motherboard until 1996 (no color) |
| GMA101 | 2 | 1 | 5 | |
| GMA41 | 30 | 29 | 28 | |
| GMA81 (A) | 3 | 2 | 1 | |

Technical Data

| Transmitter ZD21 | |
|--------------------------------|--|
| Type: | ZD21 |
| Sensor Type: | MK 395-1 |
| Gas: | Oxygen, O ₂ |
| Standard range: | 25 Vol.-% |
| Gas Supply: | Diffusion |
| Detection Principle: | Zirconia (ZD) |
| Supply Voltage: | 10 ... 32 V DC |
| Output Current: | 0.2 ... 1mA (4kΩ) or 4 ...20mA (200Ω) |
| Response Time t _A : | < 2 s |
| Typical Sensor Life: | > 5 years |
| Climate Conditions | |
| Temperature: | -25 ... +50 °C |
| Humidity: | 0 ... 99 % r. h., non condensing |
| Pressure: | 920 ... 1100 hPa |
| Casing | |
| Material: | Aluminum |
| Protection: | IP 54 |
| Cable Gland: | PG 11 screwing, for cable size up to 3 x 1.5 mm ² |
| Transmitter Cable: | 3 core shielded cable e.g. LiYCY 3 x 1.5 mm ² |
| Dimensions: | 100 x 100 x 57 mm (WxHxD) |
| Weight: | approx. 370 g |

Characteristic Curve

Transmitter ZD 21
0-25Vol% O₂



ZD21_5%O2 | 18.8.2000

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