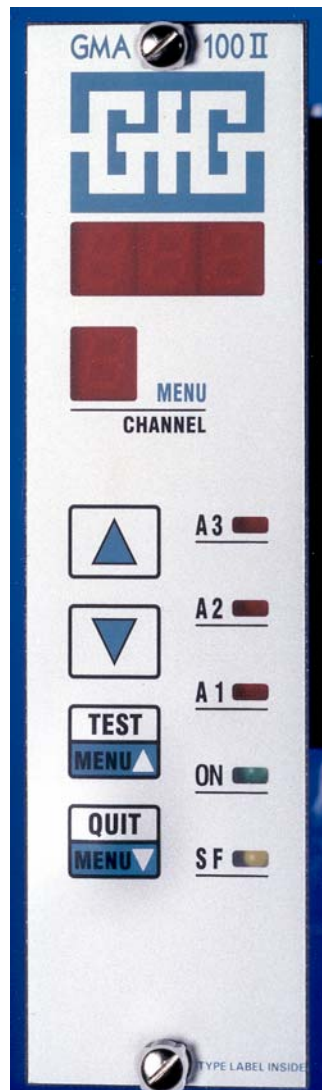




**GfG Instrumentation**  
Worldwide Supplier of Gas Detection Solutions

# GMA 104

## Operation Manual



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## Introduction

Each detection point of your fixed gas monitoring system consists of 1 up to 4 transmitters and a control module GMA 104, which are connected by means of a transmitter cable. The GMA 104 consists of the components mentioned below:

- a) GMA 104 controller (optionally available with relays and for 230V or 115V supply)
- b) GMA Multiplexer (for transmitter EC 24 and EC 25) or  
GMA Multiplexer (for transmitter CC 0238, CS 21, CI 21, CC 24, CS 24, TC 24, IR 24)
- c) GMA SPG Supply Module (not necessary for EC 24 and EC 25)

The GMA 104 (in combination with GMA SPG) supplies power to all with the multiplexer connected transmitters and receives and processes their sensor signals. Depending on the connected transmitter it monitors the ambient air for the presence of toxic or combustible gases and vapors or for its oxygen content.

The GMA 104 offers a variety of features for safe and comfortable operation. Special settings allow to adapt the gas monitoring system to your specific requirements:

- 3-digit LED display for readout of linear measurement values.
- Menu display.
- 3 variably adjustable alarm thresholds.
- Adjustable relay function: NC/NO, closed-circuit/open-circuit current.
- Alarm hysteresis to prevent „flickering“ relays.
- Activation / Deactivation of measurement channels

The GMA104 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 GMA104 gives a warning by means of the LED displays and controls the relevant alarm relays (optional).

The GMA104 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

In combination with 1 up to 4 transmitters connected, the GMA 104 forms a fixed monitoring system for continuous measurement of gas concentrations and for warning from combustible gases and vapors within the LEL range, toxic gases and oxygen monitoring in ambient air.

## For your Safety

Like any piece of complex equipment, the GfG GMA 104 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 product is not used and serviced in accordance with the instructions in this manual. They are also voided, if function or parameter settings are affected without GfG's authorization. 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 GMA104 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.

# Measuring Mode

## Front View GMA 104

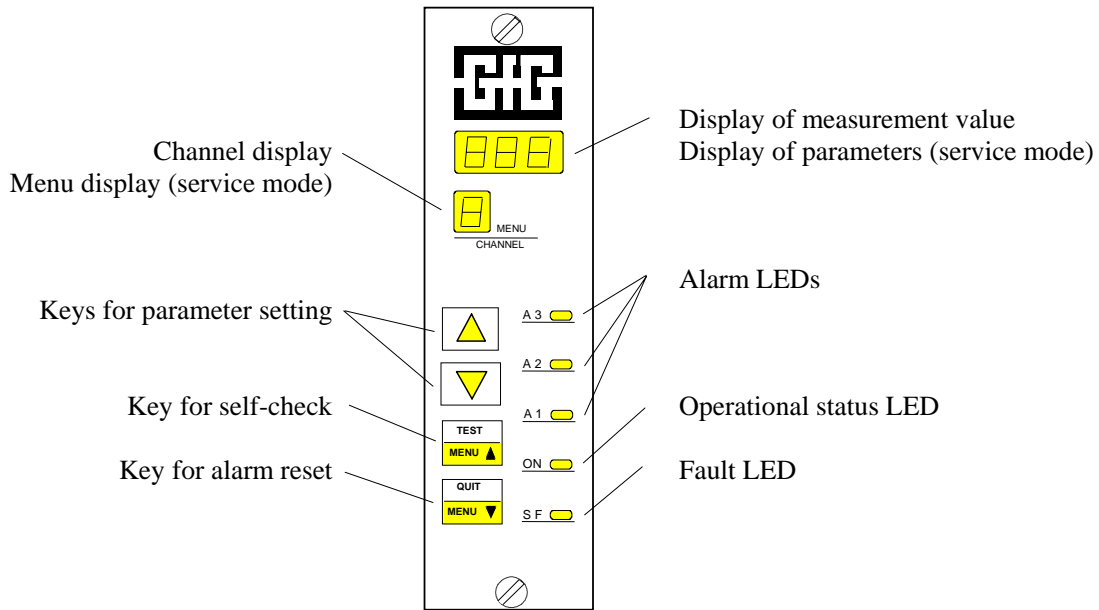


Fig. 1

## Function Description

### Turning the System On

According to UVV Gase an expert has to put the GMA 104 into operation. After switching the system on, allow several minutes for:

- the self-test, which checks all important functions, memory (ROM and RAM) and parameter memories (approx. 10 seconds),
- the warm-up of the transmitters connected (for the warm-up period of your transmitter please refer to the operation manual for your MWG).

During the warm-up time the GMA 104 displays the detection range, the unit and the alarm thresholds one after the other. The LED „ON“ blinks and the LED „S F“ is lit, i.e. the fault is activated. Threshold alarms are not activated during the warm-up. Should the GMA 104 be restarted after a mains failure, allow for the same warm-up time as above. The alarms are only evaluated after the warm-up is completed. Once the warm-up is completed, the GMA 104 automatically returns to the detection mode.

### Detection Mode

In detection mode, the 3-digit display indicates the currently measured gas concentrations of the individual transmitters one after the other (the display of the detection range can optionally be deactivated. Please call GfG service.). The channel display shows, which transmitter is currently being displayed. All channels are monitored continuously. Exceeded thresholds are recognized and reported immediately. Electronic functions like parameter memory and transmitters are permanently monitored. During trouble-free operation the green LED „ON“ is lit, and the yellow „S F“ is out.

## Check of Display, Parameter and Relays




The measuring and warning functions are not activated during these checks!

### LED Check

While in detection mode, shortly press key  for a LED self-check of the GMA 104 controller.





### Indication of Detection Range and Alarm Thresholds

Press key  and hold it for approx. 5 seconds. The LED „ON“ blinks and the display reads the following parameter one after the other:

	Display, e.g.	LED ON - blinks, additionally lit:	Description of Display
1	100, 50, 10		Detection range
2	UEG, LEL, ppm		Detection unit
3	CH4, NH3, O2 GfG Gas Number		Kind of gas
4	20 (value in detection range)	<b>A1</b>	1. Alarm
5	40 (value in detection range)	<b>A2</b>	2. Alarm
6	40 (value in detection range)	<b>A3</b>	3. Alarm

Once the above readings are completed, the GMA 104 returns to detection mode automatically.


### Check of Relays and Logical Outputs


For checking the relays and logical outputs keep key  pressed until the above readings are displayed one by one and the display of the GMA104 reads "rL". Within a period of 2 minutes you can now activate the relays and logical outputs one after the other by additionally pressing the keys  and . The relevant LEDs for alarm and fault indicate which relay and logical output was activated. Press key  to complete the check of relays and logical outputs for the GMA 104 and to return to detection mode.

## Alarm configuration

The GMA 104 provides 3 threshold alarms.

Max. number of channels	Kind of alarm	Alarms per channel	Assignment
4	collective alarm	3	alarm 1    channel 1    alarm 2    channel 1    alarm 3    channel 1 channel 2                    channel 2                    channel 2 channel 3                    channel 3                    channel 3 channel 4                    channel 4                    channel 4


The GMA 104 has, in this standard setting, 3 alarm thresholds. The alarm thresholds are collective alarms for all connected transmitters. An alarm is activated, if the gas concentration at any transmitter exceeds or falls below a preset value. The GMA 104 indicates this alarm through the corresponding alarm LED. By pressing the key , or by confirmation through the external reset, the alarm gets, after having gone through all active measurement channels, confirmed. Alarms, which are activated during this time, get confirmed as well.


Alarm	Relevant Alarm LED
has been activated	blinks
has been activated and acknowledged by pressing key 	lights permanently

Simultaneously with the alarm LEDs the GMA 104 activates the relevant alarm relay and the logic output. The standard setting for the alarm control is shown below:

Alarm	Function	Re settable during alarm	Re settable after Alarm	Remark
1	non-latching	no	---	
2	latching	no	yes	
3	latching	yes	yes	same threshold as for alarm 2



The switching functions of the three alarms can be set individually. Alarm thresholds and switching functions are the same for all 4 channels. For other settings than the standard one please refer to your test report.

By pressing key  during an alarm, the status of the corresponding channel can be seen from the LEDs.



**During the test the measuring and warning functions are not activated!**

### Stored Over range


When the detection range is exceeded by more than 10 %, the GMA 104 activates a fault message in addition to the 3 alarms. The display reads . In this case for all connected transmitters for detection of 0 .. 100% LEL, the alarms and the fault warning are latching. Only when the gas concentration has fallen below the detection range span, this alarm can be reset by means of key .

### Remarks about the alarms:

#### Exceeding/Falling below Alarm

When gases are measured, which cause hazards by reduced gas concentrations, e.g. oxygen deficiency, the gas alarm is a falling below one. An exceeding gas alarm is activated, if the hazardous situation is caused by rising concentrations, e.g. in case of toxic or combustible gases.

#### Latching / Non-latching Alarm

A latching alarm is present, until external measures, e.g. pressing key  at the GMA 104, reset the alarm. For alarm reset, this key must be hold until all channels were indicated one after the other. A non-latching alarm resets automatically, when the gas hazard is over and the concentration falls below or exceeds the preset threshold.

**Fault**

In case of a failure the yellow LED „**S F**“ is lit and the fault relay is triggered. Fault means:

- The connection between MWG and GMA 104 is cut.
- The sensor or the circuit of the transmitter is faulty.
- The zero point is deviated.
- Over range (together with alarm activation).
- Faulty self-check of the CPU.

As soon as the fault is over, the yellow LED “SF” goes out. The fault relay switches back and the controller goes back to the normal operation.

































## Relays

When equipped with the relay extension, the GMA 104 provides 4 relays:

- 3 alarm relays for controlling external alarm devices,
- 1 fault relay for failure report.

The On and Off behavior of the relays is the same as the one for alarm or fault report. Every individual alarm relay can be made a NC or NO contact. In addition to this, all alarm relays can be operated either as open-circuit or closed-circuit current. The standard setting the alarm and fault relays are NO contacts. The alarm relays are operated as open-circuit current, the fault relay is operated as closed-circuit current.

**In standard setting the relays are switched as follows:**

Relay for:	The relay switches							
	in detec- tion mode (no gas)	during gas alarm		after gas alarm		in case of mains failure	in case of fault	during gas alarm and fault
		non-reset	reset	non- reset	reset			
Alarm 1								
Alarm 2								
Alarm 3								
Fault								





Take note of the relay switching behavior when connecting to external devices. In standard setting, alarm 3 (buzzer relay) can be reset even during a gas alarm!

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

# Service

## Display of Sensor Signals

Press key , and after approx. 2 seconds the display reads the signal from the transmitter in mA (0.2 .. 1 for transmitters with 0,2 .. 1 mA output and 4 .. 20 for transmitters with 4 .. 20 mA output). The reading is for the channel, which was active when you pressed the key. This channel is kept as long as key  is pressed. This allows for a quick and easy check of the zero points of all connected transmitters directly at the GMA 104.

## Recognition of the service mode of a transmitter







This function is only supported by the transmitters CC 24 EX (type MWG 243x II), CS 24 EX (type MWG 247xII) and EC 25 (type MWG 250x).

The transmitter CC 24 EX, CS 24 EX, EC 25 all have a service switch. If this switch is pressed for service operations (see manual of the transmitter), the GMA 104 displays a fault alarm. No alarms are passed on.


## Activation of Service Mode

Via the service menu all parameters of the GMA 104 can be displayed and changed.


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

1. Press , then key  and hold both keys, until the display reads „SER“.
2. Use keys  and  to enter the security code.

	Security code	Settings
<b>Menu A</b>	<b>11</b>	Alarm thresholds and adjustments
<b>Menu B</b>	<b>222</b>	Deactivation point of the alarm thresholds Activation/Deactivation of single channels



3. Press key  to confirm the entered security code.  
The GMA 104 turns to service mode

**or**

press key  to return to detection mode.





**In the service menu already activated alarms stay active, but new alarms cannot be activated.** The GMA 104 activates the fault report. The LEDs „ON“ and „S F“ are lit, the fault relay is triggered.











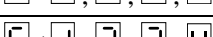
The service mode changes into the detection mode, if the keys  and  are pressed simultaneously and the menu is left by logging or not-logging. (See storing of changed parameter and leaving the service menu.)








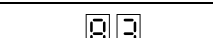

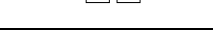

## Adjustments in Service Mode

The display of the GMA 104 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 backward. For changing of parameters use keys  and .

### Survey of Menu Points








Menu A				
Menu display	Channel	Description	Parameter display	Parameter setting
	all	Detection unit	LEL, ppm	Display only
	all	Gas	CH4, NH3, O2 or GfG-Gas No.	
	all	Threshold Alarm 1	Value in detection range	Setting with  and 
	all	Threshold Alarm 2	Value in detection range	
	all	Threshold Alarm 3	Value in detection range	
	1 to 4	Zero point adjustment	0*	
	1 to 4	Sensitivity adjustment	Value in detection range**	

\* Display of parameter --- if channels are deactivated. No parameter settings are possible.


Menu B				
Menu display	Channel	Description	Parameter display	Parameter setting
	all	Point for deactivation of alarm 1	Value in detection range	Setting with  and 
	all	Point for deactivation of alarm 2	Value in detection range	
	all	Point for deactivation of alarm 3	Value in detection range	
	1 to 4	Activation of channel	On	
	1 to 4	Deactivation of channel	Off	

## Settings in menu A





### Setting of Alarm Thresholds

1. Activate the service mode A.
2. Use keys  and  to select menu point ,  or  for the alarm threshold to be set.
3. Set the new alarm threshold by means of keys  and .
4. Store the parameters. (See page 12)

## Check and adjustment of Zero point


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. Then press key  to check the input signal from the sensor of the relevant channel. An adjustment of the zero point is only possible, if the sensor 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, the tolerance values may differ slightly).**

If the zero-point is out of tolerance, the zero point has to be adjusted at the transmitter first. For this, please read the manual of the transmitter.






3. Activate the service mode A.
4. Use keys  and  to select menu point  of the relevant channel.
5. Press  key for 3 seconds to adjust the zero point.  
The adjustment of the zero point was successful, when the value „0“ is flashing in the display. If the display is not flashing, the sensor signal was out of tolerance and has to be adjusted at the transmitter first. Please refer to the manual of your transmitter.
6. Disconnect the zero gas from the transmitter. In case of transmitters for oxygen wait until the displayed gas concentration exceeds the threshold alarm.
7. Store the parameter. (See page 12)

## Check and adjustment of sensitivity

**Note:** Before checking the sensitivity, make sure that the zero point is set correctly.

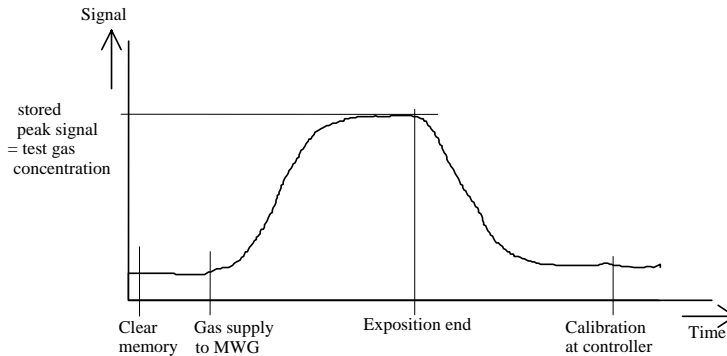
The GMA 104 allows to check and adjust the sensitivity by means of a peak value memory. The memory activates itself, after the menu  of the relevant channel has been activated for 2,5 minutes. The GMA 104 displays the activated peak value memory by a flashing display.

### Check and adjustment of sensitivity without a peak value memory

1. Activate the service mode A.
2. Use keys  and  to select menu point  of the relevant channel.
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.
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. (See page 12)

## Check and adjustment of the sensitivity with peak value memory

This adjustment uses the possibility of the GMA 104, to store the highest signal value that has been delivered during the test gas supply. The stored peak values can be used as a reference of sensitivity. Figure 2 shows this course of events:



1. Activate service menu A
2. Use keys **TEST** **MENU** **▲** and **QUIT** **MENU** **▼** to select menu point **□** of the relevant channel.
3. After 1,5 minutes supply zero gas to the transmitter and keep gas supply steady for at least 3 min.



**The supply of test gas has to be carried out in good time before beginning with the activation of the memory. This is necessary to avoid wrong measurement values through an increase in pressure while opening the pressure seal of the gas bottle.**

4. Disconnect the test gas from the transmitter
5. Use keys **▲** and **▼** to set the parameter value to the concentration of your test gas.
6. Store the parameters (see page 12)

## Settings in menu B

### Alarm Threshold Hysteresis








This function allows to adjust 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 alarm activation below:

	Alarm 1	Alarm 2	Alarm 3
<b>Alarm threshold</b>	= 20 % LEL	= 40 % LEL	= 60 % LEL
<b>Alarm activation</b>	≥ 20 % LEL	≥ 40 % LEL	≥ 60 % LEL
<b>Alarm deactivation</b>	≤ 18 % LEL	≤ 36 % LEL	≤ 54 % LEL










Adjustment of deactivation point:

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. (see next below)

### Activation /Deactivation of channels

This function allows to activate or deactivate single channels. This is useful, if a defect transmitter has to be taken out of the monitoring system or if for the time being just 2 transmitters shall be established and then later more detection points shall be added.

#### Activation / Deactivation:

1. Activate service menu B.
2. Use keys  and  to select menu point  for the relevant channel , ,  or .
3. Use key  to activate the channel and  to deactivate the channel.






**A deactivation of all channels is not possible, one channel always stays active.**

4. Store the parameter (see below)

### 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 GMA 104 stores all changed parameters and returns to detection mode.



**If the menu B is left with “storage confirmation”, all active alarms and fault reports are deleted.**

**or**

**No storage:** Press key , and the GMA 104 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

According to the „Guidelines for Explosion Protection“, „UVV Gases“ and DIN 31051, „maintenance“ stands for maintenance, inspection and repair of gas warning equipment. Appropriate measures are described in the information sheet T 023 of BG Chemie. The function test must be done before putting into operation and at least once a year, and checks:

- the zero point and the sensitivity (calibration)
- the response time
- the activation of gas and fault alarms

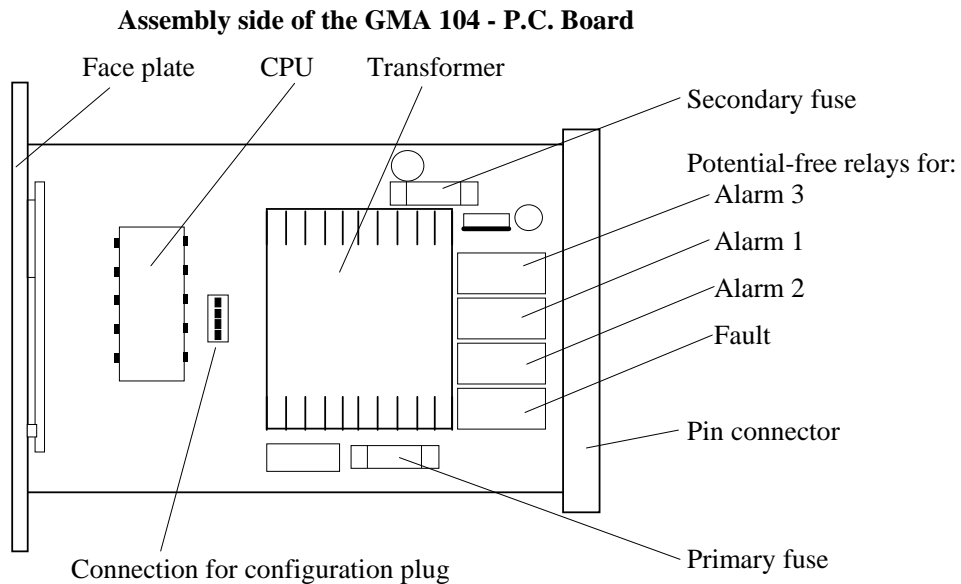
This test has to be done by an expert, and a written result must be filed.

## Service and Inspection

Maintenance and inspection describe those measures, which retain the nominal status of the gas warning system. They include a regular check and adjustment of sensitivity and zero point. In addition to this, the working order of the system is to be checked as well. Inspection intervals should not exceed 16 weeks. We recommend calling GfG's service for the regular maintenance.

## P.C. Board of the GMA 104

Die GMA 104 is designed as a 19" slide-in controller.



**Fig. 3**

## Solder side of the GMA 104 - P.C. Board

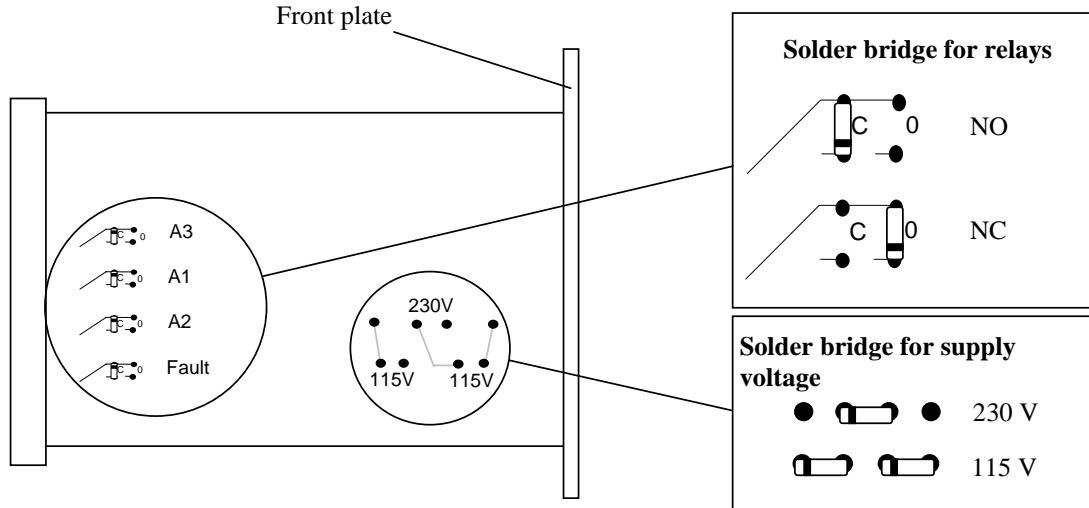


Fig. 4

### Changing of Relay Contacts

On the reverse side of the GMA 104 main p.c. board you find for every relay two assembly positions for SMD resistors. The position of the resistors decides on whether the relevant relay is a NC contact or a NO contact. On the p.c. board the assembly positions are marked "O" (NC contact) resp. "C" (NO contact), and the relevant relays are marked "A1", "A2", "A3" and "FAULT". Fig. 4 shows all relays assembled as NO contacts.

### Adaptation of Mains Voltage

On the reverse side of the GMA 104 main p.c. board you find three marked assembly positions for SMD resistors (fig. 4). Here the mains voltage is set to either 230 V or 115 V by either one or two 0  $\Omega$  SMD bridges. Should you wish to change this setting, you have to change the primary fuse as well.

#### Primary fuse:

For 230 V configuration:      **80 mA T fuse**

For 115 V configuration:      **160 mA T fuse**

### 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 and putting into operation

The GMA 104 controller must not be installed in explosion endangered areas. The correct multiplexer is plugged on the back of the GMA 104 motherboard (back panel). The transmitter and the mains supply are connected to the motherboard according to the terminal diagram. Make sure that the shield of the transmitter cable is already grounded in the cable gland. Inside the wall mount casing or the cabinet the transmitter cable should be laid separately from other control and mains cable. In case the cable shield cannot be grounded in a cable gland (e.g. in a cabinet), the shield is to be grounded directly behind its entry into the cabinet. The mains supply for the GMA 104 is generally to be fed over a mains filter (e.g. FN 610). This filter should also be mounted and grounded close to the cable entry. The GMA 104 controller is grounded over the motherboard and the conductive rack bars. The rack, therefore, must be conductively connected to the casing. Once the GMA 104 is mounted into a casing, 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 sensor. **Only experts are authorized to put the GMA 104 and the transmitters into operation.**

### Transmitter cable

The GMA 104 controller and the transmitters 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. For detailed information please refer to the operation manual of your transmitter.

## Accessories

<b>Casing:</b>	Different sizes of wall mount casings are available for sliding in different quantities of control modules
<b>Relay Module:</b>	This module plugs on the motherboard (back panel) and groups the logic outputs of several control modules for a collective gas or fault alarm
<b>Key-operated Switch Module:</b>	This module allows, like the relay module, to control a collective alarm. In addition to this, it provides the possibility of alarm suppression, e.g. during service or maintenance. You just have to make sure that the alarm devices are connected to the relays of the key-operated switch module.
<b>Battery Back-up:</b>	The gas monitoring system GMA 104 is optionally available with a battery back up.

## Remarks concerning the Technical Safety of the GMA 104

### Contact Protection

Mains supply and relay contacts of the GMA 104 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“ blinks	- 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 zero point adjustment	- Adjust the zero point, calibrate
Display <input type="text"/> <input type="text"/> <input type="text"/> LED „S F“ is lit	- Display over range (> 999) - ADC over range - stored over range	- If there is a gas-free atmosphere at the transmitter, you can reset the stored measurement value
Display <input type="text"/> <input type="text"/> <input type="text"/> LED „S F“ is lit	- Display deviation (< -99) - ADC range deviation - Cable cut	- Check calibration of transmitter and GMA controller - Check cable

## Spare parts

	Description	Article number
1.	primary fuse T 0,08 A (pack of 5)	2121301
2.	primary fuse T 0,16 (pack of 5)	2121302
3.	primary fuse T 0,5 A (pack of 5)	2121303

## Service address

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

### GfG Instrumentation

1194 Oak Valley Drive, Suite 20

Ann Arbor, MI 48108

Phone: 734-769-0573

Fax: 734-769-1888

E-Mail: info@gfg-inc.com



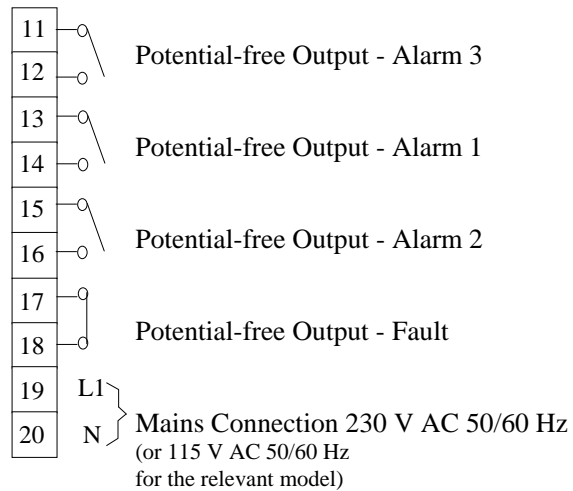
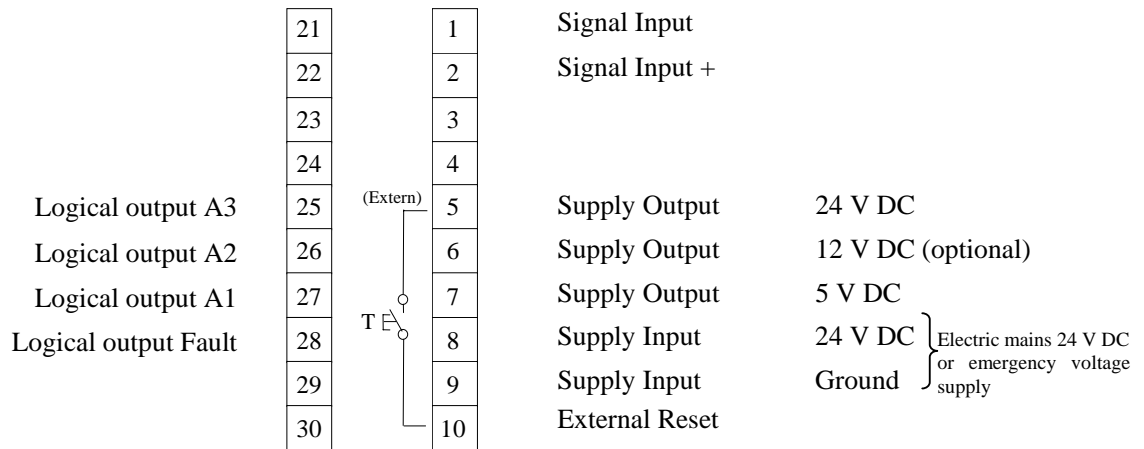
## GMA 104 - Gas List

Gas Nr.	Gas	Chemical formular	GMA Nr
1	Aceton	CH <sub>6</sub> O	1
2	Acetonitril	C <sub>2</sub> H <sub>3</sub> N	2
3	Acetylene	C <sub>2</sub> H <sub>2</sub>	3
4	Acrylnitril	C <sub>3</sub> H <sub>3</sub> N	4
5	Aminopropan	C <sub>3</sub> H <sub>9</sub> N	5
6	Ammonia	NH <sub>3</sub>	<b>nh3</b>
7	Amylalcohol	C <sub>5</sub> H <sub>12</sub> O	7
8	Benzin 60/95	Mixture	8
9	Benzin 80/110	Mixture	9
10	Benzin (fuel)	Mixture	10
11	Benzol	C <sub>6</sub> H <sub>6</sub>	11
12	Combustible gases/vapors	Mixture	12
13	Bromtrifluormethane (Halon)	C Br F <sub>3</sub>	13
14	Butadien - 1.3	C <sub>4</sub> H <sub>6</sub>	14
15	n-Butane	C <sub>4</sub> H <sub>10</sub>	<b>but.</b>
16	i-Butane	(CH <sub>3</sub> ) <sub>3</sub> CH	16
17	Butanol - 1	C <sub>4</sub> H <sub>10</sub> O	17
18	Butanon - 2	C <sub>4</sub> H <sub>8</sub> O	18
19	n-Butylacetate	C <sub>6</sub> H <sub>12</sub> O <sub>2</sub>	19
20	i-Butylacetate	C <sub>6</sub> H <sub>12</sub> O <sub>2</sub>	20
21	n-Butylalcohol	C <sub>4</sub> H <sub>10</sub> O	21
22	1-Butylene	C <sub>4</sub> H <sub>8</sub>	22
23	Chlorine	Cl <sub>2</sub>	<b>CL2</b>
24	Chloromethane	CH <sub>3</sub> Cl	24
25	Hydrogen chloride	HCl	<b>HCL</b>
26	Hydrogen cyanide	HCN	<b>hcn</b>
27	Cyclohexane	C <sub>6</sub> H <sub>12</sub>	27
28	Cyclopentane	C <sub>5</sub> H <sub>10</sub>	28
29	Cyclopropane	C <sub>3</sub> H <sub>6</sub>	29
30	Dichlordifluoromethane (R12)	C Cl <sub>2</sub> F <sub>2</sub>	30
31	1.1 Dichloroethane	C <sub>2</sub> H <sub>4</sub> Cl <sub>2</sub>	31
32	Dichlorfluoromethane (R21)	CH Cl <sub>2</sub> F	32
33	Dichloromethane	CH <sub>2</sub> Cl <sub>2</sub>	33
34	1.2 Dichloropropane	C <sub>3</sub> H <sub>6</sub> Cl <sub>2</sub>	34
35	Diethylamin	C <sub>4</sub> H <sub>11</sub> N	35
36	Dimethylether	C <sub>2</sub> H <sub>6</sub> O	36
37	Epichlorhydrin	C <sub>3</sub> H <sub>5</sub> Cl O	37
38	Natural gas (H+L)	Cn Hm, N <sub>2</sub>	38
39	Ethane	C <sub>2</sub> H <sub>6</sub>	39
40	Ethanol	C <sub>2</sub> H <sub>5</sub> OH	<b>Eol.</b>
41	Ethylacetate	C <sub>4</sub> H <sub>8</sub> O <sub>2</sub>	41
42	Ethylalcohol	C <sub>2</sub> H <sub>6</sub> O	42
43	Ethylene	C <sub>2</sub> H <sub>4</sub>	43
44	Ethylen oxide	C <sub>2</sub> H <sub>4</sub> O	44
45	FAM-Benzin	Mixture	45
46	Jet fuel 40/180	Mixture	46
47	Formaldehyde	CH <sub>2</sub> O	47
48	Frigen 22	CH Cl F <sub>2</sub>	<b>r22</b>
49	Helium	He	49
50	Heptane	C <sub>7</sub> H <sub>16</sub>	50
51	n-Hexane	C <sub>6</sub> H <sub>14</sub>	51
52	i-Hexane	C <sub>6</sub> H <sub>14</sub>	52
53	Hexanon-2	C <sub>6</sub> H <sub>12</sub> O	53
54	Isobutylacetate	C <sub>6</sub> H <sub>12</sub> O <sub>2</sub>	54

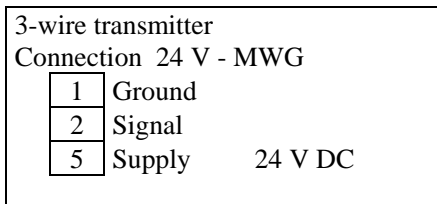
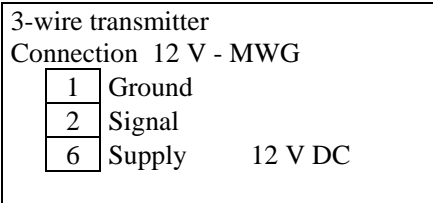
Gas Nr.	Gas	Chemical formula	GMA Nr
55	Carbon dioxide	CO <sub>2</sub>	<b>CO2</b>
56	Carbon monoxide	CO	<b>CO</b>
57	Coal gas	CO, CH <sub>4</sub> , H <sub>2</sub>	57
58	Air	N <sub>2</sub> , O <sub>2</sub> , CO <sub>2</sub>	58
59	Methane	CH <sub>4</sub>	<b>CH4</b>
60	Methanol	CH <sub>4</sub> O	60
61	Methylacetate	C <sub>3</sub> H <sub>6</sub> O <sub>2</sub>	61
62	Methylalcohol	CH <sub>3</sub> OH	62
63	Methylbutylketon	C <sub>6</sub> H <sub>12</sub> O	63
64	Methylchloride	CH <sub>3</sub> Cl	64
65	Methylene chloride	CH <sub>2</sub> Cl <sub>2</sub>	65
66	Methyl-i-butylketon	C <sub>6</sub> H <sub>12</sub> O	66
67	Methylethylketon	C <sub>4</sub> H <sub>8</sub> O	67
68	Methylglycol	C <sub>3</sub> H <sub>8</sub> O <sub>2</sub>	68
69	Methylmethacrylat	C <sub>5</sub> H <sub>8</sub> O <sub>2</sub>	69
70	Methylpropanol	C <sub>4</sub> H <sub>10</sub> O	70
71	Monochlordifluoromonobrom.	C Br Cl F <sub>2</sub>	71
72	n-Nonane	C <sub>9</sub> H <sub>20</sub>	<b>non.</b>
73	i-Octane	C <sub>8</sub> H <sub>18</sub>	73
74	n-Octane	C <sub>8</sub> H <sub>18</sub>	74
75	i-Pentane	C <sub>5</sub> H <sub>12</sub>	75
76	n-Pentane	C <sub>5</sub> H <sub>12</sub>	76
77	Pentanon-2	C <sub>5</sub> H <sub>10</sub> O	77
78	Penten-1	C <sub>5</sub> H <sub>10</sub>	78
79	Pentylacetate	C <sub>7</sub> H <sub>14</sub> O <sub>2</sub>	79
80	Perchloroethylene	C <sub>2</sub> Cl <sub>4</sub>	80
81	Propane	C <sub>3</sub> H <sub>8</sub>	<b>Pro.</b>
82	Propanol-2	C <sub>3</sub> H <sub>8</sub> O	82
83	i-Propylacetate	C <sub>5</sub> H <sub>10</sub> O <sub>2</sub>	83
84	n-Propylacetate	C <sub>5</sub> H <sub>10</sub> O <sub>2</sub>	84
85	n-Propylalcohol	C <sub>3</sub> H <sub>8</sub> O	85
86	i-Propylalcohol	C <sub>3</sub> H <sub>8</sub> O	86
87	Propylene	C <sub>3</sub> H <sub>6</sub>	87
88	Propylenedichloride-1.2	C <sub>3</sub> H <sub>6</sub> Cl <sub>2</sub>	88
89	Oxygen	O <sub>2</sub>	<b>O2</b>
90	Sulphur dioxide	SO <sub>2</sub>	<b>SO2</b>
91	Sulphurhexafluoride	SF <sub>6</sub>	91
92	Hydrogen sulfide	H <sub>2</sub> S	<b>H2S</b>
93	Town gas	CO, CH <sub>4</sub> , H <sub>2</sub>	93
94	Nitrogen dioxide	NO <sub>2</sub>	<b>no2</b>
95	Nitrogen monoxide	NO	<b>no</b>
96	Styrene	C <sub>8</sub> H <sub>8</sub>	96
97	Tetrachloroethane	C <sub>2</sub> Cl <sub>4</sub>	97
98	Toluene	C <sub>7</sub> H <sub>8</sub>	98
99	1.1.1-Trichloroethane	C <sub>2</sub> H <sub>3</sub> Cl <sub>3</sub>	99
100	Trichloroethylene	C <sub>2</sub> HCl <sub>3</sub>	100
101	Trifluoromethane (R23)	CH F <sub>3</sub>	101
102	Vinyl acetate	C <sub>4</sub> H <sub>6</sub> O <sub>2</sub>	102
103	Vinyl chloride	C <sub>2</sub> H <sub>3</sub> Cl	103
104	Hydrogen	H <sub>2</sub>	<b>H2</b>
105	Water gass	H <sub>2</sub> , CO, CH <sub>4</sub>	105
106	Xylene	C <sub>8</sub> H <sub>10</sub>	106
107	Ozone	O <sub>3</sub>	107

**Chart 1 - GfG-Gas List**

# Terminal Diagram Motherboard

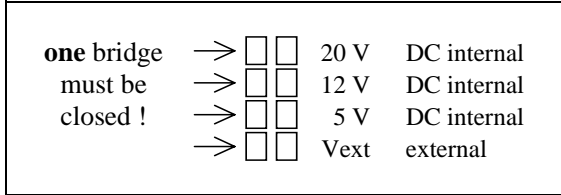


## Connection of Transmitter Cable to Motherboard

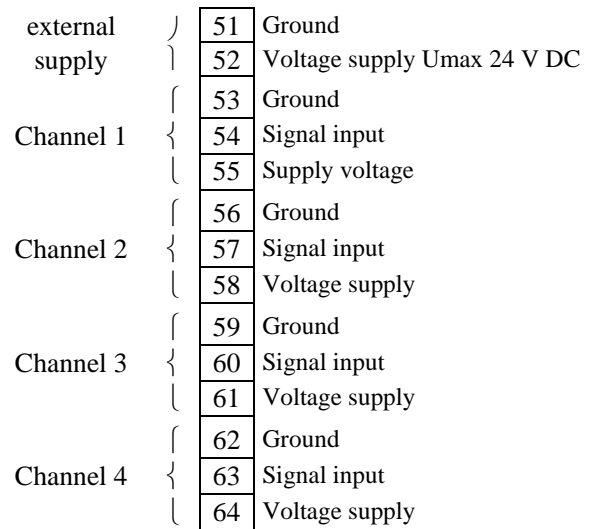
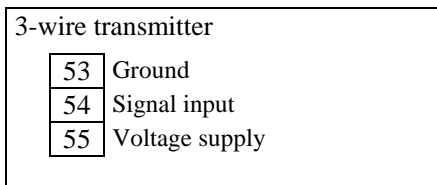
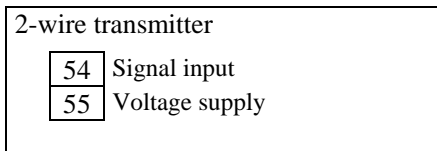


# Terminal Diagram - Multiplexer

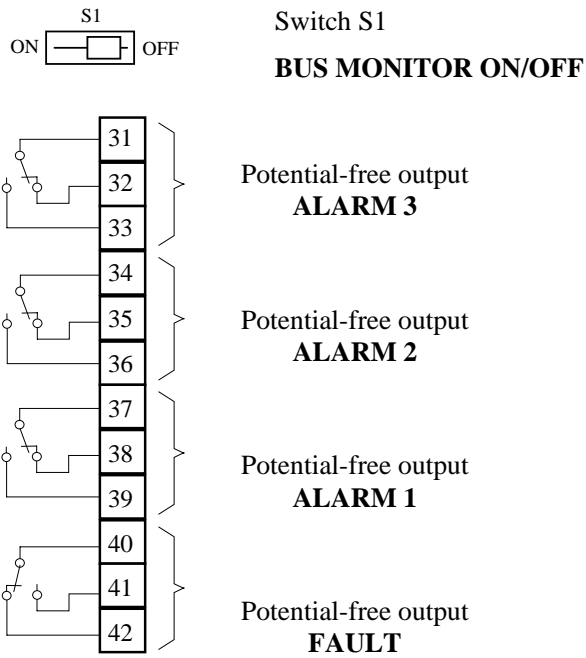
## Solder bridge



## Connection of transmitters



# Terminal Diagram Relay Module



The above shown switch positions of the contacts refer to an operating system without gas or fault alarm.

## Technical Data

<b>Control Module GMA 104</b>	for 19" slide-in rack slots
Type:	GMA 104,
Dimensions:	Height: 129 mm, Width: 35.2 mm, Depth 160 mm (175 mm with socket bar)
<b>Current Supply</b>	
Operational voltage:	1. 24 V DC (U <sub>in</sub> ) 2. 115 V / 60 Hz or 230 V / 50Hz
Power consumption:	max. 11 W at 24 V DC max. 13 W at 230 V and 115 V
Primary fuse:	T 0.08 A (for 230 V), T 0.16 A (for 115 V) G-fuse
Secondary fuse:	T 0.50 A G-fuse
<b>Climate Conditions</b>	
for operation:	-10 ... +55 °C, 0 ... 99 % r. h., 700 ... 1300 hPa
recommended storage conditions for GMA 104, accessories, spares:	-25 ... +50 °C, 0 ... 90 % r. h.
<b>Transmitter Connection</b>	
Transmitter	4 transmitter of the same kind and same detection range
Transmitter connection:	2-, or 3-wire transmitters
Current supply output:	5, 12, 24 V DC
Input signals:	4 .. 20 mA, 0.2 .. 1 mA
<b>Outputs</b>	
Sensor signal display:	0.2 .. 1 mA max. deviation: 0.2 .. 0.5 mA ± 0,02 mA > 0.5 mA + 0,05 mA
	4 .. 20 mA max. deviation: 4 .. 10 mA ± 0,4 mA > 10 mA + 1 mA
Relays (104R units):	max. switch voltage 250 V AC 50/60 Hz or 250 V DC max. switch current 4 A AC/DC max. switch power 1000 VA AC or voltage dependant 50 .. 200 W DC Relay outputs and mains connection are operation insulated
Logical outputs:	4 open collector outputs for Alarm 1, Alarm 2, Alarm 3, Fault operation allowed on low safety voltage only max. switch voltage 30 V max. switch current 100 mA
External reset:	high active 3 ... 24 V DC (input resistance 11 kΩ)
Connector:	DIN 41612 form F
<b>Safety</b>	
Protection:	DIN 40050 - IP30 (controller in 19" rack) DIN 40050 - IP00 (individual controller)
Protective separation:	by means of safety transformer type: KLF-EN 14VA PRI 2x115V / SEC 2x18V 50-60Hz
Protective insulation:	acc. to EN 61010 up to over voltage category III and soiling degree 2
Manufacturers declaration	The GMA 104 is in accordance with the EMV regulation 89/336/EWG and the low tension regulation 73/23/EWG

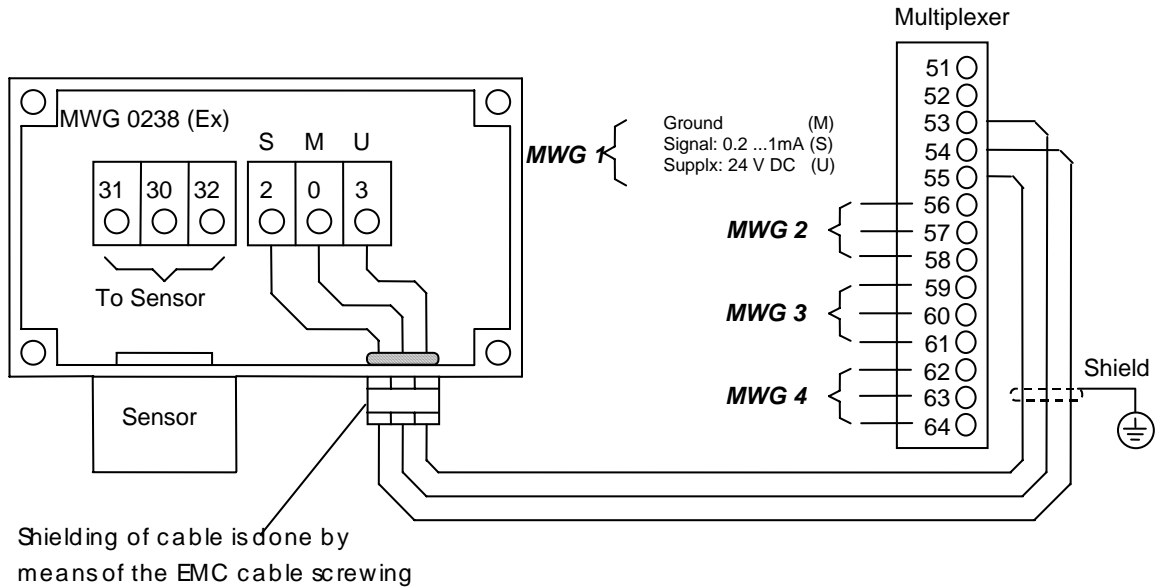
# Annex

## Terminal Diagram of Transmitters

Connection of transmitter CC 0238 EX (type MWG 0238 Ex)

The CC sensors are designed as 3-wire transmitters. The supply voltage and the 0.2 ... 1 mA output signal use the same ground line. Cable type e.g. 3 conductor 18 gauge shielded (up to 200 m).

Connection of transmitters 2 to 4 is to be done as for transmitter 1 (see below).

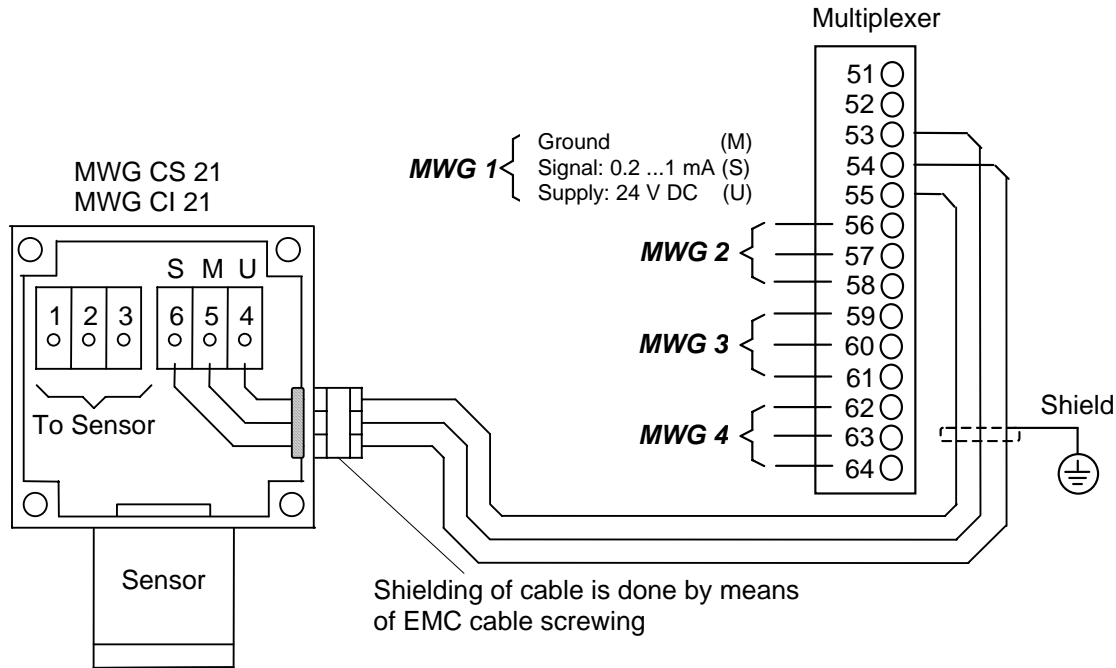


## Transmitter CS21, CI21 & ZD 21

These transmitters are designed as 3-wire transmitters.

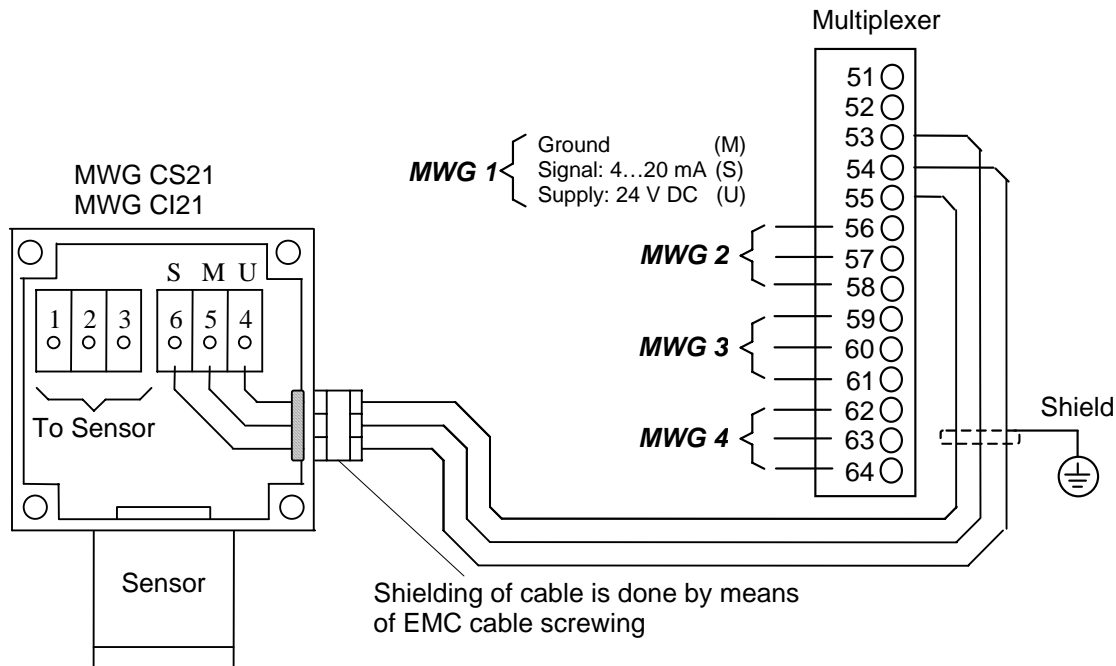
### **0.2 - 1mA output signal**

The supply voltage and the 0.2 - 1mA output signal use the same ground line. Cable type: 3 conductor 18 gauge shielded (up to 200m). Connection of transmitters 2 to 4 is to be done as for transmitter 1 (see below).



### **4 - 20mA output signal**

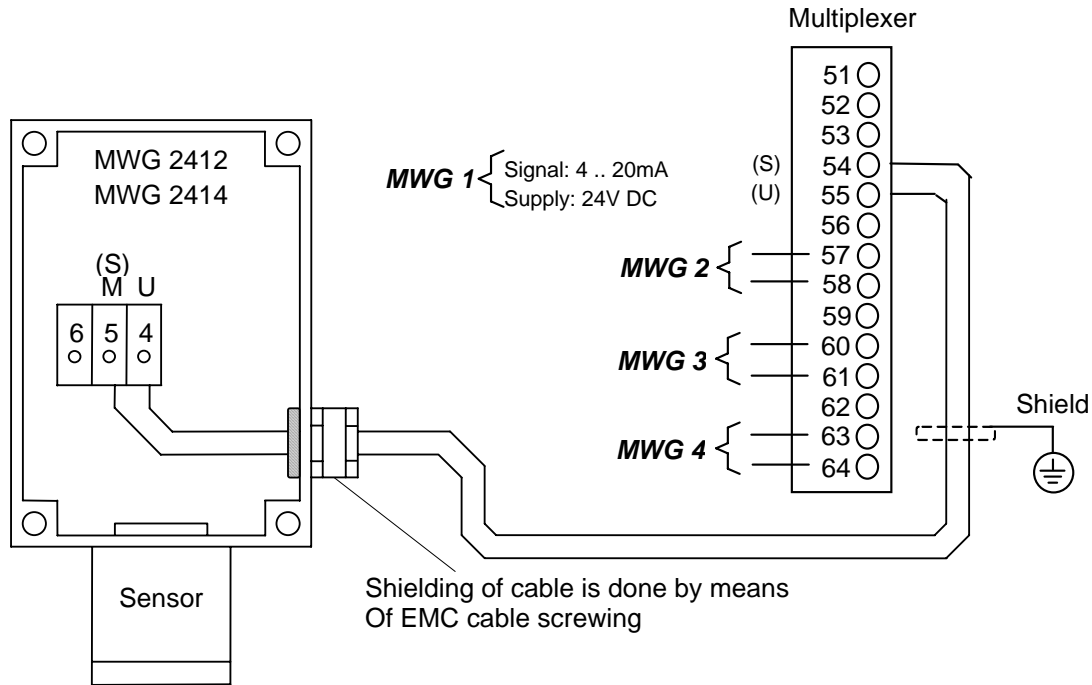
The supply voltage and the 4 - 20mA output signal use the same ground line. Connection of transmitters 2 to 4 is to be done as for transmitter 1 (see below).



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

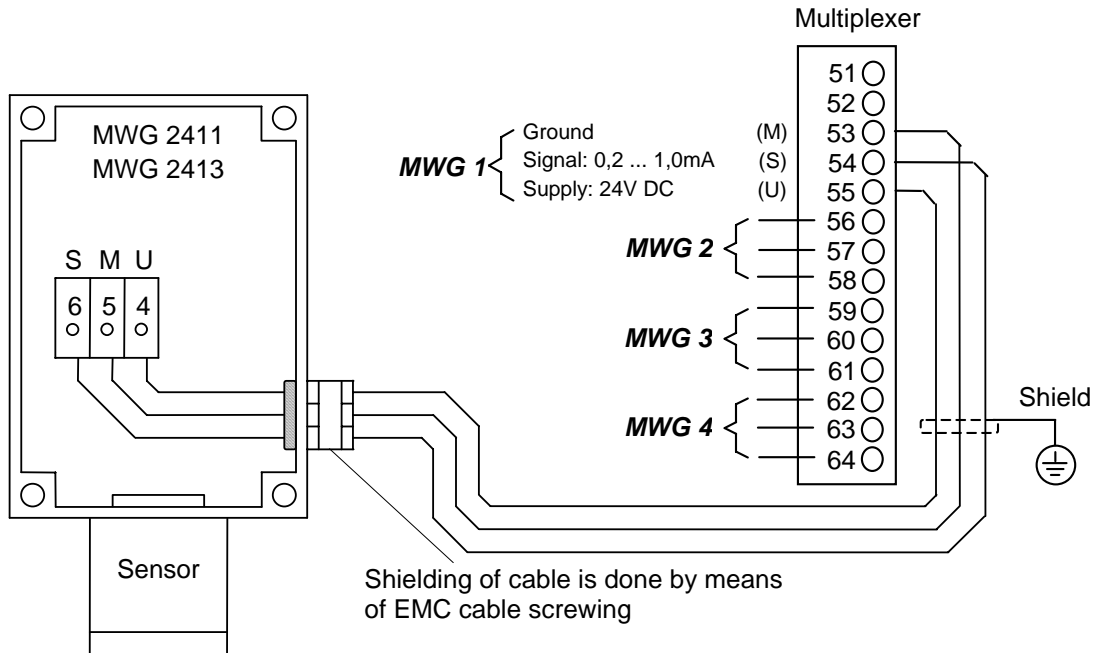
**4 - 20mA output signal**

The EC sensors MWG 2412 and MWG 2414 are designed as 2-wire transmitters. The 4 - 20 mA output signal is provided via the supply line. Connection of transmitters 2 to 4 is to be done as for transmitter 1 (see below).



**0.2 - 1mA output signal**

The EC sensors 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. Connection of transmitters 2 to 4 is to be done as for transmitter 1 (see below).





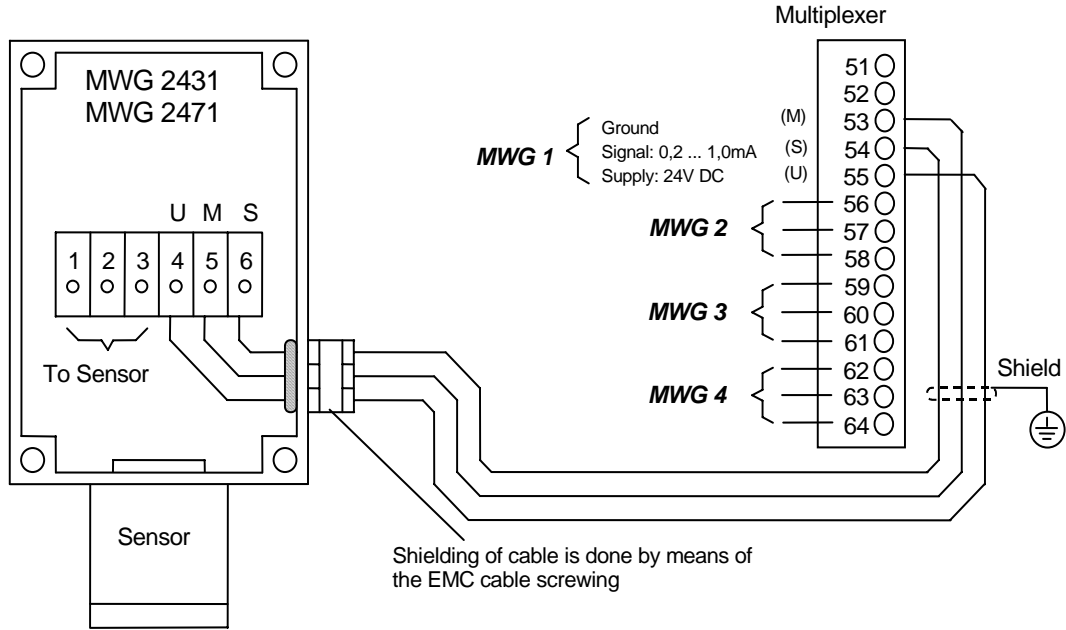
**Transmitter CC 24 EX (models MWG 2431 and 2432)**

**Transmitter CS 24 EX (models MWG 2471 and 2472)**

**0.2 - 1mA output signal**

The CC sensors MWG 2431 and the CS sensor MWG 2471 are designed as 3-wire transmitters. The supply voltage and the 0.2 - 1mA output signal use the same ground line.

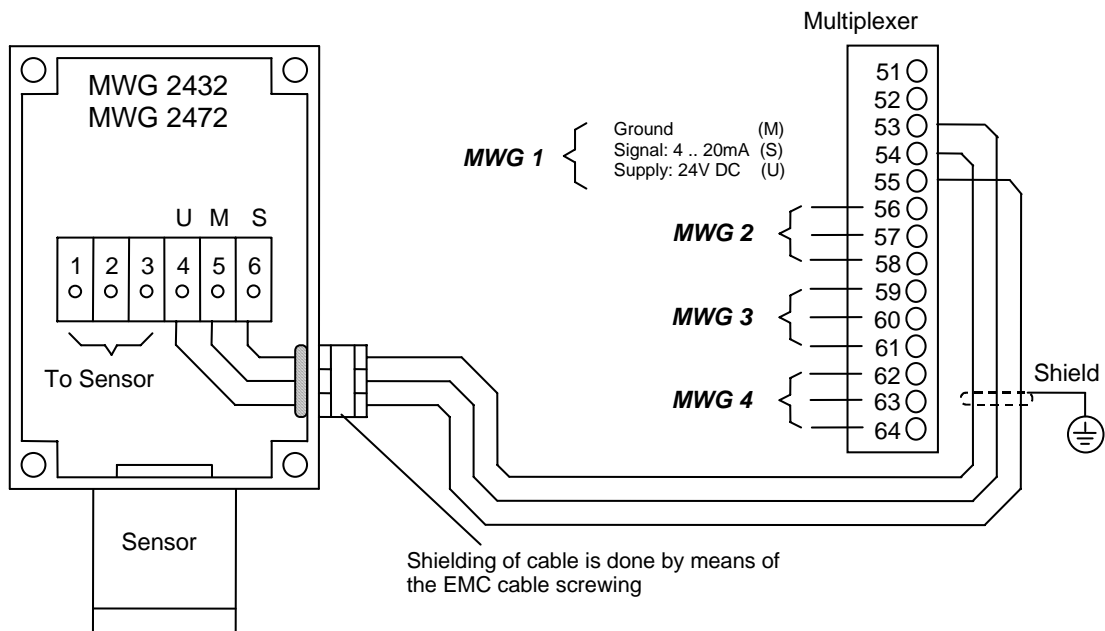
Connection of transmitters 2 to 4 is to be done as for transmitter 1 (see below).



**4 - 20mA output signal**

The CC sensor MWG 2432 and the CS sensor MWG 2472 are designed as 3-wire transmitters. The supply voltage and the 4 - 20mA output signal use the same ground line.

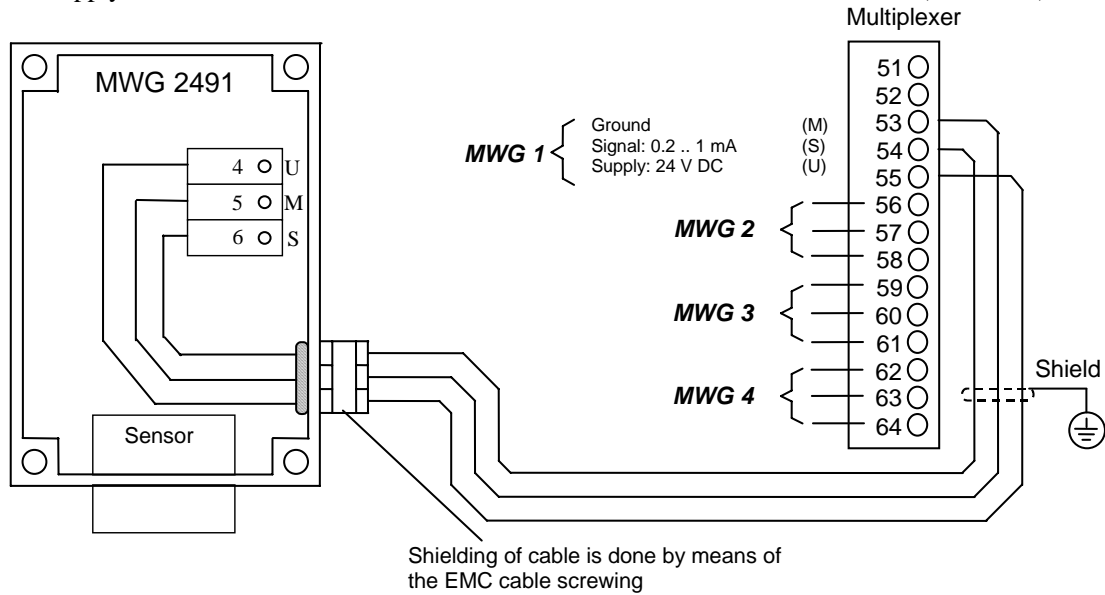
Connection of transmitters 2 to 4 is to be done as for transmitter 1 (see below).



## Transmitter IR 24 (type MWG 2491 and 2492)

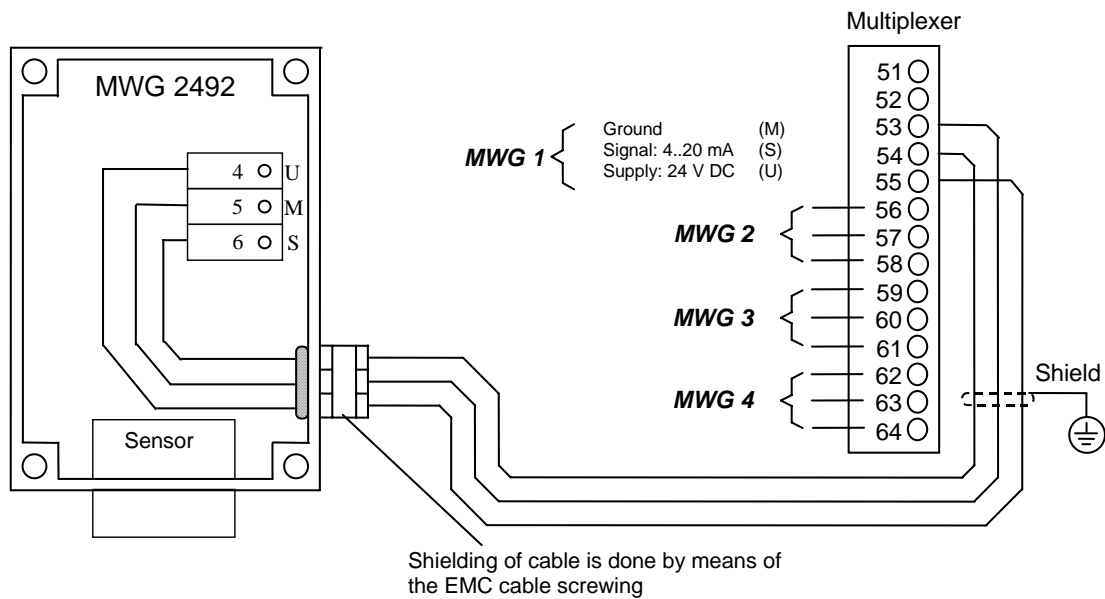
### 0,2 .. 1 mA output signal

The IR sensor MWG 2491 is designed as 3-wire transmitters. The 4 .. 20 mA output signal is provided via the supply line. Connection of transmitters 2 to 4 is to be done as for transmitter 4 (see below).



### 4 .. 20 mA output signal

The IR transmitter MWG 2492 is designed as 3-wire transmitter. The 4 .. 20 mA output signal is provided via the supply line. Connection of transmitters 2 to 4 is to be done as for transmitter 4 (see below).



**Transmitter EC 25 (models MWG 2502, 2504, 2501 and 2503) without Ex-Barrier**

**4 - 20mA output signal**

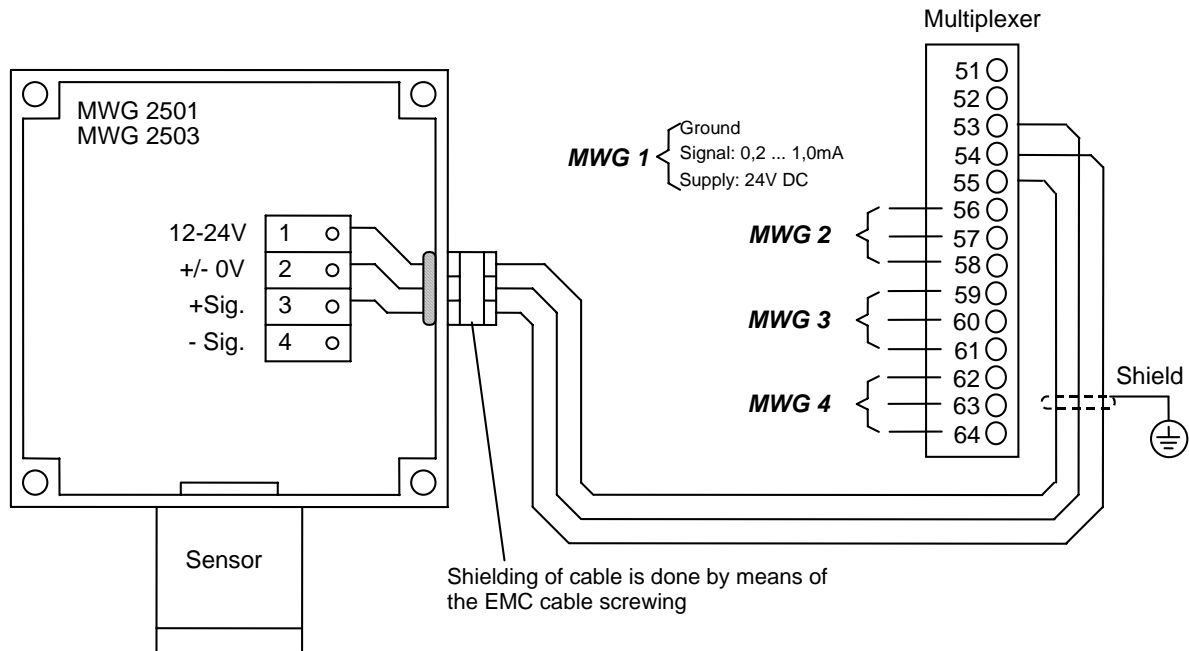
The EC sensors MWG 2502 and MWG 2504 are designed as 2-wire transmitters. The 4 - 20mA output signal is provided via the supply line. Connection of transmitters 2 to 4 is to be done as for transmitter 1 (see below).



**0.2 - 1mA output signal**

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

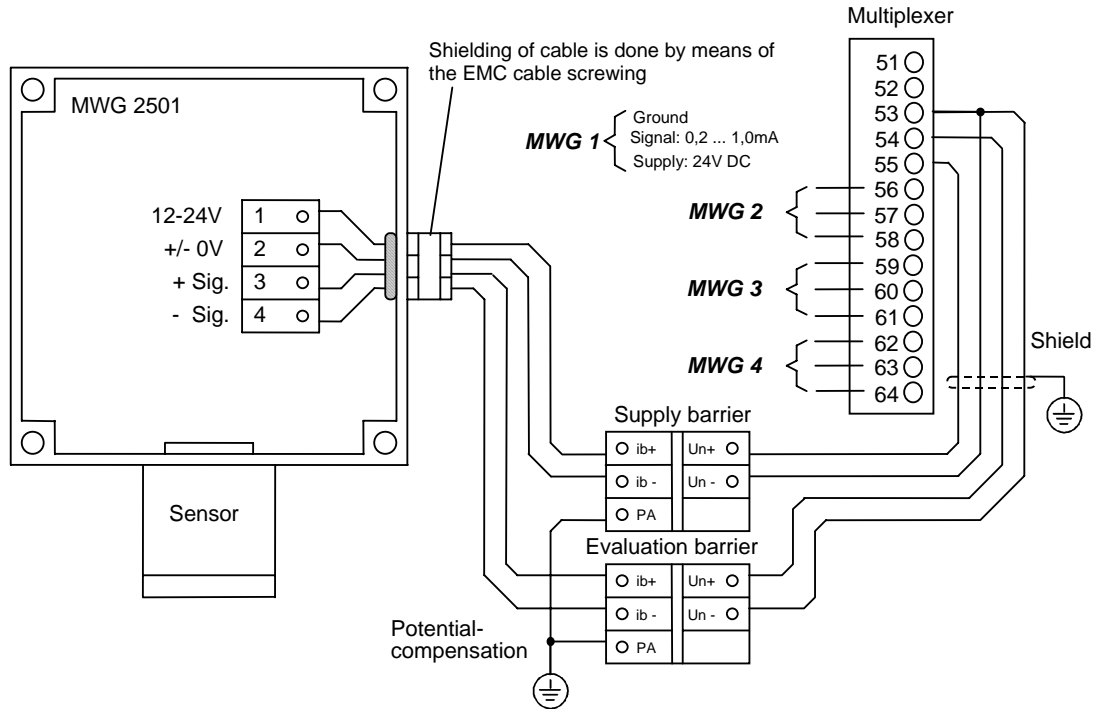
Connection of transmitters 2 to 4 is to be done as for transmitter 1 (see below).



## Transmitter EC 25 EX (model MWG 2501) with Ex-Barrier

### 0.2 - 1mA output signal

The EC sensor MWG 2501 is designed as 4-wire transmitter. Supply and signal lines are separated. The transmitter is considered as 4-pole. For reasons of explosion protection, Ex barriers are linked between transmitter and GMA 104 both in the supply lines and in the signal lines. Connection of transmitters 2 ... 4 is to be done as for transmitter 1 (see below).





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