



GfG Instrumentation
Worldwide Supplier of Gas Detection Solutions

GMA 304

Type GMA 300-4

Operation Manual

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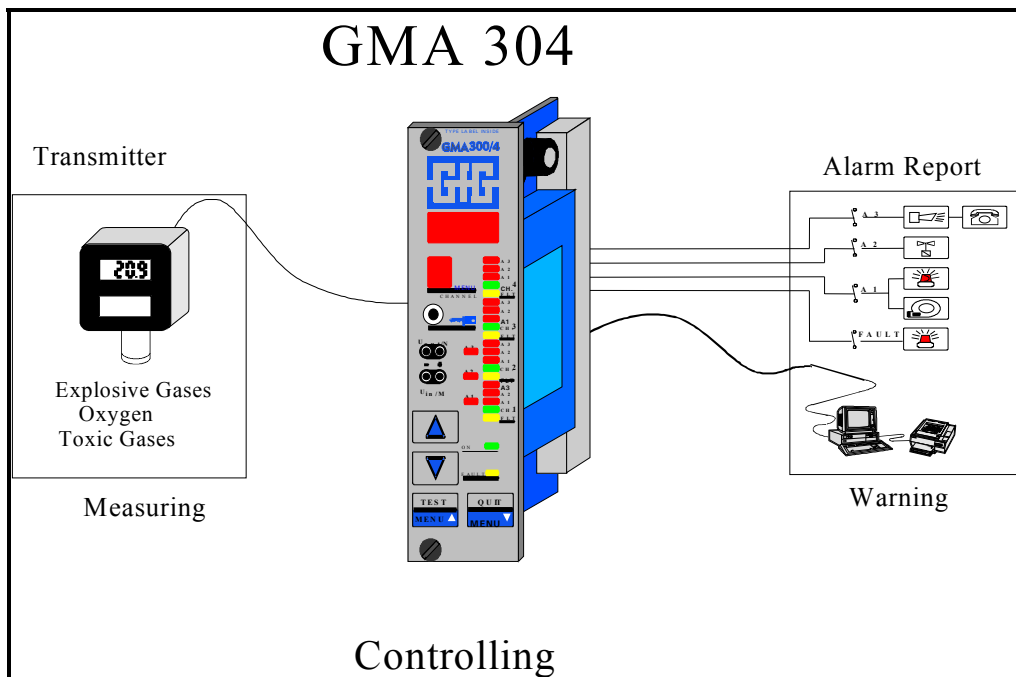
Introduction

Each detection point of your fixed gas monitoring system consists of a transmitter and a control module, which are connected by means of a transmitter cable. The GMA 304 powers up to 4 transmitters and receives and processes their sensor signals. It monitors the ambient air for the presence of toxic or combustible gases and vapors or for its oxygen content.

The GMA 304 is a development from the GMA 100 and offers an additional variety of features, which allow to adapt the gas monitoring system to your specific requirements:

- Connection of up to 4 transmitters to only one controller.
- Sensor signal filter and linearization.
- CAN bus for data transfer to a computer.
- Alarm for rapid rise of the gas concentration, even before pre-set levels are exceeded.
- Variable setting of three gas alarm thresholds.
- Time delay for the alarms.
- De-activation of alarms only when the relative threshold is deviated (alarm hysteresis).
- Relays for alarms and failure.
- Leveling of sensor signals to avoid false alarms.
- 4 - 20 mA analog output signal.

You can set all functions by just using the front keypad and the LED display.



The GMA 304 continuously provides information on the measured gas concentration, exceeded alarm thresholds and the operational status of every transmitter connected. As soon as the gas concentration exceeds one of the

three pre-set levels, the GMA 304 gives a warning by means of the LED displays and controls the relative alarm relays. In addition to this, the GMA 304 provides all important data as an analog and digital output signal for further evaluation. The GMA 304 is easy to operate and maintenance-free. Should unexpected failures or system faults occur, the automatic failure recognition allows a quick and specific service.

Application and purpose

In combination with the connected transmitters, the GMA 304 forms a fixed gas monitoring system for continuous measurement of the gas concentration and for the warning from combustible gases and vapours in the LEL range, toxic gases, and oxygen deficiency in the ambient air.

A function and accuracy test of the GMA 304 is currently being done by "DMT-Gesellschaft für Forschung und Prüfung, Essen" for the use as a warning system for hazards from explosible gas mixtures. The test is 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".

For your safety

Like any piece of complex equipment, the GfG GMA 304 will do the job designed to do only, if it is used and serviced in accordance with the manufacturer's instructions. 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 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.

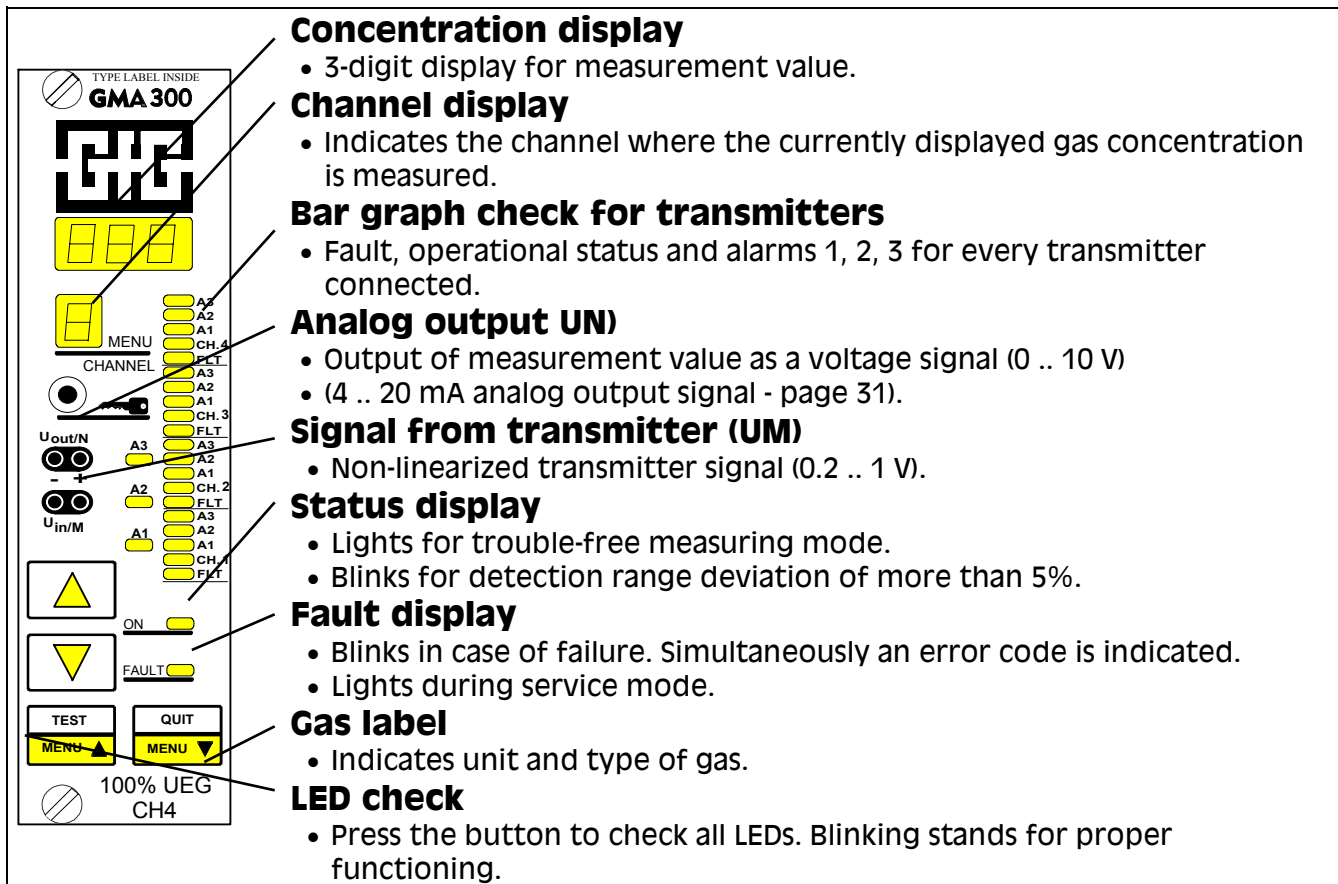


Strictly note:

For the set parameters of the supplied GMA 304 please refer to the test report. Changing functions or parameters may affect the certification. Please call for GfG's service to adapt your system to your specific requirements.

Measuring mode

During the measuring mode all important data are permanently indicated by means of LEDs.



Gas alarm

The GMA 304 provides 3 alarm thresholds, which are variably adjustable over the whole detection range. Gas alarm is activated, if the measurement value exceeds (EX and TOX) or falls below (OX) a pre-set level.

Alarm indicators for every transmitter

- Light for exceeded alarm threshold of the transmitters (non-latching).

Alarm indicators A1 A2 A3

- Blink, if the pre-set levels have been exceeded resp. fallen below.

Alarm reset

- Blink, if the pre-set levels have been exceeded resp. fallen below.
- Press **QUIT** to reset the alarm indicators and their relays. The relays react according to the respective display (see "relays", page 30).

In standard range the alarms react as follows:

Alarm 1 A1

- Blinks for gas alarm.
- Lights during gas alarm after having been reset.
- Goes out, if gas concentration falls below the threshold, even if not reset.

Alarm 2 A2

- Blinks for gas alarm.
- Lights during gas alarm after having been reset.
- Alarm status remains valid even if gas concentration falls below threshold.
- Can only be reset, if gas concentration has fallen below the alarm threshold.

Alarm 3 (= buzzer relay) A3

- Blinks for gas alarm.
- Alarm status remains valid even if gas concentration falls below threshold.
- Goes out after reset, even if alarm threshold is still exceeded.

Switching on

After switching the system on, allow 1 to 5 minutes (depending on the detection range) for:

- The self-test, which checks all important functions (approximately 10 seconds),
- The warm-up time of the transmitters connected.

Once the warm-up is completed, the GMA 304 automatically returns to the measuring mode.



Should the GMA 300 be re-started after a mains failure, allow the same warm-up time as above. The alarm is only evaluated after the warm-up is completed.

Check of zero point

1. Supply zero gas to one transmitter or make sure that the ambient air is free from interfering gases.
 - Please refer to the operation manual of your transmitter.
 - Zero gas is a test gas without any combustible or interfering components.
2. Wait until the display is stabilized.
3. Check the voltage signal U_M of every channel.
 - U_M should be 0.2 V. should you notice a deviation of more than $\pm 15 \%$, adjust the output signal of the transmitter first (refer to the operation manual of your transmitter).

4. Check the display at the GMA 304 controller. Should the display be different from "0", adjust the zero point (page 14).

Check of sensitivity

1. Use keys  and  to select the channel which is requested for the calibration check.
2. Go to the service mode by plugging the black service key into the service lock (page 9). In the service mode the alarms are suppressed.
3. Put the calibration adapter on the transmitter.
 - For details please refer to the operation manual of your transmitter.
4. Supply standard test gas to the transmitter.
5. Check the display at the GMA controller. Should the display be different from your test gas concentration, re-calibrate the system (page 14).
6. Remove the service key.

Note: You do not need to go to the service mode to check the sensitivity. Be aware, however, that the alarms are activated when you supply test gas to the transmitter.

Cleaning

Use a soft, damp cloth to clean the faceplate and the indicator elements.



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 T023 of "BG Chemie". A function test is to be effected before the system is put into operation and at least once a year, with inspectional checks to be effected in intervals of maximum 16 weeks. Following functions are to be checked:

- Zero point and sensitivity (calibration),
- Response time,
- Alarm activation,
- Fault signal.

This test has to be done by an expert, and a written test result must be filed. We recommend to sign a service contract with your local GfG service for regular maintenance.

Service mode

In the service mode you can select and change all important parameters of your GMA 304. Plug the black service key into the lock to activate the service mode. To change parameters of individual transmitters, use the keys  and  and select the respective channel.

Service keys

You need a service key to select and change the parameters. For safety reasons there are 3 different keys with different access permissions, allowing more or less parameters to be displayed or altered. The service keys are color-coded:

| | | |
|-------------------------|-------|---------------------|
| 1. Information key | BLACK | Customer's key |
| 2. Standard service key | BROWN | for skilled service |
| 3. Special service key | GREEN | personnel only |

The GMA 304 is always supplied with the customer's key (black). The special service key (green) gives access to many parameters, which can only be changed in the special range (page 30).

Display in service mode

Parameter display

- Indicates the presently selected parameter value.

Menu point display

- Before entering the service mode, it indicates the channel number for which any parameter changes are valid.
- During the service mode it indicates the menu point for the displayed parameter value.

Service lock

- Plug the service key in to enter the service mode.

LED "FAULT"

- Lights during service mode (no failure indication).










Keys for selecting channels and for changing parameters.

Keys for selecting menu points resp. for storing of new parameters.

The diagram shows the GMA 300 control panel with the following components labeled:

- TYPE LABEL INSIDE** and **GMA 300** logo at the top.
- A large **parameter display** (yellow) showing '888'.
- A **menu point display** (yellow) showing 'E'.
- A **service lock** (keyhole) with a key inserted.
- A **LED "FAULT"** (yellow triangle).
- Buttons for **channel selection** (A3, A2, A1, CH.4, CH.3, CH.2, CH.1, FLT) and **parameter selection** (A3, A2, A1, CH.1, CH.2, CH.3, CH.4, FLT).
- Buttons for **menu selection** (MENU ▲ and MENU ▼).
- Buttons for **TEST** and **QUIT**.
- Buttons for **ON** and **FAULT**.
- Buttons for **100% UEG** and **CH4**.

Selecting and changing of parameter values

| | Action | Keys | Display | Note |
|----|----------------------------------|--|---|--|
| | Selection of transmitter channel |  and  | Menu point display indicates the selected channel | If you do not plug in a service key within about one minute, the display automatically returns to the measuring mode |
| 1. | Entering the service mode |  Plug service key into service lock | LED " FAULT " lights | Alarm relays keep their switching position |
| 2. | Select menu point |  and  | Menu point display | Functions and adjustments (page 10 ff) |
| 3. | Set new parameter |  and  | Parameter display | Functions and adjustments (page 10 ff) |
| 4. | Store parameter |  +  simultaneously | " STO " (store) in parameter display | All parameters changed remain their previous value, if they are not stored |
| 5. | Return to measuring mode | Remove service key | As in measuring mode | GMA 304 returns automatically to measuring mode |



Storing saves **ALL** changed parameters - even those which were changed in previous menu points. Should you have changed a parameter by mistake, remove the service key from the service lock to give all parameters their initial values.

Functions and adjustments

Alarm thresholds


The alarm thresholds are those levels, which are pre-set at the GMA 304 controller and which activate the warning in case they are exceeded or fallen below. The alarm thresholds can be variably adjusted over the whole detection range. According to its adjustment, every threshold controls a relay, which can be used for external alarm devices. In addition to this, the DIP switches (page 29) allow to set the following alarm features:





- Warning for exceeded or fallen below alarm thresholds,
- Latching alarm,
- Alarm resettable or non-resettable in case of gas alarm.

The alarm settings are the same for all transmitters connected.



Adhere to the regulations for your specific monitoring site when setting the alarm thresholds.

| | |
|----------------------|---|
| Service key |  |
| (to read and change) | BLACK |
| | BROWN |
| | GREEN |

| | Menu   | Parameter   | Standard adjustment |
|-------------------|---|--|---------------------|
| Alarm threshold 1 | R 1 | within detection range | customer specific |
| Alarm threshold 2 | R 2 | within detection range | customer specific |
| Alarm threshold 3 | R 3 | within detection range | customer specific |

Time-delayed alarms

This function delays the activation and de-activation of the alarms (figure 1). The activation delay prevents a warning from gas concentrations only exceeding the thresholds for a very short time. The de-activation delay prevents an alarm reset, if the gas concentration falls below the pre-set threshold for a short time only.

The delays can be set between 0 seconds and 100 minutes. The display reads the time in Minutes.Seconds (M.SS for T < 10 min resp. MM.S for T > 10 min).

The time delay is valid for each of the connected transmitters.

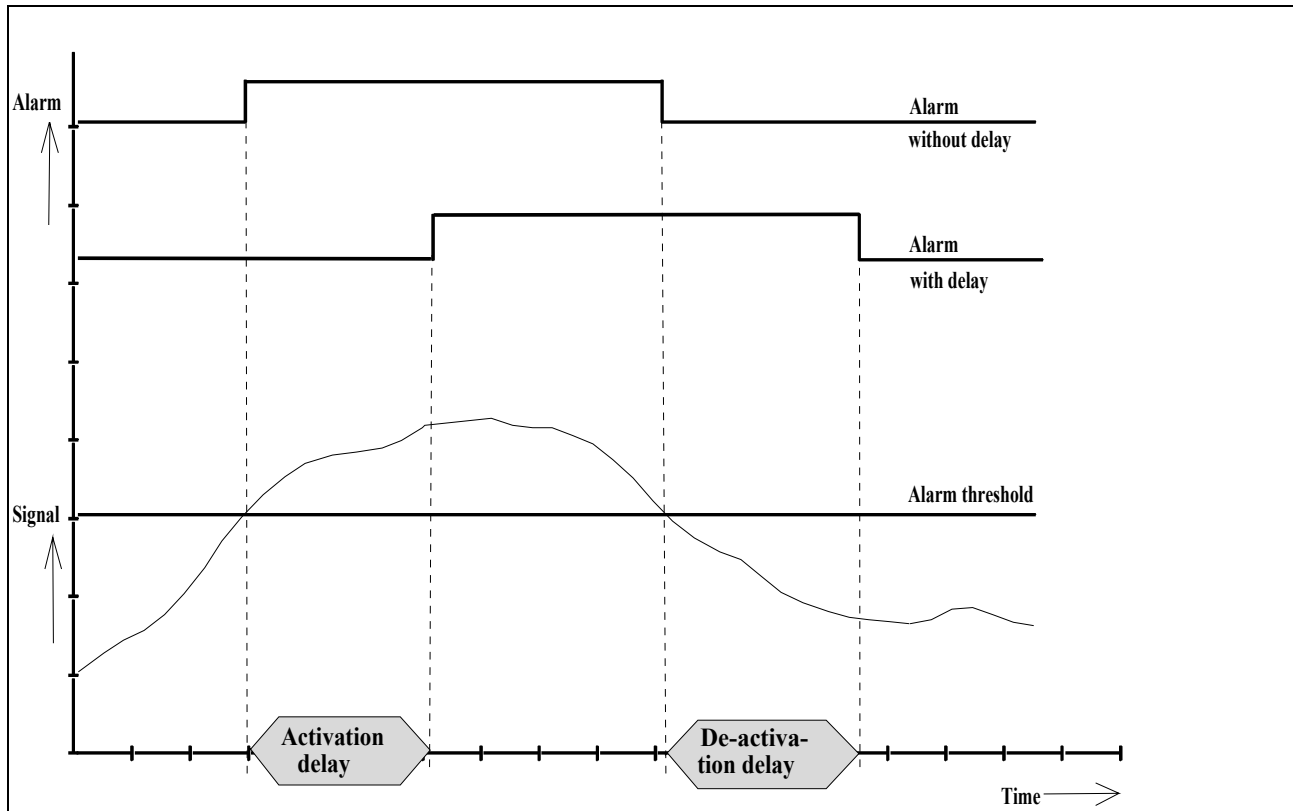



















Figure 1

| | |
|----------------------|---|
| Service key |  |
| (to read and change) | GREEN |

| | Menu   | Parameter   | Standard adjustment |
|-------------------------------|---|--|---------------------|
| Activation delay - Alarm 1 |   | 0 s to 100 min | 0 |
| De-activation delay - Alarm 1 |   | 0 s to 100 min | 0 |
| Activation delay - Alarm 2 |   | 0 s to 100 min | 0 |
| De-activation delay - Alarm 2 |   | 0 s to 100 min | 0 |
| Activation delay - Alarm 3 |   | 0 s to 100 min | 0 |
| De-activation delay - Alarm 3 |   | 0 s to 100 min | 0 |

Early recognition of gas alarm – Delta alarm

- Available for GMA 300 only -

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. The concentration does not need to reach the pre-set alarm threshold (figure 2).

You can set parameters for:

1. The change in concentration defining the alarm activation (delta concentration). This value is adjustable over the whole detection range.
2. The time interval, during which the delta concentration (see 1. above) may change (delta time). This interval can be set between 1 and 30 seconds:
 - Between 0 and 5 seconds in steps of 1 second.
 - Between 5 and 30 seconds in steps of 5 seconds.

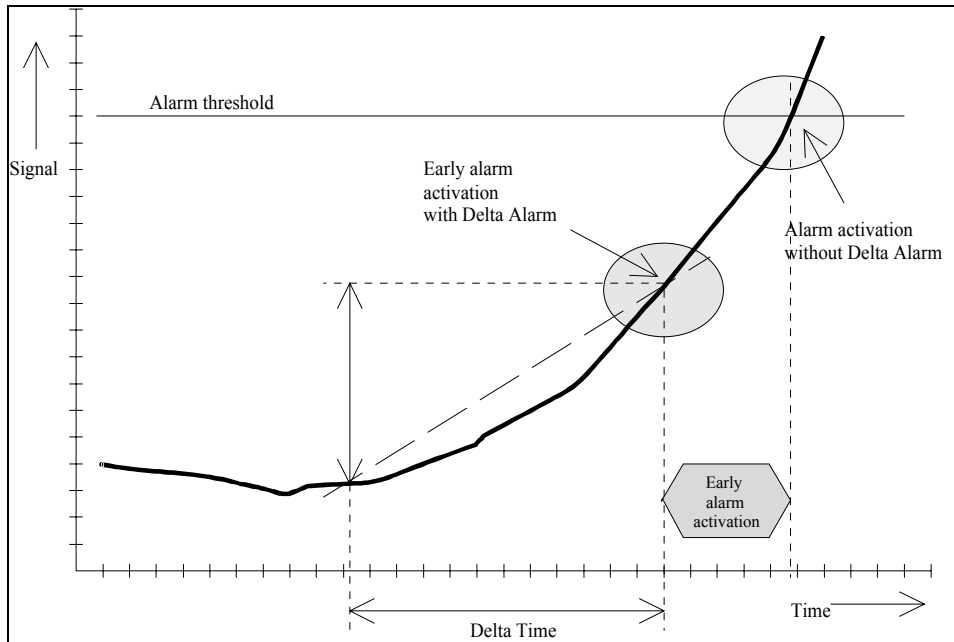


Figure 2

Alarm hysteresis


Use this function to adjust the alarm threshold hysteresis from 0 .. 10 % of the detection range. The hysteresis is the same for all alarms. The parameter is set in the unit of gas.





Example:

The hysteresis of a GMA 304, measuring gas in the ppm range, is set to 5 ppm. This results in the following:

| | Alarm 1 | Alarm 2 | Alarm 3 |
|------------------|----------------|----------------|----------------|
| Alarm threshold | = 50ppm | = 70ppm | = 150ppm |
| Alarm activation | ≥ 50ppm | ≥ 70ppm | ≥ 150ppm |
| Alarm reset | < 45ppm | < 65ppm | < 145ppm |

The set hysteresis is valid for each of the connected transmitters.

| | |
|---------------------|---|
| Service key |  |
| (to read and change | BROWN |
| | GREEN |

| | Menu   | Parameter   | Standard adjustment |
|------------------|---|--|---------------------|
| Alarm Hysteresis | H | 0 to 10 % of the detection range in the pre-set unit of gas | customer specific |

Standard calibration

The standard calibration is used to adapt the detection range of the controller exactly to the input signal (figure 2).

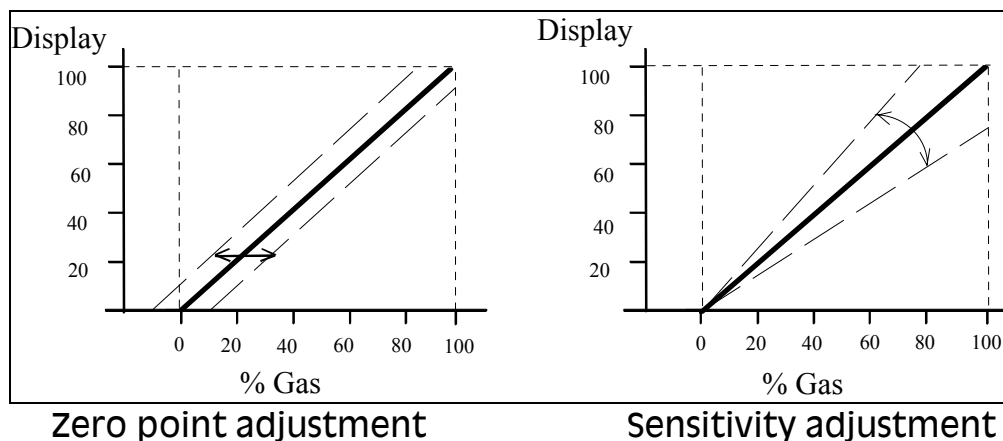




















Figure 3


Zero point adjustment







1. Use keys  and  to select the channel of that transmitter, which is to be calibrated.
2. Go to the service mode by plugging the service key into the service lock (page 9).
3. Supply zero gas to the transmitter or make sure that the ambient air is free from interfering gases.
 - Zero gas is a test gas without any combustible or interfering components.
 - For details please refer to the operation manual of your transmitter.
4. Wait until the display is stabilized.
5. Check the voltage signal U_M .
 - U_M should be 200 mV. If it is deviated by more than $\pm 15 \%$, correct the output signal of the transmitter first. Please refer to the operation manual of your transmitter.

6. Use keys  and  to select menu point "  ".
7. Use keys  and  to set the parameter value to 0.
8. Press keys  +  simultaneously to store the parameter value.
9. Remove service key.

Calibration point

1. Make sure that the zero point has been adjusted first.
2. Use keys  and  to select the channel of that transmitter, which is to be calibrated.
3. Put the calibration adapter on the transmitter.
 - For details refer to the operation manual of your transmitter.
4. Go to the service mode by plugging the service key into the service lock (page 9).
5. Supply standard test gas to the transmitter.
6. Wait until the display has stabilized.
7. Use keys  and  to select menu point "  ".
8. Use keys  and  to set the parameter value to the concentration of your standard test gas.
9. Press keys  +  simultaneously to store the parameter value.
10. Remove service key.

| | |
|----------------------|---|
| Service key |  |
| (to read and change) | BLACK |
| | BROWN |
| | GREEN |

| | Menu   | Parameter   | Standard adjustment |
|--------------------------------------|---|---|---------------------|
| Zero point adjustment |  | within detection range | 0 |
| Sensitivity adjustment (calibration) |  | within detection range | (pre-calibrated) |

Automatic calibration

This calibration uses the GMA 304 feature to store the highest and lowest signal value seen during the measuring mode. Thus the minimum and peak values can be used as zero point resp. calibration point. Figure 4 shows this calibration procedure. The advantage of the automatic calibration is that one man can do the calibration of transmitters which do not offer at site adjustment possibility.

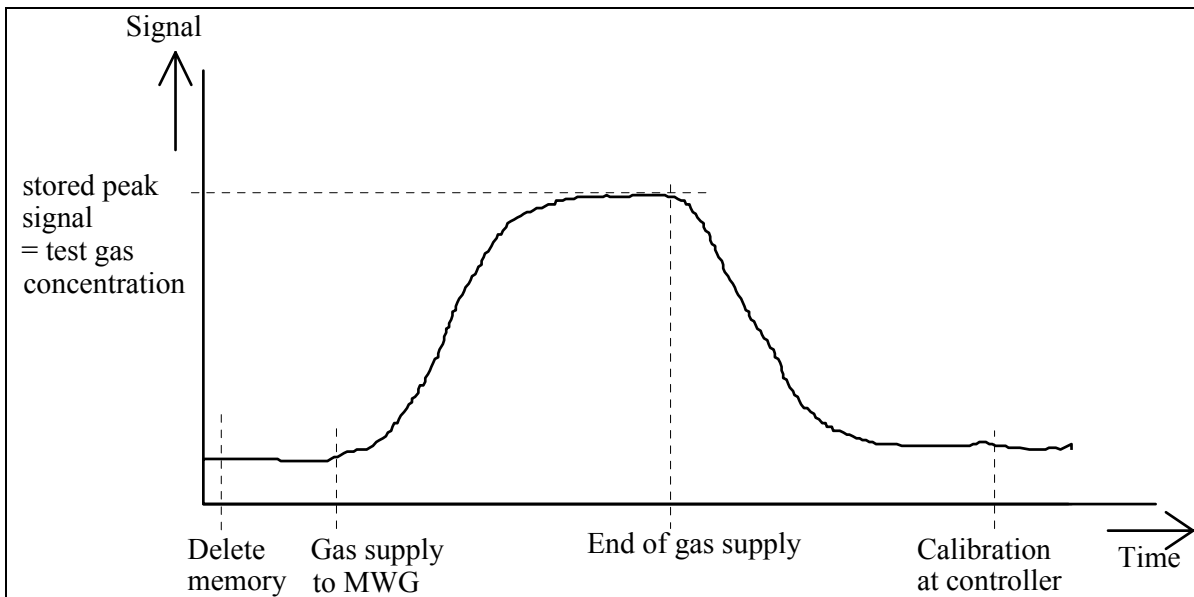


Figure 3

A calibration with stored values is done as follows:









1. Delete the old values by plugging the service key into the service lock and remove it again.
2. Use keys and to select the channel of that transmitter, which is to be calibrated.
3. Supply zero gas resp. test gas to the transmitter.



The highest resp. lowest signal value is stored. A calibration error may occur, if during the gas supply the signal exceeds or falls below the test gas concentration. As this might result in a false calibration of the system, make sure that the gas is supplied steadily.


4. Go to the service mode by plugging the green service key into the service lock.
5. Save the stored minimum and peak values as zero point resp. calibration point.
 - 5.1 To define the minimum signal as zero point:
 - Select menu point .
 - Use keys and to set the zero gas concentration.
 - 5.2 To define the peak signal as calibration point:
 - Select menu point .
 - Use keys and to set the calibration point.
6. Press keys + simultaneously to store the new parameters.







| | |
|----------------------|-------|
| Service key | |
| (to read and change) | GREEN |

| | Menu   | Parameter   | Standard adjustment |
|-----------------------|---|--|---------------------|
| Stored minimum signal |   | within detection range | pre-calibrated |
| Stored peak signal |   | within detection range | pre-calibrated |

Unit of gas


Now the display reads the unit of gas.







| | |
|----------------|---|
| Service key |  |
| (Only to read) | BLACK |
| | BROWN |
| | GREEN |

| | Menu   | Parameter   | Standard adjustment |
|-------------|---|--|---------------------|
| Unit of gas |   | ---, ppm, Vol%, %UEG (or %LEL), ppb, $\mu\text{g}/\text{m}^3$ | customer specific |

Type of gas


The type of gas is indicated either as a chemical formula or as an abbreviation or as a number from the GfG gas list. The type of gas is the same for each of the transmitters connected.






| | |
|----------------|---|
| Service key |  |
| (Only to read) | BLACK |
| | BROWN |
| | GREEN |

| | Menu   | Parameter   | Standard adjustment |
|-------------|---|--|---------------------|
| Type of gas |   | (GfG gas list, page 37) | customer specific |




Filter time constant


This filter can be used for leveling very unstable signals. The parameter determines the time considered for calculating the average from the measured values. This time is set in steps of 1 second, with a maximum of 10 seconds. Please keep in mind that the response times (T_{90}) are extended accordingly. The filter time constant is the same for each of the connected transmitters.






| | |
|----------------------|---|
| Service key |  |
| (to read and change) | BROWN |
| | GREEN |

| | Menu   | Parameter   | Standard adjustment |
|----------------------|---|--|---------------------|
| Filter time constant |  | 0 .. 10 seconds | 0 |

Zero point band



This parameter determines by how much the zero point may change without this change being displayed. The display reads "0", unless the measurement value is beyond the programmed zero point (tolerance) band. The actual measurement value is displayed when pressing the keys  resp. . Press  to re-activate the zero point band. In case you do not hit any key, the zero point band re-activates automatically after one minute. The zero point band is the same for each of the connected transmitters.

| | |
|----------------------|---|
| Service key |  |
| (to read and change) | BROWN |
| | GREEN |


| | Menu   | Parameter   | Standard adjustment |
|-----------------|---|--|---------------------|
| Zero point band |  | 0 .. 10 % of detection range | customer specific |






Display accuracy and activity

This parameter defines the accuracy resp. the resolution and the display mode of the 7-segment display. It can be used to adapt the resolution of the display to that of the connected transmitter. You can adjust the resolution in steps of 1, 2, 5, or 10. You can also use this parameter to select one of the following display modes:

1. Display is always activated (parameter = 1, 2, 5, or 10).
2. Display is only temporarily activated (parameter = -1, -2, -5, or -10). Alarm activation or pressing the keys  or  activate the display for the channels 1...4 one after the other.
3. Display is always de-activated (parameter = 0).


A de-activated display is always re-activated in the service mode.






| | |
|----------------------|---|
| Service key |  |
| (to read and change) | BROWN |
| | GREEN |

| | Menu   | Parameter   | Standard adjustment |
|-------------------------------|---|--|---------------------|
| Display accuracy and activity |  | -10, -5, -2, -1, 0, 1, 2, 5, 10 | 1 |

Alarm suppression after re-start


This parameter defines the duration of the stand-by mode. During this time the gas and fault alarms are suppressed, when the processor is re-started. You can set a time between 0 seconds and 100 minutes. The display reads the time in Minutes.Seconds (M.SS for $T < 10\text{min}$ bzw. MM.S für $T \geq 10\text{min}$).






| | |
|----------------------|---|
| Service key |  |
| (to read and change) | BROWN |
| | GREEN |

| | Menu   | Parameter   | Standard adjustment |
|----------------------------------|---|--|---------------------|
| Alarm suppression after re-start |  - | 0 seconds to 100 minutes | 1.00 minute |

Start of detection range

The display reads the value which is equivalent to the NULL input signal, e.g. 0.2 mA resp. 4 mA → Display 000


| | |
|-----------------------|---|
| Service key |  |
| *(to read and change) | GREEN |




| | Menu   | Parameter   | Standard adjustment |
|--------------------------|---|--|---------------------|
| Start of detection range |  | - | 0 |

Full scale

The display reads the full scale value which is equivalent to the full scale input signal,

e.g. 1 mA resp. 20 mA → Display 100

| | |
|----------------|---|
| Service key |  |
| (only to read) | BLACK |
| | BROWN |
| | GREEN |

| | Menu  | Parameter  | Standard adjustment |
|------------|---|--|---------------------|
| Full scale |  | 1 .. 999 | customer specific |


Channels




The GMA 304 controller provides 4 channels to connect one transmitter each. The function "channels" activates those channels with connected transmitters. The display only reads activated channels. Coordination is effected in the binary code.

Examples:

| Parameter | Parameter is equivalent to binary code | Activated channels |
|-----------|--|--------------------|
| 1 | 0 0 0 1 | 1 only |
| 2 | 0 0 1 0 | 2 only |
| 3 | 0 0 1 1 | 1 and 2 |
| | etc., up to | |
| 15 | 1 1 1 1 | 1, 2, 3 and 4 |


During the setting, the activated channels are also displayed by the bargraph: The LEDs for fault and operation are lit for every channel activated.

| | |
|---|-------|
| Service key  | |
| (only to read) | BROWN |
| | GREEN |

| | Menu  | Parameter  | Standard adjustment |
|------------|---|--|---------------------|
| Full scale |  | 1 .. 15 | customer specific |

CAN network address

The address of the CAN bus can be read.

| | |
|---|-------|
| Service key  | |
| (only to read) | BROWN |
| | GREEN |

| | Menu TEST QUIT MENU ▲ MENU ▼ | Parameter (*) ▲ ▼ | Standard adjustment |
|---------------------|------------------------------------|----------------------|---------------------|
| CAN network address | - | 0 to 31 | 0 |

(*) The parameter display reads alternating "CAN" and the parameter value.

DIP Switches

You can read the position of the 16 DIP switches without pulling the controller off the rack. In the standard range the number is displayed as shown in chart 4, **page 35**. In the special range the display reads "SPE". The bar graph display shows the position of the DIP switches (figure 4). A lit LED means that the respective DIP switch is in position "ON".

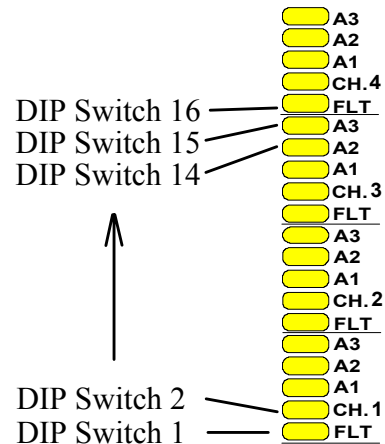


Figure 4

| | |
|----------------|-------|
| Service key | |
| (only to read) | BLACK |
| | BROWN |
| | GREEN |

| | Menu TEST QUIT MENU ▲ MENU ▼ | Parameter (*) ▲ ▼ | Standard adjustment |
|--------------|------------------------------------|----------------------|---------------------|
| DIP Switches | - | 0 to 39 or SPE | (acc. to chart 4) |

(*) The parameter display reads alternating "DIP" and the parameter value.

Summary of parameter settings

| | Menu | Parameter | Standard adjustment | Service key | Page |
|--------------------------------------|----------|---|-----------------------|-------------------|------|
| Unit of gas | | --- , ppm, Vol%, %UEG (%LEL), ppb, $\mu\text{g}/\text{m}^3$ | Specific for customer | All (read only) | 17 |
| Type of gas | | (GfG gas list, page 37) | Specific for customer | All (read only) | 17 |
| Start of detection range | | Within range | 0 | Green (read only) | 19 |
| Full scale | | Within range | Specific for customer | All (read only) | 20 |
| Alarm threshold 1 | | Within range | Specific for customer | All | 10 |
| Alarm threshold 2 | | Within range | Specific for customer | All | |
| Alarm threshold 3 | | Within range | Specific for customer | All | |
| Zero point adjustment | | Within range | 0 | All | 14 |
| Sensitivity adjustment | | Within range | pre-calibrated | All | |
| Stored minimum signal | | Within range | pre-calibrated | Green | 15 |
| Stored peak signal | | Within range | pre-calibrated | Green | |
| <i>Delta concentration - Alarm 1</i> | | <i>Only for GMA 300</i> | | <i>Green</i> | |
| <i>Delta concentration - Alarm 2</i> | | | | <i>Green</i> | |
| <i>Delta concentration - Alarm 3</i> | | | | <i>Green</i> | |
| <i>Delta time (alarm 1 to 3)</i> | | | | <i>Green</i> | |
| Activation delay - Alarm 1 | | 0 s to 100 min | 0 | Green | 12 |
| De-activation delay - Alarm 1 | | 0 s to 100 min | 0 | Green | |
| Activation delay - Alarm 2 | | 0 s to 100 min | 0 | Green | |
| De-activation delay - Alarm 2 | | 0 s to 100 min | 0 | Green | |
| Activation delay - Alarm 3 | | 0 s to 100 min | 0 | Green | |
| De-activation delay - Alarm 3 | | 0 s to 100 min | 0 | Green | |
| Channel | | 0 to 15 | specific for customer | Brown, green | 20 |

| | Menu | Parameter | Standard adjustment | Service key | Page |
|----------------------------------|----------|---------------------------------|-----------------------|--------------------------|------|
| Zero point band | | 0 to 10 % of detection range | Specific for customer | Brown, green | 18 |
| Alarm hysteresis | | 0 to 10 % of detection range | Specific for customer | Brown, green | 13 |
| Display accuracy and activity | | -10, -5, -2, -1, 0, 1, 2, 5, 10 | 1 | Green | 18 |
| Alarm suppression after re-start | (*) | 0 to 100 minutes | 1.00 | Brown, green | 19 |
| CAN Network Address | | CAN - 0 to 31 | 0 | Brown, green (read only) | 20 |
| DIP Switches | | DIP (+ Number) | Specific for customer | All (read only) | 21 |

(*) For two menu point indications the LED display reads them alternating and blinking.

Modification of basic hardware adjustment

The GMA 304 is designed as a 19" control module. Figure 5 shows the main PCB and its important components.

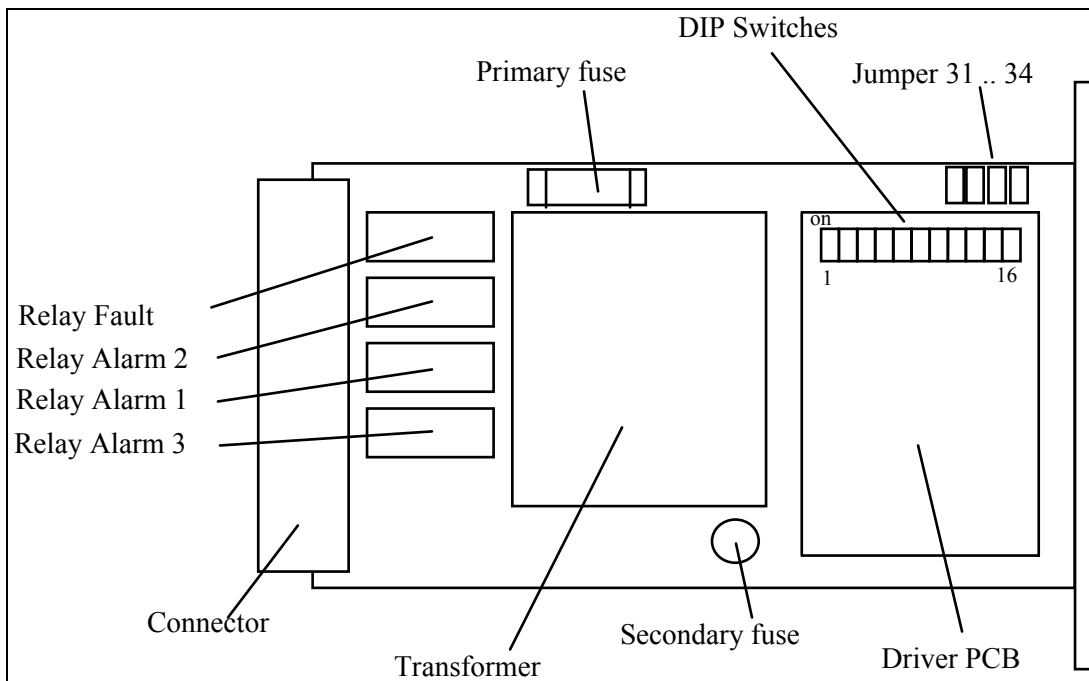


Figure 5

Changing of mains voltage

On the reverse side of the GMA 304 main PCB, close to the primary fuse, you can see three marked line-up positions for SMD resistors (figure 6).

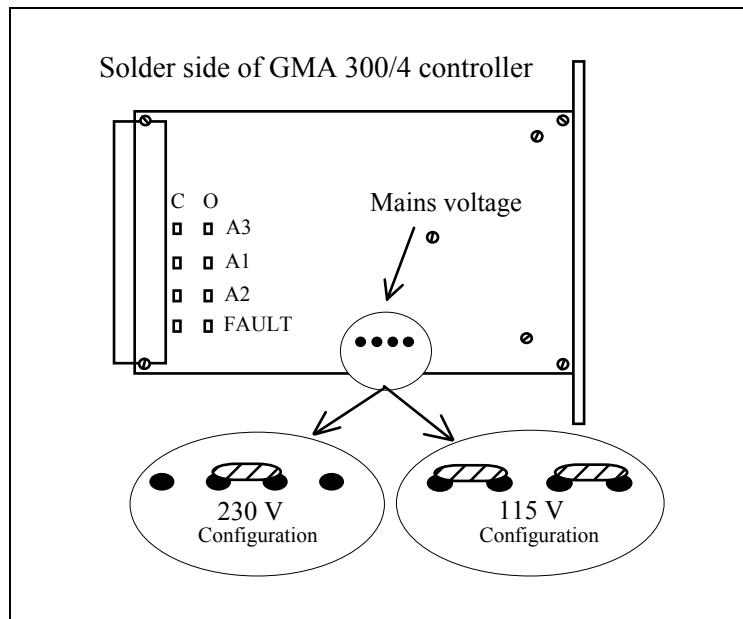


Figure 6

The mains voltage is set by means of one or two $0\ \Omega$ SMD bridges to either 230 V or 115 V. Should the adjustment be changed, you have to change the primary fuse as well.

Primary fuse:

For **220 V** configuration: **80 mA slow** fuse

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

Changing of relay contacts

On the reverse side of the GMA 304 Main PCB, below the relays, you will find eight fixing positions for MiniMelf SMD resistors. The function of the relay contacts is set to either NC or NO contacts by means of four $0\ \Omega$ SMD bridges (Figure 7). The line-up positions on the PCB are marked "O" (open) resp. "C" (close), and the relays are marked "A1", "A2", "A3" and "FAULT". Figure 7 shows all relays with NO contacts.

In standard operation, the fault relay "FAULT" is usually always closed and opens in case of failure or mains failure. The alarm relays "A1", "A2" and "A3" can be either closed or open, which is determined by the DIP switch "16" (standard position "OFF"; see page 29). With the switch in this position, the relays close only in case of an alarm. With the DIP switch in position "ON" the relays open in case of an alarm. Please keep in mind, that in this case the logic outputs are

operated invertedly as well, so you cannot get a collective alarm over the bus tracks.

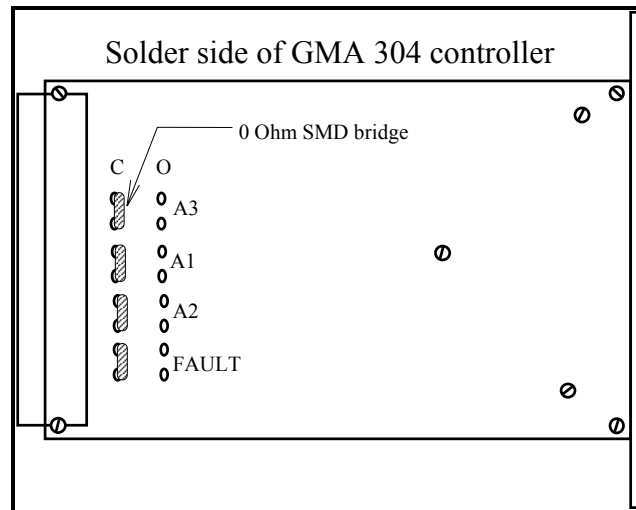


Figure 7

Changing of input signal configuration

On the main PCB of the GMA 304 controller you find four plug-on spaces for the jumpers J31, J32, J33, and J34 (figure 8). With these jumpers you can set the input signal configuration. The plug-on spaces are marked accordingly on the PCB.

In general only two jumpers are fixed: **J32 and J34** for the standard configuration with input signals from **0.2 - 1.0 mA**, and **J33 and J34** for a configuration with input signals from **4 - 20 mA**.

J31 Zero point - Jumper (standardly not fixed)

With this jumper fixed, the zero point of the input amplifier is increased. This option may be used, if the zero point signal of the connected transmitter is rather high.

J32 0.2..1mA - Jumper (standardly fixed)

This jumper must be fixed for processing input signals from 0..1.5 mA. The input resistance is **1 kΩ**.

J33 4..20mA - Jumper

This jumper must be fixed for processing input signals from 0..30 mA. The input resistance is **50 Ω**.

J34 Amplifier - Jumper (standardly fixed)

This jumper is usually fixed for measuring input signals of the following ranges:

IM : 0 .. 1.5 mA (J32) or **IM** : 0 .. 30 mA (J33) or **UM** : 0 .. 1.5 V (neither J32 nor J33 fixed)

The jumper is omitted for measuring higher currents or voltages:

IM : 0 .. 4.5 mA (J32) or **IM** : 0 .. 90 mA (J33) or **UM** : 0 .. 4.5 V (neither J32 nor J33 fixed)

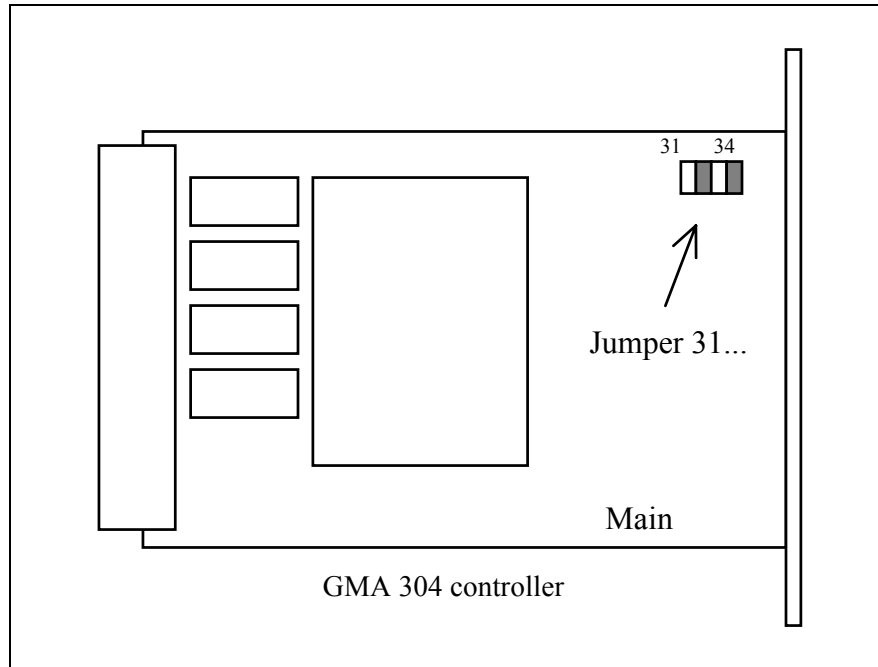


Figure 8

Positioning of DIP switches

On the driver PCB of the GMA 304 controller you find 16 DIP switches, which are used to set the basic processing parameters of the control module. Here you can set standard detection ranges or basic alarm functions, a CAN network address and the control of the alarm outputs A1, A2, and A3. Although the switches are only accessible when pulling the controller out of its rack, their positions can be read from the display any time during operation (page 21).

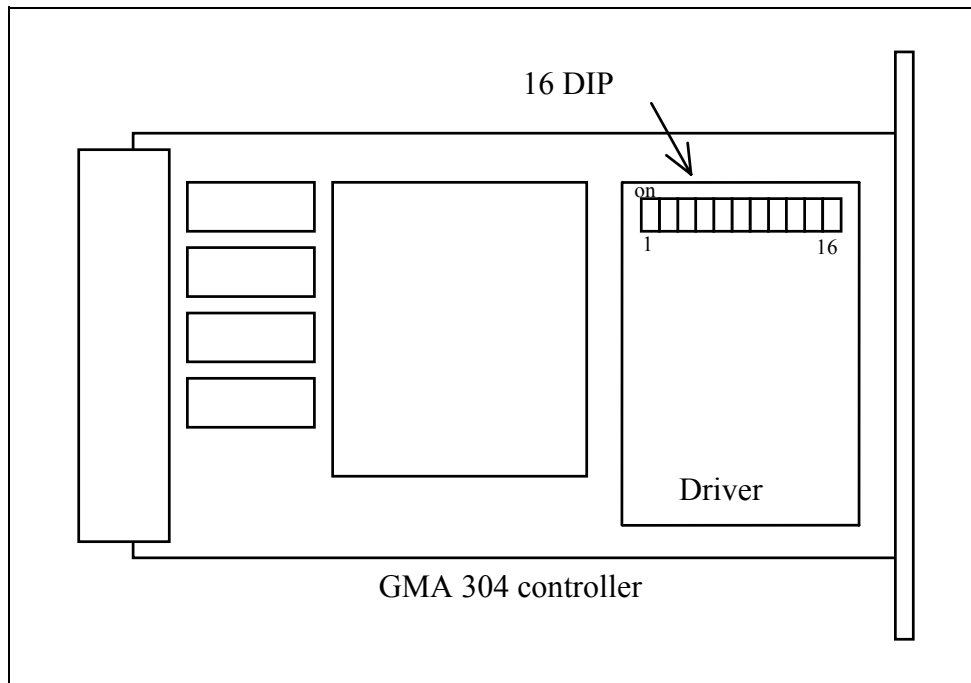


Figure 9

General adjustments

Controlling the alarm outputs A1, A2, and A3



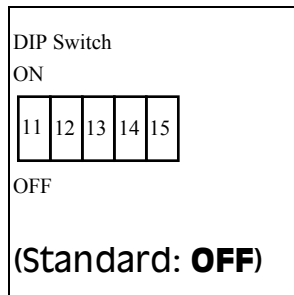
OFF Alarm outputs are active in case of alarm, i.e. the relays close and the logic transistors are controlled. The advantage of this adjustment is the low current consumption, which is particularly favorable for battery back-up systems.

ON Alarm outputs are de-activated in case of alarm, i.e. the relays open and the logic transistors lock.

This DIP switch position does not allow group or collective alarm over the logic outputs.

The switch does not have any effect on the FAULT relay or its logic output.

CAN network access



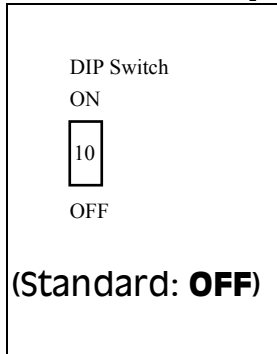
The address is binary coded:

Switch 11: LSB (least significant bit) significance : 1 (2^0)

Switch 15: MSB (most significant bit) significance : 16 (2^4)

This allows 0 to 31 settings. Should no network be installed, the address 0 is set.

Standard or special range



This switch is of special importance; as the switches 1 to 9 are dual function ones.

OFF = Standard range: The controller allows to use the DIP switches 1 to 9 for the selection of pre-defined settings, the processing parameters of which are limited to be altered by means of the keypad.

ON = Special range: By means of the keypad you can variably alter the detection ranges and the processing parameters. You just need a special, yellow service key, which is only available for authorized persons. In this case the switches 1 to 9 are used to set the basic alarm functions.

During normal operation, you can read the setting of all DIP switches by means of a service key and the keypad without having to pull the controller off its rack (page 21). Is a standard range set, its number is displayed at the end of the menu (chart 4, page 35). In the Special Range the display reads [DIP SPE]. In this menu point [-] the positions of all DIP switches are shown by the bar graph display. Every lit LED refers to one switch, with the bottom LED showing the status of DIP switch 1.

Adjustment of standard ranges by means of DIP switches

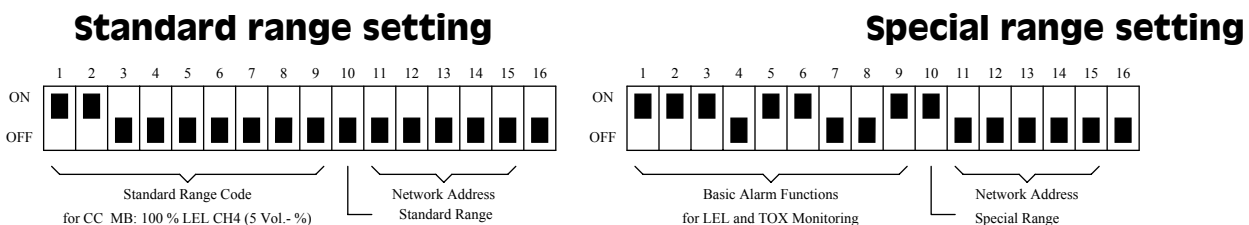
A standard range can only be set with DIP switch 10 in position OFF. In the standard range the following functions are set during putting into operation:

- Type of gas
- Unit of gas
- Full scale
- Linearisation
- Alarm thresholds and hysteresis
- Basic alarm functions
- Duration of alarm suppression

For the relating values please refer to chart 4, page 35.

In the standard range, those special functions like alarm delay and delta alarm are generally de-activated. These settings are selected by means of the DIP switches 1 to 9. The range number is binary coded, with the least significance for DIP switch 1 (LSB = least significant bit).

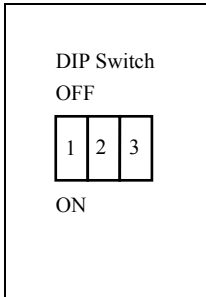
Example for DIP switch setting:



Adjustment of basic alarm functions in special range

The basic alarm functions can only be set in the special range; for the standard range they are already fixed (chart 4, page 35). For setting a special range bring DIP switch 10 in position **ON**. Now you can adjust the basic alarm functions by means of DIP switches 1 to 9. All other parameters for detection range and processing parameters have to be set by means of the function keys, which means that you have to use a service key which gives access to these adjustments. This service key is available for GfG service or authorized persons only.

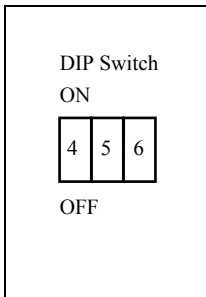
Alarm activation



- Switch 1 **ON**: Alarm 1 is activated by exceeded threshold
- Switch 2 **ON**: Alarm 2 is activated by exceeded threshold
- Switch 3 **ON**: Alarm 3 is activated by exceeded threshold

- Switch 1 **OFF**: Alarm 1 is activated by deviated threshold
- Switch 2 **OFF**: Alarm 2 is activated by deviated threshold
- Switch 3 **OFF**: Alarm 3 is activated by deviated threshold

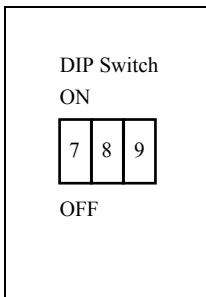
Alarm storage



- Switch 4 **ON**: Alarm 1 is stored
- Switch 5 **ON**: Alarm 2 is stored
- Switch 6 **ON**: Alarm 3 is stored

- Switch 4 **OFF**: Alarm 1 is not stored
- Switch 5 **OFF**: Alarm 2 is not stored
- Switch 6 **OFF**: Alarm 3 is not stored

Alarm reset



- Switch 7 **ON**: Alarm 1 can be reset
- Switch 8 **ON**: Alarm 2 can be reset
- Switch 9 **ON**: Alarm 3 can be reset

- Switch 7 **OFF**: Alarm 1 cannot be reset
- Switch 8 **OFF**: Alarm 2 cannot be reset
- Switch 9 **OFF**: Alarm 3 cannot be reset

Accessories

| | |
|--|---|
| Casings: | Different sizes of panel mount or wall mount casings are available for sliding in different quantities of control modules |
| Key-operated switch module (#): | This module allows 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. |
| Battery back-up (#): | The gas monitoring system GMA 304 is optionally available with a battery back-up. |

(#) These components have not been part of the function test according to EN 50054 and 50057.

Storage conditions for accessories are mentioned under "technical data".

Relays

The GMA 304 controller provides:

- Three relays for controlling external alarm devices,
- One relay for fault signal.

The chart below shows the switching behavior of the relays in the standard range:

| Relay for | in measuring mode | in case of gas alarm | | after gas alarm | | in case of mains failure | in case of fault | in case of gas and fault alarm |
|-----------|-------------------|----------------------|-------|-----------------|-------|--------------------------|------------------|--------------------------------|
| | | not reset | reset | not reset | reset | | | |
| Alarm 1 | off | on | on | off | off | off | off | on |
| Alarm 2 | off | on | on | on | off | off | off | on |
| Alarm 3 | off | on | off | on | off | off | off | on |
| Fault | on | on | on | on | on | off | off | off |

Chart 1 - Relay circuit



Always take the switching behavior of the relays into consideration when connecting external devices. In all standard ranges, relay 3 can be reset even during a gas alarm and is to be used, therefore, as a buzzer relay only.

In the special range, the functions of all relay contacts can be changed by means of the DIP switches (page 29).

Terminal diagram - Motherboard

| | | | | |
|--------------------|----|----|-----------------|--------------|
| Control output 1 | 21 | 1 | Signal - Ground | |
| Control output 2 | 22 | 2 | Signal - Input | |
| CAN-BUS-HI | 23 | 3 | Signal output U | 0 .. 10 V DC |
| CAN-BUS-LO | 24 | 4 | Signal output I | 4 .. 20 mA |
| Logic output A3 | 25 | 5 | Supply output | 20 V DC |
| Logic output A2 | 26 | 6 | Supply output | 12 V DC |
| Logic output A1 | 27 | 7 | Supply output | 5 V DC |
| Logic output FAULT | 28 | 8 | Back-up input | 24 V DC |
| BUS-CTRL-1 | 29 | 9 | Supply - Ground | |
| BUS-CTRL-2 | 30 | 10 | External reset | |

Connection of transmitters

2-wire MWG connection

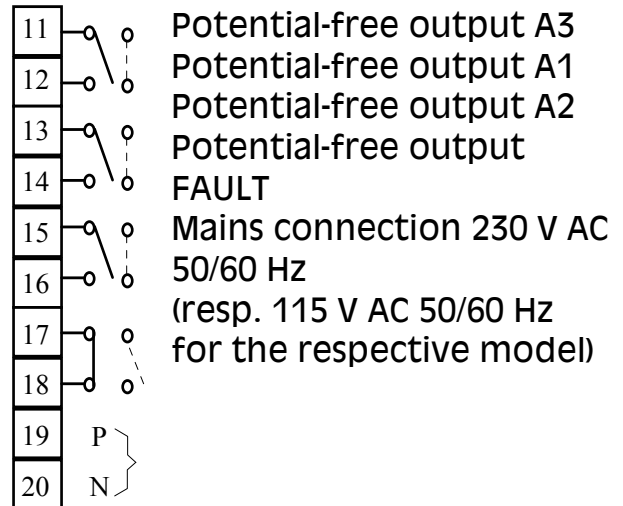
| | | |
|---|--------|-------------|
| 2 | Signal | (4 - 20 mA) |
| 5 | Supply | 20 V DC |

3-wire MWG connection

| | |
|---|----------------|
| 1 | Ground |
| 2 | Signal |
| 5 | Supply 20 V DC |

4-wire MWG connection

| | |
|---|-----------------|
| 1 | Signal - Ground |
| 2 | Signal - Input |
| 5 | Supply 20 V DC |
| 9 | Supply - Ground |



Terminal diagram - Multiplexer

Solder bridge

| | | | | |
|------------|---|----|------|-------------|
| one | → | □□ | 20 V | DC internal |
| bridge | → | □□ | 12 V | DC internal |
| must be | → | □□ | 5 V | DC internal |
| closed ! | → | □□ | Vext | External |

Connection of transmitters

2-wire MWG

| | |
|----|----------------|
| 54 | Signal input |
| 55 | Voltage supply |

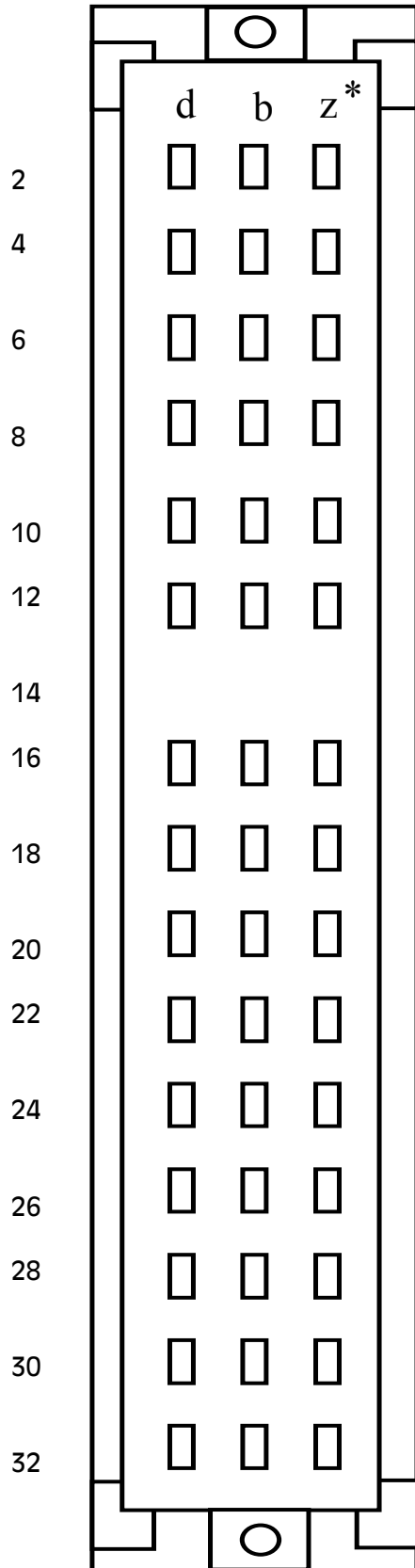
3-wire MWG

| | |
|----|----------------|
| 53 | Ground |
| 54 | Signal input |
| 55 | Voltage supply |

| | | | |
|-----------|---|----|-----------------------------|
| external |) | 51 | Ground |
| supply |) | 52 | Voltage supply Umax 24 V DC |
| | { | 53 | Ground |
| Channel 1 | { | 54 | Signal input |
| | { | 55 | Voltage supply |
| | { | 56 | Ground |
| Channel 2 | { | 57 | Signal input |
| | { | 58 | Voltage supply |
| | { | 59 | Ground |
| Channel 3 | { | 60 | Signal input |
| | { | 61 | Voltage supply |
| | { | 62 | Ground |
| Channel 4 | { | 63 | Signal input |
| | { | 64 | Voltage supply |

P.C. board pin connection

Pin-side view



Connection

- 2d Un 0 ..10 V output
- 2b CTRL 1
- 2z - Im Input
- 4d In 4 .. 20 mA
- 4b CTRL 2
- 4z + Im
- 6d + 12 V = output
- 6b Logic output A3
- 6z 24 V = back-up supply
- 8d + 5 V = output
- 8b CAN-Bus-H
- 8z + 20 V = output
- 10d Logic output A1
- 10b CAN-BUS-L
- 10z Ground
- 12d Logic output A2
- 12b Logic output fault
- 12z External reset 3 .. 24 V at 11 kΩ against ground
- 16dz } Potential-free contact relay A3
- 18dz }
- 20dz } Potential-free contact relay A1
- 22dz }
- 24dz } Potential-free contact relay A2
- 26dz }
- 28dz } Potential-free contact relay FAULT
- 30dz }
- 32d } Mains connection 230 V / 115 V 50/60 Hz
- 32z }

*) d, b, z: Marking on reverse side of socket

Trouble shooting

| Failure | Cause | Solution |
|--|--|---|
| LED "FAULT" blinks, display reads error code | System fault, see chart 2 | - Turn the system off and on again - Call GfG service |
| LED "FAULT" blinks | - System is warming up, alarm suppression is still active - Detection range is exceeded or deviated | - Allow completion of warm-up time - Adjust the zero point - Calibrate the system |
| "FAULT" lights | Service key is in service lock | - Remove service key |
| LED "ON" blinks | Detection range is deviated | - Check the zero point - Calibrate the system |
| Bar graph display blinks | Detection range is exceeded | - Calibrate the system - (no activity required in the presence of gas) |
| LEDs do not light | Voltage supply has failed; fuse or mains supply circuit is faulty | - Connect voltage supply |
| Measuring signal without gas | - Faulty calibration - Incorrect zero point adjustment | - Calibrate the system - Adjust the zero point |
| LED "ON" + bar graph display + digital display blink | Transmitter is warming up | - no activity required |

Chart 2 - Trouble shooting

Error report

The GMA 304 recognizes most operational failures and indicates their reason as an "error code" in the display. At the same time the yellow LED "FAULT" blinks.

| Error code | Cause | Reason |
|------------|-------------|--|
| 001 | DIP Switch | - DIP switches are not adjusted properly |
| 011 | RAM | - Incorrect reading or writing of information during RAM test |
| 021 | EEPROM | - Incorrect writing of hardware parameter |
| 023 | EEPROM | - Incorrect reading of parameter from standard range |
| 024 | EEPROM | - Incorrect writing of parameter from standard range |
| 025 | EEPROM | - Incorrect reading of parameter from special range |
| 026 | EEPROM | - Incorrect writing of parameter from special range |
| 031 | ADU | - Faulty input channels |
| 041 | DAU | - Analog output is not calibrated - Analog output is operated on excessive load - Hardware fault at GMA controller |
| 051 | Calibration | - A transmitter is connected to the analog output - Hardware fault in test sockets - Incorrect position of plug bridges - Analog output is not calibrated |
| 052 | Calibration | - (as error 051). |
| 053 | Calibration | - Analog input channel does not work properly |
| 054 | Calibration | - Gas monitoring system could not be calibrated |

Chart 3 - Error code list

Positioning of DIP switches in standard range

| Range No. | Characteristic curve - Principle | Type of gas | Full scale | Unit | Resolution | A1 | A2 | A3 | Hysteresis | Start delay | DIP - Code 123 456 789 10 |
|-----------|----------------------------------|-------------|------------|------|------------|------|------|------|------------|-------------|------------------------------|
| 0 | 1-LIN | - | 100 | - | 1 | 20 | 40 | 40 | 2 | 0s | 000 000 000 0 |
| 1 | 1-LIN | - | 100.0 | - | 0.1 | 20.0 | 40.0 | 60.0 | 5 | 0s | 100 000 000 0 |
| 2 | 2-CC | H2 | 100 | %LEL | 1 | 20 | 40 | 40 | 2 | 120s | 010 000 000 0 |
| 3 | 3-CC | CH4 | 100 | %LEL | 1 | 20 | 40 | 40 | 2 | 120s | 110 000 000 0 |
| 4 | 4-CC | C3H8 | 100 | %LEL | 1 | 20 | 40 | 40 | 2 | 120s | 001 000 000 0 |
| 5 | 5-CC | C4H10 | 100 | %LEL | 1 | 20 | 40 | 40 | 2 | 120s | 101 000 000 0 |
| 6 | 1-LIN | C9H20 | 100 | %LEL | 1 | 20 | 40 | 40 | 2 | 120s | 011 000 000 0 |
| 7 | 1-LIN | C2H5OH | 100 | %LEL | 1 | 20 | 40 | 40 | 2 | 120s | 111 000 000 0 |
| 8 | 1-LIN | CO2 | 5.0 | Vol% | 0.1 | 1.0 | 2.0 | 2.0 | 0.1 | 120s | 000 100 000 0 |
| 9 | 1-LIN | CO2 | 20.0 | Vol% | 0.1 | 5.0 | 10.0 | 10.0 | 0.5 | 120s | 100 100 000 0 |

| Range No. | Characteristic curve - Principle | Type of gas | Full scale | Unit | Resolution | A1 | A2 | A3 | Hysteresis | Start delay | DIP - Code 123 456 789 10 |
|-----------|----------------------------------|-------------|------------|----------|------------|------|------|------|------------|-------------|------------------------------|
| 10 | 6-EC | O2 | 25.0 | Vol% | 0.1 | 19,0 | 17,0 | 17,0 | 0,2 | 60s | 010 100 000 0 |
| 11 | 7-SC | CO | 300 | ppm | 1 | 50 | 70 | 70 | 5 | 120s | 110 100 000 0 |
| 12 | 8-SC | NH3 | 300 | ppm | 1 | 50 | 100 | 100 | 5 | 120s | 001 100 000 0 |
| 13 | 9-SC | NH3 | 1000 | ppm | 1 | 200 | 400 | 400 | 20 | 120s | 101 100 000 0 |
| 14 | 10-SC | NH3 | 200 | ppm x 10 | 1 | 20 | 40 | 40 | 2 | 120s | 011 100 000 0 |
| 15 | 11-SC | R22 | 300 | ppm x 10 | 1 | 15 | 30 | 30 | 2 | 120s | 111 100 000 0 |
| 16 | 12-SC | CH4 | 100 | %LEL | 1 | 20 | 40 | 40 | 2 | 120s | 000 010 000 0 |
| 17 | 13-SC | CH4 | 100 | %LEL | 1 | 20 | 40 | 40 | 2 | 120s | 100 010 000 0 |
| 18 | 14-SC | C3H8 | 100 | %LEL | 1 | 20 | 40 | 40 | 2 | 120s | 010 010 000 0 |
| 19 | 15-SC | C9H20 | 50 | %LEL | 1 | 20 | 40 | 40 | 2 | 120s | 110 010 000 0 |
| 20 | 16-SC | C2H4O | 300 | ppm | 1 | 50 | 100 | 100 | 5 | 120s | 001 010 000 0 |
| 21 | 17-SC | C3H5ClO | 300 | ppm | 1 | 50 | 100 | 100 | 5 | 120s | 101 010 000 0 |
| 22 | 1-EC | Cl2 | 5.0 | ppm | 0.1 | 1.0 | 2.0 | 2.0 | 0.1 | 60s | 011 010 000 0 |
| 23 | 1-EC | Cl2 | 20.0 | ppm | 0.1 | 5.0 | 10.0 | 10.0 | 0.5 | 60s | 111 010 000 0 |
| 24 | 1-EC | CO | 100 | ppm | 1 | 30 | 60 | 60 | 3 | 60s | 000 110 000 0 |
| 25 | 1-EC | CO | 300 | ppm | 1 | 30 | 60 | 60 | 3 | 60s | 100 110 000 0 |
| 26 | 1-EC | CO | 1000 | ppm | 1 | 100 | 200 | 200 | 10 | 60s | 010 110 000 0 |
| 27 | 1-EC | H2S | 50.0 | ppm | 0.1 | 10.0 | 20.0 | 20.0 | 1.0 | 60s | 110 110 000 0 |
| 28 | 1-EC | H2S | 200 | ppm | 1 | 10 | 20 | 20 | 1 | 60s | 001 110 000 0 |
| 29 | 1-EC | H2 | 200 | ppm x 10 | 1 | 10 | 20 | 20 | 1 | 60s | 101 110 000 0 |
| 30 | 1-EC | H2 | 2.00 | Vol% | 0.01 | 1.00 | 1.50 | 1.50 | 0.10 | 60s | 011 110 000 0 |
| 31 | 1-EC | SO2 | 10.0 | ppm | 0.1 | 2.0 | 4.0 | 4.0 | 0.2 | 60s | 111 110 000 0 |
| 32 | 1-EC | SO2 | 50.0 | ppm | 0.1 | 5.0 | 10.0 | 10.0 | 0.5 | 60s | 000 001 000 0 |
| 33 | 1-EC | HCN | 20.0 | ppm | 0.1 | 10.0 | 15.0 | 15.0 | 1.0 | 60s | 100 001 000 0 |
| 34 | 1-EC | HCN | 50.0 | ppm | 0.1 | 10.0 | 20.0 | 20.0 | 1.0 | 60s | 010 001 000 0 |
| 35 | 1-EC | NO | 100 | ppm | 1 | 20 | 40 | 40 | 2 | 60s | 110 001 000 0 |
| 36 | 1-EC | NO2 | 20.0 | ppm | 0.1 | 5.0 | 10.0 | 10.0 | 0.5 | 60s | 001 001 000 0 |
| 37 | 1-EC | NH3 | 200 | ppm | 1 | 50 | 100 | 100 | 5 | 60s | 101 001 000 0 |
| 38 | 1-EC | HCl | 10.0 | ppm | 0.1 | 5.0 | 7.0 | 7.0 | 0.5 | 60s | 011 001 000 0 |
| 39 | 1-EC | HCl | 20.0 | ppm | 0.1 | 5.0 | 10.0 | 10.0 | 0.5 | 60s | 111 001 000 0 |

Chart 4 - Standard range

GMA 304 - Gas list

| Gas | Type of Gas | Chemical | GMA |
|-----|-------------------------------|---|-------------|
| 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 | Cyclopentane | C ₅ H ₁₀ | 28 |
| 29 | Cyclopropane | C ₃ H ₆ | 29 |
| 30 | Dichlorodifluoromethane (R12) | C Cl ₂ F ₂ | 30 |
| 31 | 1.1 Dichlorethane | C ₂ H ₄ Cl ₂ | 31 |
| 32 | Dichlorofluoromethane (R21) | CH Cl ₂ F | 32 |
| 33 | Dichloromethane | 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 | Dimethyletheer | 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 | Ethylene | C ₂ H ₄ | 43 |
| 44 | Ethylene oxide | C ₂ H ₄ O | 44 |
| 45 | FAM-Benzine | Mixture | 45 |
| 46 | Kerosene 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 |

| Gas | Type of Gas | Chemical | GMA |
|-----|-----------------------------|---|-------------|
| 53 | Hexanon-2 | C ₆ H ₁₂ O | 53 |
| 54 | Isobutyl acetate | C ₆ H ₁₂ O ₂ | 54 |
| 55 | Carbon dioxide | CO ₂ | CO2 |
| Gas | Type of Gas | Chemical | GMA |
| 56 | Carbon monoxide | CO | CO |
| 57 | Coke oven gas | CO, CH ₄ , H ₂ | 57 |
| 58 | Air | N ₂ , O ₂ , CO ₂ | 58 |
| 59 | Methane | CH ₄ | CH4 |
| 60 | Methanol | CH ₄ O | 60 |
| 61 | Methyl acetate | C ₃ H ₆ O ₂ | 61 |
| 62 | Methyl alcohol | CH ₃ OH | 62 |
| 63 | Methyl butyl ketone | C ₆ H ₁₂ O | 63 |
| 64 | Methyl chloride | CH ₃ Cl | 64 |
| 65 | Methylene chloride | CH ₂ Cl ₂ | 65 |
| 66 | Methyl-i-butyl ketone | C ₆ H ₁₂ O | 66 |
| 67 | Methyl ethyl ketone | C ₄ H ₈ O | 67 |
| 68 | Methyl glycol | 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 | Monochlorodifluoromonobrom. | 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 | Propylendichloride-1.2 | C ₃ H ₆ Cl ₂ | 88 |
| 89 | Oxygen | O ₂ | O2 |
| 90 | Sulphur dioxide | SO ₂ | SO2 |
| 91 | Sulphur hexafluoride | SF ₆ | 91 |
| 92 | Hydrogen sulphide | H ₂ S | H2S |
| 93 | Town gas | CO, CH ₄ , H ₂ | 93 |
| 94 | Nitrogen dioxide | NO ₂ | no2 |
| 95 | Nitrogen monoxide | NO | no |
| 96 | Stvrene | 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 |

| Gas | Type of Gas | Chemical | GMA |
|------------|--------------------|-----------------|------------|
| 104 | Hydrogen | H2 | H2 |
| 105 | Water gass | H2, CO, CH4 | 105 |
| 106 | Xylene | C8H10 | 106 |

| Gas | Type of Gas | Chemical | GMA |
|------------|--------------------|-----------------|------------|
| 107 | Ozone | O3 | 107 |
| 108 | Phosgene | COCl2 | 108 |
| 109 | Phosphine | PH3 | 109 |

Chart 5 - GfG gas list

Technical data

Control module GMA 304

Type: Slide-in module for 19" rack
Dimensions: Height: 129 mm, width: 35.2 mm, depth: 160 mm

Power supply

Operational voltage: 1. 230 V / 50Hz or 115 V / 60 Hz*
2. 24 V DC (U_{in})
Power consumption: Maximum 14 VA
Primary fuse: T 80 mA (for 230 V) T 500 mA (for 115 V)*
Secondary fuse: T 500 mA * not tested by VDE

Climatic conditions

Ambient temperature: -10 .. +55 °C

Transmitter Connection

Transmitter connection: 2-, 3-, or 4-wire
Power supply output: 20 V DC
Input signals: 0 .. 1.5 mA or 0 .. 4.5 mA
0 .. 1.5 V or 0 .. 4.5 V

Outputs

Analog output for 0 .. 10 V
measurement value: 4 .. 20 mA
Digital outputs: CAN-Bus
Maximum switch voltage 250 V AC 50/60 Hz or 250 V DC
Maximum switch current 4 A AC/DC
Relay outputs: Maximum switch power 1000 VA AC or depending on voltage
50 .. 200 W DC
Relay outputs and mains connection are operation insulated
4 open collector outputs - FAULT, A1, A2, A3
operation allowed on low safety voltage only
Logic outputs: Maximum switch voltage 30 V
Maximum switch current 100 mA
External reset: high active 3 .. 24 V DC (input resistance 11 k Ω)
Service lock (front): Access rights for menu selection and parameter adjustment
Test sockets (front): Transmitter signal 0 .. 1.00 V
Standardized output signal 0 .. 10.0 V
Pin connectors: DIN 41612 form F

Protection: DIN 40050 - IP30 (controller in 19" rack)
DIN 40050 - IP00 (controller only)
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
Safety certificate: VDE report according to EN 61010
DMT test acc. to EN50054 and EN50057 pending

Contact protection

Mains supply and relay contacts of the GMA 304 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 to the requirements for contact protection. Distances of 6.5 mm ensure a safe separation. The secondary circuit operates on extra-low safety voltage.



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