



User Manual

PolyGard® Digital-Gas-Controller DGC / GC

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Technical changes, misprints and errors excepted.
In case of arbitration only the German wording shall be valid and binding.



Documents



Catalog



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1 General

1.1 Safety

The user manual must be carefully read, understood and followed by all persons who install, use, maintain and check the product. The product can fulfil its intended functions only if it is installed, used, maintained, cared for and checked in accordance with the instructions provided by MSR-Electronic GmbH.

Undated references to standards always refer to the current edition.

Due to on-going product development, MSR-Electronic GmbH reserves the right to change specifications without notice. The information contained herein is based upon data considered to be accurate. However, no guarantee or warranty is expressed or implied concerning the accuracy of these data.

1.2 Responsibility Installer and Operator

It is the installer and operator's responsibility to ensure that all PolyGard® devices are installed and used in compliance with all international, national and local regulations and requirements. The device must be checked for correct installation and functionality by a qualified person before measurement operation is started. The T 021 (DGVV-I 213-056) and T 023 (DGVV-I 213-057) leaflets must be applied in Germany. To clarify further questions, please also refer to the T 055 leaflet.

The PolyGard® devices have been tested for functionality by the manufacturer before delivery. During commissioning, a documented functional test is also required. The installation should only be carried out by trained installation technicians, taking into account the current safety procedures for control installations.

The required equipotential bonding connections (also e.g. secondary potential to ground) or grounding measures are to be carried out according to the respective project requirements. It must be ensured that no ground loops are created in order to avoid undesired interference in the measurement electronics.

The requirements of EN 60079-29-2 (gas detectors - selection, installation, use and maintenance of devices for the measurement of combustible gases and oxygen) as well as the requirements of EN/IEC 62990-2 (gas detectors - selection, installation, use and maintenance of devices for the measurement of toxic gases and vapours) must be observed for installation, operation and maintenance. It is necessary to follow all instructions as well as the user documentation.

1.3 Services

It is recommended that PolyGard® devices should be inspected on a regular basis. Performance deviations can be corrected based on regular maintenance.

Recalibration and parts replacement can be performed in the field by a qualified technician using the appropriate tools. Alternatively, the easily exchangeable sensor head can be returned to MSR-Electronic GmbH for service using the X-Change concept.

Regular maintenance is to be carried out according to the instructions.

UL 2017 recommends that these checks should be performed weekly.

The DGC system's test and diagnostic routines, which run continuously in the background, monitor the controller function, the communication to the connected sensors and the function of the digital gas sensors. Through this complete self-monitoring, internal and external errors are reliably and safely detected. A detected fault leads, due to the integrated fault management, immediately to the triggering of the fault signal relay. The fault signal relay operates in energized mode and thus also detects an operating voltage failure.

Periodic maintenance includes checking the operating and status messages on the DGC system, including accumulated maintenance messages.

System with UPS:

- The batteries are maintenance free.
- Only a check of the capacity has to be performed by disconnecting the primary power.

The maintenance requirements for the gas sensors are specified in the respective user manuals.

1.4 Limited Warranty

MSR-Electronic GmbH does not assume any liability in case of improper or incorrect use of the device. The installer and operator are solely responsible for the design and use of the product. If the product is not used, maintained or repaired in accordance with the user manual, warranty and product liability claims as well as claims arising from any guarantees assumed by MSR Electronic GmbH for the product will be forfeited.

MSR-Electronic GmbH warrants the PolyGard® devices against defects in material or workmanship for a period of 2 years (1 year for sensors) from the date of shipment. Should such a defect occur during the warranty period, MSR-Electronic GmbH will repair or replace the unit at its own discretion. This warranty does not apply to units that have been modified, self-repaired, or intentionally or unintentionally damaged. It also does not apply to devices with symptoms of poisoning.

The above warranty is in lieu of all other express warranties, obligations or liabilities. It applies exclusively to PolyGard® devices. MSR-Electronic GmbH is not liable for consequential damages resulting from the purchase or use of PolyGard® devices.

1.5 Dispose of Device



In accordance with Directive 2012/19/EU, the device must not be disposed of as municipal waste. Return the device for disposal to your national sales organization, which you can contact if you have any questions about disposal.

Outside the EU, you have to consider the corresponding directives.

2 Applicability

2.1 General Notes

This user manual is only valid for:

- PolyGard® series:
 - DGC
 - GC

The guidelines for wiring and commissioning hardware (GA_INB_DGC) must be observed for commissioning.

In addition, the user manuals for connected devices of the SB, MSC, MSB, WSB or PX2 series must be read, understood and followed. For connected sensors of the SC, MC or SSAX1 series, the user manual of the corresponding sensors must also be followed.

2.2 Intended Use

The PolyGard® Digital-Gas-Controller DGC or Gas-Controller GC is used for detection, alarming and warning of toxic and combustible gases and vapours in the ambient air. The DGC fulfils the requirements according to the European Standard EN 50545-1 for the stationary monitoring of carbon monoxide (CO), nitrogen dioxide (NO₂) and combustible gases in underground garages, tunnels, go-cart racecourses etc. The DGC also meets the requirements according to EN 378, VBG 20 and the guidelines "Safety requirements for ammonia (NH₃) refrigeration systems". The DGC can be used as well for monitoring other gases and measuring values.

The intended sites are all areas being directly connected to the public low voltage supply, e.g. residential, commercial and industrial ranges as well as small enterprises.

The DGC may only be used in ambient conditions as specified in the Technical Data. The DGC must not be used in potentially explosive atmospheres.

3 Description

The Gas-Controller GC is a measuring, warning and control system for the continuous monitoring of different toxic or combustible gases and vapours as well as of Freons refrigerants. The GC is suitable for the connection of up to 96 digital sensors like SC with the SB series via the 2-wire bus. Up to 32 analog inputs for the connection of sensors with 4–20 mA signal interface are available in addition. The controller can be employed as pure analog controller, as analog/digital or as digital controller. The total number of connected sensors, however, may not exceed 128 sensors. Up to 4 programmable alarm thresholds are available for each sensor. For binary transmission of the alarms there are up to 32 relays with potential-free change-over contact and up to 96 signal relays.

Comfortable and easy operation of the Gas-Controller GC is done via the logical menu structure. A number of integrated parameters enables the realization of various requirements in the gas measuring technique. Configuration is menu-driven via the keypad. For fast and easy configuration, you can use the PC based configuration software PCE.

Prior to commissioning, please consider the guidelines for wiring and commissioning of the hardware.

3.1 Restart (Diagnostic and Warm-up Stage)

The device is designed in a way that it generally runs through all internal device tests (diagnostics) in the Board and in the connected sensor head(s) after each power-up or processor reset before the measuring operation starts. That means that the processor's internal components and the associated program and working memories as well as the other components of the input and output units are tested. This process takes approximately 0.5 seconds.

When all diagnostics have been successful, the warm-up phase of the sensor element starts.

The warm-up is necessary for the sensor element in the sensor head to assume a stable state after return of the voltage without triggering a pseudo alarm. The duration of the warm-up phase depends on the type of sensor used and can be read from the User Manual of the SC, MC, SX1 or SSAX1. Depending on the types connected, the longest sensor warm-up time must be entered as "Power ON Time" in the controller.

During the warm-up phase, the yellow LED flashes every 2 seconds and "Power ON Time" appears in the display.

3.2 Measuring Mode

In normal operating mode = measuring mode, there are no faults, the gas concentration of the active sensors is continuously polled, checked for plausibility and output on the analog output (if available). The gas concentrations are shown scrolling on the LC display.

The gas signal is checked with each measurement cycle, if it is $\geq$ alarm threshold (alarm evaluation for increasing concentration) respectively $\leq$ alarm threshold (alarm evaluation for falling concentration) and if exceeding respectively falling below, the alarm relay are triggered and the alarm LED flashes (light red for alarm 1, dark red for alarm 2). The set alarm can be read out in the alarm status menu. If the value falls below / exceeds the alarm threshold minus / plus the set hysteresis again, the alarm is automatically cancelled.

In the "latching" mode, the alarm must be cleared manually directly on the unit that triggered the alarm after the gas-free condition has been determined. It is imperative to set this function for combustible gases with catalytic bead sensors that show a decreasing signal when the gas concentration is too high.

The GC also continuously monitors itself, its outputs and the communication to all activated sensors and modules (type SM).

3.3 Special Mode



Caution:

The operator may set the gas detector into the Special Mode only when gas-free state is ensured (no alarm), because the alarm function is not available in this mode.

In Special Mode, the measurements are slightly delayed for the operation side, but there is no alarm evaluation. The special status is indicated on the display and it always activates the fault relay. The yellow LED on the display is flashing.

The controller takes the Special Mode in the following cases:

- Accumulated fault of one or more activated devices
- Run-in operation after power recovery (Power-On)
- Special Mode activated by the user
- Reading out or changing of parameters by the user
- Manual override of an alarm/signal relay in the alarm status menu or via digital inputs

3.3.1 Maintenance and Calibration Mode

The operator can activate the Special Mode on the internal display or via the PCE-Software for the complete system. This mode includes commissioning, calibration, testing, repair and decommissioning. The fault signal relay goes into the "Error" status. In fault-free operation, it is additionally signalled in the display in the fault status with 'Service active' and by the flashing yellow LED. If faults are present, the yellow LED remains continuously on and the message is suppressed by the active faults.

In Special Mode, the gas concentration query is slightly delayed, but without alarm evaluation. During maintenance and calibration mode, the entire system can be set to Special Mode or only individual sensors or groups of sensors. In all cases, the alarms of a sensor are maintained during Special Mode, but no new alarms are generated.

The operator can exit the Special Mode after completion of work; if there are no further entries or operations, the unit will automatically return to the Measuring Mode after 15 minutes.

3.3.2 Faults

The GC includes a diagnostic module for the continuous monitoring of the relevant functions and parameters as well as a processor-independent watchdog. Due to these measures, the unit is set to the safe mode "Fault" in case of an internal or external error, e.g., communication error to one of the active bus participants or an analog signal is outside the permissible range ($< 3.0 \text{ mA} > 21.2 \text{ mA}$). The fault is indicated by the statically lit yellow LED and in the display. The fault signal relay goes into the "Fault" status, the analog output gives $\leq 2 \text{ mA}$ (only with AO setting CF/AF) if the set source contains the faults.

The error is output as plain text in the error status menu. If there are 2 or more errors on a bus participant, the errors are output including a cumulative, bit-coded error code. If the error directly affects the measured value, the error is also displayed instead of the measured value.

After the cause has been eliminated, the GC independently switches to the measuring mode. It is not necessary to acknowledge the error message*.

The errors that occurred and were automatically acknowledged are stored in the technician's menu and must be acknowledged manually.

* Exception: Error code **0x8020h (AO setting CF/AF, see chapter 5.8.4.9)**: Short circuit or interruption at the analog output.

- Disconnect the device from the voltage source and reconnect **OR**
- Activate Special Mode on the display or in the PCE-Software and set the analog output current to 4 mA using the AO test function.

Then wait until the error message disappears.

3.4 UPS Function

The UPS functionality must be activated in the system parameters (see chapter 5.8.4). The operating voltage is already set to 27.2 V DC at the factory when the DGC is ordered with the UPS function as the internal logic requires this voltage level in order to recognise an existing UPS supply.

In the event of a mains failure, the complete DGC system is supplied without interruption via the battery-buffered UPS.

In the event of a mains failure, the battery voltage immediately drops to a value < 25.5 V due to the load. The DGC detects the mains failure by the drop of the operating voltage and generates and generates a corresponding power failure message.

3.4.1 Undervoltage monitoring

The DGC checks the status of the batteries every 60 minutes during mains operation. If the battery voltage is missing, the fault-signal relay is activated and the message "UPS Error" is displayed in the "System Errors" menu. The DGC automatically acknowledges the message when the battery voltage is restored. This function is not active in the "Service" operating mode.

The voltage monitoring ensures that the supply voltage of the GC is within the expected range of 18.5 V to 30 V. If this range is exceeded or undershot, this is signalled by the "UPS Error" message (overvoltage) or by the "UPS Error" message in combination with "Power fail" (undervoltage). The check for falling below and exceeding the optimum range of the supply voltage takes place regardless of whether the UPS functionality is activated.

3.4.2 Deep discharge protection

If the battery voltage drops further due to the load, the DGC disconnects the supply from the batteries at < 19.2 V to avoid a deep discharge. The DGC system is no longer supplied with operating voltage. The fault signal relay signals: DGC not in operation.

When the mains supply is restored, the DGC automatically returns to normal and charging operation.

4 Operating Instructions

4.1 Display

The complete configuration and service are made via keypad user interface in combination with the LC display screen. Security is provided via 4 code levels against unauthorized intervention.



-  Exits programming, returns to the previous menu level.
-  Enters sub menus and saves parameter settings
-  Navigates within a menu, changes values.
-  Changes cursor position.

4.1.1 Status LED

The status LEDs indicate the operating state:

Colour of status LED	Interval	Meaning
Light red	Flashing	= Alarm 1 or more alarms are pending
Dark red	Flashing	= Alarm 2 and higher priority alarms are pending
Green	Continuous	= Operating voltage
	Flashing	= Maintenance due
Yellow	Continuous	= Malfunction, sensor manually locked
	Flashing	= Operation in Special Mode, restart (diagnosis and warm-up phase) or in de-energized state with the mains fault flashing light option

4.1.2 Setting / Changing of Parameters and Set Points

-  Open desired menu window.
Code input field opens automatically if no code is approved.
-  Push the cursor onto the position segment, which is to be changed.
-  Set the desired parameter / set point with the keys.
-  Input of value finished / Save the changed value, confirm storage (ENTER).
-  Cancel storage / close editing / go back to next higher menu level (ESCAPE function).

4.2 Code-Levels

According to the regulations of all national and international standards for gas warning systems, all inputs and changes are protected by a 4-digit numeric code (= password) against unauthorized intervention. The menu windows of status messages and measuring values are visible without entering a code.

The release of a code level is cancelled if no button is pushed within 15 minutes.

The code levels are classified in order of priority: Code level 1 has top priority.

4.2.1 Code Level 1 (Code not changeable)

Code level 1 is intended for the **service technician** of the installer to change parameters and set-points. This password allows working on all settings. For opening the parameter menus, you must first activate the Special Mode after code release.

4.2.2 Code Level 2 (Code not changeable)

With code level 2, it is possible to lock / unlock transmitters temporarily. This password is only given to the end user by the installer in problem situations. In order to lock/unlock the sensors you must first activate the Special Mode after code release.

4.2.3 Code Level 3 (Code is settable in the Display Parameter Menu)

Inactive in delivery state, activated by entering a value. Same as code-level 1, only changing the maintenance password is not possible.

Normally the code is only known to the service technician who has last changed it since it can be changed individually via code level 1.

4.2.4 Code Level 4 (Password 1234, Code not changeable)

Code level 4 allows the **operator**

- to set date and time,
- to configure and to operate the data logger option,

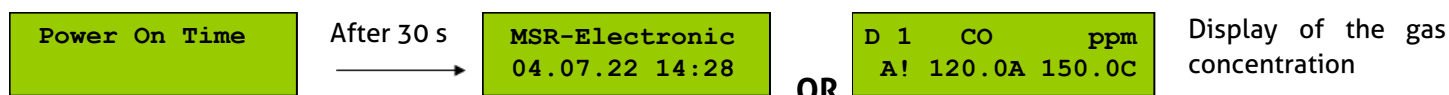
after activation of the Special Mode,

- to read all parameters,
- to operate the manual test function of the alarm relays (functional test of the connected units),
- to operate the manual test function of the analog outputs (functional test of the connected units).

5 Menu Overview

The Gas-Controller GC is operated via a menu structure. The operating menu contains the levels:

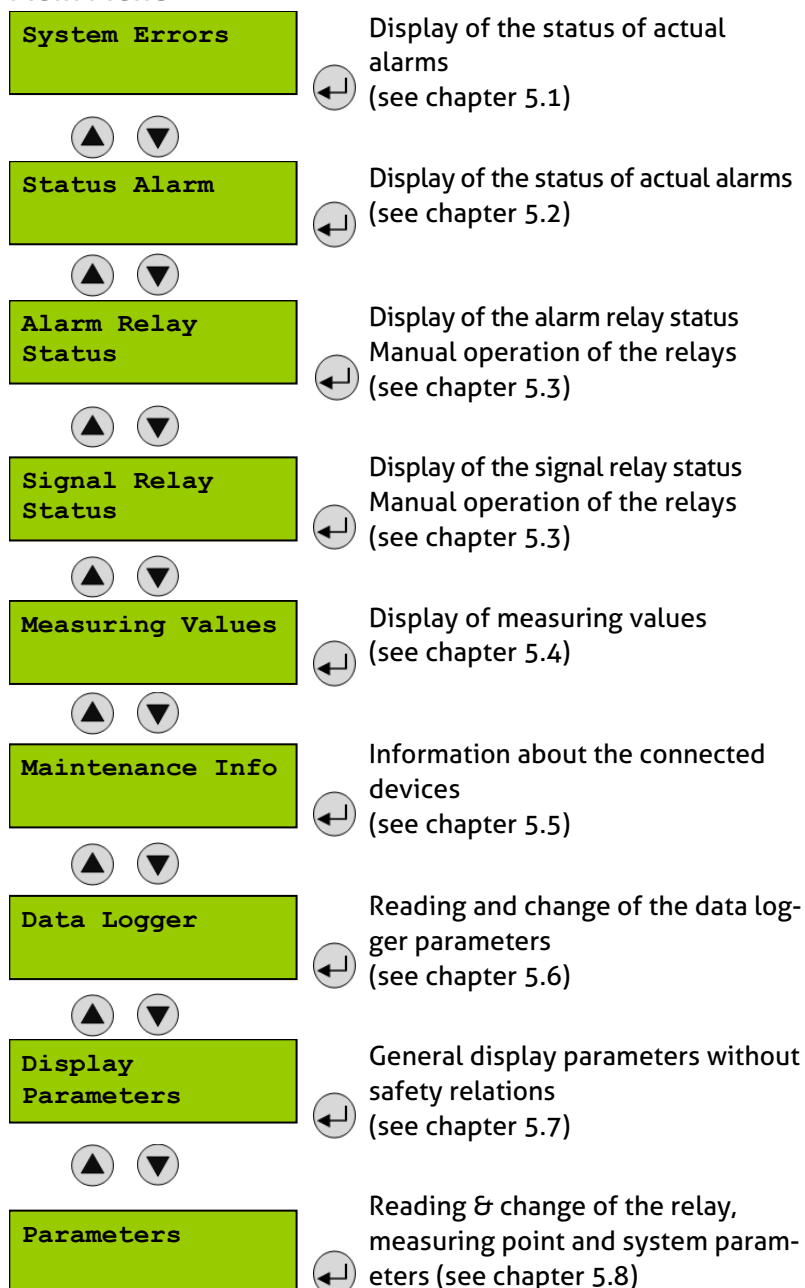
- **Starting menu** with date and time if no MP is registered, otherwise scrolling display of the gas concentrations of all registered sensors in 5-second intervals. When ESC is pressed, the start menu with date and time is displayed for 10 seconds. If a submenu is not exited with ESC, the GC Display View returns to the starting menu after 15 minutes. When maintenance message is active, the service telephone number is displayed in the starting menu.
- Main menu
- Submenus 1–4



Starting Menu

Main Menu

Submenu 1



5.1 Fault Management

The integrated fault management records the first 99 faults with date and time stamps in the menu "System Errors". Additionally, a record of the faults occurs in the "Error memory", which can be read by anyone, but only reset by the service technician.

A pending fault activates the fault indication relay. The yellow LED (Fault) starts to light up; the fault is displayed in plain text with date and time in the menu "System Errors".

In case of the fault of a connected sensor the alarms defined in the menu "MP Parameter" are activated in addition.

5.1.1 Acknowledge a Fault

In accordance with the regulations of gas measurement technology, accumulated faults are automatically acknowledged. Automatic acknowledgement of a fault is possible after the cause has been eliminated.

5.1.2 Error Memory

The menu "Error Memory" in the main menu "System Error" is visible without password.

In the error memory, the first 99 faults that have occurred and have already been acknowledged in the menu "System Error" are listed for the service technician in a power failure safe way. These can only be deleted by the code level 1/3.



Caution:

At each maintenance, this memory should be read, relevant faults tracked and entered in the maintenance book, and then the memory cleared.

Error Memory 0
Technician



Select menu "Error Memory"

DP 1 Com. Error
1 05.02 10:38



Example: Communication error DP01 Error

DP 1 Com. Error
Reset?



Acknowledge fault message?

DP 1 Com. Error
Error cleared



Fault acknowledged

The errors are provided with a consecutive number. After an error has been cleared, all other errors automatically move up.

5.1.3 System Messages and Errors

The devices connected via the analog interface can only report their malfunction by signal under-range or overrange. The reason for signal under-range mostly comes from bad, wrong or missing signal wiring that is the reason for the error.

The following system error messages of the analog interface are detected and recorded.

Error Text	Description	Cause	Solution
AP 0X Overrange	Current signal at analog input > 21.2 mA	Short-circuit at analog input, analog sensor not calibrated or defective	Check cable to analog sensor, make calibration, replace sensor
AP 0X Underrange	Current signal at analog input < 3.0 mA	Wire break at analog input, analog sensor not calibrated or defective	

Table 1: Error Messages of Analog Points

Any device with microprocessor and digital communication - such as digital sensors, sensor boards, EP modules and even the controller - is equipped with extensive self-monitoring systems and diagnostic functions. They enable detailed conclusions about the error causes and help the installers and operators to quickly determine the cause, and/or to arrange an exchange. These errors can only be transmitted when the connection to the central (or tool) is intact.

Error Text	Error Code	Description	Cause	Solution
DP 0X Sensor	0x8001h	Sensor element of the sensor- diagnostic function reports an error	Sensor pins broken, mechanical or electrical damage Sensor element defective	Replace sensor
DP 0X ADC Error	0x8002h	Monitoring of the amplifier and AD converter circuits at the input - device reports an error	Mechanical or electrical damage of the amplifiers	Replace device
DP 0X Voltage	0x8004h	Monitoring of the sensor and/or process power supply - device reports an error	Mechanical or electrical damage of the power supply (external/internal)	Measure tension if too low, replace device
DP 0X CPU Error	0x8008h	Monitoring of the processor function - reports an error	Mechanical or electrical damage of the processor	Replace device
DP 0X EE Error	0x8010h	Monitoring of the data storage - reports an error	Configuration error	Check configuration
			Electrical damage of the memory	Replace device
DP 0X Warm-up	0x8020h	Warm-up time of the sensor is active	Restart	Wait until warm-up time is over
DP 0X Overtemp.	0x8040h	Ambient temperature outside specification. At high ambient temperatures at the edge of the specification, the error is only generated after 24 hours	Too high/low ambient temperature	Protect the device from direct sunlight, check climatic conditions
DP 0X Underrange	0x8100h	Signal of sensor element in the sensor is out of range	Wire break at sensor element input, sensor drift too high, sensor defective	Recalibrate sensor, replace it
DP 0X Overrange	0x8200h	Signal of sensor element in the sensor is out of range	Sensor not calibrated correctly (e.g. wrong calibration gas), defective	

Table 2: Error Messages of Sensor

The controller monitors the communication between request and response. If the reply is too late, incomplete or incorrect, the controller recognizes the following errors and reports them.

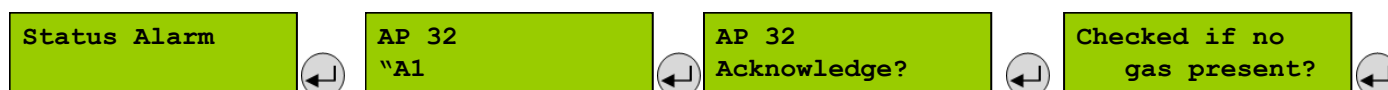
Error Text	Error Code	Description	Cause	Solution
UPS Error	0x8001h	UPS does not work correctly, can only be signalled by the GC	Supply voltage outside the expected range	Check the supply voltage
			Battery disconnected	Connect battery
			UPS defective	Replace UPS
Power Fail	0x8004h	Can only be signalled by the GC	Supply voltage outside the expected range or power failure	Check power supply
			Fuse tripped	Check fuses
SB 0X I/O Error	0x8020h	Monitoring of the in/outputs of the SB 0X reports an error	Short circuit or interruption at the analog output	Check wiring/load
Electrical damage to switching components			Replace device	
EP 0X I/O Error		Monitoring of the in/outputs of the EP 0X reports an error	Short circuit or interruption at the analog output	Check wiring/load
			Electrical damage to switching components	Replace device
GC I/O Error		Monitoring of the in/outputs of the GC module reports an error	Short circuit or interruption at the analog output	Check wiring/load
			Electrical damage to switching components	Replace device
MP Error	0x8100h	Appears with the modules (SB/EP/GC) together with a DP/AP error	Sensor or analog input error messages (see Table 2)	Eliminate DP/AP error and error message
SB 0X Com. Error	0x9000h	Communication error from central unit to SB 0X	Bus line interrupted or short circuit	Check line to SB 0X
			DP 0X registered at the controller, but not addressed	Check SB address or MP parameters
			SB 0X defective	Replace device
EP 0X Com. Error		Communication error to EP 0X module	Bus line interrupted or short circuit	Check line to EP 0X
			P 0X registered at the controller, but not addressed or addressed incorrectly	Check module address
			EP 0X module defective	Replace module
DP 0X Com. Error	0xB000h	Communication error of SB to DP 0X sensor	Bus line between SB and sensor interrupted or short circuit	Check line to DP 0X
			DP 0X registered at the controller, but not configured at SB, wrong gas type	Check sensor address or parameters
			DP 0X defective	Replace sensor
Service!	0x0080h	System maintenance is due (for display version up to 1.02.13; from display version 1.02.13 see chapter 5.5).	Maintenance date exceeded	Perform the maintenance
DP XX locked AP XX locked	--	This MP input is locked (MP is physically present, but locked by the operator)	Operator intervention	Eliminate the cause of a possible fault and then unlock the MP
XXX EC: 0xXXXX	--	Occurs, if there are several errors from one measuring point	Several causes	See the specific errors

Table 3: Further Error Messages

5.2 Status Alarm

Display of the currently pending alarms in plain text, sorted by MP addresses. Only those measuring points are displayed, where at least one alarm is active. If no alarms are active, the text 'No alarms' is output. The alarms are generated either in the controller (alarm) or directly on site in the sensor / module (local alarm).

Interventions are possible in this menu item only for the acknowledgment of latching alarms. Pending alarms cannot be acknowledged.



Symbol	Description	Function
AP X	Measuring Point	Analog measuring point X = 1–32, where an alarm is pending.
DP X	Measuring Point	Digital measuring point X = 1–96, where an alarm is pending.
'A1 A1 "A1	Alarm status	'A1 = Local alarm 1 active (generated by the device of the SB group) A1 = Alarm 1 active (generated in the GC module) "A1 = Latching mode of Alarm 1 active (local/central - no distinction)

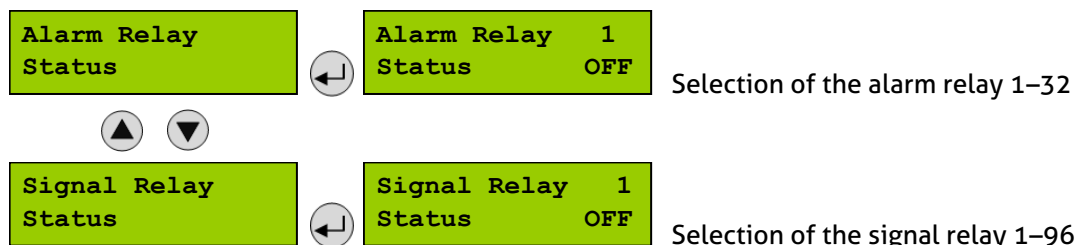
Table 4: Status Alarm Indications

5.3 Status Relay

Reading of the current status of alarm and signal relays. Only used relays are displayed. The manual operation (test function) of the alarm and signal relays is done in the Parameters menu.

Main Menu

Submenu 1



5.4 Measuring Values

This menu displays the measured value with gas type and unit for registered sensors. If the alarm evaluation is defined via the average, the display shows the current value (C) and additionally the average value (A).

Main Menu

Measuring values

Submenu 1

D 1 CO ppm
A! 120.0A 150.0C



D 1 CO ppm
#! 120.0A 150.0C



A 1 CO ppm
?! 120.0A 150.0C

Symbol	Description	Function
DX	Measured value	Measured value from digital sensor with MP address with X = 1–96
AX	Measured value	Measured value from analog sensor at analog input with AX = 1–32
CO	Gas type	Measured value from bus sensor with MP address with X = 1–96
ppm	Gas unit	See chapter 5.8.3.3
A	Average value	See chapter 5.8.3.3
C	Current value	Arithmetic average (30 measured values within the time unit)
A!	Alarm	Current value of gas concentration
#	Maint. info	MP has triggered an alarm
\$	Local mode	Local Special Mode is active.
?	ConfigError	MP has a mismatched configuration.
Error	Fault MP	Communication error, or signal out of the measuring range
Locked	MP locked	MP was temporarily blocked by the operator.

Table 5: Measuring Values Indications

The information ConfigError has priority to maintenance information and Special Mode information. Alarm information is always displayed, normally with "A!", but if ConfigError, Special Mode or maintenance information are active, only with "!".

5.5 Maintenance Information

A control of the maintenance intervals required by law (SIL) or by the customer is integrated in the GC system. When changing the maintenance intervals, you have to observe legal and normative regulations and the manufacturer's specifications. A change only becomes effective after a calibration because the maintenance counter is reset.

System Maintenance Message

At commissioning or after successful maintenance, the date for next due maintenance of the whole system has to be entered. When this date has been reached at 9 a.m., the maintenance message is activated. The system maintenance message appears in the maintenance info main menu from software version 1.02.13 of the GC display. In all previous versions, it is generated as an error message in the error status.

Sensor Maintenance Message

Sensors need regular calibration for complying with the specified accuracy and reliability. In order to avoid complex manual documentation, the sensors store their run time between the calibration intervals continuously and permanently. If the run time since the last calibration exceeds the sensor maintenance interval stored in the sensor, a maintenance message is sent to the central control. The maintenance message is reset during a calibration and the timer for the next maintenance is restarted. The remaining maintenance days are also increased to the set calibration interval.

Device reaction with pending maintenance message

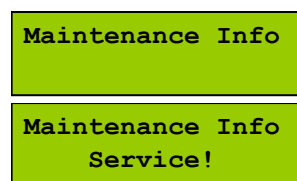
The maintenance signal can be ORed to each of the active relays in the menu Relay Parameters. In this way, one or more relays can be activated in case of maintenance (see chapter 5.8.2.10)

In case of a pending maintenance message, the phone no. of the service company appears in the main menu and the green LED flashes in the rhythm of 3 s ON : 1 s OFF.

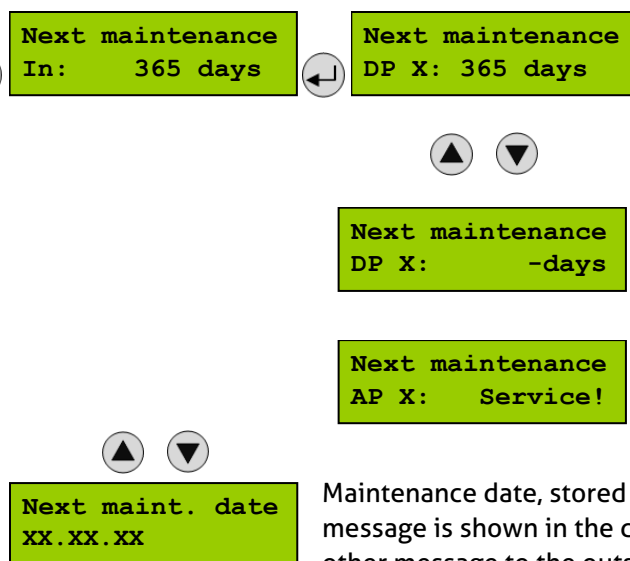
The maintenance message can only be cleared by removing the cause - changing the maintenance date in the event of a system maintenance message, or calibration or replacement of the sensors in the event of a sensor maintenance message.

In order to distinguish between the sensor maintenance messages and the system maintenance message and to get a quick allocation of the serviceable sensors, the measured value in the menu item Measured Values gets the maintenance prefix "#". As additional information, a separate window displays the time (in days) when the next sensor is due for maintenance in the Maintenance Info. If several sensors are connected, the shortest time is always displayed. In the submenu, you can scroll through the display of all active measuring points to determine the sensors where the maintenance is due soon. The largest representable number is 889 days (127 weeks / 2.5 years). If the next maintenance is due in an even longer period, the time display is still limited to 889 days. If the data is not available, the time is displayed with "- days" or, if maintenance is pending, with plain text "Service!

Main Menu



Submenu 1

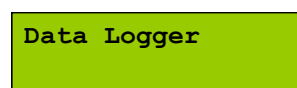


Scrolling through all active sensors and display of the related days remaining until next maintenance.

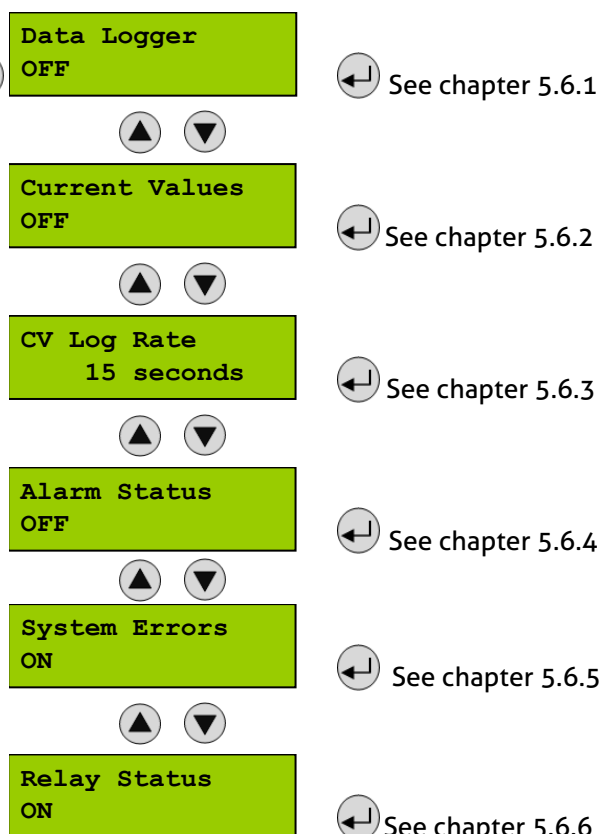
5.6 Menu Data-Logger

Connect an USB device at the USB connector of the GC module to use the data logger function. This USB device may be for example an USB stick version 2.0 (not all types have been tested). In this menu, the parameters for the long-term recording of the USB device are set.

Main Menu



Submenu 1



See chapter 5.6.1

See chapter 5.6.2

See chapter 5.6.3

See chapter 5.6.4

See chapter 5.6.5

See chapter 5.6.6

5.6.1 Data Logger Switch On / Off

Starting the logger function

Symbol	Description	Default	Function
OFF	Turned off	OFF	OFF = Data Logger function is turned off. ON = Data Logger function is turned on.

Table 6: Data Logger

Note:

This function only works with an USB device.

If this function is active, the USB device mustn't be removed, otherwise data may be lost!! (Like with Windows – safe removal of USB devices)

If the data logger files have to be created on the USB stick first, it takes up to 2 seconds. During this time, the values are not recorded.

5.6.2 Current Values

Symbol	Description	Default	Function
OFF	Current value	OFF	OFF = Current values of all registered MP are not recorded. ON = Current values of all registered MP are recorded.

Table 7: Current Values

Release of the current value recording of all active measuring points on the USB device in a CSV file. The file name is generated by the system and can't therefore be determined manually.

The name of the file is structured as follows:

CVMMDD.csv, with MM standing for the current month and DD standing for the current day.

As of version 1.02.13, the interval time can be set in seconds, minutes, hours and days (see chapter 5.6.3). If the interval time is specified in seconds or minutes, a new file is created every day. If the interval time is specified in hours or days, the file is written up to the maximum number of data records of 10,000 and only then a new file is started. This makes sure that the files won't be too big to be still edited by established PC programs.

Internal structure of the file

(The headlines and column numbers are only for easy explanation and aren't written in the file.)

Column 1	2	3	4	5	6	7	..	98	99	100	Etc.
		1	2	3	4	5	...	96	97	98	x
Date	Time	DP1	DP2	DP3	DP4	DP5	...	DP96	AP1	AP2	
19_09_27	08_54_33	0	20	20	28	-	...	-	0	0	
19_09_27	08_54_44	0	20	20	28	-	...	-	25	29	
19_09_27	08_54_54	0	20	20	28	-	...	-	25	29	
19_09_27	08_55_05	0	20	20	28	-	...	-	25	29	
19_09_27	08_55_16	0	20	20	28	-	...	-	25	29	
19_09_27	08_55_27	0	20	20	28	-	...	-	25	29	
19_09_27	08_55_37	0	20	20	28	-	...	-	25	29	
19_09_27	08_55_49	0	20	20	28	-	...	-	25	29	
19_09_27	08_55_59	0	20	20	28	-	...	-	25	29	
19_09_27	08_56_10	0	20	20	28	-	...	-	25	29	
19_09_27	08_56_20	0	20	20	28	-	...	-	0	29	

Table 8: Internal Structure of the File (Current Values)

The 1st column gives the time; from the 2nd column on, the current values of all registered measuring points at this time are written. Inactive measuring points within the recorded measuring points are marked by a dash -.

Values less than 0 stand for an error status of the measuring point.

e.g. 0x8100 = Underrange of sensor measuring point

e.g. 0x8200 = Overrange of sensor measuring point

e.g. 0x9000 = Communication error of sensor board measuring point

e.g. 0xB000 = Communication error of sensor measuring point

Each error is marked by the prefix 0x. In this way the file keeps a fixed structure and can be evaluated with Excel and graphed according to the chronological progress.

5.6.3 CV Log Rate

Setting of the time interval in which the current values of all registered MP are stored.

Symbol	Description	Default	Function
15	Time	15	Time interval between 2 entries in the CSV file (1–9999, with the time interval depending on the time unit)
seconds	Time unit	sec- onds	Time interval in - seconds - minutes - hours - days

Table 9: CV Log Rate

Note:

The current actual values are always written at the end of a cycle. If the interval time has not yet expired at this point, they are not written until the next cycle. This can cause discrepancies between 2 entries.

If they are to be written in each cycle, the interval time must be set to less than 5 s.

5.6.4 Alarm Status

Symbol	Description	Default	Function
OFF	Alarm Status	OFF	OFF = Alarms are not stored. ON = Alarms are stored.

Table 10: Alarm Status

Release of the alarm recording for all active measuring points on the USB device into a separate CSV file for alarms and faults.

The name of the file structured as follows:

AEMMDD.csv, with MM standing for the current month and DD standing for the current day.

Every day, a new file with the current date is generated. This makes sure that the files won't be too big to be still edited by established PC programs.

Internal structure of the file

(The headlines are not written in the file.)

Time	MP	Gas	Coming/ Going	CV	AV	A1	A2	A3	A4
09_49_47	DP 02	CO	+	84	84	A1	A2		
09_49_47	AP 03	CO	+	194	194	A1	A2	A3	A4
09_50_02	DP 02	CO	-	20	20				
09_50_02	AP 03	CO	-	20	20				

Table 11: Internal Structure of the File (Alarm Status)

1. Column: Time
2. Column: MP Address
3. Column: Gas Type
4. Column: Information Coming (+) / Going (-).
5. Column: Current Value
6. Column: Average Value
- 7.–10. Column: Active Alarms.

All active alarms of the MP are always written if there is any change of an alarm. The reset of an alarm is documented by an empty column. This shows how long the alarm has been active.

5.6.5 Error Status

Symbol	Description	Default	Function
OFF	Error status	OFF	OFF = Faults are not stored. ON = Faults are stored.

Table 12: Error Status

Release of the fault recording for all active measuring points on the USB device in the common CSV file for alarms and faults.

Internal structure of the file

(The headlines are not written in the file.)

Current time	Source	Error code	+ Error present - Error absent	Error date (month day) Time (hours minutes)	Error text
10_22_28	DP 79	0x8100	+	03_30 10_20	Underrange
13_48_28	DP 79	0x8100	-	03_30 13_46	Underrange

Table 13: Internal Structure of the File (Error Status)

1. Column: Current time

2. Column: Error Source

3. Column: Error Code

4. Column: Action: + = Error occurred.
 - = Error acknowledged.

5. Column: Time and date when the error has occurred

From 6. Column: Plain text of the error code. If several errors are coded so you can read multiple entries here.

Every internal restart of the system (system reset) is also documented in the current day file.

Frequent reboots (several times per day) may point to a technical problem. Please consult the installer as soon as possible.

Information	Date	Time
GC Reset	30_03_15	13_38_19

Table 14: Example

When activating fault records, a CSV file including the error bits of the units connected to the field bus is also written (from version 1.02.13). One data record per cycle is always saved.

The name of this file is structured as follows:

EBMMDD.csv, where EB stands for Error Bits, MM for the current month and DD for the current day.

Internal structure of the file

(The headlines are not written in the file.)

Current time	System Error Bits	SB Address 1 Error Bits	SB Address 2 Error Bits	...	SB Address 96 Error Bits	GC Error Bits with regard to own module	EP Address 1 Error Bits	...	EP Address 7 Error Bits
10_22_28	0x0000	0x0000	0x0000	...	0x0000	0x0000	0x0000	...	0x0000
13_48_28	0x0000	0x0000	0x0000	...	0x0000	0x0000	0x0000	...	0x0000

Table 15: Error Bits

5.6.6 Relay Status

Symbol	Description	Default	Function
OFF	Relay status	OFF	OFF = Relay states are not stored. ON = Relay states are stored.

Table 16: Relay Status

Release of the relay states recording for all relays on the USB device in the CSV file.

The name of this file is structured as follows:

RLMMDD.csv: RL = relay, MM = current month, DD = current day

Internal structure of the file

(The headlines are not written in the file.)

Current time (Column 1/A)	SR1 (Column 2/B)	...to...	SR96 (Column 97/CS)	AR1 (Column 98/CT)	...to...	Bis AR32 (Column 129/DY)
10_22_28	1		0	0		1
13_48_28	0		0	0		0

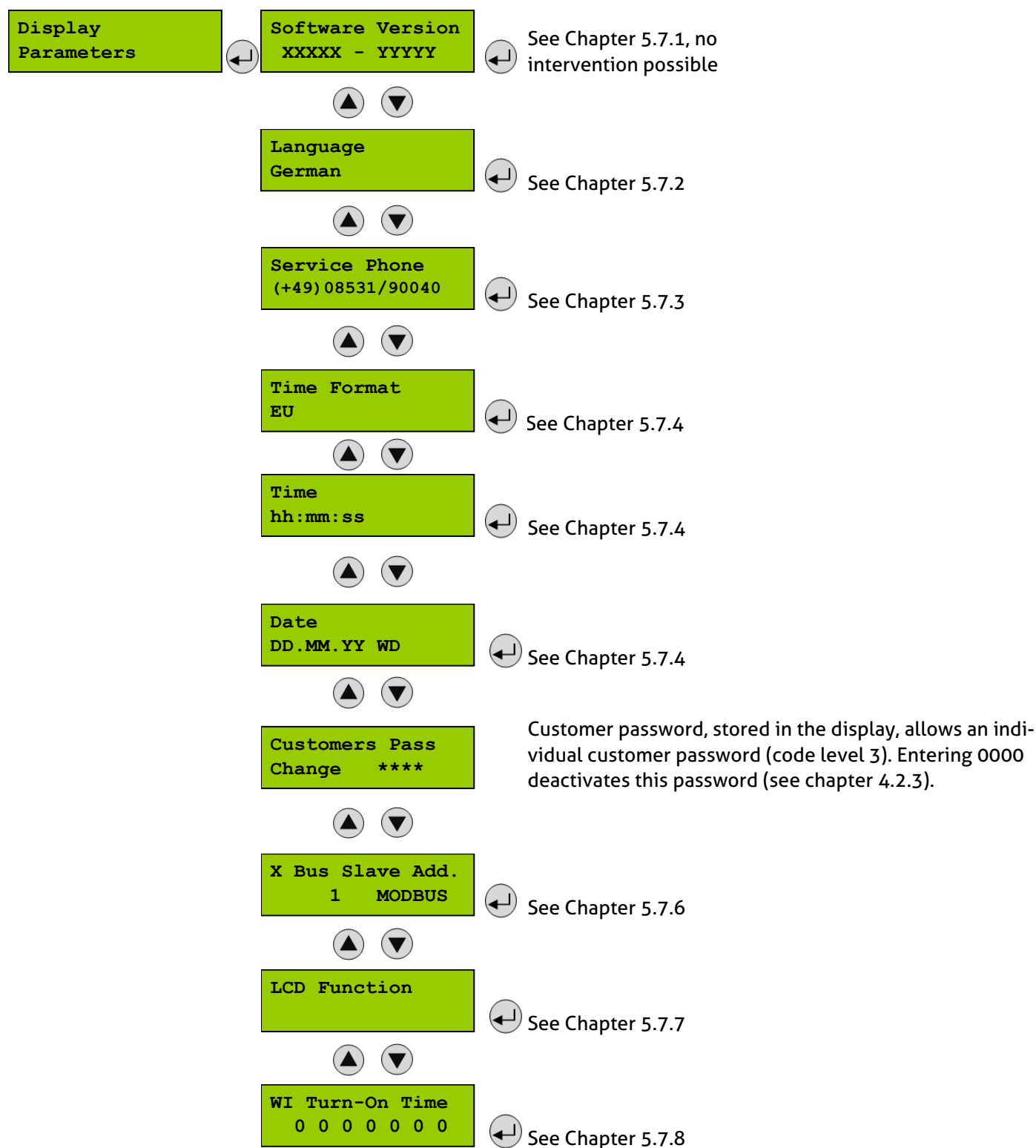
Table 17: Internal Structure of the File (Relay Status)

5.7 Display Parameter

In the menu Display Parameters, you can find the general, security irrelevant parameters of the Gas-Controller GC. These parameters can be changed during the operation mode of the controller.

Main Menu

Submenu 1



5.7.1 Software Version

Symbol	Description	Function
XXXXXX	Software-Version of the displays	XXXXXX Software-Version
YYYYYY	Software-Version of the basic board	YYYYYY Software-Version

Table 18: Software Version

5.7.2 Language

Selection of the menu language.

Symbol	Description	Default	Function
German	Language	German	German English Spanish French Italian USA English

Table 19: Language

5.7.3 Service Phone Number

The service phone no. can be entered individually in the next menu.

Symbol	Description	Function
0853....	Phone No.	Input of the individual service phone no.

Table 20: Service Phone Number

5.7.4 System Time / System Date

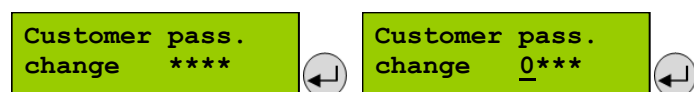
Input and correction of time and date, selection of time and date format

Symbol	Description	Default	Function
EU	Time format	EU	EU = Display of time and date in EU format US = Display of time and date in US format
hh.mm.ss	Time		hh.mm.ss = Input of the correct time (EU format) hh.mm.ss pm = Input of the correct time (US format)
DD.MM.YY WD	Date		DD.MM.YY = Input of the correct date (EU format) MM.DD.YY = Input of the correct date (US format) WD = Weekday, is automatically generated. * February is always represented with 28 days. Manual adjustment of the date in a leap year is required.

Table 21: System Time / System Date

5.7.5 Customer password

Storage of an individual customer password for changing parameters (see Chapter 4.2.3, code level 3). Changing the password only with code level 1. This menu item only appears if code level 1 is enabled.



Enter new customer password.

5.7.6 X-Bus Slave Address

(Only existing, if X-Bus function is available)

Symbol	Description	Default	Function
Address	Slave address at the X-Bus interface	1	Input of the slave address at the X-Bus. In addition to the address, the available option appears. Currently only Modbus available: Standard Baud Rate 19200 (pay attention to the additional documentation of the protocol)

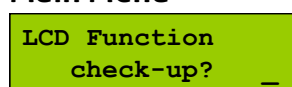
Table 22: X-Bus Slave Address

5.7.7 LCD Function

Testing the LCD hardware: For about 2 seconds, all the LEDs are lit. All points are displayed on the LCD.

Starting Menu

Main Menu



5.7.8 Weekly Timer

This menu item is used to set switching times of the weekly timer and their assignment to virtual switching output channels (WI - Watch Input - in the Relay Parameters). Via these 7 individual switching output channels, each relay (alarm and signal relay) can be activated in addition to the switching commands from the alarm processing (OR function, the safety-relevant functions therefore remain unaffected).

Application examples: Forced ventilation 1x 1 h per week with low occupancy or lighting control. An external-OFF option is not implemented for safety reasons.

It should also be noted here:

- Only one override function (via digital inputs or timer channel) is possible per relay.
- An active external OFF function (e.g. of fireman's switches) blocks the external ON control of e.g. the timer channel (see chapter 5.8.2.7).

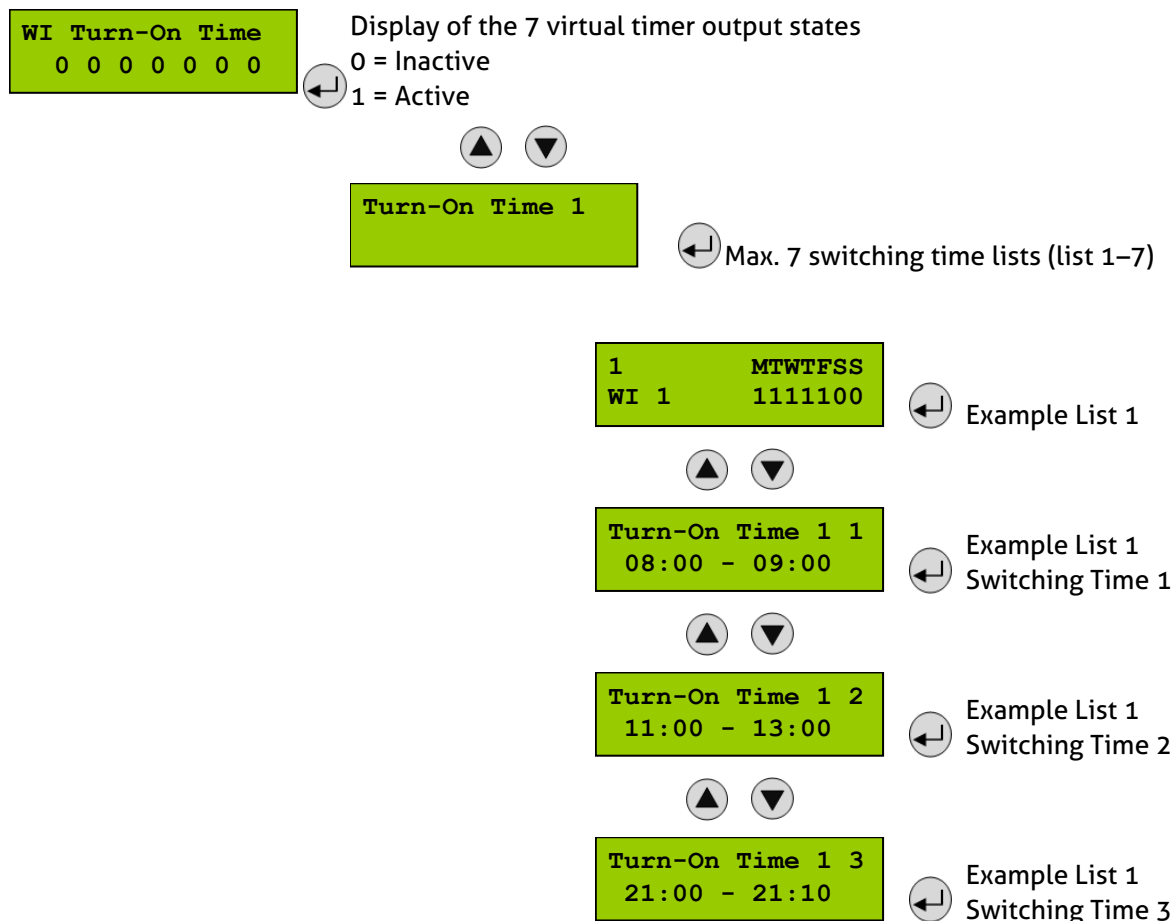
The weekly timer can only be operated on the GC display, but not with PCE.

In the weekly timer main menu, all 7 switching states are displayed, 0 = Inactive, 1 = Active.

Pressing the Enter key takes you to the settings menu where you can select which of the 7 lists to edit. Each list contains the submenu for the switching output channel (WI 1–7) and weekday assignment as well as the 3 other submenus with the corresponding ON and OFF switching times.

Main Menu

Submenu 1



The time 00:00 - 00:00 is considered inactive.

It is therefore possible to set up to 7 different switching times with 1 WI and 3 time intervals each. Thus, a maximum of 7 days with one WI each or each weekday can be configured differently. The 3 different times can be set only over the time of 1 day - 24 hours (no yearly timer).

5.8 Parameter

In the menu Parameters you can find the parameter functions of the Gas-Controller GC.

Main Menu

Parameters

Submenu 1

Service
OFF



See chapter 5.8.1 (password protected)

Only with service ON the following parameters can be activated.



Alarm Relay
Parameters



See chapter 5.8.2



Signal Relay
Parameters



See chapter 5.8.2



Digital MP
Parameters



See chapter 5.8.3



Analog MP
Parameters



See chapter 5.8.3



System Parameter



See chapter 5.8.4



Operating Data



See chapter 5.8.5



Alarm Relay
Test Function



See chapter 5.8.6



Signal Relay
Test Function



See chapter 5.8.6



Analog Outputs
Test Function



See chapter 5.8.7

5.8.1 Service

Service and maintenance work must not and cannot be executed when the Gas-Controller is in the normal measuring mode for it is not sure that all response times and functions can be observed correctly. Therefore, for service and maintenance work on the Gas-Controller, the operating mode "Special Mode" must be activated first. Only then may changes be made to the safety-relevant parameters. The Special Mode is activated by the Service ON function, among others. After setting, the text "Please wait..." is output. The changeover can take up to 8 seconds (a so-called cycle time = the duration of a complete evaluation cycle of all parameterised/connected devices).

Further parameters menu items are therefore only accessible in the Service ON state. The Service ON state is reset to normal operation mode either automatically 15 minutes after the last key press or manually in the menu by the operator.

Sensors cannot be actively switched into the Special Mode directly from the Controller unless this is absolutely necessary to carry out a parameterisation process. In this case, the special mode can be activated to carry out the process on the sub-device and then deactivated again. This can also be done directly on the sensor using STL Service-Tool or PCE-Software. Sensors in the Special Mode are not included in the alarm evaluation.

Symbol	Description	Default	Function
OFF	Service	OFF	OFF = No reading and changing of parameters. ON = Controller GC in Special Mode, parameters can be read and changed.

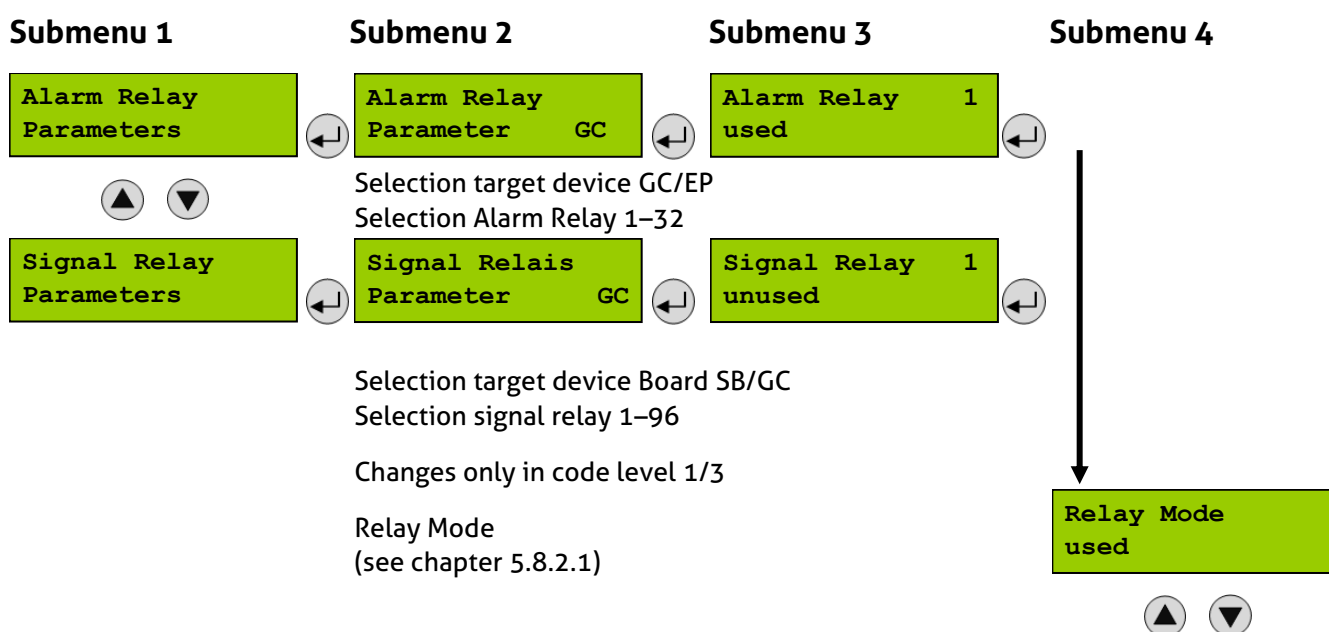
Table 23: Service

5.8.2 Relay Parameter

Reading and changing of the parameters separately for each relay.

The display of the GC can display not only the parameters from the basic board, but also those from local devices such as the EP module or SB-group (SB, WSB, MSB, PX2 board).

However, the parameters from the local devices cannot be adjusted from the GC.



Operation mode relay
(see chapter 5.8.2.2)

Operation Mode
Energized



Relay function
(see chapter 5.8.2.3)

Flashing
Yes



Signal Source
(see chapter 5.8.2.4)

Signal source
Local



Alarm trigger quantity
(see chapter 5.8.2.5)

Alarm Quantity
1



Definition horn function
(see chapter 5.8.2.6)

Time-Recurr.- DI
0s Yes 0



Definition external operation
(see chapter 5.8.2.7)

External Mode
↗ DI 0 ↘ DI 0



Delay time for relay ON
(see chapter 5.8.2.8)

Delay ON time
0s



Delay time for relay OFF
(see chapter 5.8.2.8)

Delay OFF time
0s



Collective fault OR operation
(see chapter 5.8.2.9)

Fault → active
No



Maintenance OR operation
(see chapter 5.8.2.10)

Maint. → active
No

The Used / Not Used indication in the relay selection can only be displayed in GC level.

5.8.2.1 Relay Mode

Definition of the relay mode.

Symbol	Description	Default	Function	
Used	Mode	Used	Used Unused	= Relay is registered on the controller and can be used = Relay is not registered on the controller

Table 24: Relay Mode

5.8.2.2 Relay Operation Mode

Definition of the relay operation mode

The terms energized / de-energized for this item come from the terms open-circuit and closed-circuit principle used for safety circuits. This does not refer to the relay contact circuit (as a changeover contact, and therefore optionally available in the 2 principles), but to the activation of the relay coil. The LEDs attached to the modules show the 2 states in analogy. (LED off -> relay de-energized).

Symbol	Descrip-	Default	Function	
De-energ.	Mode	De-energized	De-energized Energized	= Relay (and LED) de-energized if no alarm active = Relay (and LED) permanently energized, if no alarm active

Table 25: Relay Operation Mode

5.8.2.3 Relay Function Flashing

Definition of the relay function

The function "Flashing" represents a connection option for warning devices to improve visibility. If "Flashing" is set, the relay mustn't be used as a safe output circuit anymore.

A combination of relay mode energized with flashing operation makes no sense and is therefore suppressed.

Symbol	Description	Default	Function
Yes	Function	Yes	Yes = Relay function flashing at alarm (= time fixed 1 s) impulse:break = 1:1 No = Relay function static ON at alarm

Table 26: Relay Function

5.8.2.4 Signal Source

Note:

For the alarm relays of the GC module, the menu item "Signal Source" is not available, as the GC does not allow overriding control. The alarm relays on the EP modules and the signal relays on the MSB and WSB boards must be configured to "Remote" (see GA_STL, chapter External Override) if the GC is to control these relays (AR/SR).

The signal source determines whether the relay is controlled by an alarm in the I/O board (local) or from the control centre (remote).

Symbol	Description	Default	Function
Local	Signal spurce	Local	Local = The relay is controlled based on the local settings and alarms. Remote = The relay is controlled by the control panel.

Table 27: Signal Source

5.8.2.5 Alarm Trigger Quantity

In some applications it is necessary that the relay switches only at the n^{th} alarm. Here you can set the number of alarms necessary for relay tripping.

Symbol	Description	Default	Function
Quantity	Function	1	Only if this quantity is reached, the relay trips. Maximum number is 9.

Table 28: Number of Alarms for Activation

5.8.2.6 Horn Function (not safe output circuit because resettable)

The horn function is considered active if at least one of the 2 parameters (time or assignment to digital input) is set. The horn function retains its functionality even for alarms in latching mode.

Symbol	Description	Default	Function
Recur- rence	Reset mode	0	0 = Reset of the relay after time having run out via DI (external) or by pushbut- tons 1 = After reset of the relay, time starts. At the end of the set time, the relay is activated again (recurrence function).
Time		120	Enter time for reset function or recurrence function in s 0 = no reset function
DI		0	Assignment, which digital input resets the relay.

Table 29: Horn Function

Horn function resettable:

The activated horn can be reset with this function.

The following possibilities to acknowledge are available for the alarm relay as horn relay:

- By pressing the left button (ESC). Only available in main menu.
- Automatic reset at the end of the pre-set time (active if value > 0).
- By a physically available internal/external pushbutton (assignment of the appropriate digital input DI 1–n).

Due to fixed polling cycles, external buttons must be pressed for a few seconds before the reaction occurs. After successful acknowledgment, the horn remains permanently reset until a new alarm is registered for this relay function.

Alarm or relay 4 is only an example in the following function diagrams and applies in analogy to all alarms/relays.

Acknowledge the horn relay:

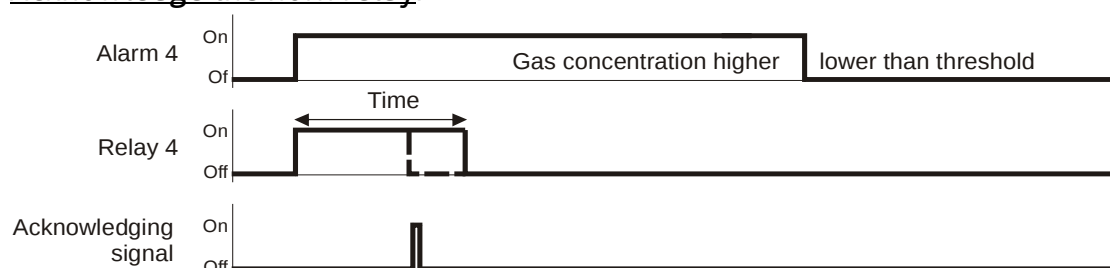


Figure 1: Acknowledgement of the Horn Relay

Recurrence of the horn relay:

After an alarm has been triggered, the horn will remain active until a reset action is done. After acknowledgment of the horn relay (via a button or externally via digital input) a timer starts. When this time has run out and the alarm is still acting, the horn relay is set again. This process is repeated endlessly as long as the associated alarm remains active.

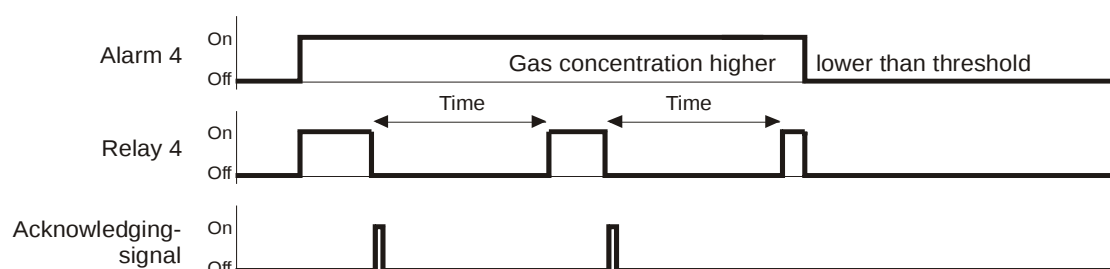


Figure 2: Recurrence of the Horn Relay

Internal horn (option)

Depending on the version, the internal horn of the DGC is connected to alarm relay 4 of the GC module or to the open collector output of the 1st EP module.

If an alarm relay with selected horn function is activated by a gas alarm, the open collector output of the 1st EP module is automatically activated and the internal horn sounds.

For the DGC Controller without EP module, the alarm relay 4 must be defined as horn relay.

5.8.2.7 External Override of Alarm/Signal Relay via DI, WI or BI

Assignment of a digital input (DI/BI/WI) for external switching on or off of the alarm relay.

DI = Digital hardware input DI1 to DI4 of the GC (DI1–DI4).

BI = Digital hardware input DI1 of WSB or DI1/DI2 of MSB (BI1–BI96)

WI = Virtual input WI1 to WI7, controlled by the timer outputs (WI1-WI7)

Manual switching of the alarm relays via DI does not trigger the Special Mode, as this is an intended and configured functionality. The use of the override should be used with caution, particularly the function of setting "external OFF" (e.g. only via fire brigade switch on the fire brigade panel, but not via generally accessible control panels to deactivate the ventilation).

This external OFF function has priority over a gas alarm ON command or a timer channel ON command.

If External ON and External OFF are configured simultaneously to the same relay and both are active at the same time, so in this state, only the External OFF command is executed. In this mode, too, the relays work respecting the parameter settings "Flashing Yes/No" and "Energized/De-energized".

Symbol	Description	Default	Function
↗ DI 0	External ON	0	As long as DI/BI 0 is closed or WI is active, relay switches to ON.
↘ DI 0	External OFF	0	As long as DI/BI 0 is closed, relay switches to OFF.

Table 30: External Override

5.8.2.8 Delay Mode of Alarm / Signal Relay

Definition of the switch-on and switch-off delay of the relays

Symbol	Description	Default	Function
0 s	Switch-ON Delay Time	0	Alarm / Signal Relay is only activated at the end of the defined time. 0 = No delay, maximum value = 9999 s
0 s	Switch-OFF Delay Time	0	Alarm / Signal Relay is only deactivated at the end of the defined time. 0 = No delay, maximum value = 9999 s

Table 31: Delay Mode of Alarm / Signal Relay

5.8.2.9 OR Operation of Fault to Alarm/Signal Relay

Enables the Fault OR operation of the current alarm/signal relay.

If the OR operation for this relay is set to active = Yes, all device faults will activate the relay in addition to the alarm signals.

In practice, this ORing will be used if, for example, fans should run or warning lights should be activated in case of device malfunction, since the fault message of the central control is not permanently monitored.

Note:

Exceptions are all errors of the measurement point because the MPs can be assigned to each alarm separately in the menu MP Parameters. This exception is used to build up targeted zone related signalling in case of MP errors, which should not affect other zones.

Symbol	Description	Default	Function
No / Yes	No assignment / Activated assignment	No	No = Alarm and/or signal relay is not affected when a device fault occurs. Yes = Alarm and/or signal relay switches to the alarm state when a device fault occurs.

Table 32: OR Operation of Fault to Alarm/Signal Relay

5.8.2.10 OR Operation of Maintenance to Alarm/Signal Relay

Enables the Maintenance OR operation of the current alarm/signal relay.

If the OR operation for this relay is set to active = Yes, the relay will be activated in addition to the alarm signals when at least one maintenance message is pending.

In practice, this ORing will be used if, for example, fans should run when the sensor accuracy is not ensured anymore because of missing calibration (therefore pending maintenance message) or warning lights should be activated, since the maintenance information of the central control is not permanently monitored.

Note:

When the maintenance message is activated, the reset of the control can only be done by calibrating the sensors or a disabling this OR function.

Symbol	Description	Default	Function
No / Yes	No assignment / Activated assignment	No	No = Alarm and/or signal relay is not affected when a maintenance message occurs. Yes = Alarm and/or signal relay switches to the alarm state when a maintenance message occurs.

Table 33: OR Operation of Maintenance to Alarm/Signal Relay

5.8.3 MP Parameter

For reading and changing measuring point parameters for each bus and analog sensor including registration of MP and assignment of the alarm relays.

The display of the GC can display not only the parameters of the base board, but also those from local devices such as the EP module or SB group (SB, WSB, MSB, PX2).

However, the parameters from the local devices cannot be adjusted from GC.



Definition alarm threshold 3
(see chapter 5.8.3.5)

Threshold 3
A 0.0 ppm ↗



Definition alarm threshold 4
(see chapter 5.8.3.5)

Threshold 4
A 0.0 ppm ↗



Hysteresis
(see chapter 5.8.3.5)

Hysteresis
0.0 ppm



Delay time for alarm ON
(see chapter 5.8.3.6)

Delay ON time
0s



Delay time for alarm OFF
(see chapter 5.8.3.6)

Delay OFF time
0s



Average value overlay
(see chapter 5.8.3.7)

AV-Overlay
No



Definition of latching mode
(see chapter 5.8.3.8)

Alarm - 1234
Latching - 0000



Assign MP fault to alarm
(see chapter 5.8.3.9)

Alarm - 1234
Fault - 0000



Assign alarm to alarm relay
(see chapter 5.8.3.10)

A1	A2	A3	A4
0	0	0	0



Assign MP signal to analog output
(see chapter 5.8.3.11)

Analog Output
x y

5.8.3.1 Activate – Deactivate MP

Deactivation shuts the registered / not registered sensor down in its function, which means that there is no alarm or fault message at this measurement point. Existing alarms and faults are cleared with deactivation. Deactivated sensors do not output a collective fault message.

Symbol	Description	Default	Function
active	MP Mode	Not active	active = Measuring point activated at the GC. not active = Measuring point not activated at GC.

Table 34: Activate – Deactivate MP

5.8.3.2 Lock or Unlock MP

In the temporary Lock Mode, the function of the registered sensors is put out of service, which means that there is no alarm or fault message at this measuring point. Existing alarms and faults are cleared with the locking. If at least one sensor is blocked in its functionality, the collective fault message is activated after expiry of the internal fault delay time, the yellow fault LED is continuously lit and a message appears in the menu System Errors.

Symbol	Description	Default	Function
unlocked	Lock mode	unlocked	unlocked = MP free, normal operation locked = MP locked, error message only on the display

Table 35: Lock or Unlock MP

5.8.3.3 Selection Gas Type with Unit

Selection of the desired and connected gas sensor type (connection possible as digital sensor SC, SX1, SSAX1 or analog sensor MC)

The selection contains all necessary information for the GC, and is also used for comparing the real, digital data with the settings.

This feature increases the user and operating security.

The unit is permanently assigned to each gas sensor type (see Table 36) and automatically entered during selection.

MSR Type	Sensor head type SC, SX1, SSAX1, MC	Gas type	Formula	Measuring range ¹	Unit
1105	E1105-XX	Acetylene*	C ₂ H ₂	0–100	% LEL
1110	E1110-XX	Carbon monoxide	CO	0–300	ppm
1125	E1125-XX	Ammonia	NH ₃	0–300	ppm
1129	E1129-XX	Nitrogen monoxide	NO	0–100	ppm
1130	E1130-XX	Nitrogen dioxide	NO ₂	0–30	ppm
1135	E1135-XX	Bromine*	Br ₂	0–2	ppm
1147	E1147-XX	Phosgene*	COCl ₂	0–1	ppm
1150	E1150-XX	Methanol*	CH ₃ OH	0–250	ppm
1160	E1160-XX	VOC	VOC	0–5	ppm
1181	E1181-XX	Chlorine dioxide*	ClO ₂	0–1	ppm
1182	E1182-XX	Hydrogen fluoride*	HF	0–10	ppm

MSR Type	Sensor head type SC, SX1, SSAX1, MC	Gas type	Formula	Measuring range ¹	Unit
1183	E1183-XX	Hydrogen cyanide	HCN	0–100	ppm
1184	E1184-XX	Hydrogen arsenide*	AsH ₃	0–1	ppm
1185	E1185-XX	Formaldehyde	CH ₂ O	0–10	ppm
1186	E1186-XX	Hydrogen chloride	HCL	0–20	ppm
1187	E1187-XX	Phosphine*	PH ₃	0–5	ppm
1188	E1188-XX	Silane*	SiH ₄	0–50	ppm
1189	E1189-XX	Ethylene	C ₂ H ₄	0–200	ppm
1190	E1190-XX	Ozone	O ₃	0–5	ppm
1191	E1191-XX	Hydrogen peroxide	H ₂ O ₂	0–10	ppm
1192	E1192-XX	Nitrous oxide*	N ₂ O	0–2000	ppm
1193	E1193-XX	Chlorine	CL ₂	0–20	ppm
1194	E1194-XX	Hydrogen	H ₂	0–1000	ppm
1195	E1195-XX	Oxygen	O ₂	0–25	% vol
1196	E1196-XX	Sulphur dioxide	SO ₂	0–100	ppm
1197	E1197-XX	Hydrogen sulphide	H ₂ S	0–200	ppm
1198	E1198-XX	Fluorine*	F ₂	0–2	ppm
1199	E1199-XX	Ethylene oxide	C ₂ H ₄ O	0–10	ppm
2020	2020-XX	FR LFL	R32 R454b R455a R1234yf R1234ze	0–50	%LEL
2053	2053-XX	Xylene*	C ₈ H ₁₀	0–300	ppm
2059	2059-XX	FR01*	R12	20–2000	ppm
2061	S2061-A	FR02	R23 R508b	20–2000	ppm
2063	S2063-A	FR03	R452a R454b R454c R455a R513a R515b R1233zd R1234yf R1234ze	20–2000	ppm
2064	S2064-A	FR04*	R123	20–2000	ppm
2066	S2066-A	FR05*	R11	20–2000	ppm
2070	S2070-A	FR06	R22 R401a R401b R402a R402b R403a R408a R409a R411a	20–2000	ppm

MSR Type	Sensor head type SC, SX1, SSAX1, MC	Gas type	Formula	Measuring range ¹	Unit
2077	S2077-A	FR07	R134a R407a R416a R417a R422a R422d R427a R437a R438a R449a R407f R450a	20–2000	ppm
2080	S2080-A	FR08	R125 R32 R404a R407c R410a R434a R507a R448a R452b	20–2000	ppm
2125	S2125-X	Ammonia	NH ₃	0–3000	ppm
2189	S2189-X	Ethylene	C ₂ H ₄	0–1000	ppm
3400	P3400-A	Methane	CH ₄	0–100	% LEL
3402	P3402-A	LPG	LPG	0–100	% LEL
3405	P3405-A	Acetylene*	C ₂ H ₂	0–100	% LEL
3408	P3408-X	Ammonia	NH ₃	0–100	% LEL
3410	P3410-A	Ethylene	C ₂ H ₄	0–100	% LEL
3415	P3415-A	Cyclohexane	C ₆ H ₁₂	0–100	% LEL
3420	P3420-A	Ethane	C ₂ H ₆	0–100	% LEL
3425	P3425-A	Ethanol	C ₂ H ₅ OH	0–100	% LEL
3427	P3427-A	Ethyl acetate	C ₄ H ₈ O ₂	0–100	% LEL
3430	P3430-A	Benzene	C ₆ H ₆	0–100	% LEL
3435	P3435-A	n-hexane	C ₆ H ₁₄	0–100	% LEL
3440	P3440-A	Hydrogen	H ₂	0–100	% LEL
3448	P3448-A	Butyl acetate	C ₆ H ₁₂ O ₂	0–100	% LEL
3450	P3450-A	Methanol	CH ₃ OH	0–100	% LEL
3458	P3458-A	Methyl ethyl ketone MEK	C ₄ H ₈ O	0–100	% LEL
3460	P3460-A	n-butane	C ₄ H ₁₀	0–100	% LEL
3468	P3468-A	Isobuthanol/Isobutyl alcohol	C ₂ H ₆ O ₂	0–100	% LEL
3470	P3470-A	n-octane	C ₈ H ₁₈	0–100	% LEL
3472	P3472-A	Cyclopentane	C ₅ H ₁₀	0–100	% LEL
3473	P3473-A	Methyl acetate	C ₃ H ₆ O ₂	0–100	% LEL
3475	P3475-A	n-pentane	C ₅ H ₁₂	0–100	% LEL
3480	P3480-A	Propane	C ₃ H ₈	0–100	% LEL
3480	P3480-C	Propane	C ₃ H ₈	0–5000	ppm
3481	P3481-B	Propene	R1270	0–30	% LEL
3482	P3482-A	Isopropyl alcohol	C ₃ H ₈ O	0–100	% LEL
3485	P3485-A	Acetone	(CH ₃) ₂ CO	0–100	% LEL

MSR Type	Sensor head type SC, SX1, SSAX1, MC	Gas type	Formula	Measuring range ¹	Unit
3490	P3490-A	Toluene	C ₇ H ₈	0–100	% LEL
3491	P3491-A	n-heptane	C ₇ H ₁₆	0–100	% LEL
3493	P3493-A	Xylene	C ₈ H ₁₀	0–100	% LEL
3494	P3494-A	Butadiene	C ₄ H ₆	0–100	% LEL
3495	P3495-A	Nonane	C ₉ H ₂₀	0–100	% LEL
3496	P3496-A	Petrol vapours	Petrol	0–100	% LEL
3497	P3497-A	Styrene*	C ₈ H ₈	0–100	% LEL
3498	P3498-A	JP8*	JP8	0–100	% LEL
I184	I184	Sulphur hexafluoride*	SF ₆	0–3000	ppm
I200	I200-A	IR-R32	R32	0–100	% LEL
I400	I400-A	IR-methane	CH ₄	0–100	% LEL
I400	I400-B	IR-methane	CH ₄	0–100	% vol
I464	I464-X	Carbon dioxide	CO ₂	0–2000	ppm
I464	I464-X	Carbon dioxide	CO ₂	0–5	% vol
I480	I480-X	IR-propane*	C ₃ H ₈	0–100	% vol
I480	I480-B	IR-propane	C ₃ H ₈	0–100	% LEL
I564	I564	Carbon dioxide*	CO ₂	0–2000	ppm
I564	I564	Carbon dioxide*	CO ₂	0–5	% vol
M200	M200-B	MPS-R32*	R32	0–100	% LEL
M203	M203-B	MPS-R454b*	R454b	0–100	% LEL
M205	M205-B	MPS-R1234ze*	R1234ze	0–100	% LEL
M400	M400-A	MPS-methane	CH ₄	0–100	% LEL
M405	M405-A	MPS-acetylene	C ₂ H ₂	0–100	% LEL
M408	M408-B	MPS-ammonia	NH ₃	0–30	% LEL
M440	M440-A	MPS-hydrogen	H ₂	0–100	% LEL
M480	M480-A	MPS-Propane	C ₃ H ₈	0–100	% LEL
M499	M499-B	MPS-DMC	C ₃ H ₆ H ₃	0–30	% LEL
S164	I-S1164-X	Carbon dioxide	CO ₂	0–5	% vol
S164	I-S1164-X	Carbon dioxide*	CO ₂	0–2000	ppm
S400	S400-A	IR-methane	CH ₄	0–100	% LEL
S480	S480-A	IR-propane	C ₃ H ₈	0–100	% LEL
5XXX		TVOC group*	TVOC		ppm
5XXX		TVOC group*	TVOC		% vol
EXT	Possible connection of sensors with 4–20 mA signal	Temperature	TEMP		°C
EXT		Temperature	TEMP		°F
EXT		Humidity	Humidity		% r. H.
EXT		Pressure	Press.		mbar
EXT		TOX	TOX		ppm
EXT		Combustible	Comb.		% LEL
EXT		External	Extern		%
EXT		Digital ²	Digital		%

Table 36: Gas Types

* Currently not available

¹ Different measuring ranges are possible, but not shown here.

² The use with measuring range value: 1 results in a binary value output of the values 0 or 1.

This menu item is available in GC MP Parameters. It only appears if a Freon group is selected as the gas type. The actual Freon designation is then entered in the second line. These Freons are entered in the above table under the Freon groups in the FORMULA column.

FRXX Blend Type
RYYYYY

5.8.3.4 Measuring Range Definition

The measurement range must be adapted to the working range of the connected gas sensor. For additional control by the installer, the settings in the GC must mandatorily match with the used sensors. If the types of gas and/or measurement ranges of the sensor do not agree with the settings of the GC, the error "EEPROM / configuration error" is generated, and the collective fault message is activated.

The range also affects the display of the measured values, alarm thresholds and hysteresis. For measuring ranges <10 3 decimal places, <100 2 decimal places, <1000 one decimal place are displayed. For measuring ranges ≥ 1000 , the display is without decimal place. The resolution and accuracy of the calculation are not affected by the different measuring ranges. The measuring range can only be set with the 2 left digits (internal scaling). The maximum adjustable value of the measuring range is 20,000.

5.8.3.5 Thresholds / Hysteresis

For each measuring point 4 alarm thresholds are available for free definition. If the gas concentration is higher than the set alarm threshold, the associated alarm is activated. If the gas concentration falls below the alarm threshold inclusive hysteresis the alarm is again reset. In the mode "Alarm at falling" the corresponding alarm is set in case of falling below the set alarm threshold and reset again when exceeding the threshold inclusive hysteresis. The display depends on the set measuring range (see chapter 5.8.3.4). Unused alarm thresholds must be set to 0, in order to avoid undesired alarms. If an alarm threshold is exceeded, all lower-level alarm thresholds are also triggered automatically.

Before new alarm thresholds and hysteresis values can be accepted by the system, the following plausibility criteria must be met:

- The thresholds must be $\leq$ measuring range, for measuring range 20,000 not more than 16,000.
- For increasing thresholds, the threshold values must also be indicated in ascending order.
- For falling thresholds, the threshold values must also be indicated in descending order.
- In case of mixed settings e.g. for O₂, first the falling thresholds and then the increasing thresholds must be indicated.
- The hysteresis must not be 0 if at least one threshold is set. If this occurs, GC calculates the smallest possible hysteresis¹ and stores it.
- The maximum hysteresis can be as large as half of the smallest threshold. GC also limits the hysteresis when saving.

¹ Calculation of the smallest hysteresis: For O₂, the hysteresis is 1.5 % of the lowest threshold. For all other gases, the hysteresis is 3 % of the lowest threshold.

Symbol	Description	Default	Function
C	Evaluation	C	C = Alarm evaluation by current value of MP A = Alarm evaluation by average value of MP
80 ppm	Threshold 1 Threshold 2 Threshold 3 Threshold 4 Hysteresis	40 80 100 120 15	Gas concentration > Threshold 1 = Alarm 1 Gas concentration > Threshold 2 = Alarm 2 Gas concentration > Threshold 3 = Alarm 3 Gas concentration > Threshold 4 = Alarm 4 Gas concentration < (Threshold X –Hysteresis) = Alarm X OFF
↗		↗	↗= Alarm release at increasing concentrations ↘= Alarm release at falling concentrations

Table 37: Thresholds / Hysteresis

5.8.3.6 Delay for Alarm ON and/or OFF for Current Value Evaluation

Definition of delay time for alarm ON and/or alarm OFF. The delay applies to all alarms of an MP with current value evaluation, not with average value overlay (see chapter 5.8.3.7).

Symbol	Description	Default	Function
0 s	CV Alarm ON delay	0	Gas concentration > Threshold: Alarm is only activated at the end of the fixed time (s). 0 s = No delay
0 s	CV Alarm OFF delay	0	Gas concentration < Threshold: Alarm is only deactivated at the end of the fixed time (s). 0 s = No delay

Table 38: Delay for Alarm ON and/or OFF for Current Value Evaluation

5.8.3.7 Average Overlay (VDI 2053 Functionality)

The alarm evaluation of the operation mode "Average" is overridden by the current value, if this exceeds the alarm threshold defined in the menu "System Parameters AV Overlay" (see chapter 5.8.4.3) The overlay is delayed by the time factor entered in the local menu. The function of the average overlay is only evaluated for the gas type CO and is activated here.

Symbol	Description	Default	Function
Yes	AV Overlay	Yes	Yes = Average overlay active (for CO) No = Average overlay not active

Table 39: Average Overlay

5.8.3.8 Latching Mode Assigned to Alarm

In this menu you can define, which alarms should work in latching mode.

Symbol	Description	Default	Function
Alarm - 1 2 3 4 Latching - 0 0 0 0	Latching alarms	0 0 0 0	0 = No latching 1 = Latching

Table 40: Latching Mode Assigned to Alarm

5.8.3.9 MP Fault Assigned to Alarm

In this menu you can define, which alarms should be activated by a fault at the measuring point.

Symbol	Description	Default	Function
Alarm - 1 2 3 4 Fault - 1 1 0 0	MP Fault	1 1 0 0	0 = Alarm not ON at MP fault 1 = Alarm ON at MP fault

Table 41: MP Fault Assigned to Alarm

5.8.3.10 Alarm Assigned to Alarm/Signal Relay

Each of the 4 alarms can be assigned to any physically existing alarm relay AR1–AR32 or signal relay SR1–SR96. Unused alarms are not assigned to any alarm relay.

Symbol	Description	Default	Function
0	A1 A2 A3 A4	0 0 0 0	RX = Assignment of the alarms A1–A4 to signal relay SR1–SR96 X = Assignment of the alarms A1–A4 to alarm relay AR1–AR32

Table 42: Alarm Assigned to Alarm/Signal Relay

5.8.3.11 MP Signal Assigned to Analog Output

The measuring point signal (current or average value) can be assigned to one of the max. 16 analog outputs.

The same assignment to different outputs (8) generates a functional duplication. This is often used to control remote devices in parallel (supply fan in the basement, exhaust fans on the roof).

After the analog output has been assigned and activated, this output must also be physically connected so that the output current can also flow (min. jumper against 0 or maximum load 500 Ω), since the GC compares the setpoint current with the actual current and an IO device error is output in case of deviation.

Analog output see also chapter 5.8.4.9.

Symbol	Description	Default	Function
x y	Analog Output	x y	x = MP Signal is assigned to analog output x, (activates output control -> signal can be used). y = MP Signal is assigned to analog output y, (activates output control -> signal can be used). 0 = MP Signal isn't assigned to any analog output When the AO is inactive, the output monitoring is inactive. The AO becomes active when the MP parameter is set to at least 1 MP and the output signal is set to > 0 in the system parameter.

Table 43: MP Signal Assigned to Analog Output

5.8.4 System Parameters

The display of the GC can display not only the parameters from the base board, but also those from local devices such as the EP module or SB group and the SC. Depending on the type of unit, some menu items are not displayed.

However, the parameters from the local devices cannot be adjusted from the GC.

Submenu 1

System Parameter

Submenu 2

System Parameter
GC



Selection target device
GC

System Parameter
SC



Selection target device
SC

System Parameter
SC 1



Selection SC 1–96

System Parameter
SB



Selection target device
SB/EP

System Parameter
SB 1



Selection SB 1–96,
EP 1–7

No intervention possible
(see chapter 5.8.4.1)

No intervention possible
(see chapter 5.8.4.1)

Definition of the maintenance interval
(see chapter 5.8.4.2)

Serial Number
XXXXX

Date manufacture
XX.XX.XX

Mainten. Interval
XXXX days

Definition of average overlay
(see chapter 5.8.4.3)

AV Overlay
0s 0 ppm



Definition of average time
(see chapter 5.8.4.3)

Average Time
900s



Definition of power on time in s
(see chapter 5.8.4.4)

Power On Time
5s



Setting of the collective fault via an external DI (see chapter 5.8.4.6)

Activate Failure
DI 0



Selection of special function
(see chapter 5.8.4.7)

Special Function
Standard



Selection of UPS function
(see chapter 5.8.4.8)

UPS
active



Selection of analog output function
(see chapter 5.8.4.8)

AO Function



Selection of the relay duplication
(see chapter 5.8.4.10)

R-Multiplication

5.8.4.1 System Information

Symbol	Description	Default	Function
XXXXXX	Serial Number		Serial number
XX.XX.XX	Date of Production		Date of production

Table 44: System Information

5.8.4.2 Maintenance Interval

The description of the maintenance concept is shown in chapter 5.5.

The maintenance interval of the controller is set here. If 0 is set, this function is disabled.

Symbol	Description	Default	Function
XXXX	Maintenance Interval		Entry of the interval between 2 services in days

Table 45: Maintenance Interval

5.8.4.3 Average Value Function

The Gas-Controller calculates the arithmetic average value for each active measuring point out of 30 measurements got within the time unit defined in the menu "AV Time". This average is available in addition to the current value for alarm evaluation. The selection which value should be used for evaluation is defined separately for each alarm in the menu "Alarm Threshold X". In the average mode, the average value is indicated in the menu "Measuring Values" next to the current value.

The alarm evaluation of the control mode "Average Value" is overlaid by the current value, when the current value exceeds the alarm threshold defined in the menu "AV-Overlay". The overlay is delayed by the time factor defined in this menu. The average overlay function is only available for the gas type CO (VDI 2053 functionality). Average value overlay function is not available for SC, I/O-Boards and EP.

Symbol	Description	Default	Function
120 s 120 ppm	AV Overlay	120 s 120 ppm	s = Delay time of average value overlay ppm = Threshold for average overlay
900 s	AV Time	900 s	s = Time for calculation of the average value Minimum adjustable value is 30 s

Table 46: Average Value Function

Changes in the average time need a complete time cycle for new calculation!

5.8.4.4 Power On Time

Gas sensors need a running-in period, until the chemical process of the sensor reaches stable conditions. During this running-in period the current signal can lead to an unwanted triggering of a pseudo alarm. Therefore, the Power On time is started at the Gas-Controller after you have switched on the power supply. While this time is running out, the Gas-Controller does not output alarms nor analog signals. The UPS function is not active. The Power On status occurs on the 1st line of the starting menu.



Caution: During the Power On phase, the GC is in Special Mode and does not perform further functions beside the starting diagnostic procedures. A count-down Power On Time in seconds (s) is shown on the display.

Symbol	Description	Default	Function
30s	Power On Time	30s	XXX = Definition of the Power On Time (s)

Table 47: Power On Time

5.8.4.5 Deadband

The deadband function is not available directly from the GC side. Noise in the measured value around the zero point can be prevented by parameterising the deadband function on the sensor side.

5.8.4.6 Fault Activation by External DI

The collective fault output can be triggered by an external digital input in addition by using the ORing operation. Example given: the fault message of the ventilation system should be connected.

Symbol	Description	Default	Function
DI 0 BI 0	Digital Input	0	DI 1–4: DI address via GC BI 1–96: DI address via MSB/WSB

Table 48: Fault Activation by External DI

This menu item is only available with GC. The digital inputs are not available in the standard version of the EP. Therefore, the DI5–DI32 cannot be used here.

5.8.4.7 Special Function

The following special functions are available:

Symbol	Description	Default	Function
Standard Zone function	Function	Standard	Standard function of GC Combination of the MP alarm signals into alarm zones

Table 49: Special Function

This menu item is only available for GC.

The setting in the special function menu affects the distribution of control information in the GC system.

A: Standard

The values of the analog outputs 3–16 are forwarded to the EP modules, addresses 1–7. In parallel, the values are also output to the DP addresses in 6 blocks with 16 pieces of information each. Example: Signal AO1 is output to DP addresses 1, 17, 33, 49, 65 and 81. In order to be able to use this function, multiple addressing must not be set on the sensor boards. If necessary, the addressing of the boards must be adapted to the above conditions.

An analog output (GC) must also be assigned (GC) to the measuring points that are to mirror one of the 16 analog outputs according to the 16-block scheme. The measured values of all MPs that are assigned to the same analog output only contribute to the formation of the output value. The 16-block scheme is used to assign which MP is to output which AO value. The addressing of the boards may have to be adapted to the above conditions.

Relay information is distributed 1:1 to the corresponding addresses. Override functions are executed for each alarm or signal relay.

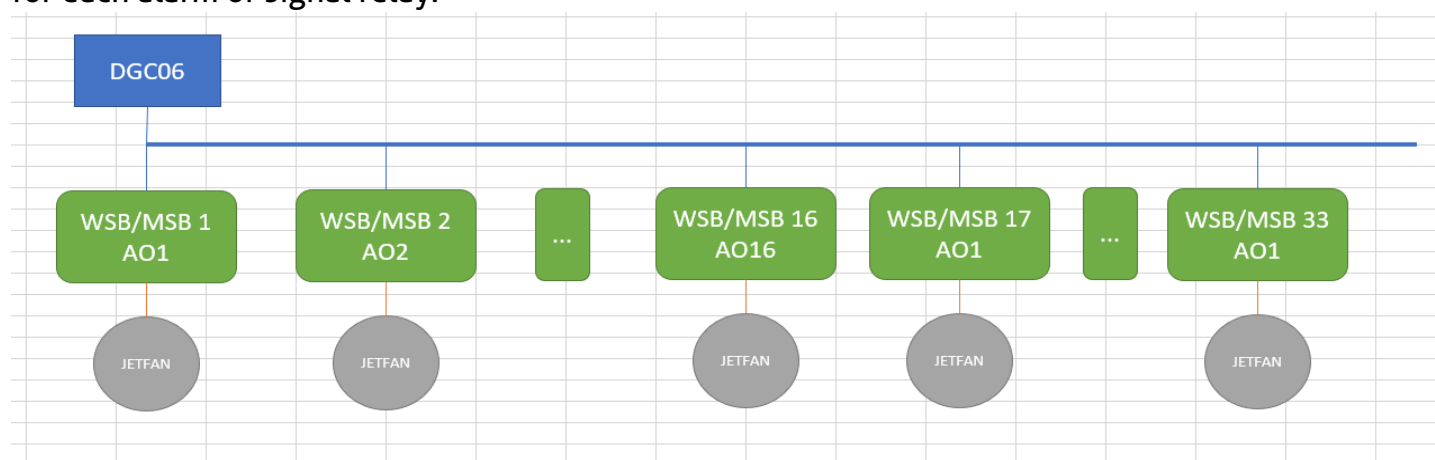


Figure 3: Analog output values are distributed in blocks of 16 pieces of information each to the sensor boards.

B: Zone Function

In order to realize a common but decentralized control of fans of a ventilation section (we use the term "zone" here) for a jet fan ventilation system, there is the possibility to assign each sensor to an alarm zone via parameters. The following rules apply:

Rule 1: Up to 16 zones can be created.

Rule 2: For each subsequent zone, the smallest MP address with still free assignment for analog output and relay (AR/SR) is defined as reference of a new zone. All further MP addresses with the same output assignments (AO and relay) are thus considered members of this zone, regardless of which own address this member has. The fixed assignment to the relay addresses as in standard mode does not apply here.

Rule 3: If 2 stages are to be switchable at each fan, the boards of the reference relays must be addressed and their addresses must follow each other. For the other members of this zone, one address is sufficient.

To do this, 2 addresses are activated in the address menu and then the unused input is deactivated in the MP parameters menu.

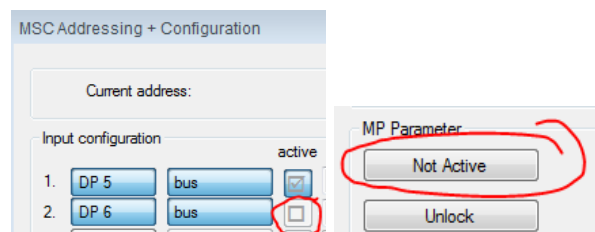


Figure 4: MP Parameters

Rule 4: The assignment of the relays in the MP parameters (GC) must be consecutive for alarm 1 and 2. The signal relays must be set to active in the relay parameters (GC). There must be no other assignment of these relays.

Effects:

- All alarm conditions of a zone are combined.
- All members of a zone receive the same analog output value and thus allow parallel continuous control of motors with 0(2)–10 V, 0(4)–20 mA input signal.
- All signal relays (SR) of the respective members of a zone (MSB) switch simultaneously with the relay(s) assigned as reference to this zone. These functions can be used for start/stop or level 1/2 control of the fans.
- In order to require only 1 MP address per fan in large systems, the 2nd signal relays of all zone members additionally switch with the 2nd reference relay. For this, both relays of the zone members must be parameterised in the boards (MSB) to "Used" and "Remote".
- Forced-off functions (via digital inputs) are NOT forwarded to the signal relays.

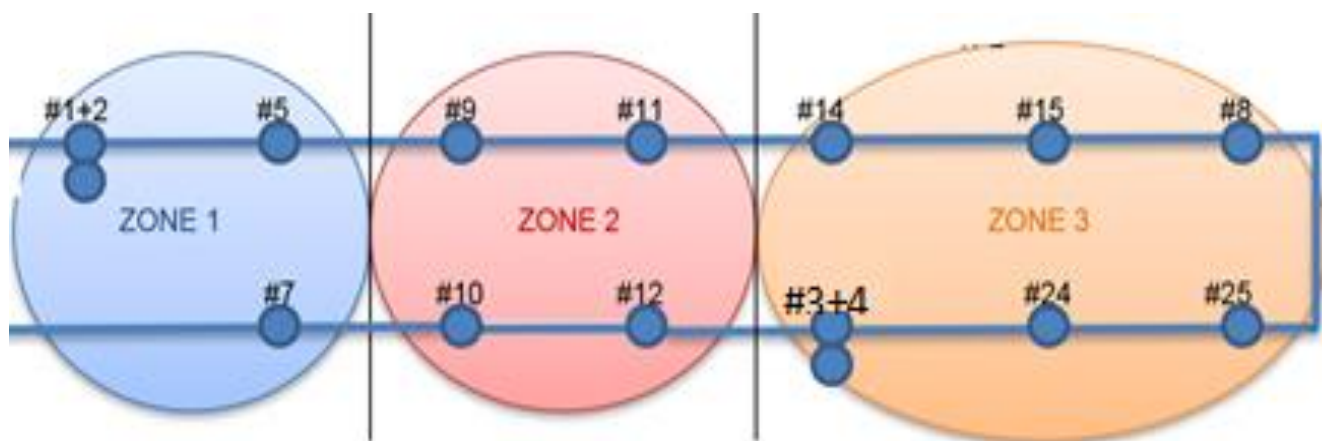


Figure 5: Example for parametrizing with 3 zones

The analog output 1 is assigned to MP 1, 2, 5, 7 in the MP parameters of the GC.
(MP address 1+2 = reference, 5 and 7 are zone members).

The analog output 2 is assigned to MP 9–12 in the MP parameters of the GC.
(Reference relays are AR1+AR2 on the GC module and not shown).

The analog output 3 is assigned to MP 3, 4, 8, 14, 15, 24, 25 in the MP parameters of the GC.
(Reference relays are SR3+SR4.)

5.8.4.8 UPS Function

This menu item can be used to activate or deactivate the UPS function for the respective GC for the entire system (see also chapter 3.4).

Symbol	Description	Default	Function
active inactive	UPS function	inactive	active = UPS function is activated on the GC. inactive = UPS function is not activated on the GC.

Table 50: UPS Function

The UPS function can only be parameterised for the GC from version V1.02.21 and higher. This menu item is not available for older software versions.

The monitoring of the supply voltage is implemented in GC from software version V1.02.21 (regardless of the activation status of the uninterruptible power supply) as part of the UPS logic (see chapter 3.4).

5.8.4.9 Analog Output

The GC module as well as the EP modules 1–7 dispose of 2 analog outputs (AO) with 4–20 mA signal each.

The exact behaviour depends on the parameterisation of the respective analog output:

- Output of error states for analog output **activated** ("Source selection": "CF" or "AF"): Extension of the output range according to the limits of the permissible underrange or over-range of - 4.5 % (3.3 mA) or + 6 % (21.2 mA), alternatively for pellistors: - 10 % (2.4 mA) or 106 % (21.2 mA).
- Output of error states **inactive** ("Source selection": "C" or "A"): Output range of the analog output of the GC limited to 4–20 mA. If the measuring range limits are violated, the current at the analog output is limited to 4–20 mA.

The signal of one or more measuring points can be assigned to each of the analog outputs; in this case, the signal control becomes active and the output is current monitored. The assignment is done in the menu "MP Parameter" for each MP. The measuring point sends the measurement value signal to the analog output.

Out of the signals of all assigned measuring points the Gas-Controller GC determines the minimum, the maximum or the average value and transmits it to the analog output. The definition, which value is transmitted, is done in the menu "Analog Output X".

To allow flexible air volume regulation of speed-controlled motors, the slope of the output signal can be adapted to the on-site conditions and varied between 10–100%. The slope can be set for the variable "Analogue Output X" by a number between 10–100 %. Example 50 %: At 50 % gas signal, 20 mA are output.

For bus devices with analog output (EP, WSB, MSB) this parameter must be set to 1 (see GA_STL, see chapter "Analog output") if the GC is to control the output (see chapter 5.8.4.7)

Note:
With the GC, the setting 1 = override cannot be used, because the GC does not allow to be overridden.

EP cannot be operated as stand-alone units, but only in conjunction with a GC. Therefore, the setting 10–100 % is not allowed for EP modules.

Symbol	Description	Default	Function
Analog Output 1	Selection of channel		Selection of the analog output 1–16
0 1 (not GC) 10–100 %	Selection of output signal	1 (not GC) 100 %	0 = Analog output is not used (therefore, always de-activated output monitoring) 1 = Analog output of EP is controlled by GC Selection of signal slope- permitted range 10–100 % (not EP) 10 % gas signal controls output signal = 20 mA (high sensitivity)
A	Selection of source	A	C = Source is current value A = Source is average value CF = Source is current value and additional fault message at AO AF = Source is average value and additional fault message at AO
Max.	Selection of output mode	Max.	Min. = Displays the minimum value of all assigned MP Max. = Displays the maximum value of all assigned MP Average = Displays the average value of all assigned MP

Table 51: Analog Output

This menu item is not available with SC. The number of analog outputs for the local devices depends on the device.

AO Function



Analog Outp. 1
100% A Max.



5.8.5 Operating Data

No intervention possible in the Operating Data. Viewing the operating data helps with troubleshooting.

Submenu 1

Operating Data



Submenu 2

Operating Data
GC



Selection of target de-
vice GC

Operating Data
SC



Selection of target de-
vice SC

Operating Data
SC X



Selection SC 1–96

Operating Data
SB



Selection of target de-
vice SB/EP

Operating Data
SB 1



Selection
SB 1–96,
EP 1–7



Serial Number
XXXXXX



Date Manufacture
XX.XX.XX



etc.



5.8.5.1 Operating Data Digital Sensor

Reading the operating data from a SC at the GC can take a few seconds, as it is queried via the local devices.

Headline	Value	Description
Software Version	XXXXXX	Software Version
Operating Days	XXXX days	Days of operation since the SC has been switched on for the first time
Gas Conc. Counter	XXXX 10%MR/day	Gas concentration counter Counts the gas concentration on the SC in the unit 10 % of the measuring range per day.
Operating Days Expected	XXXX days	Expected service life of the sensor element, depending on the previous gas concentration and calibrations
Min. Temperature	XX °C	Minimum temperature ever registered by SC
Max. Temperature	XX °C	Maximum temperature ever registered by SC
Last Tool Number	XXXX	Tool number of the Service-Tool STL the calibration was last carried out with
Number of Calib.	XXX	Number of calibrations on the SC, factory calibration is not included
Zero Gain	XXXX XXXXX	Currently set zero offset and gain factor on the SC
Sensitivity	XXX %	Sensitivity of the sensor element during the last calibration
Maintenance Days Last	XXXX	Remaining days until maintenance during the last calibration
Operating Days Last	XXXX	Operating days during the last calibration
Maintenance Days Currently	XXXX	Current number of remaining days until next maintenance
Max. Curr. Value	XXXX	Maximum current value measured, with unit

Table 53: Operating Data Digital Sensor

5.8.5.2 Operating Data SB Group / EP Module

Headline	Value	Description
Serial Number	XXXX	Serial number
Date of Production	XX.XX.XX	Date of production
Operating Days	XXXX days	Days of operation since the SB/EP has been switched on for the first time
Min. Temperature	XX °C	Minimum temperature ever registered by SB/EP
Max. Temperature	XX °C	Maximum temperature ever registered by SB/EP
Last Tool Number	XXXX	Tool number of the Service-Tool STL the calibration was last carried out with.
Analog Output 1 Offset	XXXX	Shows the currently set offset of the 1 st analog output at the SB/EP
Analog Output 2 Offset	XXXX	Shows the currently set offset of the 2 nd analog output at the EP
Analog Input X	/	Selection of operating data per maximum 3 analog inputs on MSB or maximum 4 analog inputs of EP.

Table 54: Operating Data SB Group / EP Module

MP X

Headline	Value	Description
Number of Calib.	XXX	Number of calibrations on the AI X, factory calibration is not included
Zero Gain	XXXX XXXXX	Currently set zero offset and gain factor on the AI X
Sensitivity	XXX %	Sensitivity of the AI during the last calibration, related to the connected device
Maintenance Days Last	XXXX	Remaining days until maintenance during the last calibration
Operating Days Last	XXXX	Operating days during the last calibration
Maintenance Days Currently	XXXX	Current number of remaining days until next maintenance
Max. Curr.Value	XXXX	Maximum current value measured, with unit

Table 55: MP X

5.8.5.3 Operating Data Gas-Controller GC

The operating data of the Gas-Controller GC are the same as for SB/EP.

5.8.6 Test Function of the Alarm and Signal Relays

This function is only available in Special Mode.

Submenu 1

Alarm Relay
Test Function



Signal Relay
Test Function

Submenu 2

Alarm Relay X
Status OFF



Signal Relay X
Status OFF

Submenu 3

Selection of alarm relay
AR 1–32

Selection of signal relay
SR 1–96

Select function

Alarm Test ON = Relay manual ON

Alarm Test OFF = Relay manual OFF

Automatic = Cancel manual operation

Take function over with

Signal Relay X
Alarm manual ON



Signal Relay X
Alarm manual OFF



Signal Relay X
Automatic

Alarm Relay X
Alarm manual ON



Alarm Relay X
Alarm manual OFF



Alarm Relay X
Automatic

Note:

This test function always checks the alarm status of the relay, regardless of the set relay mode (energized/de-energized mode).

With this function, only relays with the signal source setting "Remote" can be tested. Relays with the signal source setting "Local" must be tested locally with a Service-Tool STL. With alarm test ON, the relay changes to the alarm state. Depending on the parameterisation, this can cause different reactions. For example, with the setting Flashing, the relay starts flashing, etc. External actuation of the relays via an assigned digital input has priority over the manual test function in this menu item

Symbol	Description	Function	
Alarm Relay X	Relay No. X	X = 1–32 Select alarm relay	
Signal Relay X	Relay No. X	X = 1–96 Select signal relay	
Status OFF Status ON	Relay Status		= Relay not supplied with current = Relay supplied with current
Alarm Manual ON	Alarm Status	Alarm Test OFF Alarm Test ON Automatic	= Relay manual in "No alarm" status = Relay manually in "Alarm" status = Relay reset into automatic mode

Table 56: Test Function of the Alarm and Signal Relays

5.8.7 Test Function of the Analog Outputs

This feature is only available in Special Mode.

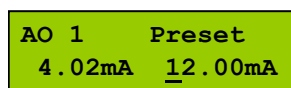
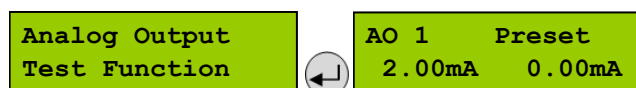
With the test function you can enter the value (in mA) that should be physically output.

The test function via the GC can only be applied for overridable analog outputs (configuration 1 of analog outputs in the system parameters of the associated device, see chapter 5.8.4.9)

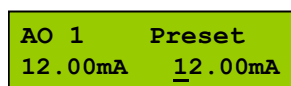
If an analog output is not assigned anywhere, it is displayed as inactive and cannot be tested.

Submenu 1

Submenü 2



On the left, the current set point of the AO is shown. On the right, there is the default value entered by the operator.



After confirming the AO accepts the predetermined value and outputs it physically. As the current set point is transmitted again and again, the confirmation appears in the display at the left.

The default value is output until the test function is exited with ESC or if no button is pressed for 15 minutes.

Abbreviations

Units

mA	Milliampere
Min.	Minute
ppm	parts per million
s	Second
V	Volt (tension)
V AC	Volt Alternating Current
V DC	Volt Direct Current
VA	Voltampere

Products from MSR-Electronic GmbH

DGC	PolyGard® Digital-Gas-Controller DGC
EP	PolyGard® Expansion-Modul EP
GC	PolyGard® Gas-Controller GC
MC	PolyGard® Sensor MC with Analog Output
MSB	PolyGard® Multi-Sensor-Board MSB
PCE	PolyGard®/PolyXeta®2 PCE-Software for PC
PX2	PolyXeta®2 Gas Detector PX2, ATEX-compliant
SB	PolyGard® Sensor-Board SB
SC	PolyGard® Sensor SC
SSAX1	PolyXeta®2 Sensor Head SSAX1, ATEX compliant (remote sensor head)
STL	PolyGard®/PolyXeta®2 Service-Tool STL
SX1	PolyXeta®2 Sensor Head SX1, ATEX compliant
WSB	PolyGard® Warning- and Sensor-Board WSB

Others

AO	Analog-Output
AV	Average Value
CV	Current value
DIN	Deutsches Institut für Normung (German Institute for Standards)
EN	European Standard
EU	European Union
ESD	Electrostatic Discharge
IEC	International Electrotechnical Commission System for Certification
LED	Light-emitting diode
LC	Liquid crystal
max.	maximal
min.	minimum
SIL2	Safety Integrity Level 2
UPS	Uninterrupted Power Supply

Glossary

Adjustment

Correction of the measured value by the deviation from the target value in order to obtain a correct measured value display (see also calibration).

Calibration

Determination of the deviation between the current value and the actual target value under specified conditions (equivalent to adjustment or a combination of calibration and adjustment when calibrating MSR-Electronic GmbH devices).

Inspection

Part of servicing with measures to assess the actual condition of the gas detector (visual inspection, as well as checking the calibration and maintenance interval).

Maintenance

Any activity that is carried out in accordance with the manufacturer's specifications (e.g. maintenance interval, etc.) and technical requirements in order to keep a device in perfect condition.

Measuring mode

Gas detector is ready for measurement and all inputs and outputs are operational.

Power-On Time

Time required for the device to complete the power-up process.

Repair

Any activity carried out to restore a device to perfect working order.

Running-in time

Time the sensor head needs to be continuously supplied with the operating voltage before calibration.

Servicing

All inspection, maintenance and repair activities.

Special Mode

Device in maintenance mode for calibration or parameterization. Warning and output signals are suppressed.

Warm-up period

Time period between switching on the device in a given atmosphere and the time when the measured value reaches the specified deviations.

Watchdog

Function for failure detection of a digital system. If a possible malfunction is detected, a restart is initiated to correct the failure automatically.

List of Revisions

Version	Chapter	Changes
2019-11	-	-
2021-07	3.4 5.13 5.7.8 5.8.2.1 5.8.2.7 5.8.4.6 5.8.4.7	More detailed description UPS Function Horn/WT error deleted, since no monitoring ext. warning devices More detailed description Weekly Timer Note added in Relay Mode More detailed description External Override Fault activation not possible for DI5–DI32 More detailed description Special Function
2022-07	All Page 1 5.8.3.3	New format, new logo Picture added Update gas list
2023-07	3 All	Complete restructuring and text adaptation Adaptations to UL2017, text adaptations
2023-12	All 5.7.5 3.4	Text adjustments, display text adjustments, update to new software New chapter Undervoltage monitoring and deep discharge protection added, extended function for UL removed
2024-08	3.3.2 5.8.3.3. 5.8.4, 5.8.4.8 Glossary	Acknowledgement added Gases added UPS function added Terms added
2024-11	Page 2 2.1 5.8.2.6 5.8.3.3	QR codes added Chapter added Description of internal horn (option) added Release of xylene
2025-05	3.4, 3.4.1 5.1.3 5.8.1 5.8.2.8 5.8.3.3 5.8.3.5 5.8.4, 5.8.4.5 5.8.4.8 All	UPS function adjusted Error messages (UPS error, power failure) adjusted More detailed description of the "Service" Maximum values added M200 & M203 changed to not available, D184 deleted Text adapted, calculation of minimum threshold added Deadband removed from display texts Monitoring of the supply voltage added PolyGard® instead of PolyGard®2 GC/DGC/EP/PCE/STL instead of GC-06/DGC-06/EP-06/PCE06/STL06 MSC/MSB/SB/WSB/MC/SC instead of MSC2/MSB2/SB2/WSB2/MC2/SC2
2025-07	5.1.3 5.8.3.3	Error messages restructured, supplemented S2064-A (R123) not available