PolyGard® DGC5

Digital Gas Controller DGC5 System

User Manual

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Digital Gas Controller System DGC5

1 Application Intended for Use

The PolyGard® DGC5 Gas Controller is used for monitoring and warning of toxic and combustible gases and vapors in the ambient air. The DGC5 Gas Controller fullfils the requirements according to VDI 2053 (January 04), ÖNORM and NVN 2443 for the stationary monitoring of carbon monoxide (CO), nitrogen dioxide (NO_2) and combustible gases in underground garages, tunnels, go-cart race courses etc. The DGC5 Gas Controller also fulfils the requirements according to EN 378, VBG 20 and the guidelines "Safety requirements for ammonia refrigeration systems". The Gas Controller can be used as well for monitoring lot of other gases.

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 (according to EN55 02). The Gas Controller may only be used in ambient conditions as specified in the Technical Data.

The PolyGard® Gas Controller DGC5 must not be used in potentially explosive atmospheres.

2 Description

The Gas Controller is a measuring and warning controller for the continuous monitoring of different toxic or combustible gases and vapors as well as freons. The DGC5 is suitable for the connection of up to 98 digital transmitters DT5 Series via RS-485 communication. In the 48/48 SP addressing mode you can connect 48 DT5 Series transmitters with 48 AT Series or other 4-20 mA analog transmitters. The total number of connected transmitters, however, may not exceed A) 98 digital or B) 48 digital with 48 analog transmitters.

Up to five free programmable alarm thresholds are available for each transmitter. For transmitting the alarms there are up to 30 relays with potential-free change-over contact.

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

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

2.1 Normal Mode

In normal mode, the gas concentrations of the active transmitters are continuously polled and displayed at the LCD display in a scrolling way. The controller also monitors the communication to all active transmitters and modules.

2.2 Alarm Mode

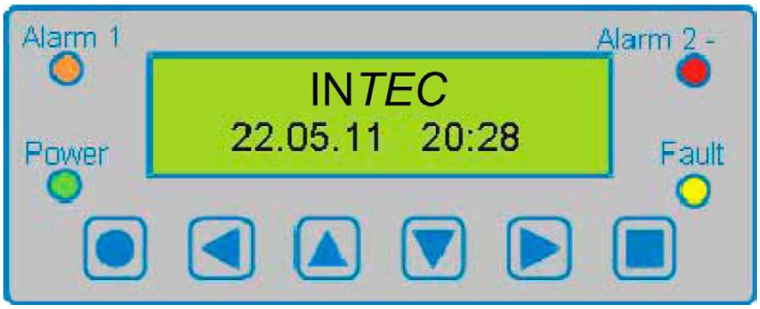
If the gas concentration reaches the programmed alarm threshold, the alarm is started, the assigned alarm relay activated and the alarm LED (orange for alarm1, red for alarm 2 + n) starts to flash. The set alarm can be read from the menu Alarm Status. When the gas concentration falls below the alarm threshold and hysteresis, the alarm is automatically reset. In latching mode, the alarm has to be reset manually in the menu Relay Status or via a digital input.

2.3 Fault Mode

If the controller detects an incorrect communication at an active transmitter or module, or if a signal is outside the admissible range (< 3 mA - > 22 mA), the assigned fault relay will be set and the error LED will start to flash. The error is displayed in the menu Error Status in clear text. After removal of the cause, the error message has to be acknowledged manually in the menu Error Status.

3 Operating Instruction

The complete configuration, parameterization and service is made via keypad user interface in combination with the display screen. Security is provided via four password levels.



3.1 Description Keypad User Interface

Exits programming, returns to the previous menu level.

Enters sub menus, and saves parameter settings.

Scrolls down & up within a menu, changes a value.

Moves the cursor position.

LED orange: Flashes when alarm one or more alarms are active.
Permanently on, when at least one relay is manually operated.

LED red: Flashes when alarm two or more alarms are active.
Permanently on, when at least one relay is manually operated.

LED yellow: Flashes at system or sensor failure or when maintenance needed.

LED green: Power LED

3.2 Setting / Change Parameters or Set points

Open desired menu window.

Code input field opens automatically, if no code is approved.

After input of valid code the cursor jumps onto the first position segment to be changed.

Push the cursor onto the position segment, which has to be changed.

Set the desired parameter / set point.

Save the changed value.

Finished

3.3 Code Levels

According to the regulations of all national and international standards for gas warning systems, all inputs and changes are protected by a four-digit numeric code (= password) against unauthorised intervention. All menu windows 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: Priority 1 has top priority.

Priority 1: (fixed value – not changeable)

Code level priority 1 is intended for the service technician of the installer to change parameters and set-points. All settings can be treated with this password.

Priority 2: (fixed value – 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.

Priority 3: (settable)

It is only intended to update the maintenance date, as well as to turn on and off the service mode.

Normally the code is only known by the service technician.

It can be changed individually via priority 1.

Priority 4: (password 1234 – fixed value – not changeable)

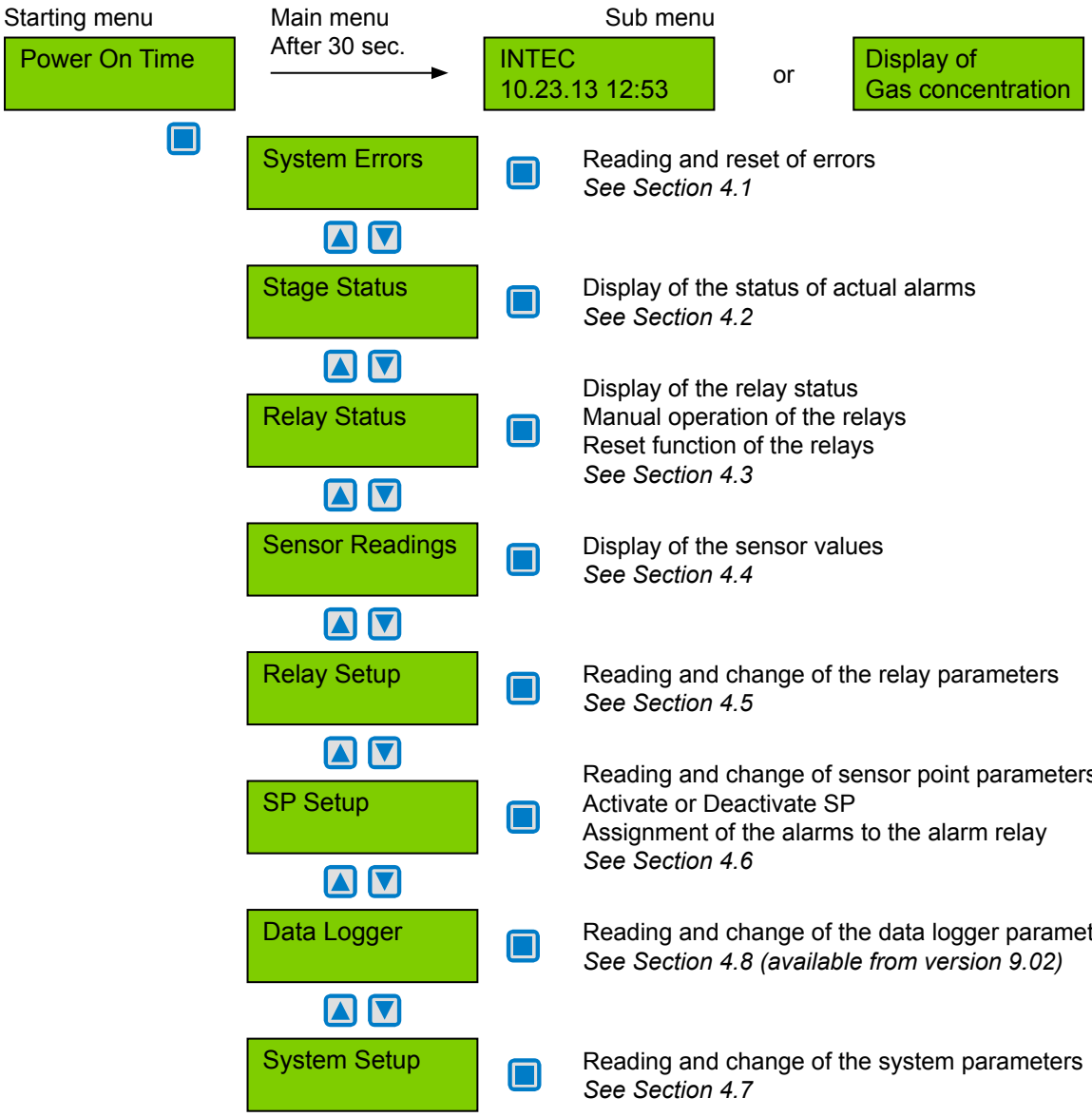
Code level priority 4 allows the operator:

- to acknowledge faults
- to manually operate the alarm relays
- to set date and time
- to configure the data logger.

4 Menu Overview

The Gas Controller DGC5 is operated via a simple and logical menu structure which is easy to learn. The operating menu contains the following levels:

- Starting menu with date and time if no SP is registered, otherwise scrolling display of the gas concentrations of all registered transmitters in 5-second intervals
- Main menu
- Submenu 1 and 2



4.1 Fault Management

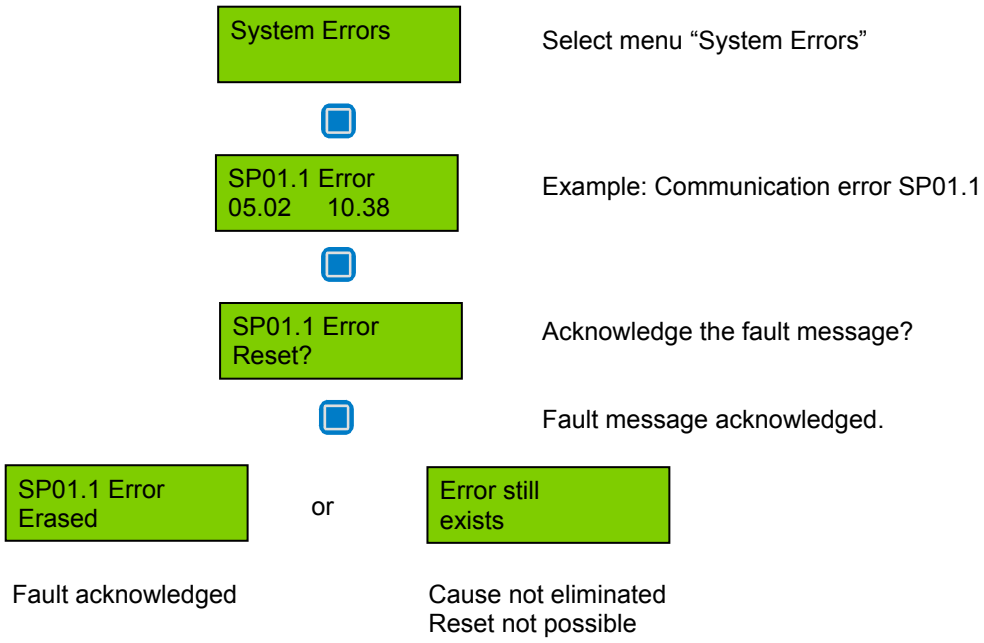
The integrated fault management records the first 20 faults with date and time stamps in the menu „System Errors“. Additionally a record of the faults occurs in the “Error memory”, which can only be read and cancelled by the service technician.

An actual fault activates the fault indication relay which is defined in the system parameter “Fault relay” after an internal fault delay time of 2 minutes. The yellow LED (Fault) starts to flash and the fault is displayed in plain text with date and time in the starting menu.

In case of the fault of a connected transmitter the alarms defined in the menu “SP Parameter” are activated in addition.

4.1.1 Acknowledge a Fault

Attention:
Acknowledging of a fault is only possible after having removed the cause!
In order to recognize situations where errors and faults occur sporadically and temporarily, their error states - even after return to normal operations - are displayed until they are manually acknowledged,



4.1.2 Error Memory

The menu „Error Memory“ in the main menu “System Error” can only be opened via the code level priority 1.

In the error memory, the 20 first faults already acknowledged in the menu “System Error” are listed for the service technician.

The error memory is captive, even in case of power failure.

This memory should always be emptied during maintenance.

The deletion of each individual message is effected in the same way as the reset of a fault.

4.1.3 System Errors

The following system error messages are recorded:

SP XX.1 Error Communication error to SPXX.1.

Cause: Bus line interrupted or short circuit, SPXX.1 registered at the controller, but not addressed, Transmitter defective.

Solution: Check line to transmitter, check transmitter address, replace transmitter.

SPXX.1 > 22 mA
SPXX.1 < 3 mA Sensor signal at transmitter out of the measuring range.

Cause: Transmitter not calibrated, defective.

Solution: Calibrate transmitter, replace transmitter.

SPXX.2 > 22 mA Current signal at analog input SPXX.2 > 22 mA.

Cause: Short-circuit at analog input, analog transmitter not calibrated, or defective.

Solution: Check cable to analog transmitter, make calibration, replace the analog transmitter.

SPXX.2 < 3 mA Current signal to analog input SPXX.2 < 3 mA.

Cause: Wire breaking at analog input, analog transmitter not calibrated, or defective.
Solution: Check cable to analog transmitter, make calibration, replace the analog transmitter.

EP00 Error: Internal communication error I/O Board to LCD Board.

Cause: Internal error. RS 485 field bus at X10 pin 11- 12 not correct

Solution: Check RS 485 field bus at X10 pin 11 and 12.
Disconnect RS 485 bus at X10 pin 11 and 12, check function again.
Replace the Gas Controller.

EP 0X Error Communication error to extension module EP 0X.
(Only active, if EP 0X is registered).

Cause: EP module address not correct. (See Commissioning.)
Bus line to EP 0X module interrupted.
No power supply at the EP 0X module.
EP module defective.

Solution: Check and correct the EP module address.
Check the bus cable and the power supply.
Replace the EP 0X module.

Maintenance: System maintenance is necessary.

Cause: Maintenance date exceeded.

Solution: Perform the maintenance.

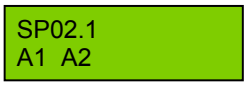
SPXX locked: This SP input is locked (SP is physically present, but cancelled by the operator)

Cause: Operator intervention.

Solution: Eliminate the cause of a possible fault and then unlock the SP.

4.2 Status Alarm

Display of the actual alarms in plain text in the order of their arrival. Only those sensor points are displayed, where at least one alarm is active. Changes are not possible in this menu.



Symbol	Description	Function
SP02.1	Sensor (SP) Point No.	
AX	Status alarm	A1 = Alarm 1 ON A2 = Alarm 2 ON A3 = Alarm 3 ON A4 = Alarm 4 ON A5 = Alarm 5 ON

4.3 Status Relay

Reading of the actual status of alarm relays, manual operation of the alarm relays.

Symbol	Description	Setting Status	Function
R 01	Relay No. 01		
OFF	Status Relay	OFF	OFF = Relay OFF (no gas alarm) ON = Relay ON (gas alarm) Manual OFF = Relay manual OFF Manual ON = Relay manual ON Latching mode = Relay in latching mode

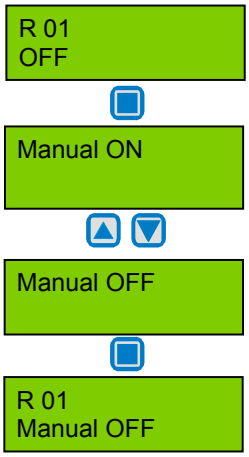
4.3.1 Manual Operation of the Relays

The manual operation of the alarm relays is managed in the menu “Status Relay” or externally via an assigned digital input. In the manual ON or OFF status, the alarm LEDs at the Gas Controller are lit continuously.

The external operation of the alarm relay via an assigned digital input has priority to the manual operation in the menu "Status Relay" and to gas alarm.

Relays manually operated in the menu “Status Relay” are cancelled again by selection of the automatic function.

Acknowledging the relays in latching mode is also effected in this menu or by a digital input.



Select the relay

Select the function manual operation

Select the function

Manual ON	= Relay ON
Manual OFF	= Relay OFF
Automatic	= Cancel manual operation.
Reset ?	= Reset of a latching mode.

Take over the function

4.4 Menu Sensor Values

In this menu, the display shows the current value (CV), the gas type and the defined control mode (CV or AV mode) for each active sensor point.

In the control mode Average Value (AV), both values (CV and AV) are displayed.

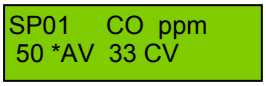
SP01.**1** = Measuring value of the bus transmitter with SP address 01.
SP01.**2** = Measuring value of the analog transmitter connected to the bus transmitter via SP address 01.

The SP address and the display depend on the system parameter settings for the SP addressing mode (see 4.8.3).

In the version without analog transmitters at the 4 to 20 mA input of the bus transmitter, the addresses SP-01 to SP 98 are listed.

In the version with analog transmitters at the bus transmitter, the addresses SP01 to SP48 are listed with the index XX.1 for the measured value of the bus transmitter and with XX.2 for the measured value of the analog transmitter.

SP addressing mode: 98 bus transmitters



SP addressing mode: 48 bus transmitters and 48 analog transmitters

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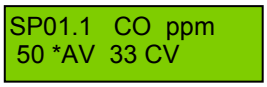
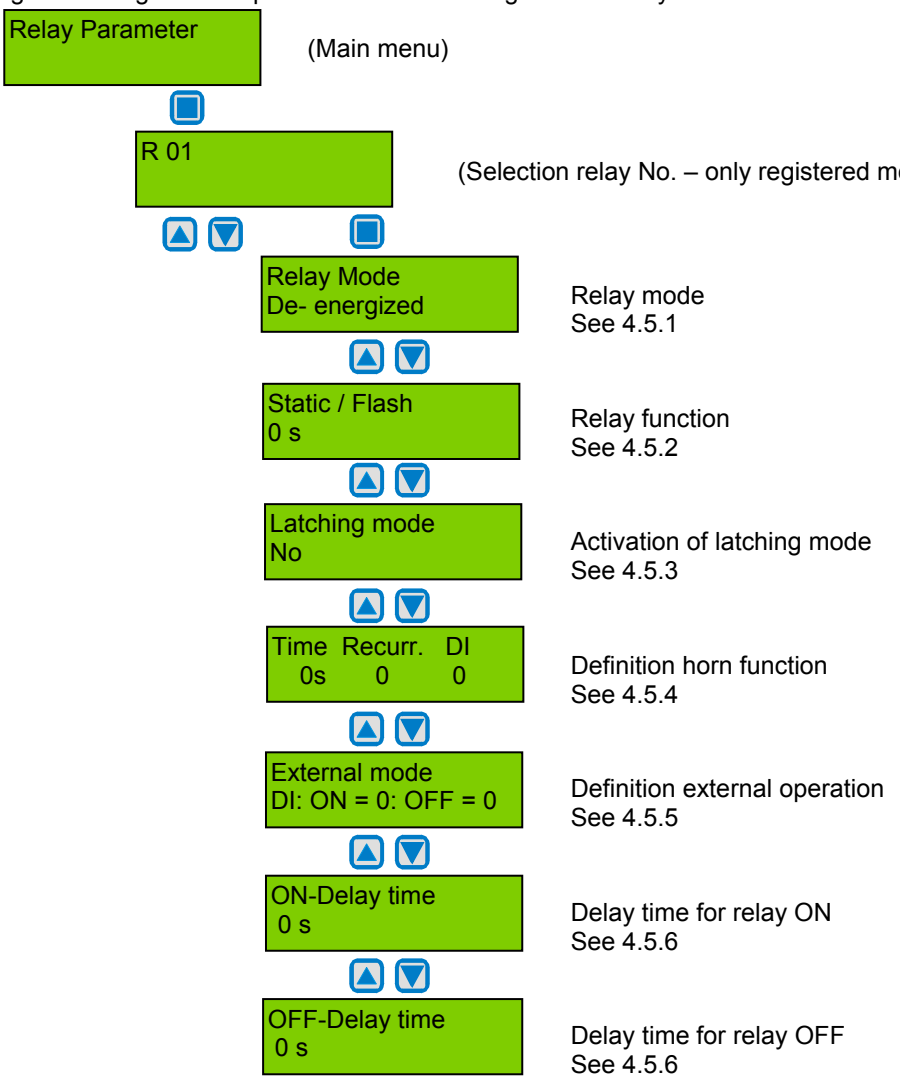


Symbol	Description	Setting Status	Function
SPXX.**1**	Measured value		Measured value Bus transmitter with SP address XX
SPXX.**2**	Measured value		Measured value analog transmitter at bus transmitter with SP address XX
CO	Gas type		See 4.6.2
ppm	Gas unit		See 4.6.2
CV	Current value		Current value of gas concentration
AV	Average value		Average value (10 measured values within the time unit)
*	Control mode		Display of selected control mode (CV or AV evaluation)
Not active	Status SP		SP not active
Error	Malfunction SP		Communication error, or signal out of the measuring range
Locked	SP locked		SP was temporarily locked by the operator.

4.5 Menu Relay Parameter

Reading and changes of the parameter for each single alarm relay.



4.5.1 Relay Mode

Definition of the relay mode – in activation status it is only overridden by the flashing function:

Symbol	Description	Setting Status	Function
R 01	Relay No.		Selection of relay
De-energized	Relay Mode	De- energized	De-energized = Alarm OFF = Relay OFF Energized = Alarm ON = Relay OFF

4.5.2 Relay Function Static / Flash

Definition of the relay function – acts directly on the relay output:

Symbol	Description	Setting Status	Function
R 01	Relay No.		Selection of relay
0	Function	0	0 = Relay function static > 0 = Relay function flashing (= time interval in sec.) Impulse / Break = 1:1

4.5.3 Latching Mode

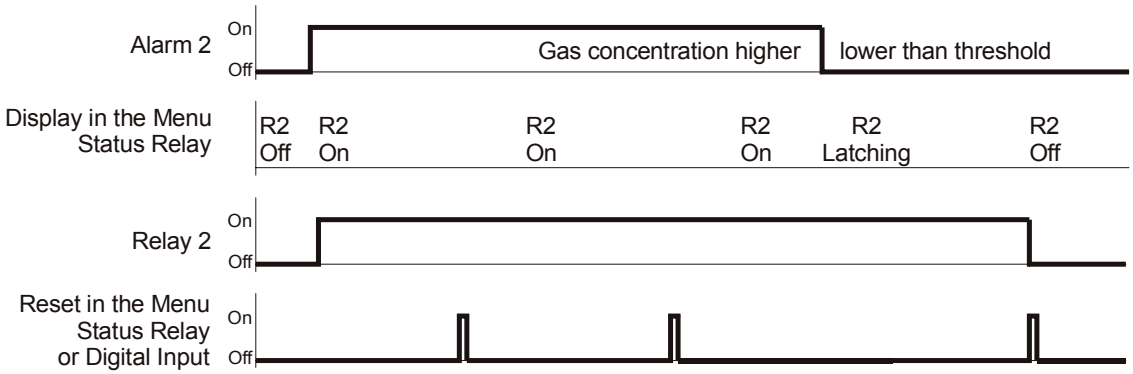
Definition of the latching function:

The combination of the latching function and the automatic reset of the horn function cancels the effect of each other and therefore should be avoided.

Symbol	Description	Setting Status	Function
R 01	Relay No.		Selection Relay
No	Latching Mode	No	No = Latching mode not active Yes = Latching mode active

Acknowledging a latching relay in the menu “Status Relay” is only possible if the gas concentration is again lower than the alarm threshold including hysteresis. In this case the status latching occurs in the display.
The respective switch-off delay is without effect when the latching mode is active.

Example: Alarm relay R2 with latching mode



4.5.4 Horn Function

The horn function is only activated if at least one of the two parameters (time or digital input) is set. This finction has priority to the latching mode function.

The alarm relay is defined by the following parameters as horn relay with the following possibilities to reset.

- By pressing any of the 6 pushbuttons. (Only possible in the starting menu).
- Automatic reset at the end of the fixed time (active if value >0).
- By an external pushbutton. (Assignment of the appropriate digital input DI: 1-4).

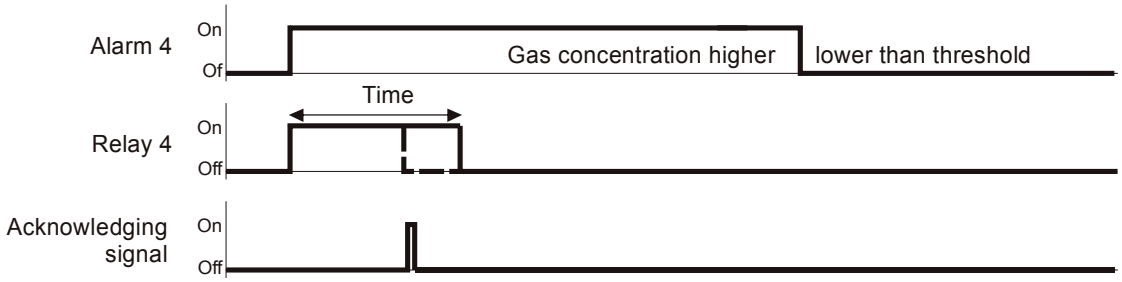
After acknowledge the horn remains reset until all assigned alarms for this relay function have become inactive. After that it can be triggered anew.

Special function Recurrence

After acknowledging the relay (by pushbutton or externally) time starts. When this time has run out and the alarm is still acting, the relay is set again.

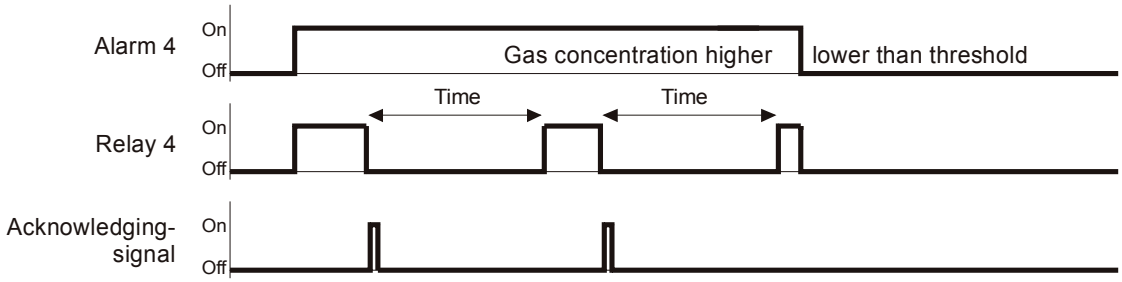
Symbol	Description	Setting Status	Function
R 04	Relay No.		Selection relay
Recurrence	Reset Mode	0	0 = Reset of the relay after time having run out, via DI (external) or by pushbuttons 1 = After reset of the relay, time starts. At the end of the set time, the relay is activated again (recurrence function).
Time		120	Enter time for function automatic reset or recurrence function in sec. 0 = no reset function
DI		0	Assignment, which digital input resets the relay.

Acknowledge the horn relay



Reset command by external push-button or one of the operating keys.

Special function Recurrence of the horn relay



Reset command by external push-button or one of the operating keys.

4.5.5 External Operation of Alarm Relay

Assignment of a digital input (DI) for external switching of the alarm relay (ON and/or OFF).

This function has priority to a gas alarm and/or manual switching in the menu “Status Relay” and is subordinate to the switching of static/flashing and energized/de-energized modes. If external ON and OFF are parameterised on the same relay, and the both are active at the same time, then only the signal arrived first is performed in this situation.

Symbol	Description	Setting Status	Function
R 01	Relay No.		Selection relay
DI-ON	External ON	0	As long as digital input closed, relay switches to ON
DI-OFF	External OFF	0	As long as digital input closed, relay switches to OFF

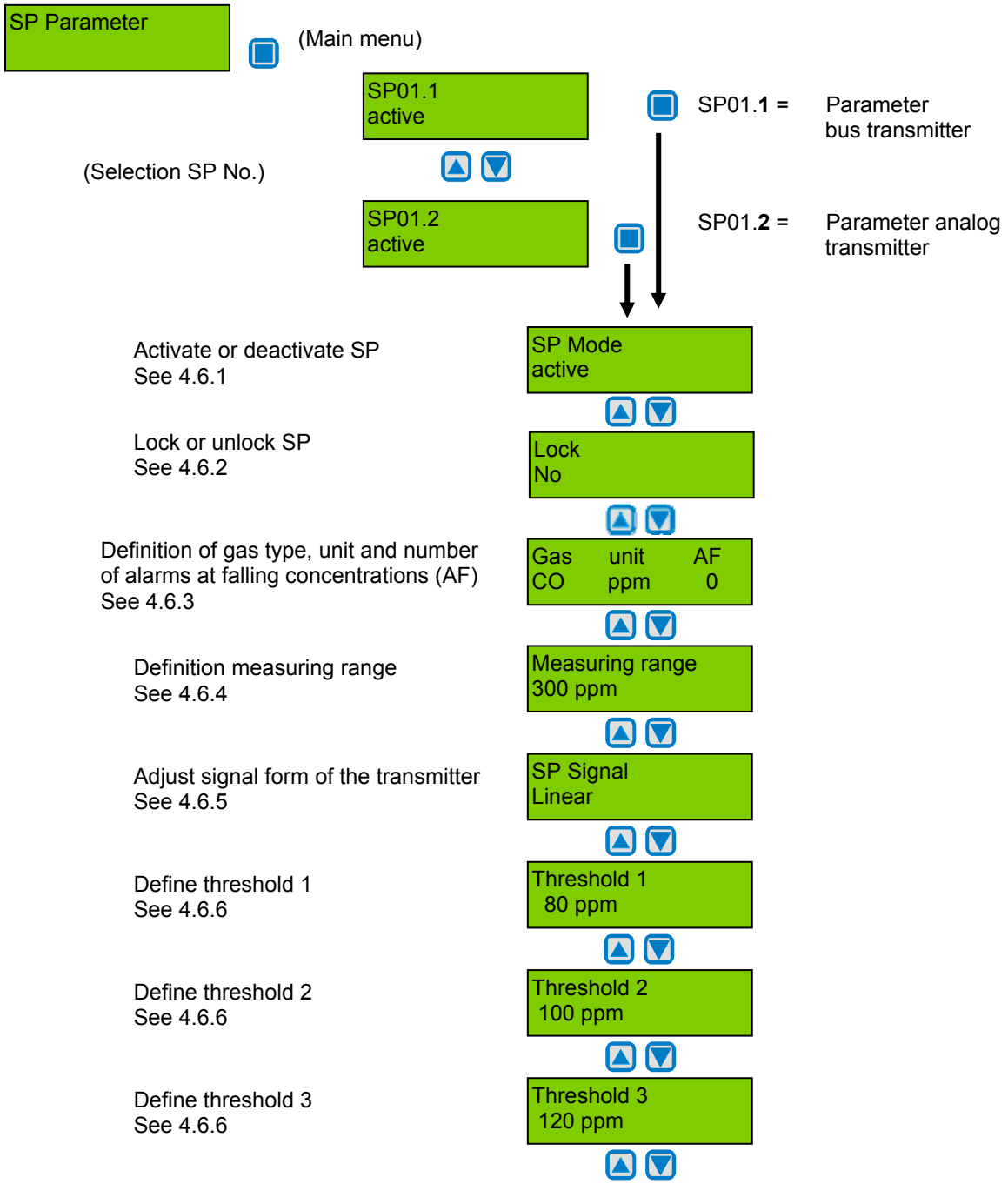
4.5.6 Delay Mode of Alarm Relay

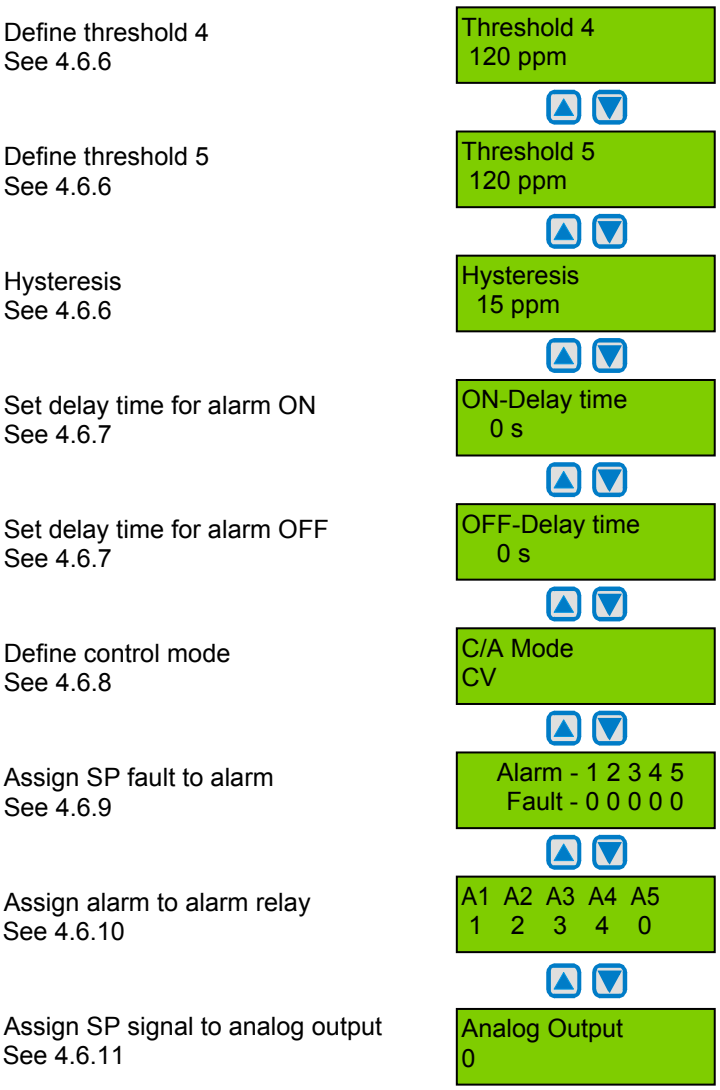
Definition of the switch-on and switch-off delay of the relays
If the latching mode is set for this relay, the respective switch-off delay is without effect.

Symbol	Description	Setting Status	Function
R 01	Relay No.		Selection relay
0 s	Switch-ON Delay Time	0	Relay is only activated at the end of the defined time (sec.) 0 sec. = No delay
0 s	Switch-OFF Delay Time	0	Relay is only deactivated at the end of the defined time (sec.) 0 sec. = No delay

4.6 Menu SP Parameter

For reading and changing sensor point parameters for each bus and analog transmitter including registration of SP and assignment of the alarm relays.
The presentation of the SP parameters depends on the system parameter settings for the GC mode (see 4.7.3).





4.6.1 Activate – Deactivate SP

Symbol	Description	Setting Status	Function
SP01.1	Sensor point		Selection SP No./ bus or analog transmitter
Active	SP Status	not active	active = Sensor point activated at the controller not active = Sensor point not activated at the controller

4.6.2 Lock or Unlock SP

This functionality is available from version 9.02

If a transmitter is damaged or completely destroyed, the consequence is that the ventilation works continuously. This functionality can be used until the transmitter is repaired or replaced.

In the Lock Mode the function of the existing transmitter is put out of service, which means there is no alarm or fault message at this sensor point. If at least one transmitter is blocked in its functionality, the collective fault message is activated, the yellow fault LED is flashing and there is a message in the menu System Errors.

Symbol	Description	Setting Status	Function
SP01.1	SP No.		Selection Lock Yes/ No
No		No	No = SP free, normal operation Yes = SP locked, SSM (collective error message) active

4.6.3 Selection Gas Type

Assign gas type of the attached gas transmitter.

Symbol	Description	Setting Status	Gas type[3]		Unit[1]	Measuring range[1]
SP 01	Sensor point					
CO	Gas type	CO	CO	Carbon monoxide	ppm	0 – 300
			Ex	Combustible gases	% LEL	0 – 100
			NO	Nitrogen oxide	ppm	0 – 50
			NO_2	Nitrogen dioxide	ppm	0 – 25
			NH_3	Ammonia	ppm	0 – 300
			O_2	Oxygen[2]	Vol%	0 – 25
			CO_2	Carbon dioxide[4]	ppm	0 – 2000
			SO_2	Sulphur dioxide	ppm	0 – 100
			H_2S	Hydrogen sulphide	ppm	0 – 200
			CL_2	Chlorine	ppm	0 – 100
			ETC	Ethylene oxides	ppm	0 – 20
			VOC	Air quality	%	0 – 100
			R4XX	Refrigerant gas	ppm	0 – 300 / 2000
			R5XX	Refrigerant gas	ppm	0 – 300
			R11	Refrigerant gas	ppm	0 – 300
			R123	Refrigerant gas	ppm	0 – 300
			R134	Refrigerant gas	ppm	0 – 300 / 2000
			R22	Refrigerant gas	ppm	0 – 300
			TEM	Temperature	°F	XXXX
			RH	Humidity	%RH	0 – 100
			CO_2	Carbon dioxide[3]	ppk	0 – 50
			TOX	Toxic gas	ppm	0 – XXX
			TEM	Temperature	°C	0 – 100

Symbol	Description	Setting Status		Function
ppm	Unit	ppm		ppm %LEL Vol% °F %RH % ppk °C
AF	Direction of the alarm release	0		0 = Alarm release at increasing concentration 1 = Alarm 1 at falling, Alarm 2- 5 at increasing conc. 2 = Alarm 1 + 2 at falling, Alarm 3-5 at increasing c. 5 = Alarm 1-5 at falling concentration

[1] Recommendation without obligation
[2] Oxygen measurements: Alarm at falling concentration
[3] Carbon dioxide measurements with unit ppk (1 vol% = 10 ppk)
[4] Carbon dioxide measurements with unit ppm (1 vol% = 10.000 ppm)

Direction of the alarm release

In the gas measuring technique, most of the gases are monitored for their increasing concentration. For example oxygen, however, is monitored for its falling concentration. In this menu there is the definition how many of the 5 alarm thresholds monitor a falling concentration.

4.6.4 Measuring Range Definition

The measuring range can be adjusted to the working range of the connected gas transmitter within 10 to 10000.

4.6.5 SP Signal Definition

Gas transmitter using electro-chemical or catalytic beat gas sensors normally produce a linear signal, proportional to the gas concentration.

Semiconductor gas sensors produce a non-linear (exponential) signal due to the measuring function. This signal leads again to a non-linear 4 to 20 mA signal of the gas transmitter.

The Gas Controller GC-05 is prepared for both types of gas transmitters. The classification of signals is defined in this menu.

Symbol	Description	Setting Status	Function
SP01.1	Sensor Point		Selection SP No. bus or analog transmitter
Linear	SP Signal	linear	Linear = Transmitter with linear output signal Non-linear = Transmitter with non-linear output signal (semiconductor)

4.6.6 Threshold/ Hysteresis

For each sensor point five 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.

Unused alarm thresholds have to be defined at measuring range end point, in order to avoid false alarms.

Symbol	Description	Default Status		Function
SP01.1	Sensor Point			Selection SP No. / Bus or analog transmitter
80 ppm	Threshold	80	Threshold 1	Gas concentration > Threshold 1 = Alarm 1
		100	Threshold 2	Gas concentration > Threshold 2 = Alarm 2
		120	Threshold 3	Gas concentration > Threshold 3 = Alarm 3
		120	Threshold 4	Gas concentration > Threshold 4 = Alarm 4
		300	Threshold 5	Gas concentration > Threshold 5 = Alarm 5
		15	Hysteresis	Gas concentration < (Threshold X –Hysteresis) = Alarm X OFF

4.6.7 Delay for Alarm ON and/or OFF

Definition of delay time for alarm ON and/or alarm OFF. The function applies to all alarms of an SP.

Symbol	Description	Default Status	Function
SP01.1	Sensor Point		Selection SP No./ bus or analog transmitter
0 s	Delay Time ON	0	Gas concentration > Threshold: Alarm is only activated at the end of the fixed time (sec.). 0 sec. = No Delay
0 s	Delay Time OFF	0	Gas concentration < Threshold: Alarm is only deactivated at the end of the fixed time (sec.). 0 sec. = No Delay

4.6.8 Control Mode Current or Average Value

Definition of the alarm evaluation by current value CV) or average value (AV).

Symbol	Description	Default Status	Function
SP01.1	Sensor Point		Selection SP No./ bus or analog transmitter
CV	Evaluation	CV	CV = Control by the current gas value AV = Control by the average gas value

Current/ average value function see also 4.8.6

4.6.9 SP Fault Assigned to Alarm

In this menu you can define, which alarms are activated by a fault at the sensor point.

Symbol	Description	Default Status	Function
SP01.1	Sensor Point		Selection SP No./ bus or analog transmitter
Alarm - 1 2 3 4 5 Fault - 1 1 0 0 0	Failure SP	1 1 0 0 0	0 = Alarm not ON at SP failure 1 = Alarm ON at SP failure

4.6.10 Alarm Assigned to Alarm Relay

Each of the 5 alarms can be assigned to any alarm relay. Unused alarms are not assigned to any alarm relay.

Symbol	Description	Default Status	Function
SP01.1	Sensor Point		Selection SP No./ bus or analog transmitter
1	A1 A2 A3 A4 A5	01 02 03 04 00	01 = Alarm 1 activates alarm relay R 01 02 = Alarm 2 activates alarm relay R 02 03 = Alarm 3 activates alarm relay R 03 04 = Alarm 4 activates alarm relay R 04 00 = Alarm 5 doesn't activate any alarm relay

4.6.11 SP Signal Assigned to Analog Output

The sensor point signal can be assigned to one of the max. twelve analog outputs. The signal defined in the control mode (current or average value) is transmitted.

Analog output, see also 4.8.15

Symbol	Description	Default Status	Function
SP01	Sensor Point		Selection SP No./ bus or analog transmitter
0	A	0	0 = SP Signal not assigned to any analog output 1 = SP Signal assigned to analog output 1 X = SP Signal assigned to analog output X

4.7 Menu Data Logger

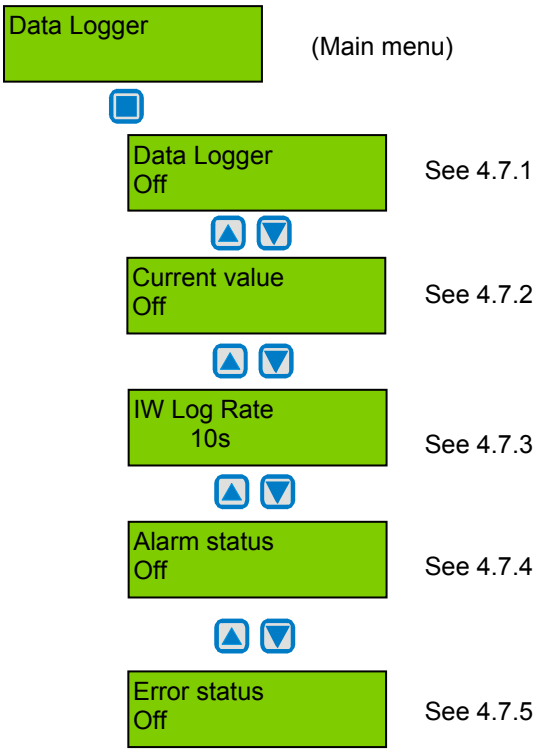
This function is available from software version 9.02.

But only if the GC-05 controller is equipped with a mini USB interface incl. USB special cable at the bottom side of the module. This option can't be retrofit.

Connect an USB device at the USB cable to use the data logger function.

This USB device may be for example an USB stick.

In this menu, the parameters for the long-term recording of the USB device are set.



4.7.1 Data Logger Switch On/Off

Starting the logger function.

Symbol	Description	Setting Status	Function
OFF	Turned off	OFF	OFF = Data Logger function is turned off ON = Data Logger function is turned on

Note:

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)

4.7.2 Current values

Symbol	Description	Setting Status	Function
OFF	Current value	OFF	OFF = Current values of all registered SP are **not** recorded. ON = Current values of all registered SP are recorded.

Release of the current value recording of all active sensor 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:

CVMMTT.csv, with MM standing for the current month and TT standing for the current day.

Every day, a new file with the current date is created. 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	8	9	10	etc.
Time	SP1	SP2	SP3	SP4	SP5	SP6	SP7	SP8	SP9	SP10
Or time	SP1.1	SP1.2	SP2.1	SP2.2	SP3.1	SP3.2	SP4.1	SP4.2	SP5.1	SP5.2
09_50_02	0	20	20	28	0	-	0	0	0	
09_50_03	0	20	20	28	0	-	25	29	0	
09_50_04	0	20	20	28	0	-	25	29	0	
09_50_05	0	20	20	28	0	-	25	29	0	
09_50_06	0	20	20	28	0	-	25	29	0	
09_50_07	0	20	20	28	0	-	25	29	0	
09_50_08	0	20	20	28	0	-	25	29	0	
09_50_09	0	20	20	28	0	-	25	29	0	
09_50_10	0	20	20	28	0	-	25	29	0	
09_50_11	0	20	20	28	0	-	25	29	0	
09_50_12	0	20	20	28	0	-	0	29	0	

The first column gives the time, from the second column on, the current values of all registered sensor points at this time are written. Inactive sensor points within active sensor points are marked by a dash -.

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

- 50 = Sensor point locked.

- 40 = Communication error at the sensor point.

- 10 = Analog sensor points with a measured value less than 3 mA.

In this way the file keeps a fixed structure and can be evaluated with Excel and graphed according to the chronological sequence.

4.7.3 CV Log Rate

Setting of the time interval in which the current values of all registered SP are stored (in seconds).

Symbol	Description	Setting Status	Function
10s	Time in seconds	10s	Time interval between two entries in the CSV file (10- 9999 sec are possible – approx.. every 2.7 h)

4.7.4 Alarm Status

Symbol	Description	Setting Status	Function
OFF	Alarm status	OFF	OFF = Alarms aren't stored. ON = Alarms are stored.

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

The name of the file structured as follows:

AEMMTT.csv, with MM standing for the current month and TT standing for the current day.

Every day, a new file with the current date is created. 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	SP	Gas	CV/AV	A1	A1R	A2	A2R	A3	A3R	A4	A4R	A5	A5R
09_49_47	SP 02	CO	84	40	R01	80	R02						
09_49_47	SP 03	CO	194	40	R01	80	R02	100	R03	120	R04		
09_50_02	SP 02	CO	20										
09_50_02	SP 03	CO	20										

The first column gives the time, the second the SP address and the third the gas type.

In the fourth column there is the measured value having caused the triggering of the alarm. The measured value is stored in dependence of the definition in the SP parameter menu as current or average value. In case of average value overlay it is the current value that is stored.

The fifth column gives the threshold of the first alarm; in the sixth the assigned alarm relay. In this way you can track which relay switches at what threshold. The next column is for the second alarm threshold with the associated alarm relays and so on up to the fifth alarm threshold.

If no relay is assigned to an alarm, the corresponding column remains empty.

At every change of an alarm, always all active alarms of the SP are written. The reset of an alarm is documented by an empty column. This shows how long the alarm has been active.

4.7.5 Error Status

Symbol	Description	Setting Stattus	Function
OFF	Error status	OFF	OFF = Faults are **not** stored. ON = Faults are stored.

Release of the fault recording for all active sensor 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 date + time	Error type
10_22_28	SP 79	03_30 10_20	+ SP 79 error
13_48_28	SP 79	03_30 13_46	- SP 79 error

The first column gives the current time, the second one the error source. The third column indicates the time and date when the error has occurred.

In the fourth column there is the type of error.
+ = Error occurred.
- = Error acknowledged.

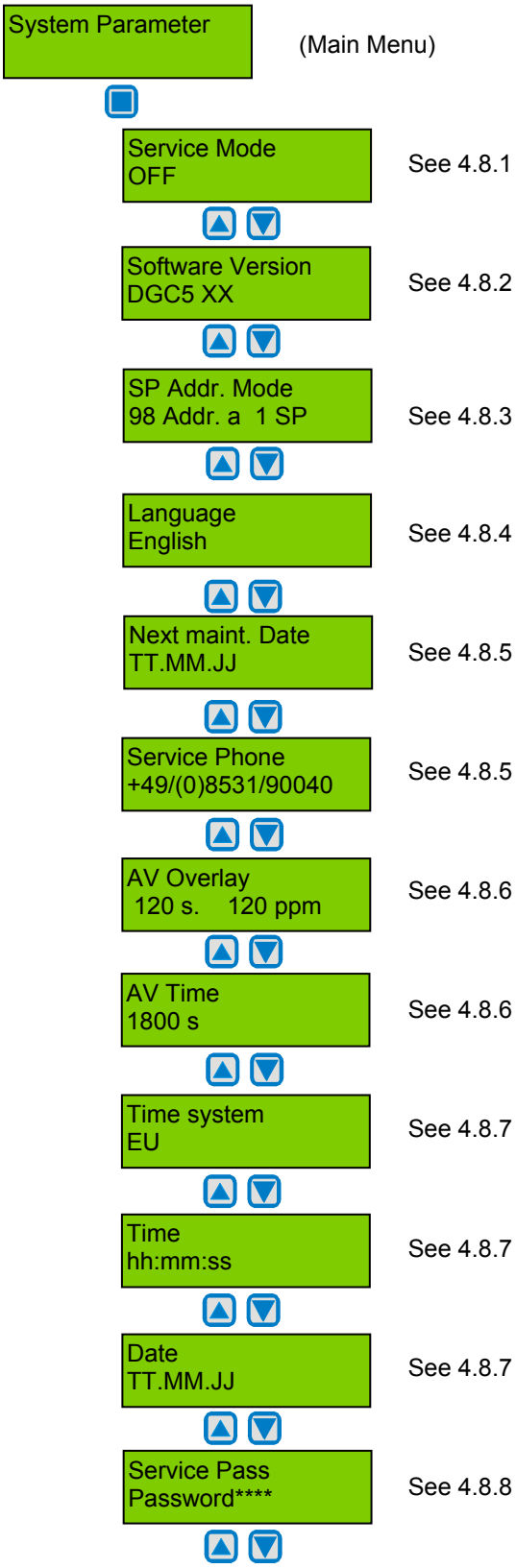
Every internal restart of the system (system reset) is also documented in the current day file.

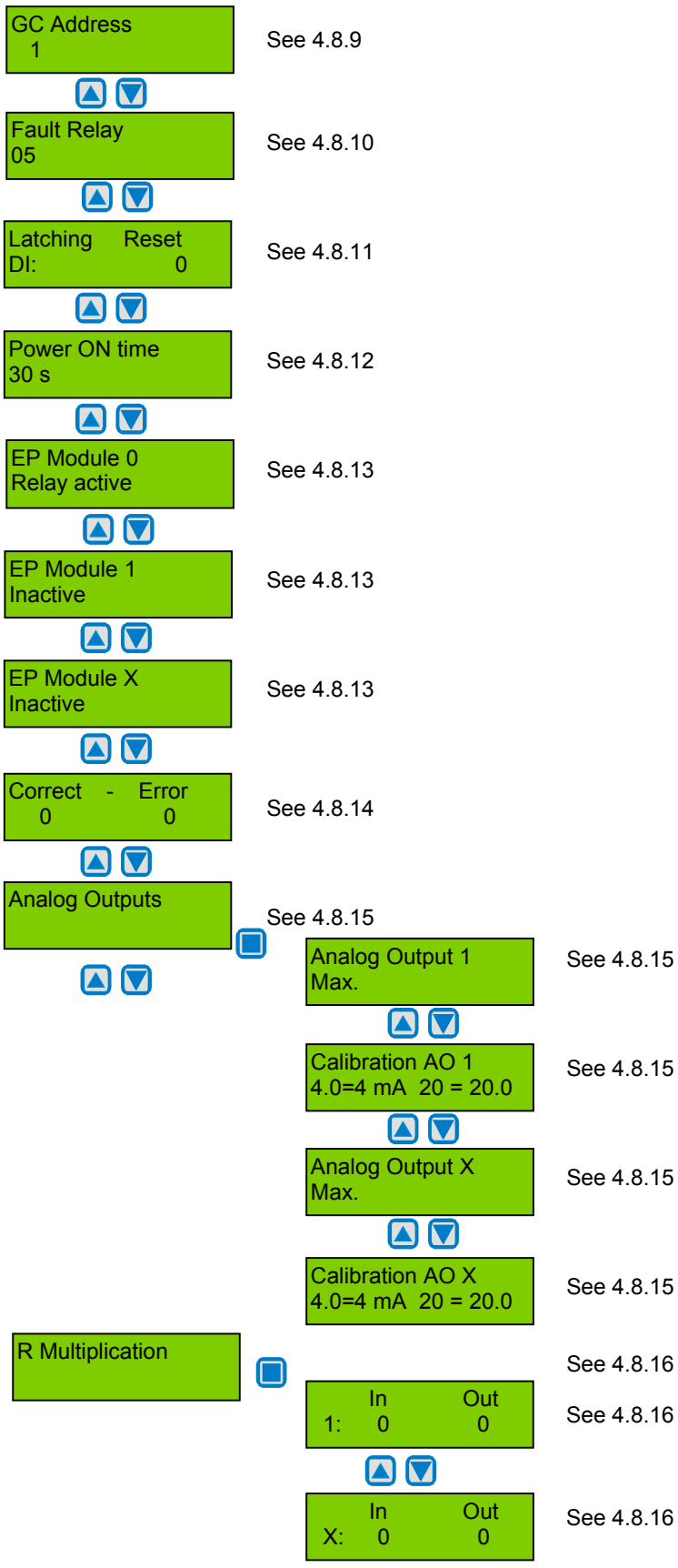
Frequent reboots (several times per day) may point to a technical problem. Please consult the installer as soon as possible.

Info	Date	Time	
DGC05 Reset	30_03_12	13_38_19	

4.8 Menu System Parameter

Display and changes of the system parameter for the Gas Controller




GC Address
1
See 4.8.9
Fault Relay
05
See 4.8.10
Latching Reset
DI: 0
See 4.8.11
Power ON time
30 s
See 4.8.12
EP Module 0
Relay active
See 4.8.13
EP Module 1
Inactive
See 4.8.13
EP Module X
Inactive
See 4.8.13
Correct - Error
0 0
See 4.8.14
Analog Outputs
See 4.8.15
Analog Output 1
Max.
See 4.8.15
Calibration AO 1
4.0=4 mA 20 = 20.0
See 4.8.15
Analog Output X
Max.
See 4.8.15
Calibration AO X
4.0=4 mA 20 = 20.0
See 4.8.15
R Multiplication
See 4.8.16
In Out
1: 0 0
See 4.8.16
In Out
X: 0 0
See 4.8.16

4.8.1 Service Mode

For calibration and service work, the alarms are not transmitted to the alarm relays when the service mode is active (ON). The service mode ON is reset automatically after 60 minutes or manually in the menu “Service Mode”. If the calibration is executed with the service tool DGC05-STL or with the DGC-EasyConf Software, the alarm suppression is automatically activated during calibration.

Symbol	Description	Default Status	Function
Off	Service Mode	Off	Off = Alarms activate the associated alarm relays On = Alarms are not transmitted to the alarm relays

4.8.2 Software Version

Symbol	Description	Default Status	Function
GC05-XX	Software Version		XX = Software Version

4.8.3 SP Address Mode

Adaptation of the value and parameter display to the connected field bus transmitters.

This configurable functionality is available from version 9.02.

Symbol	Description	Default Status	Function
98 Addr. a 1 SP	SP Addr. Mode	98 Addr. a 1 SP	98 Adr. a 1 SP = only bus transmitters 48 Adr. a 2 SP= bus transmitters + analog transmitters

4.8.4 Language

This configurable functionality is available from version 9.02.

Selection of the menu language

Symbol	Description	Default Status	Function
German	Language	German	German English Dutch USA English French Swedish

4.8.5 Maintenance Concept

A control of the maintenance intervals required by law or by the customer is integrated in the DGC5 system.

At commissioning or after maintenance the date for next maintenance is entered. When this date is reached, the failure signal is activated the next morning at 9 o'clock, and the phone no. of the service technician occurs in the display instead of the measured values. The text message “Maintenance” and the service phone no. can only be reset after having accomplished the maintenance by entering the next maintenance date.

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

Symbol	Description	Default Status	Function
TT.MM.JJ	Maintenance date		TT.MM.JJ = Input of the date for next maintenance.
0853....	Phone No.		Input of the individual service phone no.

4.8.6 Average Function

The each active sensor point the Gas Controller calculates the arithmetic average value out of 10 measurements got within the time unit defined in the menu „AV-time“. Depending on the definition of the operating mode the alarm is evaluated with the current or the average value. In the average mode, the average value is indicated in the menu “Sensor Values” next to the current value. The control mode (current or average value) for the evaluation of the alarm is defined for each sensor point.

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 active for the gas type CO.

Symbol	Description	Default Status	Function
120 s 120 ppm	AV Overlay	120 s 120 ppm	sec. = Delay time of average value overlay. 0 = No overlay function ppm = Threshold average overlay
1800 s	AV Time	1800 s	sec. = Time for calculating the average value

4.8.7 System Time, System Date

Input and correction of time and date. Selection of time and date format.

Symbol	Description	Default Status	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)
TT.MM.JJ	Date		TT.MM.JJ = Input of the correct date (EU format) MM.TT.JJ = Input of the correct date (US format)

4.8.8 Service Password (Maintenance)

Change of the system password for maintenance. With this password you can set the maintenance date anew and acknowledge the fault message.

Symbol	Description	Default Status	Function
1	Service Password	1	**** = Define the individual password with 4 characters (maintenance)

4.8.9 GC Address

This configurable functionality is available from version 9.02.

The option of an additional serial interface allows data to be transmitted to the superior systems without feedback. This option cannot be retrofitted.

The description of the interface can be read from a separate document.

In this menu, the address of the gas controller can be set for this RS485 interface.

Symbol	Description	Default Status	Function
1	GC Address	1	0-255 = GC address

4.8.10 Define the Failure Relay

In this menu you can define one of the relays as fault indication relay. See also fault management (4.1)

Symbol	Description	Default Status	Function
5	Fault Relay	5	0 - 30 = Definition of the fault indication relay

4.8.11 Acknowledge a Relay in Latching Mode by a DI

This configurable functionality is available from version 9.02.

All relays in latching mode can be acknowledged via the set DI.

See also 4.5.3 latching function

When operating the DI with these settings, all non-active error messages are deleted and moved to the service technicians menu.

Note:
This function is not suitable for all applications. Especially in connection with pellistors and higher gas concentrations, it is not allowed because the absence of gas has to be checked manually on site.

In such cases, this input should only be able to be actuated by a key switch.

Symbol	Description	Default Status	Function
0	DI	0	0-4 digital inputs

4.8.12 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 releasing of a pseudo alarm. Therefore the Power ON time is started at the Gas Controller after switching on of the power supply. While this time is running out, the Gas Controller does not activate alarms. The power on status occurs on the first line of the starting menu.

Symbol	Description	Default Status	Function
30 s	Power On Time	30 s	XX = Define the power on time (sec.)

4.8.13 Registration of Expansions modules

The DGC5 system manages up to 23 expansion modules EP-05 with four analog inputs each. The EP-05 modules with the addresses 1 to 5 dispose of 5 alarm relays and 2 analog outputs each. Connected EP- 05 modules are registered in this menu with the desired function (only alarm relay or alarm relay + analog input). A module address is assigned to every EP-05 module via the address switch.

The controller checks the communication to the registered EP-05 modules and shows a fault signal in case of a communication error. To recognize the position of the EP-05 modules a module address is assigned to each module by the address selector. See table.

EP Module 0:
This is the in/output board in the GC-05 Controller Module. The module is always active, but the function “Only alarm relay or alarm relay + analog inputs” can be selected.

Active analog inputs at an EP module occupy the four SP addresses; therefore they aren’t available any longer for the bus transmitters.

The table shows the assignment of the relay numbers and of the analog in/outputs to the EP module addresses.

Symbol	Description	Default	Function	Module Address	Analog Input	Relay No.	Analog Output	Module
	EP- Mod. 0	Relay	Relay active: = Only alarm relay active Relay + SP active = Alarm relay + analog inputs active		01 - 04	01 - 05	01 - 02	GC-05
Inactive	EP- Mod. 1	Inactive	Inactive = Module not active Relay active: = Only alarm relay active Relay + SP active = Alarm relay + analog inputs active	1	05 - 08	06 - 10	03 - 04	EP-05
	EP- Mod. 2	Inactive		2	09 - 12	11 - 15	05 - 06	EP-05
	EP- Mod. 3	Inactive		3	13 - 16	16 - 20	07 - 08	EP-05
	EP- Mod. 4	Inactive		4	17 - 20	21 - 25	09 - 10	EP-05
	EP- Mod. 5	Inactive		5	21 - 24	26 -30	11 - 12	EP-05
	EP-Mod. 6	Inactive	Inactive = Module not active SP active = Analog inputs active	6	25 - 28	----	----	EP-05
	EP-Mod. 7			7	29 - 32	----	----	EP-05
	EP Mod. 8			8	33 - 36	----	----	EP-05
	EP Mod. 9			1	37 - 40	----	----	EP-05A
	EP Mod. 16			8	65 - 68	----	----	EP-05A
	EP Mod. 17			1	69 - 72	----	----	EP-05B
	EP Mod. 23			7	93 - 96	----	----	EP-5B

4.8.14 Error Indicator System Bus

All data packets received by the GC-05 are checked for completeness and compatibility. Faulty data packets are recorded by the error counter. Max. 1-2 faulty data packets are admissible a day.

A higher error rate mostly comes from incorrect laying of the field bus line.

4.8.15 Analog Output

The Gas Controller Module as well as the EP-05 Modules 1 to 5 have two analog outputs (AO) with 4 to 20 mA signal each. The signal of one or more sensor points can be assigned to each of the analog outputs. The assignment is effected in the menu “SP Parameter” for each SP. The sensor point sends the signal, which is defined in the menu “C/A Mode”.

Out of the signals of all assigned sensor points the Gas Controller determines the minimum, the maximum or the average value and displays it at the analog output. The definition, which value is transmitted, is effected in the menu “Analog Output X”.

The analog output can be calibrated at 4 and at 20 mA. Therefore an ampere meter (measuring range 25 mA) can be attached to the AO and the respective factor has to be changed until the analog output corresponds to 4 and/or 20 mA. During calibration evaluation of the sensor point signals is not possible. This calibration is effected by the factory. The factors should not be changed.

Symbol	Description	Default Status	Function
Max.	Select Output mode	Max.	Min. = Displays the minimum value of all assigned SP Max. = Displays the maximum value of all assigned SP Average = Displays the average value of all assigned SP
4.0 20.0	Calibration	4.0 20.0	4.0 = Calibration factor at 4 mA 20.0 = Calibration factor at 20 mA

4.8.16 Relay Multiplication

This function is available from version 9.02.

With the relay multiplication table, it is possible in the DGC5 system, to assign an alarm to multiple relays.

There is a maximum of 20 entries for In-relays and Out-relays. So it is possible to expand one relay to 20 others or to double max. 15 relays.

In the column IN, the relay assigned to an alarm in the menu SP Parameter is set.

In the column OUT, the additionally required relay is entered.

Note:
Manual intervention on IN or Out relays in the menu Relay Status or via external DI will only affect the single relay!

Number	Description	Default Status	Function
0-30	In-Relay	0	0 = Function off X = Relay X should be multiplied (information source)
0-30	Out-Relay	0	0 = Function off X = Relay X should switch together with In-Relay.

Example 1:
3 relay contacts are needed with the same effect of relay 3.
(see assignment of the relays in chapter SP Parameter)
Entry: 1: IN 3 Out 7
Entry: 2: IN 3 Out 8
If relay 3 is activated via an alarm, relays 3, 7 and 8 switch at the same time.

Example 2:
2 relay contacts each are needed from 3 relays (for ex. 7, 8, 9).
Entry: 1: IN 7 Out 12 (Relay 12 switches at the same time as relay 7)
Entry: 2: IN 8 Out 13 (Relay 13 switches at the same time as relay 8)
Entry: 3: IN 9 Out 14 (Relay 14 switches at the same time as relay 9)
This means that relay 7 switches with 12; 8 with 13; 9 with 14.
The two examples can be mixed up, too.

5 Notes and General Information

It is important to read this user manual carefully in order to understand the information and instructions. The PolyGard® DGC5 gas monitoring, control and alarm system may only be used for applications in accordance to the intended use. The appropriate operating and maintenance instructions and recommendations must be followed.

Due to permanent product developments, MSR-Electronic-GmbH and IN*TEC* Controls reserves the right to change specifications without notice. The information contained herein is based on data considered to be accurate. However, no guarantee or warranty is expressed or implied concerning the accuracy of these data.

5.1 Intended product application

The PolyGard® DGC5 is designed and manufactured for controlling, for saving energy and keeping OSHA air quality in commercial buildings and manufacturing plants.

5.2 Installer's responsibilities

It is the installer's responsibility to ensure that all PolyGard® DGC5 are installed in compliance with all national and local regulations and OSHA requirements. All installation shall be executed only by technicians familiar with proper installation techniques and with codes, standards and proper safety procedures for control installations and the latest edition of the National Electrical Code (ANSI/NFPA70). It is also essential to follow strictly all instructions as provided in the user manual.

5.3 Maintenance

All monitoring and control systems such as the PolyGard® DGC5 should be periodically recommissioned. Recommissioning includes verifying that all field devices such as gas transmitters and fan controls are preforming to their original specifications, that the system's sequence of operation is fully functional, and that minimum ventilation rates as required by local codes are being met. Common problems identified during recommissioning include sensors that are out of calibration and fans that have been left in "hand" mode (manually off or manually on) either at the motor control panel or in the gas controller's configuration.

Recommissioning typically begins with verifying the measurement accuracy of a select number of gas transmitters by presenting them with calibration gas and viewing the transmitter's digital response. If all of the tested transmitters are within their original specified accuracy, it is generally accepted that the remainder of the transmitters are also "in calibration". If any of the tested transmitters are "out of calibration", those transmitters should be calibrated and the rest of the transmitters in the system should be tested and calibrated as required.

The system's sequence of operation is tested by presenting test gas to one or more transmitters in each fan control zone and verifying that the fan is activated and de-activated according to the desired control parameters (start/stop delay and minimum on/off time) – "bump testing". If the system incorporates variable speed fans, the technician must be able to verify setup parameters in the variable speed drive as well as the Digital Gas Controller.

The re-calibration interval for a gas transmitter is highly dependent on the amount of the target gas that the transmitter is exposed to over time. Refer to the transmitter manufacturer's technical documentation for recommendations.

5.4 Limited Warranty

MSR-Electronic-GmbH and IN*TEC* Controls warrants the PolyGard® DGC5 for a period of two years from the date of shipment against defects in material or workmanship. Should any evidence of defects in material or workmanship occur during the warranty period, IN*TEC* Controls will repair or replace the product at their own discretion, without charge.

This warranty does not apply to units that have been altered, had attempted repair, or been subject to abuse, accidental or otherwise. The above warranty is in lieu of all other express warranties, obligations or liabilities.

This warranty applies only to the PolyGard® DGC5. MSR-Electronic-GmbH and/or IN*TEC* Controls shall not be liable for any incidental or consequential damages arising out of or related to the use of the PolyGard® DGC5.

If the PolyGard® DGC5 needs to be returned to IN*TEC* Controls for service, an RMA number must be obtained prior to sending.