





Commissioning of the Hardware

Guidelines for Wiring

Digital-Gas-Controller DGC / GC

for Digital and Analog Sensors

Version:	2025-05	Release date:	2025-05-12
Language:	English	Name of file:	GA_INB_DGC_E



Imprint

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



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1 General

These instructions explain the basics of dimensioning, laying and terminating of the cables as well as the procedure of commissioning of the Digital-Gas-Controller DGC.

These data were compiled by us with great care, but deviations cannot be excluded. Therefore, MSR-Electronic shall not be liable for possible mistakes in this description.

During installation, especially the applicable local technical requirements and regulations concerning wiring, electrical security, environmental conditions, fire protection etc. must be considered.

This user manual treats the installation and commissioning of analog and digital sensors as well as of the DGC.

1.1 Safety

The operating instructions must be carefully read, understood and followed by all persons who 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 (DGUV-I 213-056) and T 023 (DGUV-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

These commissioning instructions are only valid for:

- PolyGard® series:
 - o DGC
 - o GC
 - EP

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



2.2 Intended Use

The PolyGard® Digital-Gas-Controller DGC is used for monitoring, detection 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 race courses 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 Digital-Gas-Controller may only be used in ambient conditions as specified in the Technical Data.

The DGC must not be used in potentially explosive atmospheres.

3 Installation of Field Bus Cable

3.1 Installation of Cables for Analog Sensors

The installation of the field cables for the analog sensors with 4–20 mA signal has to be done in star topology. The connection type of the sensor, whether 2-wire (+24 V DC and 4–20 mA signal) or 3-wire (+24 V DC, 0 V DC and 4–20 mA signal), can be taken from the user manual of the analog sensor.

We recommend using the cable JY(St)Y 2x2x0.8 LG, but not connecting the shield. The cable length is permitted up to about 500 m.

The connection to the Digital-Gas-Controller DGC is performed according to Figure 10 to Figure 26 directly at the terminal block X12 of the GC and EP modules:

- Analog sensors with a max. current requirement of 130 mA each can be connected directly at X11 (24 V DC) to the GC/EP modules.
- Analog sensors with higher power consumption have to be connected directly to the power unit at 24 V DC.



3.2 Installation of Field Bus Cable

Chapters 3.2 to 3.8 concern the installation of the field bus cable and therefore aren't important for the installation of analog sensors. For simple and fast installation of the field bus cable, the DGC system is only attuned to the Twisted Pair Cable JY(St)Y 2x2x0.8 LG concerning communication, operation voltage supply, connection etc.

When using this cable, you have to pay attention to the following factors concerning dimensioning and installation:

- Bus communication
- Physical capacity.

The installation of the field bus cable for the field devices (bus sensors, EP modules) has to be executed only in line topology. Branch lines are not allowed. For reliable communication the cable length shall not exceed 900 m per network segment. The cable length is also limited essentially by the physical load capacity. Section 3.6 gives examples for the cable lengths in dependence of the connected field devices; they must be adhered to in any case.

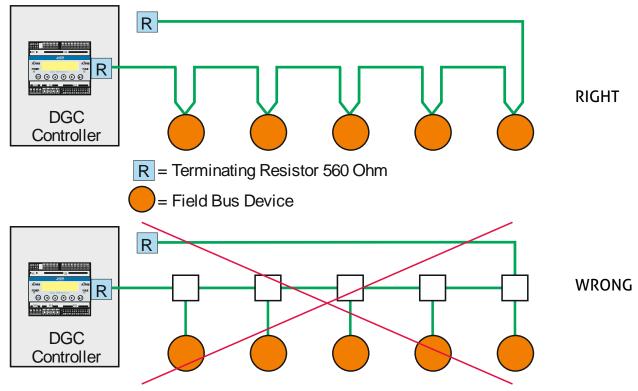


Figure 1: Structure of Line Topology



3.3 Use of Repeaters

Networks of larger dimensions are divided into several network segments. The maximum cable lengths apply to one network segment with a terminal resistor at the beginning and at the end of the field bus line. Repeaters are used for connecting the segments.

Repeaters amplify the data signals, not making any difference between desired and interfering signals. Only maximum 7 repeaters are allowed per system to enable a secure transfer.

Repeaters can be installed both in the DGC central unit and in the field. For the field installation you additionally need to feed the operating voltage (24 V DC) in order to supply the devices of the subsequent segments.

In the DGC system the repeater function is integrated in the EP modules. Alternatively, you can use a separate repeater module (REP) as well.

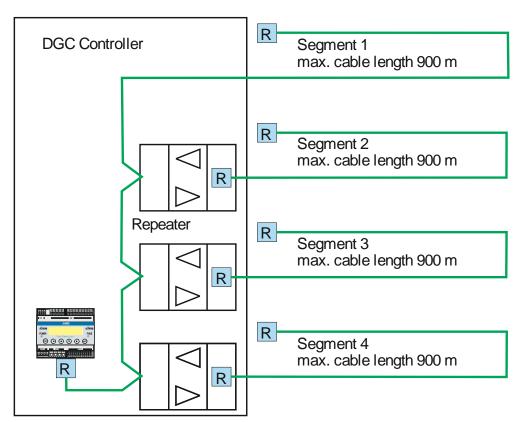


Figure 2: Overview: Repeater Installation in the DGC

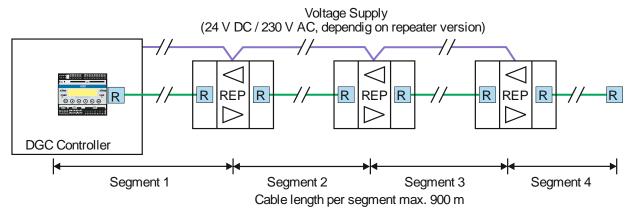


Figure 3: Overview: Repeater Installation in the Field

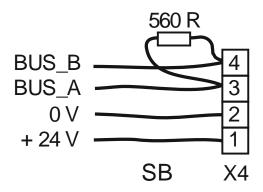


3.4 Termination

Each segment needs an ohmic terminating resistor of 560 Ω each at both cable ends.

These terminating resistors are already integrated in the DGC system at the field bus outgoing lines. A terminating resistor is inserted at the field bus end between the terminals of BUS_A and BUS_B.

Please check that only one resistance is active at each of the both bus ends!



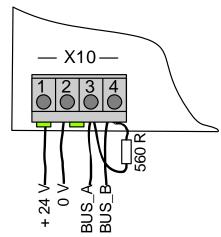
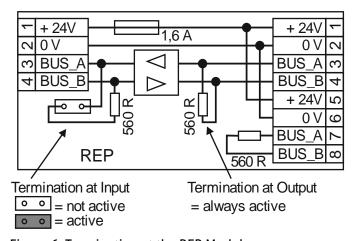


Figure 4: Terminating Resistor at the Last Field Bus Device (Example SB Sensor-Board)

Figure 5: Terminating Resistor at the Last Field Bus Device (Example EP Module)



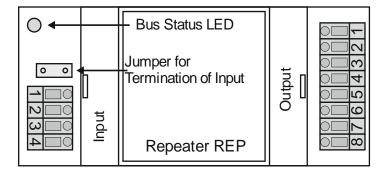


Figure 6: Termination at the REP Module



3.5 Physical Load Capacity of the Bus Cable

The DGC field bus devices work with a nominal operating voltage of 24 V DC. This tension is impressed via the shared 4-wire Twisted Pair Cable (JY(St)Y 2x2x0.8LG) with a cross-section of 0.5 mm².

Therefore, it must be determined for each segment which cable length is permissible depending on the total power of the connected field bus devices in order to ensure the required minimum terminal voltage of 16 V DC for PolyGard® Sensor-Board SB and 19.5 V DC for all other field bus devices.

Note:

The operating voltage supply of the EP modules mounted in the field always shall be executed via a separate line, because due to the higher power requirement of the modules the allowable voltage drop in the bus cable only permits relatively short cable lengths. As an option, the EP module can be supplied via an external power supply unit. Each additional power pack is then only connected to the system with 0 V DC. + 24 V DC is only applied to the respective EP module and not connected to the + 24 V DC of the system.

3.6 Calculation of the Cable Length

As described above, the field bus cable is only laid in line topology. You have to consider 3 possibilities for a voltage drop in the bus cable:

- a) Line topology with no return line of the cable
- b) Line topology with return line of the cable
- c) Voltage supply of 24 V DC directly in the field.

Example for the calculation without return line

- 5x SB with SC-Tox (e.g. E1110)
- 5x SB with SC-Tox (e.g. E1110) & SC-Ex (e.g. P3480)
- 5x SB with SC-Tox (e.g. E1110) & SC-Ex (e.g. P3480) & 1 x EP Module
- 4x PX2 with SX1-Ex (e.g. P3480)

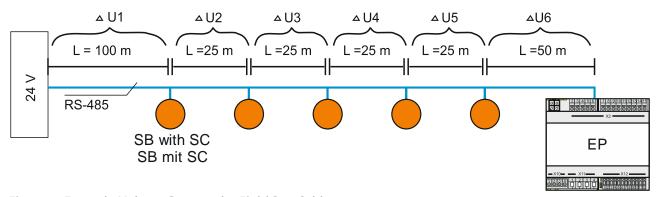


Figure 7: Example Voltage Drop at the Field Bus Cable



	∆U1 (V)	∆ U2 (V)	∆ U3 (V)	∆ U4 (V)	∆ U5 (V)	∆ U6 (V)	U min (V)
SB with SC-Tox	0.288	0.058	0.044	0.029	0.015		23.57
SB with SC-Tox & SC-Ex	2.088	0.418	0.313	0.209	0.105		20.87
SB with SC-Tox & SC-Ex & EP	2.592	0.544	0.439	0.334	0.230	0.252	19.610
PolyXeta®2 PX2 & SX1	2.592	0.486	0.324	0.162			20.44

Table 1: Examples for Cable Lengths

Calculation Δ U for SB with SC-Tox & SC-Ex:

 $\Delta U1 = 5 * (I_{SB + SC-Tox + SC-Ex}) * R_{Cable} = 5 * 58 mA * 72 \Omega / 1000 * 100 m = 2.088 V$

 Δ U2 = 4 *(I_{SB + SC-Tox + SC-Ex}) * R_{Cable} = 4 * 58 mA * 72 Ω / 1000 * 25 m = 0.418 V}

 Δ U5 = 1 *(I_{SB + SC-Tox + SC-Ex}) * R_{Cable} = 1 * 58 mA * 72 Ω / 1000 * 25 m = 0,105 V}

 U_{min} = 24 V - Δ U1 - Δ Un

The Excel program "DGC cable calculation" is available for the calculation of the permissible cable length.

3.7 Technical Data for the Calculation of Individual Field Bus Cable Lengths

Type Version	Current	SB	WSB without relays	WSB with relays	MSB	PX2	פכ	EP	REP
Basic	(mA)	6	8	16	55	40	130	70	30
Analog Output	22	/							//
WAO	5					1	1	1	1
Display	10						1	1	1
SC/SX1/SSAX1 Sensor Head									
Electrochemical (-E11XX)	2						1	1	1
Catalytic (-P34XX)	50						1	1	1
Infrared (-I-XXXX)	13 ¹						1	1	1
Semiconductor (-SXXXX)	40						1	1	1
MPS™ (-MXXXX)	25						1	1	1
MC Sensor Head									
Electrochemical (-E11XX)	24	1				/			/
Catalytic (-P34XX)	72	1				/			/
Infrared (-I-XXXX)	35 ²	1				/			/
Semiconductor (-SXXXX)	62	1				/			/
MPS™ (-MXXXX)	40	1				1			1
Total Current (mA)	1 0660								

Table 2: Power Requirement of the DGC Devices

² Peak 90 mA

Cable types	Wire diameter (mm)	Wire cross-section (mm²)	AWG	Loop resistance¹ Ω/km
JY(St)Y 2x2x0.8LG	0.800	0.503	22	72.00
NYM-J 3x1.5	1.380	1.500	16	24.40
NYM-J 3x2.5	1.780	2.500	14	15.20

Table 3: Technical Data of Used Cables

¹ Peak 70 mA

¹ Resistance of feed and return line



For fast project planning 2 examples related to practice are calculated concerning maximum lengths of feed line cables and intermediate cables.

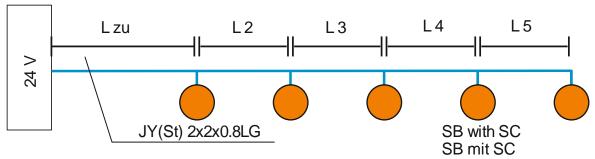


Figure 8: Example for Cable without Return Line

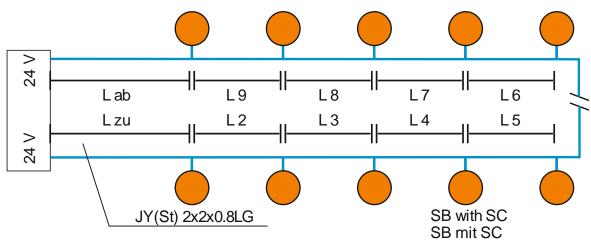


Figure 9: Example for Cable with Return Line

SB & SC-Tox (pcs)	SB & SC-Тох & SC-Ех (pcs.)	Feed Line L zu (m)	Return Line L ab (m)	Delta L2; L3 (m)	Total Length (m)
		Without Retu	rn Line		
28	0	50	0	25	750
26	0	100	0	25	750
24	0	150	0	25	750
0	11	50	0	25	350
0	10	100	0	25	375
0	9	150	0	25	375
		With Return	Line		
48	0	50	50	25	1300*
48	0	100	100	25	1400*
48	0	150	150	25	1500*
0	22	50	50	25	700
0	20	100	100	25	750
0	19	150	150	25	775

Table 4: Examples for Cable Lengths with/without Return Line

^{*} Cable length of max. 900 m exceeded!



3.8 Terminal Connection of the Field Bus Cable

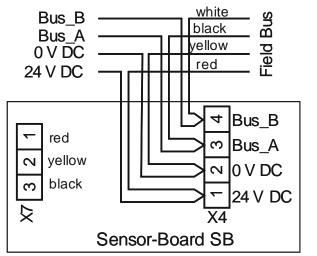


Figure 10: Connection Diagram Sensor-Board SB (Field Bus)

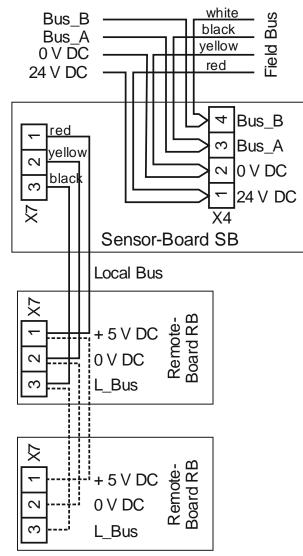


Figure 11: Connection Diagram of Sensor-Board SB (Field Bus) with 2x Remote-Board RB (Local Bus)



Caution:

Maximum length of the local bus cable incl. sensor head cable = 15 m

The connection diagram for other field bus devices (WSB, MSB, PX2 etc.) can be found in the respective User Manual.



4 Mounting

4.1 Digital-Gas-Controller DGC

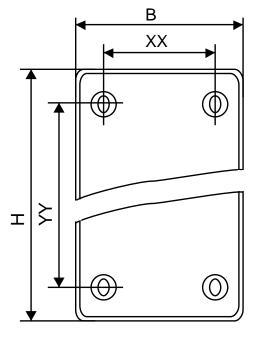
The DGC is fixed to the wall through the 4 or 6 marked mounting points at the back side of the housing. These mounting points are accessible after opening the housing (see Figure 12). The mounting points are covered with the enclosed caps after the end of the assembly.

We recommend considering the following when choosing the mounting position:

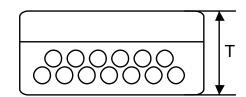
- Installation height approx. 1.6 m for easy operation.
- Cables are introduced from above.
- Keep at least 150 mm of distance on the left side in order to open the view cover.
- Customer's instructions.

Housing Type	XX (mm / in.)	YY (mm/in.)	B (mm/in.)	H (mm/in.)	T (mm/in.)
1	200 / 7.87	161 / 6.34	298 / 11.73	260 / 10.24	140 / 5.51
According UL2017	230 / 9.06	215 / 8.46	315 / 12.04	300 /11.81	155 / 6.10
2	200 / 7.87	320 / 12.60	298 / 11.73	420 / 16.54	140 / 5.51
According UL2017	230 / 9.06	365 /14.37	315 / 12.04	450 / 17.72	155 / 6.10
3	200 / 7.87	494 / 19.45	298 / 11.73	570 / 22.44	140 / 5.51
According UL2017	230 / 9.06	515 / 20.28	315 / 12.04	600 / 23.62	155 / 6.10
4	319 /12.56	586 / 23.07	410 / 16.14	655 / 25.79	140 / 5.51
According UL2017	230 / 9.06	665 / 26.18	315 / 12.04	730 / 28.74	155 / 6.10

Table 5: Dimensions of the DGC









4.2 GC Door Mounting Option

The door mounting option makes it possible to keep an eye on the GC displays in a closed switch cabinet or room. The door mounting version comes with the door mounting housing and 2 modules (display and control unit for door mounting and I/O unit for rail mounting).

A cut-out (W = 165 mm, H = 138 mm) must be made on the door for this purpose.

- Mounting height approx. 1.6 m for easy operation.
- Cables are inserted from above.

	External dimensions			Device Mounting				Door Cutout			
	Α	В	C	N	D	E	F	G	Н	I	L
mm	170	200	12	97	75	48	14	90	80	138	165
In	6,69	7,87	0,47	3,82	2,95	1,89	0,55	3,54	3,15	5,43	6,50

Table 6: Dimensions for Housing of Door Mounting Option

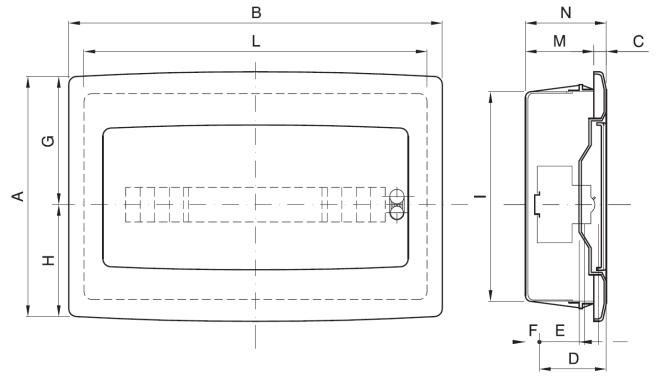


Figure 13: Mounting of Housing for Door Option



5 Electrical Connection

5.1 Wiring

The technical requirements and regulations for wiring, electrical security, fire protection, as well as project specific and environmental conditions etc. must be observed when mounting.

We recommend the following cable types¹:

Power supply
 Alarm message
 Sensor / field bus
 NYM-J 3 x 1.5 mm²
 NYM-J X x 1.5 mm²
 J-Y(St)Y 2x2 x 0.8LG

Analog sensors are connected directly to the spring type terminals X12 of the GC/EP module. The field bus is connected directly to X10, X11 (power supply), X12 of the GC/EP module. The correct polarity must be observed.

The alarm signals are also connected directly to the GC/EP module at X2 by means of spring type terminals. For looping through the signals, there are 2 terminal points at the outgoing terminals of X2.

The alarm signals are available as potential-free change-over contacts. If required, the voltage supply is available at the terminal L1 (only standard version). The relay contacts are drawn in the circuit diagram without voltage. The individually parameterized relay mode (deenergized/energized) must be taken into account.

The exact position of the terminals for the sensors and alarm relays is shown in the diagram according to Figure 14 to Figure 26.

The diagram includes the maximum number of extension modules. Depending on the DGC type, however, only individual modules are fitted.

Notes for installation according to UL2017

The minimum length of individual wires of the field cables must be 153 mm (6 in.).

Field cables must be mounted and fixed in such a way that they can withstand a pull of 4,5 kg/10 pound for 1 minute without showing any signs of damage.

Field cable for high-voltage circuits must not be smaller than 18 AWG and the insulation, if made of rubber or thermoplastic, must be at least 0,8 mm (1/32 inch).

¹ The recommendation does not consider local conditions such as fire protection etc.



Status LED Relay AR01 AR02 AR03 AR04 9 10 11 12 13 14 15 2 3 4 5 6 1 2 3 4 – X1 – X2 ALARM 1 ALARM 2 MSR-Electronic 01.03.25 15:00 **POWER** Gas Detection. X10-X11-X12 -3 4

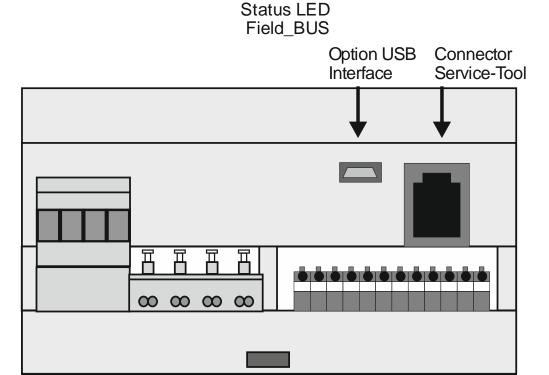
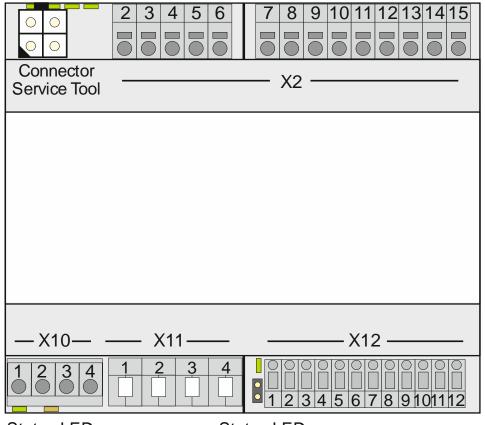


Figure 14: GC Module



Status LED Relay 900(2) 900(2) 900(2) 900(2) 900(2)



Status LED Field_BUS Segment X Status LED Field_BUS Segment Y

Figure 15: EP Module



5.2 Connection Diagram

The connection diagram contains all components for the maximal configuration of the DGC system. Depending on the version single components may be lacking in the delivered DGC central control. When choosing the supply 110/230 V AC you have to make sure that a switch or a circuit breaker is provided in the building automation especially for the DGC. It must be installed easily accessible near the DGC. It has to be marked as a disconnecting device for the DGC. The switch or circuit breaker has to comply with the requirements IEC 60947-1 and IEC 60947-3.

Door Mounting Option of GC Module (see also chapter 4.2)

The connection diagram of the I/O unit can be found in Figure 19, GC module connection diagram. The connection assignment of the display and control unit is shown in Figure 28. The optional Modbus is connected to X11 of the display and control unit.

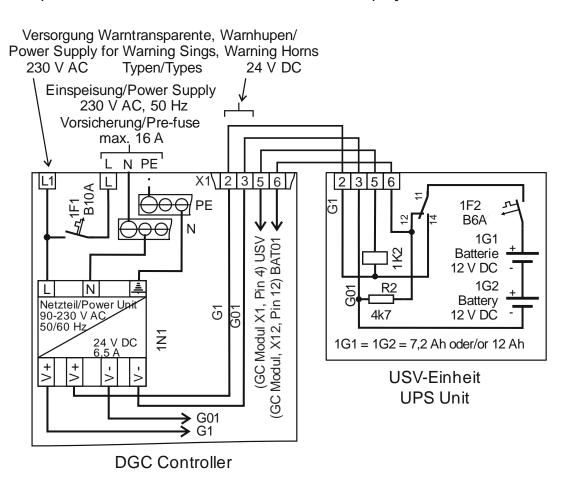


Figure 16: Connection Diagram of Power Supply for Standard Version with Optional UPS Unit



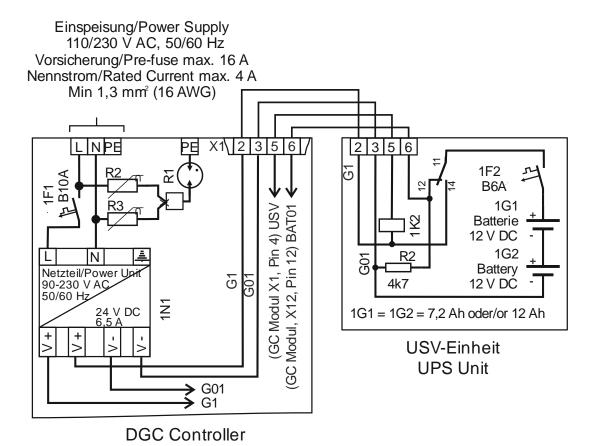
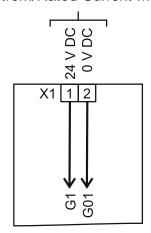


Figure 17: Connection Diagram of Power Supply for UL Version with Optional UPS Unit

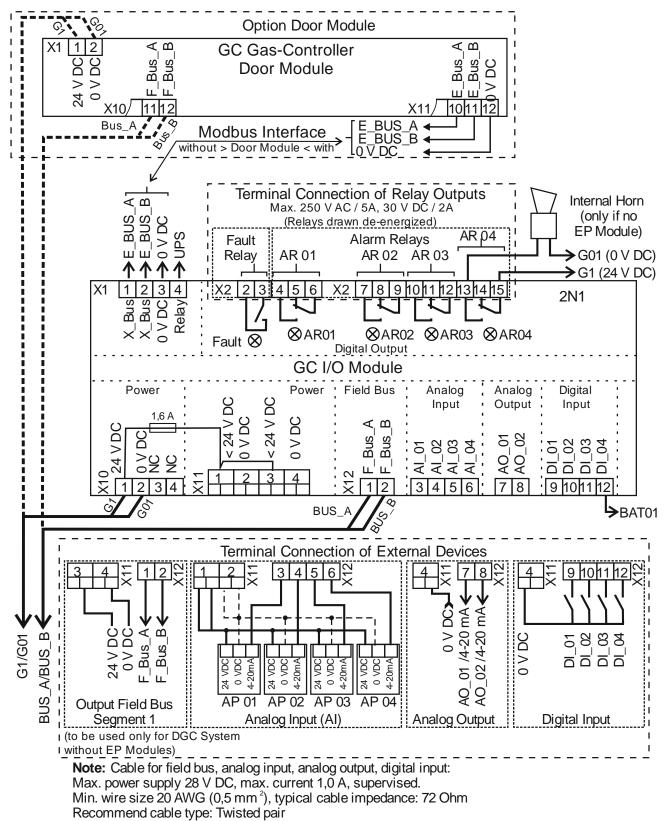
Einspeisung/Power Supply
24 V DC ± 20 %
Vorsicherung/Pre-fuse max. 6 A
Nennstrom/Rated Current max. 4 A



DGC Controller

Figure 18: Connection Diagram of Power Supply 24 V DC (optional)





Max. cable length: 2700 ft. (900 m) for field bus

1500 ft. (500 m) for analog input, analog output, digital input

Field bus: Connect only SB/MSB/WSB Boards for SC gas sensor series as well as EP Modules.

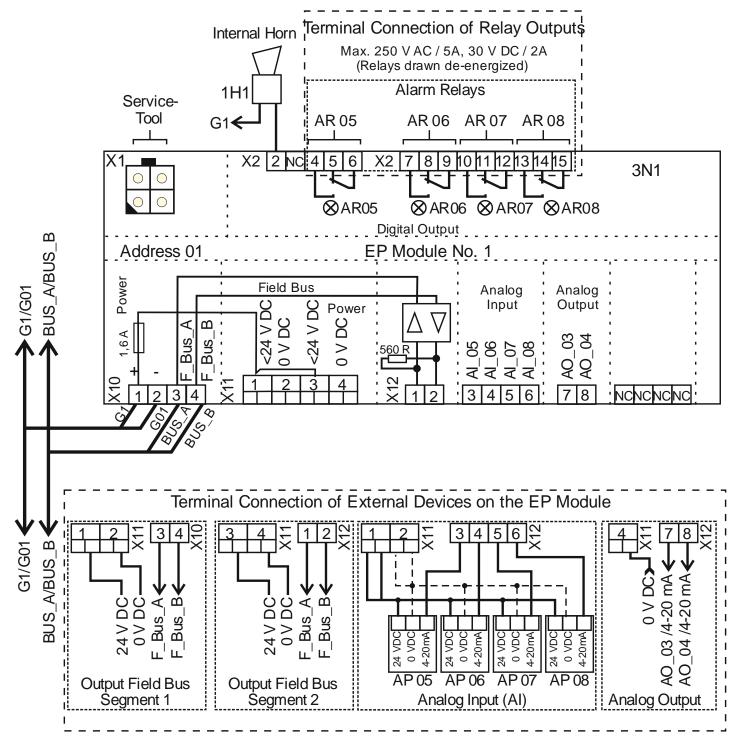
Analog input: Connect only units with 4-20 mA output signal.

Analog output: Connect only units with 4-20 mA input signal.

Digital input: Connect only units with potential-free contact.

Figure 19: Connection Diagram of GC Module





Note: Cable for field bus, analog input and analog output:

Max. power supply 28 V DC, max. current 1,0 A, supervised.

Min. wire size 20 AWG (0,5 mm2), typical cable impedance: 72 Ohm

Recommend cable type: Twisted pair

Max. cable length: 2700 ft. (900 m) for field bus

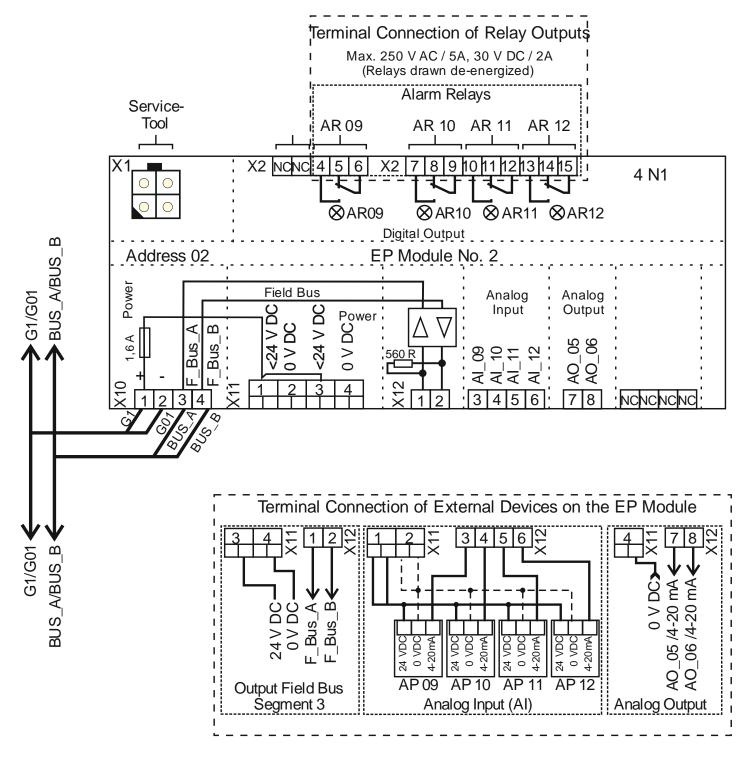
1500 ft. (500 m) for analog input, analog output

Field bus: Connect only SB/MSB/WSB Boards for SC gas sensor series as well as EP Modules.

Analog input: Connect only units with 4-20 mA output signal. Analog output: Connect only units with 4-20 mA input signal.

Figure 20: Connection Diagram of EP Module, Address 01





Note: Cable for field bus, analog input and analog output:

Max. power supply 28 V DC, max. current 1,0 A, supervised.

Min. wire size 20 AWG (0,5 mm2), typical cable impedance: 72 Ohm

Recommend cable type: Twisted pair

Max. cable length: 2700 ft. (900 m) for field bus

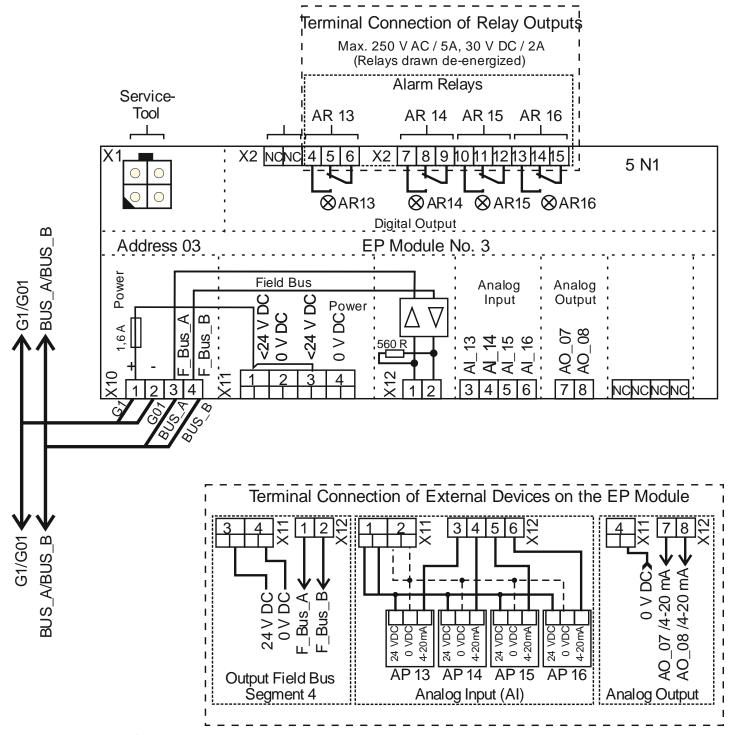
1500 ft. (500 m) for analog input, analog output

Field bus: Connect only SB/MSB/WSB Boards for SC gas sensor series as well as EP Modules.

Analog input: Connect only units with 4-20 mA output signal. Analog output: Connect only units with 4-20 mA input signal.

Figure 21: Connection Diagram of EP Module, Address 02





Note: Cable for field bus, analog input and analog output: Max. power supply 28 V DC, max. current 1,0 A, supervised.

Min. wire size 20 AWG (0,5 mm2), typical cable impedance: 72 Ohm

Recommend cable type: Twisted pair

Max. cable length: 2700 ft. (900 m) for field bus

1500 ft. (500 m) for analog input, analog output

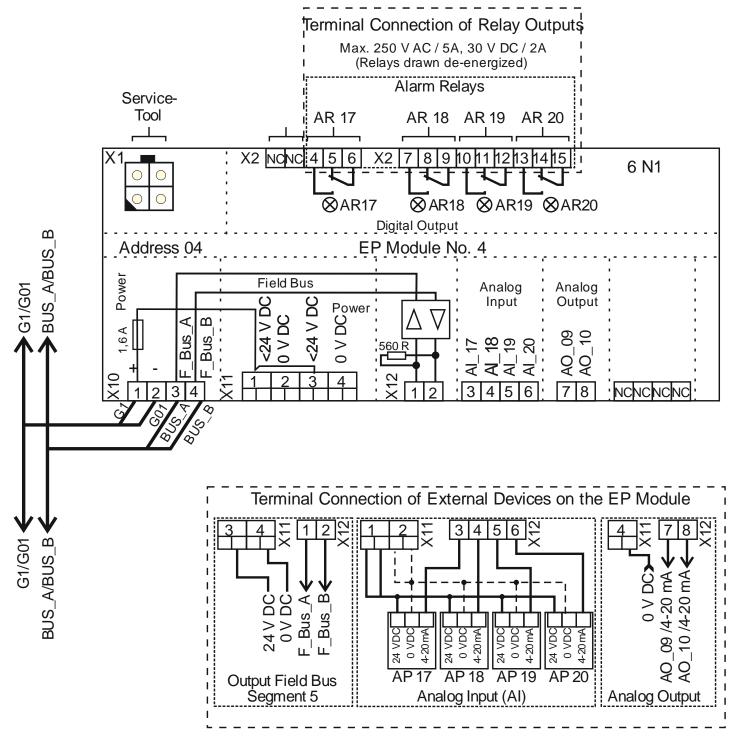
Field bus: Connect only SB/MSB/WSB Boards for SC gas sensor series as well as EP Modules.

Analog input: Connect only units with 4-20 mA output signal.

Analog output: Connect only units with 4-20 mA input signal.

Figure 22: Connection Diagram of EP Module, Address 03





Note: Cable for field bus, analog input and analog output:

Max. power supply 28 V DC, max. current 1,0 A, supervised.

Min. wire size 20 AWG (0,5 mm2), typical cable impedance: 72 Ohm

Recommend cable type: Twisted pair

Max. cable length: 2700 ft. (900 m) for field bus

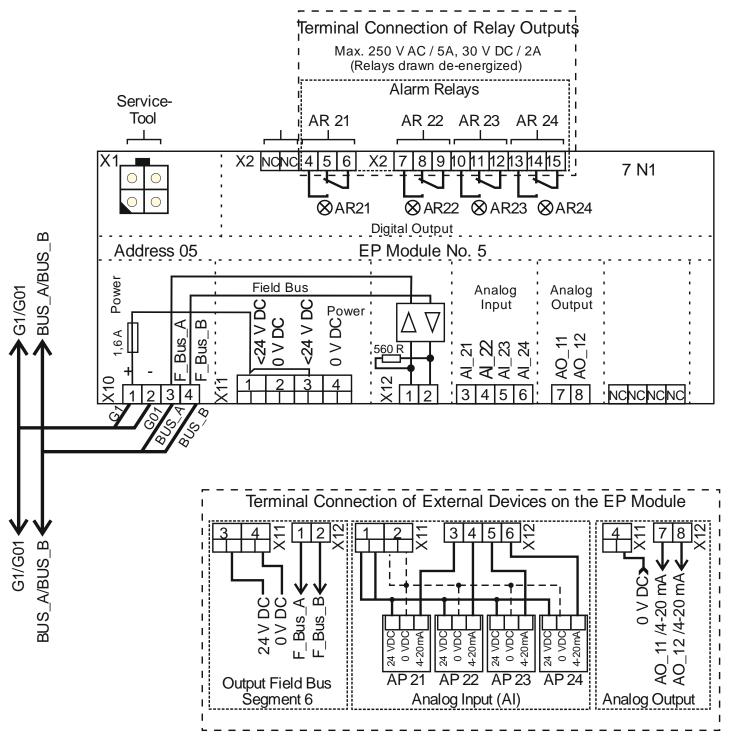
1500 ft. (500 m) for analog input, analog output

Field bus: Connect only SB/MSB/WSB Boards for SC gas sensor series as well as EP Modules.

Analog input: Connect only units with 4-20 mA output signal. Analog output: Connect only units with 4-20 mA input signal.

Figure 23: Connection Diagram of EP Module, Address 04





Note: Cable for field bus, analog input and analog output:

Max. power supply 28 V DC, max. current 1,0 A, supervised.

Min. wire size 20 AWG (0,5 mm2), typical cable impedance: 72 Ohm

Recommend cable type: Twisted pair

Max. cable length: 2700 ft. (900 m) for field bus

1500 ft. (500 m) for analog input, analog output

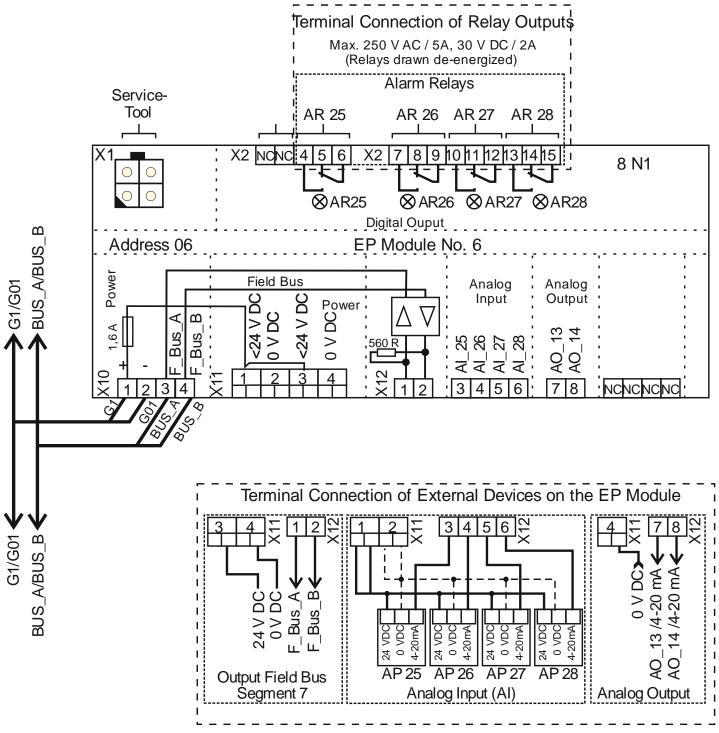
Field bus: Connect only SB/MSB/WSB Boards for SC gas sensor series .

Analog input: Connect only units with 4-20 mA output signal.

Analog output: Connect only units with 4-20 mA input signal.

Figure 24: Connection Diagram of EP Module, Address 05





Note: Cable for field bus, analog input and analog output:

Max. power supply 28 V DC, max. current 1,0 A, supervised.

Min. wire size 20 AWG (0,5 mm2), typical cable impedance: 72 Ohm

Recommend cable type: Twisted pair

Max. cable length: 2700 ft. (900 m) for field bus

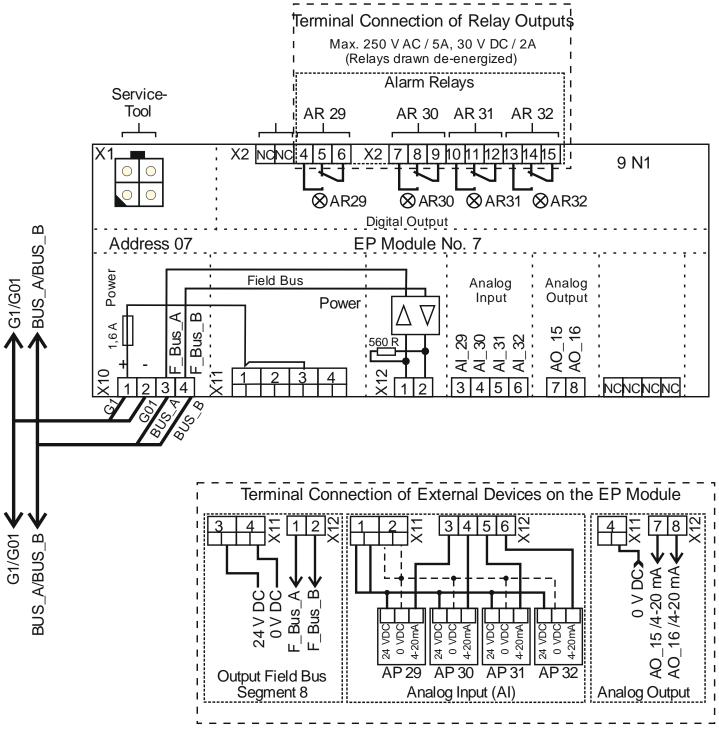
1500 ft. (500 m) for analog input, analog output

Field bus: Connect only SB/MSB/WSB Boards for SC gas sensor series .

Analog input: Connect only units with 4-20 mA output signal. Analog output: Connect only units with 4-20 mA input signal.

Figure 25: Connection Diagram of EP Module, Address 06





Note: Cable for field bus, analog input and analog output:

Max. power supply 28 V DC, max. current 1,0 A, supervised.

Min. wire size 20 AWG (0,5 mm2), typical cable impedance: 72 Ohm

Recommend cable type: Twisted pair

Max. cable length: 2700 ft. (900 m) for field bus

1500 ft. (500 m) for analog input, analog output

Field bus: Connect only SB/MSB/WSB Boards for SC gas sensor series .

Analog input: Connect only units with 4-20 mA output signal. Analog output: Connect only units with 4-20 mA input signal.

Figure 26: Connection Diagram of EP Module, Address 07



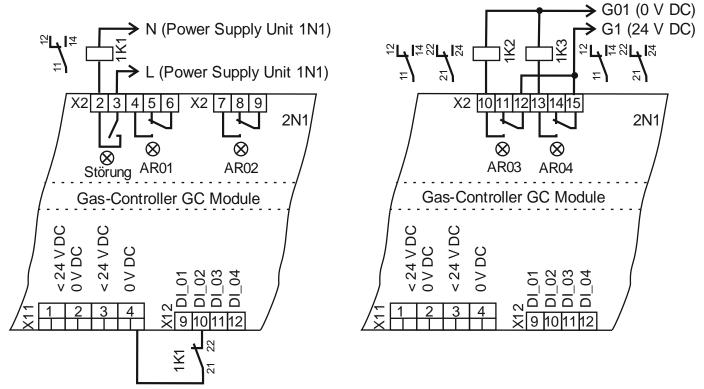


Figure 27: Option Contact Multiplication of Relay

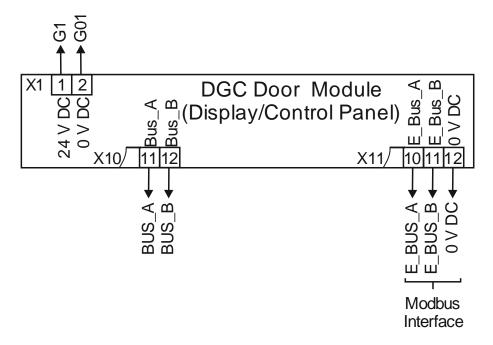


Figure 28: Option Door Mounting Module, Display and Control Unit



6 Commissioning

For fast and comfortable commissioning, we recommend proceeding as follows. Especially the given specifications of the field bus cable have to be checked carefully, because it is here where most of the causes for problems in the field bus communication appear.

Commissioning is described using the SB Sensor-Board as an example. However, the procedure is identical for the other field bus devices such as WSB, MSB, PX2, etc.

6.1 Optical Check

- Right cable type used.
- Cable topology and cable length.
- Correct mounting height of the sensors according to definition of the sensor's user manual.
- Correct connection at each Sensor-Board according to the Figure 10 and Figure 11.
- Termination with 560 Ω at the beginning and at the end of each segment.
- Pay special attention so that the polarities of BUS_A and BUS_B are not reversed!
- Consider correct connection of the analog sensors (2-/3-wire connection).

6.2 Check Short-circuit / Interruption / Cable Length of the Field Bus

This procedure has to be executed for each single segment.

The field bus cable must be laid at the connector terminal block of the Sensor-Board for this testing. The plug, however, is not yet plugged into the Sensor-Board.

Disconnect the field bus leads from the DGC central unit.

Connect ohmmeter to the loose leads and measure the total loop resistance (see Figure 29).

The total loop resistance is calculated as follows:

 $R_{(Total)} = R_{(Cable)} + 560 \Omega$ (terminating resistance)

 $R_{(Cable)} = 72 \Omega/km (loop resistance) (cable type JY(St)Y 2x2x0.8LG)$

R _(Total) (Ω)	Cause	Troubleshooting
< 560	Short-circuit	Look for short-circuit in the field bus cable.
Infinite	Open-circuit	Look for interruption in the field bus cable.
> 560 < 640	Cable is o.k.	

Table 7: Check of Field Bus

The cable length can be calculated in a sufficiently exact way according to the following formula:

Total cable length (km) = $(R_{(Total)} - 560 \Omega) / 72 \Omega$

If the field bus cable is OK, reconnect it to the DGC central.



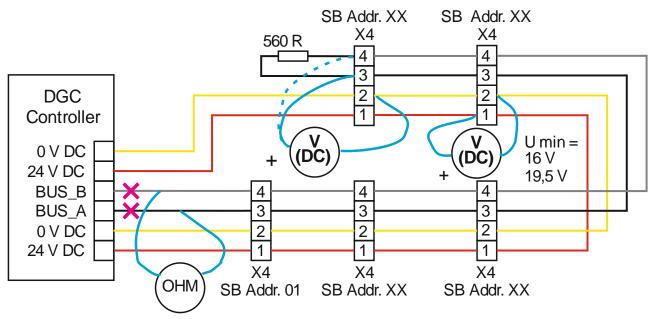


Figure 29: Measurements at the Field Bus Cable

6.3 Check Voltage and Bus Polarity of the Field Bus

- The connector X4 has to be plugged into each Sensor-Board.
- Switch operating voltage on at the DGC central.
- The green LED at the field bus device lights up weakly when operating voltage is applied (voltage indicator).
- Check operating voltage and bus polarity at each field bus device according to Figure 29.
 SB: U_{min} = 16 V DC
 - Every other field bus device: U_{min} = 19.5 V DC
- Measure tension BUS_A against 0 V DC and BUS_B against 0 V DC.
 - $U_{BUS_A} = ca. 0.5 V > U_{BUS_B}$

U_{BUS_B} = ca. 2–4 V DC (depending on the number of field bus devices and on the cable length)

6.4 Addressing of the Sensor-Board

After having checked the field bus successfully, a basic communication address has to be assigned to each Sensor-Board via the Service-Tool STL or the PCE-Software. With this basic address, the data of the Sensor assigned to input 1 are sent via the field bus to the Gas-Controller. Any further SC connected/registered on the Sensor-Board automatically gets the next address.

An automatic link connection "STL <> SB" is established when the Service-Tool STL is connected to the service tool jack of the SB. If this connection is OK, you can read the current SB address in the menu "Address".

- 0 = Address of new SB
- XX = Current SB address (permissible address range 1–96)

The detailed description of the addressing can be taken from the user manual of the STL Service-Tool or the PCE-Software.



6.5 Registration/Assignment of the Sensors (SC) at the Sensor-Board

The SB recognizes automatically the SC(s) physically connected to the Sensor-Board (unimportant whether directly on the Sensor-Board or on the Remote-Board) from the gas type and the measuring range which are factory-integrated in the SC address bit. By selecting the signal type, analog or bus, the input is activated. In the 2nd step, assigning the gas type and defining the measurement range connects the SC to the input.

The detailed description of the registration / assignment of the SC can be taken from the User Manual of the PolyGard® Sensor-Board SB and PolyGard® and-PolyXeta®2 STL Service-Tool or the PCE-Software.

6.6 Release of the SB Addresses in the DGC

The assigned SB address is now activated at the MP mode in the "DP Parameter" menu of the DGC. All other parameters in this menu must be adjusted to the sensor registered at this address. The DGC (master) sends a request to each registered address in sequence that is answered by the SB (slave) with a telegram of all relevant data. The continuous response telegram is signalled by a flashing pulse of the status LED on the SB. The cycle time is approximately 7–8 seconds.



Caution:

The DGC system cannot prevent double or multiple assignment of SB addresses by a service technician. However, the DGC detects 2 or more identical SB addresses on a system. The fault message is activated and a plain text message "communication error" of the affected address is displayed.

You must then assign a new, free address to the affected SB.

6.7 Communication Error

Communication errors at commissioning are nearly always due to mistakes in laying the cables, in connecting to the terminals and in terminating as well as in assigning the SB addresses.

Therefore, the following checks have to be executed:

- Bus line reconnected after measurement of the loop resistance?
- DGC in operating mode.
- Check the operating voltage at all devices on the field bus SB: U_{min} = 16 V DC
 - Every other field bus device: Umin = 19,5 V DC
- Check bus leads for short-circuit or interruption (see Figure 29).
- Check polarity of the field bus (BUS_A BUS_B) (see Figure 29).
- Check termination. Terminating resistance of 560 Ω at the beginning and at the end of the segment.
- Check cable topology of the field bus. Only line topology <> No branch lines!!
- Check cable length in dependence of the load (see Figure 29).



6.8 Commissioning of EP

The DGC system manages up to 7 EP Expansion Modules with each 4 analog inputs, 4 alarm relays and 2 analog outputs.

SOFTWARE VARIANTS

The DGC software is available in several variants, which differ in terms of the number of configurable measuring points and outputs.

The number of measuring points has a direct influence on the cycle time - the time required by the system to fully analyse all connected measuring points and then update the system states of all components.

A shorter cycle time results in a faster reaction time of the overall system.

Number of Digital Points	Number of EP Modules	Number of Analog Points	Number of Signal Relays	Number of Alarm Relays	Number of Analog Outputs	Cycle time (арргох.)
96	7	8 x 4 = 32	96	32	16	8000 ms
64	7	8 x 4 = 32	64	32	16	5300 ms
32	4	5 x 4 = 20	32	20	10	2600 ms
16	2	3 x 4 = 12	16	12	6	1300 ms

Table 8: Software Variants

6.9 Addressing of EP Modules

A communication address (01–07) is assigned to each EP with the help of the STL Service-Tool or the PCE-Software. With this address the EP module communicates via the field bus with the GC. This address also defines the input and output numbers of the EP module in the system.

When connecting the STL Service-Tool or the PCE-Software to the Service-Tool jack of the EP, there will be an automatic connection STL <> EP.

If this connection is OK, the current EP address is displayed in the "Address" menu.

0 = address of new EP module

XX = current EP address (permissible address range 1–7)

The detailed description of addressing can be taken from the User Manual PolyGard® and-PolyXeta®2 STL Service-Tool or PCE-Software.



Caution:

The DGC system cannot prevent double or multiple assignment of EP addresses by a service technician. However, the DGC detects 2 or more identical EP addresses on a system. The fault message is activated and a plain text message "communication error" of the affected address is displayed.

You must then assign a new, free address to the affected EP module.



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

Module Address	Analog Input AP	Alarm Relay AR	Analog Output AO	Module
	01-04	01-04	01-02	GC
1	05-08	05-08	03-04	EP
2	09-12	09-12	05-06	EP
3	13-16	13-16	07-08	EP
4	17-20	17-20	09-10	EP
5	21-24	21-24	11-12	EP
6	25-28	25-28	13-14	EP
7	29-32	29-32	15-16	EP

Table 9: Addressing of EP Modules

EP Module 0 is the input/output board in the GC module.



Caution:

In the DGC systems by MSR-Electronic GmbH, the complete configuration of the EP modules is already factory-set.

Configuration only is necessary with single modules or in case of retrofitting or exchange of a module.

6.10 Adjustment of System Parameters

At commissioning the alarm relays must be assigned to the alarms for each measuring point. For all other parameters the values are deposited as defaults, which can be changed at any time if necessary.

See also User Manual of the PolyGard® Gas-Controller GC.

7 Calibration

New sensors are always delivered factory-calibrated by MSR-Electronic GmbH. This is documented by the calibration label indicating date and calibration gas.

Calibration of the SC/MC/SSAX1 during commissioning is only necessary if the calibration date is no longer up to date (see User Manual SC/MC or SSAX1).

For the calibration of the sensor there is an automatic routine in the calibration menu of the STL Service-Tool or the PCE-Software.

As long as the calibration menu is open, the SC does not issue alerts.

As facilities you only need a zero gas and a calibration gas, the calibration adapter and an extraction set.



Caution:

Prior to calibration the sensor must be connected continuously to the power supply for stabilization for a running-in period.

This running-in period depends on the sensor element and can be taken from the User Manual of the corresponding Sensor.



8 Protection Codes

8.1 Partner Protection

To prevent access to the sensitive parameter and calibration data by 3rd parties, every customer receives his own internal partner ID (PID). The PolyGard® devices (GC, STL Service Tool, PCE-Software and the SB, WSB, MSB Boards with display option) for a partner come with this internal individual PID.

EP modules and the Boards SB, WSB, MSB without display get the PID during addressing via Service Tool STL or PCE-Software.

The STL/PCE automatically checks the PID of the respective device when turned on. Only if both PID are the same, the communication will be possible.

If the PID does not match, the Service Tool STL or PCE-Software gives the following message:

NO ACCESS AUTHORIZATION

The DGC can only communicate with units of the same PID. In case of deviation, the unit response is not accepted and a communication error is issued for each of these incorrect PID responses.

Note:

Partner protection is deactivated for devices that are bound with MSR-Electronic-PID.

8.2 Plant Protection

On the one hand, the system protection is intended for end customers who want to look after their DGC systems themselves (calibration or/and parameterisation). For this purpose, the end customer is provided with a special end customer tool (STL/PCE) with system identification, which is only valid for exactly this system.

On the other hand, it serves to enable end customers to help each other out if they do not want to carry out commissioning or maintenance on DGC systems themselves. For this purpose, the buyer = first installer of the system receives a system identification number (AID) on request from MSR-Electronic GmbH. This can be entered on the STL or PCE at start-up and then allows access to exactly this system by means of the STL/PCE.

Each GC (master) when delivered receives its own unique serial number (SRN, see device label) and an installation identification number (AID) upon delivery. This AID is part of the communication between GC and its modules (slave) and is taken over by the modules at the first communication in a fail-safe way if the master and slave PID match and no AID is stored in the slave yet.



9 Options

9.1 UPS

The function and description can be found in the instructions for use of the PolyGard® GC Gas-Controller.

9.1.1 Mounting / Installation



Caution:

The housing must not be drilled into, nor must holes be drilled outside the pre-stampings. The mounting position of the UPS unit is always vertical, with the viewing window on top. The UPS unit is not suitable for mounting on the ceiling.

Standard

The housing is mounted on the wall at the 4 mounting points.

Then the 2 separately supplied batteries are placed in the housing for the standard version.

UL version

The batteries are inserted into the holder from above. First insert the 1st battery on the right side and push it to the left. Then insert the 2nd battery on the right side. The battery terminals are at the top.

Electrical connection

The UPS unit is connected to the DGC via a cable, minimum cross-section 1.5 mm² (16 AWG) according to the connection diagram (see Figure 16 for standard version and Figure 17 for UL version).



Caution:

A short circuit on the battery can cause dangerous sparks, fire or an explosion.

The 2 batteries are wired with the enclosed prepared wires according to the connection diagram in Figure 16 or Figure 17. Pay special attention to the polarity and the series connection of the batteries. Fuse 1F2 in the UPS unit is in the OFF position.



9.1.2 Commissioning

For commissioning, the UPS unit must be connected to the DGC according to the connection diagram (see Figure 16 or Figure 17). The DGC is operating in normal mode. The 2 batteries are mounted and connected according to the connection diagram.

- Check or set the DGC operating voltage to > 27 V DC.
- Switching on the fuse 1F2 in the UPS unit.
- Checking the message "UPS present" In the Error status menu.

Calculation of the supply duration

The supply duration depends on the connected load and the available battery capacity. It can be determined with the following table.

Type Version	Current	SB	WSB without relays	WSB with relays	MSB MSC	PX2	פכ	EP	REP
Basic	(mA)	6	8	16	55	40	130	70	30
Analog Output	22	1							//
WAO	5					1	1	/	/
Display	10						1	/	/
SC/SX1/SSAX1 Sensor Head	SC/SX1/SSAX1 Sensor Head:								
Electrochemical (-E11XX)	2						/	/	/
Catalytic (-P34XX)	50						/	/	/
Infrared (I-XXXX)	13 ¹						/	/	/
Semiconductor (-SXXXX)	40						1	/	/
MPS™ (-MXXXX)	25						/	/	/
MC Sensor Head:	· · ·								
Electrochemical (-E11XX)	24	/				/			/
Catalytic (-P34XX)	72	/				/			/
Infrared (I-XXXX)	35 ²	/				/			/
Semiconductor (-SXXXX)	62	/				/			/
MPS™ (-MXXXX)	40	/				/			/
Total Current (mA)									

Table 1: Current consumption of system components

² Peak 90 mA

Warning Device	current (mA)	
Warning sign D3-30	130	mA, components total current
Warning Horn WH-24-98	35	,,,
Flashing Light BL-24	35	+
Warning horn/Flashing light WH/BL-24	40	mA, warning device total curre
Total current warning devices (mA)		= 1117, Warming device total early
		mA, system total current

The supply duration is obtained by dividing the battery capacity (Ah) by the determined system total current.

¹ Peak 70 mA



9.1.3 Replacement of the batteries



Caution:

Only original batteries may be used.

Both batteries must always be replaced together.

- Switch off circuit breaker 1F2 in the UPS unit.
- Disconnect the plugs from the two batteries (observe polarity).
- Remove used batteries from the housing, place new batteries in the housing with the same polarity position.
- Connect the connections to the 2 batteries observing the correct polarity according to Figure 16 or Figure 17.
- Switch on circuit breaker 1F2 in the UPS unit.
- When the batteries are charged, check the function and capacity by switching off circuit breaker 1F1 in the DGC (disconnecting the mains supply). The DGC system is now supplied by the batteries without interruption.
- Switch on circuit breaker 1F1 in the DGC = back to normal operation.

9.2 Communication Module with Modbus RTU Protocol und TCP/IP Interface

The technical data, function and description can be read from the datasheet DB_MODIP.

9.3 Communication Module with BACnet Protocol

The technical data, function and description can be read from the datasheet DB_BAC.



10 Specifications

- F	
ELECTRICAL	
Power supply	110/230 V AC, 50/60 Hz; 24 V DC ± 20 %
Power consumption (incl. sensors)	Min. 30 W, max. ca. 160 W, depending on type and configuration
Analog input (max. 32)	4–20 mA, overload and short-circuit proof, input resistance 130 Ω
Tension for external analog transmitter	24 V DC ± 20 %, max. 130 mA / per sensor
Analog output (max 16)	Proportional, overload and short-circuit proof, charge \leq 500 Ω
configurable for each input	4–20 mA = measuring range
	3.0-<4 mA = underrange
	> 20–21.2 mA = overrange
	2.0 mA = fault
Relay (max. 32)	250 V AC, 5 A; 30 V DC, 2 A, potential-free, change-over (SPDT)
Fault relay (1)	250 V AC, 5 A; 30 V DC, 2 A, potential-free, normally open (SPST)
VISUALISATION	
LCD	2 lines, 16 characters each, illuminated
Status LED (4 colours)	Green = Power, yellow = Fault, Light red = Alarm 1, dark red = Alarm 2
Operation	6 pushbuttons
Menu language (selectable)	German, English (UK), Spanish, French, Italian, English USA
INTERFACE FIELD BUS	
Transceiver	RS-485 / 19200 Baud
INTERFACE MODBUS RTU RS-485	
Function	Transmission of current and average values, alarm and relay status,
	and analog output states in Modbus RTU RS 485 protocol to external
	devices (see GA_GC_Modbus_Supplement_E)
GASE	
	Digital PolyGard®/PolyXeta®2 and analog sensors for toxic,
	combustible & refrigerant gases and oxygen
AMBIENT CONDITIONS	
Working temperature range	-5 °C to +40 °C (23 °F to 104 °F)
Humidity range	15–95 % RH non-condensing
RECOMMENDED STORAGE CONDITIONS (with	
Storage temperature range	0 °C to +40 °C (32 °F to 104 °F)
Storage time	Ca. 6 months
Humidity range	15–95 % RH non-condensing
PHYSICAL	District the state of
Housing: Standard	Plastic housing with view cover
According to UL2017	Polymeric housing with view cover, rated UL-94 V2
Colour	Similar to RAL 7035 (light grey)
Protection class	IP65
Weight	Min. 2.7 kg (4.4 lb), max. 13 kg (28,7 lb) depending on type
Mounting	Wall mounting
Cable entry	M 16; M 20; M 25
Dimensions (W x H x D): Type 1	298 x 260 x 140 mm (11.7 x 10.2 x 5.5 in.)
According to UL2017	315 x 300 x 155 mm (12,4 x 11,8 x 6,1 in.)
Dimensions (W x H x D): Type 2	298 x 420 x 140 mm (11.7 x 16.5 x 5.5 in.)
according to UL2017	315 x 450 x 155 mm (12,4 x 17,7 x 6,1 in.)
Dimensions (W x H x D): Type 3	298 x 570 x 140 mm (11.7 x 22.4 x 5.5 in.)
According to UL2017	315 x 600 x 155 mm (12,4 x 23,6 x 6,1 in.)
Dimensions (W x H x D): Type 4	410 x 655 x 140 mm (16.1 x 25.8 x 5.5 in.)
According to UL2017	315 x 730 x 155 mm (12,4 x 28,7 x 6,1 in.)
Wire connection:	2/22
Power supply	Screw type terminal: 0.5–2.5 mm ² (22–14 AWG)
 Output relays 	2x spring type terminal: 0.5–1.5 mm² (22–16 AWG)
 Digital/analog signals 	Spring type: 0.5–1.5 mm ² (22–16 AWG)



REGULATIONS			
Directives	EMC Directive 2014/30/EU Low Voltage Directive 2014/35/EU EN 50271 EN 61010-1:2010 ANSI/UL 2017 / UL 61010-1 CAN/CSA-C22.2 No. 61010-1 Conformity to: EN IEC 61508-1-3 EN 50402		
	EN 50545-1 EN 378		
Warranty OPTIONS	2 years on device		
UPS (see also DB_DGC_UPS)			
Power supply	24 V DC (24,0–27,3 V), supply only by the DGC		
Output voltage	19,3–27,3 V DC		
Charging voltage	26,5–27,3 V DC		
Deep discharge limit	19,2 V DC		
Quantity battery / voltage	2 / 12 V DC / maintenance-free		
Capacity	7.2 Ah or 12 Ah		
Working temperature range	-5 °C to +30 °C (23 °F to 86 °F)		
Humidity range	15–95 % RH not condensing		
Storage temperature range	-5 °C to +40 °C (23 °F to 104 °F)		
Housing: Standard	Plastic housing with view cover		
According UL	Polymeric housing with view cover, rated UL-94 V2		
Colour	Similar to RAL 7035 (light grey)		
Protection class	IP65		
Weight	Min. ca. 8.3 kg (18.3 lb), max. ca. 11.0 kg (24.3 lb) (depending on type)		
Mounting	Wall mounting		
Cable entry	M20, M25, M30		
Dimensions (W x H x D): Standard According UL	410 x 285 x 140 mm (16.1 x 25.8 x 5.5 in.) 315 x 450 x 155 mm (12,4 x 17,7 x 6,1 in.)		
Wire connection:	Screw type terminal: 0.5–2.5 mm² (22–14 AWG)		
FLASHING LIGHT AT POWER FAILURE			
LED	Battery backed		
Operation duration	10 h (flashing)		
WARNING BUZZER			
Acoustic pressure	85 dB (distance 1 m)		
Frequency	3500 Hz		
DATA LOGGER			
Function	Storage of measured values, of faults and alarm status with time and date stamp on an USB flash drive		
Log rate	Log rate adjustable from 10 to 10,000 sec.		
Data format	Output of the data in standard Excel format		
COMMUNICATION MODULE BACNET			
Technical data, function and protocol see da			
COMMUNICATION MODULE MODBUS RTU TO			
Technical data, function and protocol see da	tasheet DB_MODIP		

All specifications were collected under optimal test conditions. We confirm compliance with the minimum requirements of the applicable standard.



Abbreviations

<u>Units</u>

A Ampere
Ah Ampere-hour

Hz Hertz

mA Milliampere ppm Parts per million

s, sec. Second

V Volt (tension)

V AC Volt Alternating Current V DC Volt Direct Current

VA Voltampere

W Watt

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 PX2 Gas Detector with ATEX approval

SB PolyGard® Sensor-Board SB

SC PolyGard® Sensor SC with digital transmission

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

WAO Warning unit Acoustic / Optic (buzzer and status LED)

Others

e.g. Example given
EN European standard
EU European Union

IEC International Electrotechnical Commission System for Certification

LED Light-emitting diode

LC Liquid crystal max. Maximum min. Minimum

UPS Uninterruptible Power Supply



Glossary

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).

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.

Running-in time

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

Special mode

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

Warm-up time

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	Date	Chapter	Changes
2019-11		-	-
2021-06		3.1	Analog sensors current requirement 130 mA
		3.4	Terminal voltage of 16 V DC (20 V DC with PolyXeta®2)
		3.5	Table: PolyXeta®2 line added
		3.6	Table new
		6.	Explained in more detail
		7	Circuit diagrams new: Fuse added, Mainbus removed
		9	Data changes like in datasheet
2022-11	29.11.2022	All	New format, new logo
			Picture page 1 added
		6.4	Door mounting option GC added
		10	Modbus Standard, UPS 2.2 Ah removed, UPS 12 Ah added
2023-07	04.07.2023	3.9	Chapter deleted
		9	New chapter added, more detailed description of options
		11	New Chapter: Declaration of Conformity
		All	Textual adjustments, adjustments to UL2017
2023-12	05.12.2023	5.2	Circuit diagrams for UPS adapted
		9.2, 9.3	Text adjustments, MPS™ added
		10	Adjustments according to datasheet
2024-11	26.11.2024	Page 2	QR codes added
		1	Text adjustments
		2.1	Chapter added
		5.2	Figure 18 added
		10	Recommended storage conditions added
		11	Declarations of conformity removed
2024-12	17.12.2024	9.1.2	Correction calculation of supply duration
2025-05	12.05.2025	All	PolyGard® instead of PolyGard®2
			GC/DGC/EP/STL/PCE instead of GC-06/DGC-06/EP-06/STL06/PCE06
			SB/MSC/MSB/WSB/MC/SC instead of SB2/MSC2/MSB2/WSB2/MC2/SC2
		5.2	Door mounting option of the GC module: Information added
		6.8	Software variants added
		8.1	Note added