



PolyGard®2 Warning Sensor Board

Warning Sensor Board for Sensor Series SC2 and MC2
Serial No. WSB2_002

User Manual

June 19, 2019

Up-to-date data sheets and user manuals can be found in the download area of www.msr-24.com.



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1 Notes and General Information

1.1 Applicability

PolyGard®2 WSB2 Board Series WSB2-002.

1.2 Intended Use

The PolyGard®2 WSB2 Board is a communication and supply board for the gas sensors of the SC2 and MC2 series for measuring and warning of toxic, combustible & refrigerant gases and oxygen in stand-alone mode. The RS 485 interface allows also for the communication to the Gas Controller System DGC-06 for larger systems.

The WSB2 must only be employed in areas within the environmental conditions as specified in the Technical Data (indoor application). The intended sites are all areas being directly connected to the public low voltage supply, e.g. residential, commercial and industrial environments as well as small enterprises (according to EN 50 082).

The PolyGard®2 WSB2 must not be used in potentially explosive atmospheres.

1.3 For Your Safety

The operating instructions must be read and strictly followed by all persons installing, using, servicing and inspecting the product. The product can only fulfil its intended functions if installed, used, serviced, maintained and controlled according to the specifications of MSR-Electronic GmbH.

1.4 Installer's and Operator's Responsibilities

It is the installer's and operator's responsibility to ensure that all PolyGard®2 devices are installed and used in compliance with all national and local regulations and requirements. The device must be checked by an expert for correct installation and functioning before starting the measuring operation.

BGR 500 chapter 2.33 has to be applied in Germany.

The PolyGard®2 WSB2 has been tested for functionality at the factory before delivery. When starting up, however, you have to perform and document a function testing according to chapter 7.2.

1.5 Maintenance

Regular maintenance has to be performed according to the instructions in chapter 7.

1.6 Liability

MSR-Electronic GmbH will assume no liability if the device is not used properly or as intended. The installer and operator are solely responsible for the interpretation and the use of the product.

If the product is not used, maintained or repaired according to the specifications in the user manual, warranty and product liability claims as well as claims arising from any guarantees that MSR-Electronic GmbH assumes for the product will lapse.



2 General Description

2.1 General

The function of the sensor series SC2 and MC2 is not the subject of this manual but can be read in the operating instructions SC2 or MC2.

The WSB2 board is equipped with three local bus interfaces for connecting up to three SC2 sensor cartridges. In place of the SC2 at DP1 one analog sensor of the MC2 series can be connected. The connected sensors are monitored in the WSB2 board for plausibility within the defined measuring, temperature and voltage range, etc.

Stand-alone operation:

The device monitors the measured values for up to four alarm thresholds and, if exceeded, activates two alarm relays, an optical and an acknowledgeable audible alarm. A fault activates the common alarm and fault relay and is signalled visually and acoustically.

DGC06 operation:

In bus mode, the DGC06 controller continuously monitors the measured values and sensor data for plausibility and alarms via the fieldbus interface. The WSB2 board is integrated in the system as a slave with its base address. The addressing on the field bus level as well as the registration and assignment of the connected sensors on the local bus level is done via the Service Tool STL 06 or with the EasyConf Software DGC-06, which is directly connected to the WSB2.

The detailed instructions can be found in the operating instructions for the Controller GC06, Service Tool STL06 or PCE06_EasyConfig Software.

The cable topology for the RS-485 fieldbus can be found in the guidelines "Wiring and Commissioning DGC-06 Hardware".

3 Installation



Check for completeness and accuracy using the delivery documents and the identification label on the device.

Electronics can be destroyed by electrostatic discharge (ESD). Therefore the installation work should be done only by persons connected to ground, e. g. with a wrist strap connected to ground or by standing on a conductive floor (acc. to DIN EN 100015).

3.1 Site of Installation

When choosing the mounting location, you have to consider the ambient conditions in order to get representative measurement results. Please pay special attention to the following factors:

- External heat sources are not allowed on the installation site.
- Choose mounting location according to the local regulations.
- Consider ventilation conditions! Do not mount next to air passages or suction holes.
- The sample gas must pass the sensor even under adverse flow conditions. A flow test can be performed for instance with smoke tubes.
- If the flow conditions are > 6 m/s, it is advisable to use a wind shield.
- Mount the device at a location with minimum vibration and minimum variation in temperature
- Provide adequate space around the sensor for maintenance and calibration work.
- The installation height depends on the relative gas density of the monitored gas type and can be read in the User Manual of the SC2 / MC2.

3.2 Installation Work



Assembly work must only be carried out under gas-free conditions.

The housing must neither be spot-drilled nor drilled through outside the knockouts.

The installation position of the gas detector is always with the sensor head downwards.

The housing comes in closed state. Therefore before mounting, break out the pre-embossed knockouts for inserting the cable glands and the SC2 / MC2 Sensor Cartridge(s). The housing types A, C and E offer different mounting options thanks to the knockout versatility depending on the number and types of Sensor Cartridge(s).

Prior to breaking out the knockouts it is essential to determine the exact position and size of the Sensor Cartridge(s) and cable glands.

The mounting is done through the pre-embossed holes at the backside by means of suitable screws. The exact dimensions are shown at the backside of the housing.

4 Electrical Connection



Assembly work must only be carried out under gas-free conditions!
Consider static electricity instructions (ESD)!

4.1 General Notes

- Installation and connection of the electrical installation should only be performed by a professional when de-energized, according to the connection diagram and in accordance to the relevant regulations!
- The technical requirements and regulations for wiring, electrical security, as well as project specific and environmental and local conditions etc. must be observed when mounting.
- All terminals are screw type. The permissible conductor cross section can be read in the Technical Data.
- When selecting and installing the cables you have to comply with the regulations concerning the RS 485 bus installation. See Commissioning Instructions DGC06. The installations have to be executed in line topology. Cable length and type have to be considered as well.
- Avoid any influence of external interferences by using shielded cables for the bus line, but do not connect the shield.
- Strip the cables as short as possible. It is important to ensure that bare wires, e.g. wire shields do not come into contact with the mounted PCB (risk of short-circuit).
- Low voltage wires and mains connected wires must be fixed separately by cable ties or similar to secure against looseness.
- Recommended cable¹ for field bus: J-Y(St)Y 2x2x0.8 LG (20 AWG), loop resistance 73 Ω /km (20.8 Ω /1000 ft) for Europe, min. 300 V for USA/Canada.
- Recommended cable¹ for local bus for remote mounting: J-Y(St)Y 2x2x0.8 LG (20 AWG) for Europe, min. 300 V for USA/Canada.
- Recommended cable for power 230 V: Europe: NYM-J 3 x 1,5 mm²; USA/Canada 14 AWG /300 V
- Use copper conductors only if the terminal is only for connection to copper wire.

¹ The max. cable lengths and our recommendation don't consider any local conditions, like fire protection, national regulations etc.

When choosing the option "Power Supply \geq 90 V AC" you have to make sure that a switch or a circuit breaker is provided in the building automation especially for the Unit. It must be installed easily accessible near the Unit. It has to be marked as a disconnecting device for the Unit and shall meet the relevant requirements of UL/IEC 60947 and UL/IEC 60947-3.

4.2 Wire Connection

- Open the cover.
- Insert the cable from above and connect it.
- Remove terminal block X4, connect cable according to connection diagram fig. 1.
- Replug terminal carefully at X4.
- Non-pluggable terminals are available for the other inputs and outputs.
- For remote sensor:
 - Insert and connect local bus cable at the basic and remote sensor board.
 - Remove terminal block X7 from sensor board, connect cable acc. to connection diagram fig. 1.
 - Replug terminals carefully on both sensor boards.
- Close cover.



Connecting the 24 V field bus voltage to the local bus terminal X7 can destroy the Basic Sensor Board completely!



5 Commissioning

5.1 General Notes

Before delivery all devices without exception run through a complete functional test.

However, transportation, storage, installation or other environmental conditions may lead to (mostly small) deviations. It is therefore necessary that a person authorized by the manufacturer or alternatively an expert puts the device properly into operation and performs a functional test.

Only trained technicians should perform the following when commissioning:

- Check for correct mounting location.
- Check that the board is firmly seated in the housing.
- Check if connection is correct according to connection diagram.
- Check power voltage.
- Install the SC2 / MC2 in the housing if not already installed ex works.
- Check Sensor Cartridge SC2 for correct engagement.
- Address the device if operated in DGC06 mode.
- Register the SC2 / MC2.
- Adjust application parameters.
- Calibrate (if not already factory-calibrated).

Required instruments for commissioning (calibration):

- Service Tool DGC-06 STL or
- DGC-06 EasyConf Software incl. USB/RS-485 communication set:
- Calibration: See User Manual of SC2 / MC2.

5.2 Installation of Sensor Cartridge SC2 / MC2

The Sensor Cartridge is supplied in a separate packaging and should be installed on the housing only during commissioning to protect it against dirt and damage.

- Check gas type, range and calibration date of Sensor Cartridge.
- Define installation place on the housing and break out knockouts.
- Insert Sensor Cartridge and tighten it with M32 hexagon lock nut.
- Plug in the Sensor Cartridge SC2 at X2 or X3 of the sensor board. Observe plug polarity, the plug must engage.
- Connect Sensor Cartridge MC2 to the analog input (X1).
 - Pin1 = + 24 V
 - Pin 3 = AI Signal
 - Pin 5 = GND



5.3 Registration / Assignment of the SC2 / MC2

The device recognizes automatically the SC(s) physically connected to the device (unimportant whether directly on the device or on the Remote Sensor Board) via 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. The instructions can be read in the User Manuals of Service Tool STL06 or PCE06_EasyConfig Software.

Up to three SC2, or two SC2 and one MC2 can be connected to the board. The physical position of the SC2s does not have to agree with the input in the menu. The MC2 must then be registered in any case at Input 1. If two SC2s of the same type of gas are available (only version WSB2-X-XXXXX1X3X), one SC2 must necessarily be connected to X3. Three SC2s of the same gas type are not permitted.

Example 1:

Basic Sensor Board with one MC2 for CO and two SC2s for NO₂ and C₃H₄ with basic address 01.

Input	Mode	Field Bus Address	Gas Type	Measuring Range	Result
1	MC2	DP 01	CO	300 ppm	CO MC assigned to input 1 und thus field bus address DP01
2	SC2	DP 02	NO ₂	30 ppm	NO ₂ SC assigned to input 2 und thus field bus address DP02
3	SC2	DP 03	C ₃ H ₄	100 % LEL	C ₃ H ₄ SC assigned to input 3 und thus field bus address DP03

Only the parameters with blue background have to be worked on for the BSB addressing and the SC registration.

Mode: MC2 : = MC2 with 4 – 20 mA signal, assignment to input 1
 SC2: = SC2 assignment possible
 SC2: = SC2 assignment possible

Gas type and meas. range: Selection of gas type and measuring range of the connected SC2 or MC2

The registration is only accepted if the assigned gas type/measuring range are identic in the device and in the SC2.

Example 2:

Basic Sensor Board with two SC2s for NO₂ and one SC2 for C₃H₄ with basic address 01.

Input	Mode	Field Bus Address	Gas Type	Measuring Range	Result
1	SC2	DP 01	NO ₂	30 ppm	NO ₂ SC assigned to input 1 und thus field bus address DP01
2	SC2	DP 02	NO ₂	30 ppm	NO ₂ SC assigned to input 2 und thus field bus address DP02
3	SC2	DP 03	C ₃ H ₄	100 % LEL	C ₃ H ₄ SC assigned to input 3 und thus field bus address DP03

Only the parameters with blue background have to be worked on for the BSB addressing and the SC registration.

Mode: SC2 NO₂: = SC2 assignment to input 1
 SC2 NO₂: = SC2 assignment possible
 SC2: = SC2 assignment possible

Gas type and meas. range: Selection of gas type and measuring range of the connected SC2

The registration is only accepted if the assigned gas type/measuring range are identic in the device and in the SC2.

Example 3:

Three different SC2

Different sensor heads can be plugged in everywhere. The only thing to consider is that the head connected to **X3** must be configured to **DP1** and the heads connected to **X2** or **X7** must be configured to **DP2** or **DP3**.

Sensor	Klemme	DP1	DP2	DP3
SC2 CO 300ppm	x3	o	x	x
SC2 NO2 30ppm	x2	x	o	o
SC2 C3H8 100%	x7	x	o	o



Two SC2s of the same type, one SC2 of different type

If two SC2 of the same type are to be connected, make sure that the two identical heads are connected and configured to **X3** and **X2** or to **X3** and **X7**.

Note: As long as two SC2s of the same type are connected, no analog sensor is possible.

Sensor	Klemme	DP1	DP2	DP3
SC2 CO 300ppm	x3	o	x	x
SC2 CO 300ppm	x2	x	o	o
SC2 C3H8 100%	x7	x	o	o



Sensor	Klemme	DP1	DP2	DP3
SC2 CO 300ppm	x3	o	x	x
SC2 C3H8 100%	x2	x	o	o
SC2 CO 300ppm	x7	x	o	o



Sensor	Klemme	DP1	DP2	DP3
SC2 C3H8 100%	x3	o	x	x
SC2 CO 300ppm	x2	x	x	x
SC2 CO 300ppm	x7	x	x	x



One MC2, two different SC2

Since there is only one **analog input** on the WSB2, it must be configured to DP1.

Note: As soon as an analog input is occupied, it is no longer possible to operate **two identical SC2s**.

Sensor	Klemme	DP1	DP2	DP3
MC2 CO 300ppm	x1	o	x	x
SC2 CO 300ppm	x2	x	o	o
SC2 C3H8 100%	x7	x	o	o



Sensor	Klemme	DP1	DP2	DP3
SC2 CO 300ppm	x3	o	x	x
MC2 CO 300ppm	x1	o	x	x
SC2 C3H8 100%	x7	x	o	o



Sensor	Klemme	DP1	DP2	DP3
SC2 CO 300ppm	x3	o	x	x
SC2 C3H8 100%	x2	x	o	o
MC2 CO 300ppm	x1	o	x	x



5.4 Check / Change of Operating Parameters

The complete parameter set is stored in the PX2 gas detector in a fail-safe way and documented in the enclosed calibration and test record. Necessary changes of parameters for adaptation to the application should be done by qualified persons with the STL06 Service Tool, the PCE06 EasyConfig Tool or if available, with the display.

The parameter functions as well as the menu navigation and operation are described in the User Manual of Service Tool STL06 or PCE06_EasyConfig Software.

5.5 Stand-alone mode

In stand-alone mode, monitoring, evaluation and warning are carried out directly on the device. For this purpose, the alarm thresholds and the assignment of the alarms to the local alarm relays and outputs for a visual and audible warning must be parameterized directly on the device.

Alarm 1 = Relay 1;

Alarm 2 = Horn output via transistor;

Alarm 3 = Relay 2.

5.6 Addressing for DGC06 mode

The device is assigned a base communication address using the Service Tool STL06 or the PCE06_EasyConf software. With this base address, the data of the Sensor Cartridge assigned to Input 1 are sent via the fieldbus to the Gas Controller. Each additional registered SC2 / MC2 automatically occupies the following address. The instructions can be found in the operating instructions of Service Tool STL06 or PCE06_EasyConfig Software.

5.7 Running-in Characteristics

After switching on or after an internal reset of the microcontroller, the device always runs through a start routine with defined status of the outputs. The start always begins with the diagnosis and warm-up stages. When they have succeeded and finished, measurement operation starts. External intervention is not possible during this start routine.

The states of analog output, relays, central bus and signal LEDs for all operating stages are shown in the following table.

















Start ↓	LED			Analog Output	Relays		Central Bus
	Power	Alarm	Fault		Alarm	Fault	
Diagnosis (~ 0,5 sec) OK ↓				< 2 mA	OFF	Error ⁴	Communication STOP
Warm-up period OK ↓				< 2 mA	OFF	Error ⁴	Communication STOP
Measuring mode	⁶ 	² 		4-20 mA ¹	³	OK ⁵	Communication OK
Maintenance mess.		² 		4-20 mA ¹	³	OK ⁵	Communication OK
Special mode	⁶ 	⁷ 		2 mA	⁷	Error ⁴	Communication OK
Detected fault	⁶ 	⁷ 		2 mA	⁷	Error ⁴	Communication OK
Processor failure				< 1 mA	OFF	Error ⁴	Communication STOP

Table 5.1: Status operating modes

- ¹ Depends on the measured gas concentration
- ² Status depends on the gas concentration and the alarm threshold
- ³ Status depends on the gas concentration, the alarm threshold and the operating mode
- ⁴ Relay de-energized, contact open
- ⁵ Relay energized, contact closed (OK state)
- ⁶ Brightness cyclically flashing when message to central bus
- ⁷ Previous status doesn't change.

5.8 Functional Test

The functional test must be carried out and documented in accordance with Chapter 9.2 "Functional Check / Calibration and Adjustment".

5.9 Calibration SC2 / MC2

Calibration of the SC2 / MC2 during commissioning is only required if the calibration date is no longer current. See operating instructions SC2 / MC2.

6 Operating Modes

6.1 Restart (Diagnostic and Warm-up Stage)

The device is designed so as to generally run through all internal device tests (diagnostics) in the WSB2 board and the connected gas sensors after each power-up or processor reset before the measuring operation starts. That means that the processor's internal components and the associated program and working memories as well as the other components of the input and output units are tested. This process takes approximately 0.5 seconds.

When all diagnostics have been successful, the connected sensors start their warm-up phase. The warm-up is necessary for the connected gas sensors to assume a stable state after return of the voltage without triggering a pseudo alarm. The duration of the warm-up phase depends on the type of sensor used and can be read from the User Manual of the SC2 / MC2.

During warm-up, the yellow LED flashes every 2 seconds and "Power ON" appears in the display. The device status during warm-up is given in Table 5.1 "Status operating modes". The measuring operation starts after the end of the warm-up phase; the necessary diagnostic functions continue to run in the background.

6.2 Measuring Mode

In normal operating mode = **measuring mode** there are no faults present, the gas concentration of the active sensors is continuously polled, checked for plausibility, output on the analog output if active and provided on the central bus. The gas concentration is displayed on the optionally built-in display, if available.

When the alarm evaluation is activated, only with alarm threshold > 0 , the gas signal is checked with each measurement cycle, if \geq or \leq alarm threshold and if exceeding, the alarm LED and the alarm relay are triggered. If the value falls again below the alarm threshold minus the set hysteresis, the alarm is automatically cancelled.

The device continuously monitors itself, the measurement signal, the analog output, the alarm relay and the communication to the sensor head.

If the measurement signal falls below the zero point, this will be tolerated up to a limit of minus 6 % of the measuring range, the analog output signal drops down to 3 mA and there will be still no error generated.

If the measurement signal exceeds the full-scale value, this will be tolerated up to a limit of plus 6 % of the measuring range, the analog output signal increases up to 21 mA and there will be still no error generated.

6.3 Special Mode



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

The special mode includes all operating states outside the measuring operation.

In special mode operation the query of the gas concentrations is slightly delayed, but there is no alarm evaluation. The fault relay switches to error status and the analog output delivers 2 mA. The flashing yellow LED and the optional display indicate the special mode.

The device goes into the special mode in the following cases:

- Internal device fault
- Measurement signal exceeds or falls below limit
- Diagnostic and warming-up phase after the return of voltage (Power On Status)
- Service mode activated by the operator.

The operator can activate the special mode on the internal (optional) display or via an external service tool or the PC software EasyConfig. This mode includes commissioning, calibration, inspection, repair and decommissioning.

Pending alarms are held in active special mode, but new alarms are not generated.

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

6.4 Faults

The warning device includes a diagnostic module for the continuous monitoring of the relevant functions and parameters as well as a processor-independent watchdog. These features set the device into the safe mode "Fault" in case of an internal or external error. The following table shows 6.1 all possible errors, possible cause, the related troubleshooting and the resulting device status.

When the cause of the error has been eliminated, the device restarts with the diagnostic mode on its own. It isn't necessary to acknowledge the error message.

If an error occurs, it is output in the option with display instead of the measured value and in the menu error status in plain text. If there is more than one error, it is output with a cumulative, bit-coded error code.

Error type	Cause	Remedy	Fault Relay	Analog Output	Centr. Bus	Display	
						Error Code	Text Mess.
Error Messages of connected Sensor SC2							DP1-
Sensor element defective	Internal	Replace SX1 sensor head	Error	< 2 mA	Error code is sent	0x8 001 h	Sensor
Temperature < -25 °C > +60 °C						0x8 002 h	Overtemp.
Measured value processing						0x8 002 h	ADC error
System voltages <>						0x8 004 h	Voltage
RAM / ROM / µC error						0x8 008 h	CPU error
EEPROM error						0x8 010 h	EE error
Meas. value < -6 % of range	Sensor drift, calibration not correct	Perform calibration	> 21.2 mA	Error code is sent	0x8 100 h	Underrange	
Meas. value > 106 % of range	Gas concentration > meas. range				0x8 200 h	Overrange	
Analog Input (MC2) > 21.6 mA	MC2 fault or uncorrect calibration	Calibrate / replace			0x8 200 h	Overrange	
Analog Input (MC2) < 3 mA					0x8 100 h	Underrange	
Maintenance due	Maintenance date reached	Perform maintenance	No effect		Mainten. message	0x8 080 h*	Maintenance
Error Messages from WSB2							EP1-
Temperature < -25 °C > +60 °C	Ambient temp.	Temp.!	Error	< 2 mA	Error code is sent	0x8 002 h	Overtemp.
Measured value processing	Internal	Replace device				0x8 002 h	ADC error
RAM / ROM / µC error						0x8 008 h	CPU error
EEPROM error						0x8 010 h	EE error
No response alarm relay						0x8 020 h	I/O error
Configuration error	Meas. range SC2 ≠ I/O unit	Adjust meas. range				0x8 010 h	EE error
Deviation of analog output signal < 5 % >	Short-circuit or Interruption at the analog output	Check wiring / load	Error	X mA	Error code is sent	0x8 020 h	I/O error
	Internal	Replace device					
Communication error to sensor head	Sensor head not fitted correctly / wrong gas type	Check it , set correct gas type	Error	< 2 mA		0x9 000 h	Communic. error
	Internal	Replace SC2 sensor head					
Hardware Watch Dog triggered	Internal, < system voltage, µC defect.	Replace device	Error	< 1 mA	Comm. STOP	Reset	Reset
Operating voltage limits exceeded too high / too low	External	Check voltage	Error	< 2 mA	Comm. STOP	0x8 008 h	Voltage
	Internal	Replace device					
Maintenance due	Maintenance date reached	Perform maintenance	No effect			0x8 080 h*	Maintenance

Table 6.1: Error messages

* Is only faded in if an error code is pending.

6.5 Exchange of Sensor Cartridge

Instead of the on-site calibration, the used SC can be easily and conveniently replaced by a calibrated one.



The communication of the local bus (Sensor Cartridge <-> BSB) is continuously monitored during operation and results in an immediate error message on the gas controller in case of fault or interruption. When replacing the sensor unit, the communication of the local bus is also interrupted when unplugging the SC connector which leads to an immediate triggering of the error message.

- Disconnect the SC connector from the BSB or the RSB (error message will be activated).
- Loosen the locknut.
- Remove used SC.
- Take calibrated SC out of the original packaging, check for gas type, measuring range and valid calibration date.
- Insert the SC and retighten with lock nut.
- Insert the SC plug into the socket at the BSB or RSB. Check plug for proper engagement.

The local bus communication is automatically established and tested. At the same time the gas type and the measuring range of the "new" SC are compared with the data stored in the BSB. If they match and the communication is correct, the error message will be automatically acknowledged at the Gas Controller.

7 Inspection and Service

It is obligatory to perform maintenance regularly in order to maintain safety, measuring and warning functions of the device. The maintenance includes visual, functional and system inspections and must only be carried out by appropriately qualified personnel.

When carrying out maintenance and repair work according to the user manual, only use original spare parts from MSR-Electronic. Repairs or changes of the warning devices not complying with the maintenance manual or carried out by unauthorized persons can affect proper equipment and safety features and always result in a termination of the manufacturer's warranty and certificates.

For regular maintenance and calibration of the sensor by trained technicians we recommend concluding a service contract with MSR or one of their authorized partners.

According to EN 45544-4, inspection and service has to be executed at regular intervals. The maximum intervals have to be determined and observed by the person responsible for the gas warning system according to the legal requirements. MSR-E recommends applying the inspection and maintenance intervals as prescribed in the general regulations of the gas measuring technique like EN50545, VDI-2053, EN 60079-29-1 etc. The inspection interval normally is three months. The recommended service intervals are listed in the User Manual of the SC2 and MC2 Sensor Cartridges.

Inspections and services must be documented. The date for the next maintenance has to be affixed to the sensor.

7.1 Inspection

Gas sensors should be controlled regularly by a competent person according to EN 45544-4. The following has to be checked in particular:

- Maintenance / calibration interval not exceeded.
- Visual inspection of the device including cable for damage, vandalism etc.
- Remove dust deposits etc. with a dry cloth, especially at the gas inlet.
- The filter at the gas inlet has to be replaced if extremely dirty.

7.2 Service and Calibration

When performing the maintenance you have to do the calibration and the functional test in addition to the inspection. The procedure for the calibration and test gas application can be found in the operating instructions for the SC2 and MC2 sensor cartridge used.

Functional check alarm relay: (Only necessary if the alarm relay is used)

- Apply test gas with a concentration \geq of the set alarm threshold. The alarm relay must change into the alarm status and the actuated device goes into alarm.

Functional check analog output: (Only necessary if the analog output is used)

- Apply test gas. Check the proper reaction of the connected actuator.

Functional check central bus: (Only necessary if the central bus is used)

- Apply test gas. Read the concentration of the test gas on the controller and check the corresponding reactions.

The functional control must be documented by a protocol stating at least:

Identification of the gas detector, type and concentration of the zero gas and test gases used, display before and after calibration with zero and test gas, response time, deficiencies fixed and measures started with the date and name of the person responsible for the functional check.

7.3 Repairs

Please always apply the operating and maintenance instructions when repairing and replacing parts of the gas warning device. For safety reasons replace parts only by original spare parts from the manufacturer.

Appropriate technical qualification is necessary for further repair work, which may only be carried out by the manufacturer or by trained and authorized service partners.

The responsibility for proper operation and condition of the gas detection device after repair lies with the technician who has done the work and/or with the entrepreneur.

After repair before restart you have to check the function and the system depending on the type of repair.



8 Technical Data

Electrical		
Power supply	24 V DC ± 20 % ; reverse polarity protected 24 V AC - 10 % / + 15 %	
Power consumption (24 V DC)	Max. 250 mA (5 VA)	
Overvoltage category	I	
Analog input		
Input signal	4 -20 mA, overload and short-circuit proof, input resistance 200 Ω	
Power supply for MC2 analog sensor	24 V DC, max. 100 mA	
Digital input		
Signal input	Potential-free contact	
Function	Acknowledgment function for horn or latching mode of main alarm	
Analog output signal		
	Proportional, overload and short-circuit proof, load ≤ 500 Ohm 4 - 20 mA = measuring range 3.0 < 4 mA = underrange > 20 - 21.2 mA = overrange 2.0 mA = fault	
Outgoing line local bus		
Power supply	5 V DC, 250 mA max., overload, short-circuit and reverse-polarity protected	
Serial interface		
Local bus	1-wire / 19200 Baud	
Field bus	RS 485 / 19200 Baud	
Tool bus	2-wire / 19200 Baud	
General		
Temperature range	-30 °C to +60 °C (-22 °F to 140 °F)	
Humidity range	15 - 90 % RH not-condensing	
Pressure range	Atmosphere ± 10 %	
Pollution degree	2 (installation only indoors), not suitable for wet environment	
Permissible height above sea level	1500 m (env. 5000 ft.)	
Storage temperature	+5 °C to +30 °C (41 °F to 86 °F)	
Storage time	6 months	
Physical		
Housing	Type A / C / E	Type N
Material	Polycarbonate	ABS
Burning behaviour	UL 94 V2	----
Housing colour	RAL 7032 (light grey)	
Dimensions B x H x T (mm)	94x130x57 / 130 x130 x75 / 130x130x99	80x82x56
Weight (kg)	Ca. 0.3 kg (1 lb)	
Protection class (delivery status) *	NEMA 4X (IP 65)	IP 65
Installation	Wall mounting	
Knockouts for cable entry	Type A: 2 x M12/ 3 x M20 / Type C & E: 6 x M20/25	1 x M20
Number of knockouts for SC2/MC2/WAO	Type A: 2 / Type C & E: 4	----
Number of boreholes for SC2/MC2/WAO	----	1 or 2
Wire connection: Power supply, field bus Analog in/output; digital input Relays Local bus for SC2	Screw-type terminals 0.25 to 2.5 mm ² , 24 to 10 AWG Screw-type terminals 0.25 to 1.3 mm ² , 24 to 16 AWG Screw-type terminals 0.25 to 1.3 mm ² , 24 to 16 AWG 3-pin plug connector	
Cable length local bus Remote Sensor Board	Max. 5 m (16.4 ft.)	

*If there are changes on the housing it has to be re-evaluated.



Directives	EMC directives 2014/30/EU Low voltage directive 2014/35/EU, CE Conformity to: EN 50271, EN 61010-1:2010 ANSI/UL 61010-1 CAN/CSA-C22.2 No. 61010-1
Warranty	2 years on device
Options	
Alarm relay / fault relay	
	30 V AC/DC, 0.5 A, potential-free, change-over contact (SPDT)
LCD display	
LCD	Two lines, 16 characters each, background highlighted in two colours
Operation	Menu driven via six push-buttons
Power consumption	5 V, 60 mA, 0.3 VA
Status LED / buzzer	
Colour / mode	Red / yellow / green (alarm – fault – operation - service)
Acoustic pressure	> 85 dB (A) (0.1 m distance)
Frequency	2300 Hz
Protection class	IP 65
Power supply 230 V	
Wide range power input	100 - 240 V AC - 50/60 Hz
Power consumption	Max. 15 VA
Overvoltage category	II

9 Figures

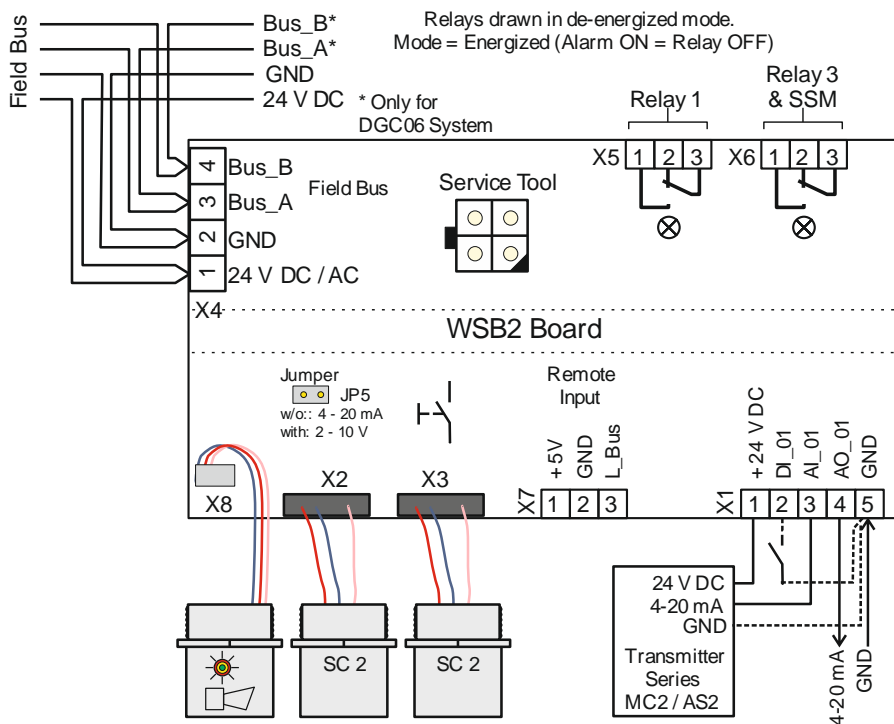


Fig 9.1: Electrical connection (schematic diagram) 24 V AC / DC

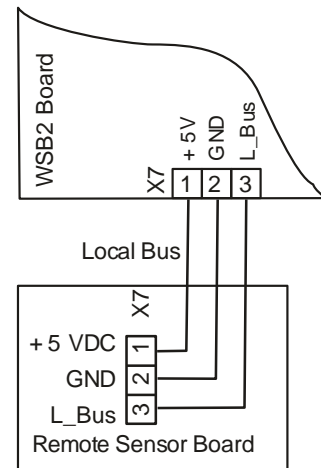


Fig 9.2 Remote Sensor Board

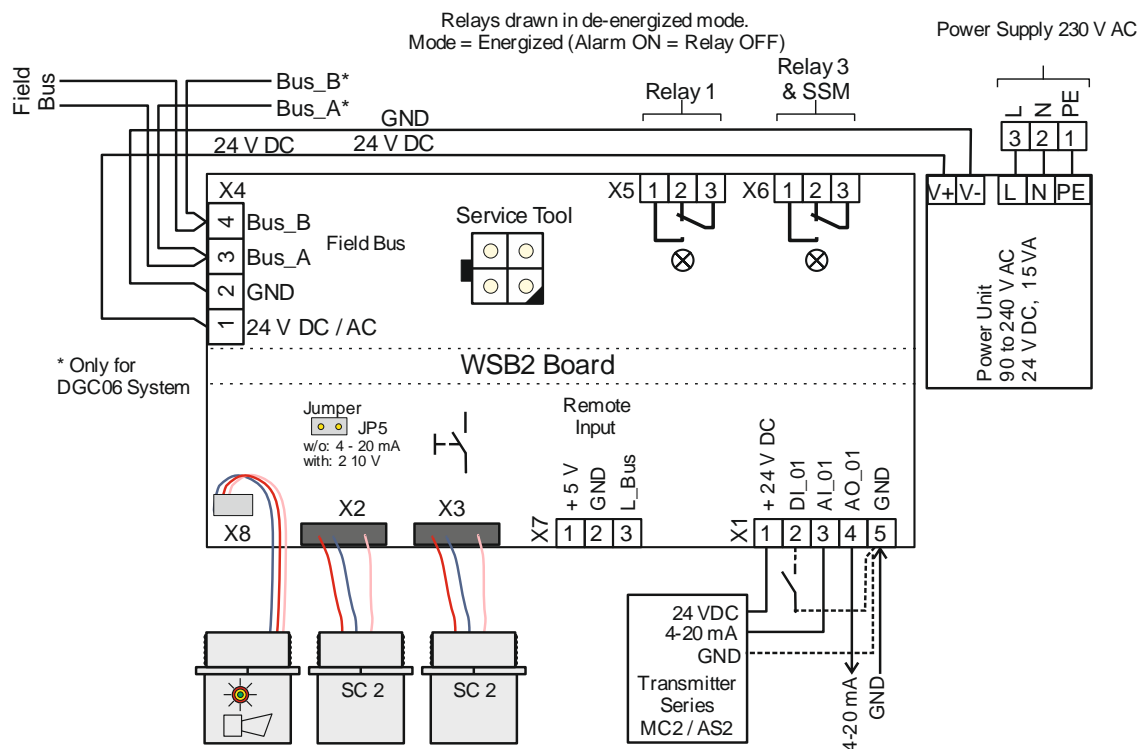


Fig 9.3: Electrical connection (schematic diagram) 230 V AC

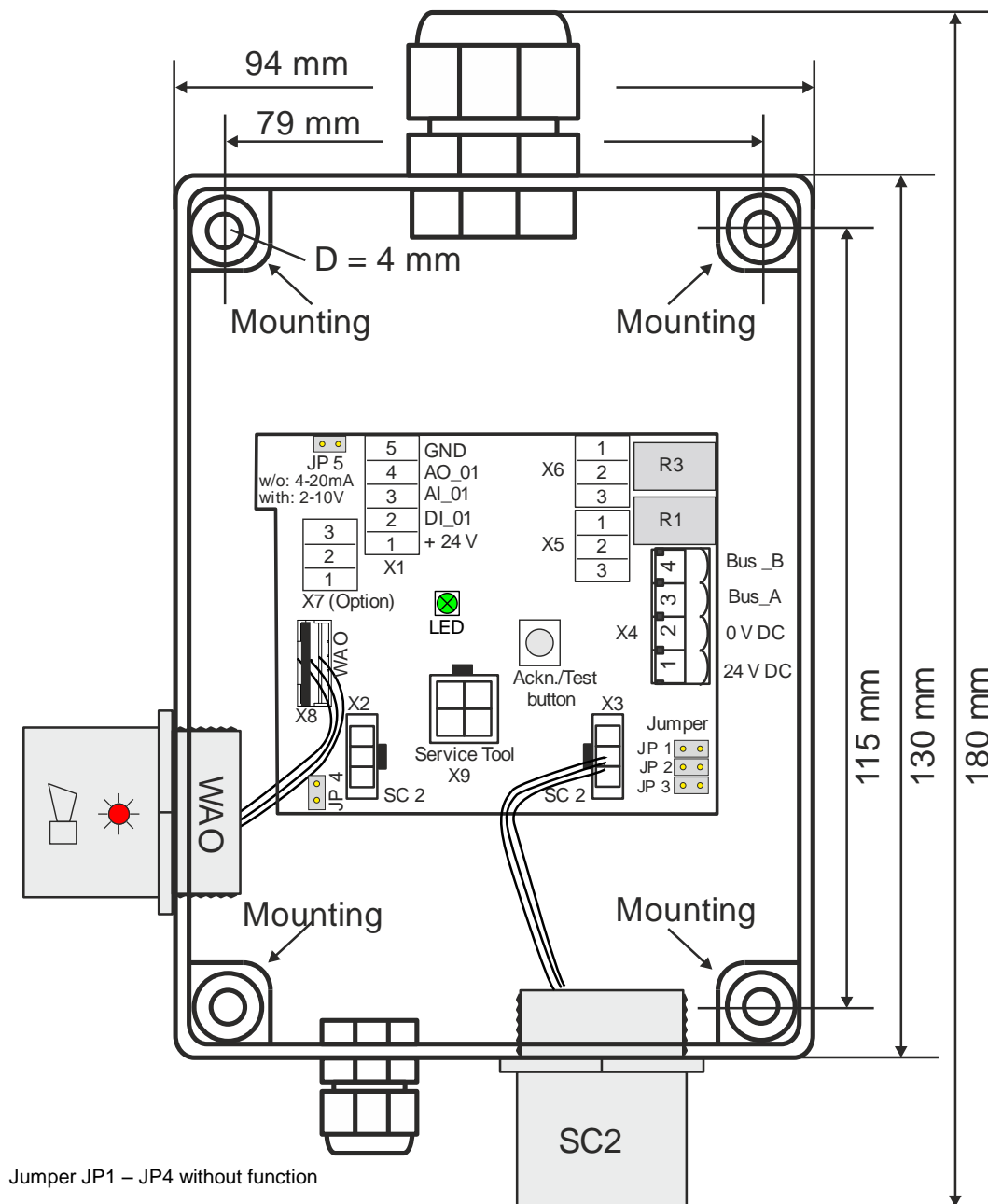


Fig. 9.4
Housing dimensions



10 Part Disposal

Since August 2005 there are EC-wide directives defined in the EC Directive 2002/96/EC and in national codes concerning the waste electrical and electronic equipment and also regarding this device.

For private households there are special collecting and recycling possibilities. For this device isn't registered for the use in private households, it mustn't be disposed this way. You can send it back to your national sales organisation for disposal. If there are any questions concerning disposal please contact your national sales organisation.

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

11 Notes and General Information

It is important to read this user manual thoroughly and clearly in order to understand the information and instructions. The PolyGard®2 devices must be used within product specification capabilities. The appropriate operating and maintenance instructions and recommendations must be followed.

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 is expressed or implied regarding the accuracy of these data.

11.1 Intended Product Application

The PolyGard®2 devices are designed and manufactured for control applications and air quality compliance in commercial buildings and manufacturing plants.

11.2 Installers' Responsibilities

It is the installer's responsibility to ensure that all PolyGard®2 devices are installed in compliance with all national and local codes and OSHA requirements. Installation should be implemented 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).

The equipotential bonding required (also e.g. secondary potential to earth) or grounding measures must be carried out in accordance with the respective project requirements. It is important to ensure that no ground loops are formed to avoid unwanted interference in the electronic measuring equipment.

It is also essential to follow strictly all instructions as provided in the user manual.

11.3 Maintenance

It is recommended checking the PolyGard®2 device regularly. Due to regular maintenance any performance deviations may easily be corrected. Re-calibration and part replacement in the field may be implemented by a qualified technician and with the appropriate tools. Alternatively, the easily removable plug-in Sensor Cartridge with the sensor element may be returned for service to MSR-Electronic GmbH.

11.4 Limited Warranty

MSR-Electronic GmbH warrants the PolyGard®2 devices for a period of one (1) year 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, MSR-Electronic GmbH 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 warranty also does not apply to units in which the sensor element has been overexposed or gas poisoned. The above warranty is in lieu of all other express warranties, obligations or liabilities.

This warranty applies only to the PolyGard®2 devices. MSR-Electronic GmbH shall not be liable for any incidental or consequential damages arising out of or related to the use of the PolyGard®2 devices.