



## **PolyGard®2 Multi Sensor Board MSB2**

**Sensor Board for connection of up to three Sensor Cartridges (analog/digital)**  
**Serial No. MSB2**

## **User Manual**

May 2019/ Germany

Up-to-date data sheets and user manuals can be found in the download area of [www.msr-24.com](http://www.msr-24.com).



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## 1 Intended Use

The PolyGard®2 Multi Sensor Boards (for connection of max. three sensor heads) are designed for the detection of toxic, combustible or dangerous atmosphere in many commercial and industrial applications in connection with the Gas Controller System DGC-06.

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 devices must not be used in potentially explosive atmospheres. The device must only be employed in areas within the environmental conditions specified in the Technical Data.

## 2 Functional Description

### 2.1 General

The Multi Sensor Board can manage up to three sensors in total, two of them may be different Sensor Cartridges of the SC2 series via local bus and/or up to three of them analog sensors with 4 to 20 mA signal (MC2 series).

| Connection to MSB2 | SC2 sensors via local bus | MC2 sensors with 4-20 mA signal |
|--------------------|---------------------------|---------------------------------|
| Number             | 0                         | 1 - 3                           |
| Number             | 1                         | 0 - 2                           |
| Number             | 2                         | 0 - 1                           |

Table: Connection possibilities of sensors to the MSB2

The function of the sensor series SC2 or MC2 is not the subject of this User Manual but can be found in the operating instructions SC2/MC2.

The MSB2 provides the power supply of the SC2(s) and makes the measured data available for digital communication and for the 4 to 20 mA output. Communication with the DGC06 controller takes place via the RS 485 field bus interface with DGC06 protocol. The alarm relays can be controlled both via the DGC 06 controller and locally via the measurement signals. The digital input for acknowledgment or test function and other options such as display or various communication protocols for direct connection to superordinate BMS ensure the adaptation to the wide range of applications in gas detection technology.

The Multi Sensor Board is integrated in the system as a slave with its basic address. The addressing on the field bus level as well as the registration and assignment of the Sensor Cartridge 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 MSB2. The cable topology for the RS-485 field bus can be taken from the "Guidelines for wiring and commissioning of the DGC-06 hardware".

### 2.2 Measuring Mode

The sensor element continuously monitors the ambient air to detect an existing gas concentration and transmits a measurement signal which is proportional to the gas concentration via the amplifier directly to the AD converter of the µController. The µController checks the measurement signal for plausibility (within defined measuring, temperature and voltage ranges, etc.), calculates the average and sends both values with the attributes of gas type and unit via the local bus to the µController of the Multi Sensor Board. The MSB2 (slave) sends the data of the registered Sensor Cartridge upon polling request to the GC-06 Controller (master).

### 2.3 Special Mode

If a fault occurs (measurement signal, temperature or operating voltage outside the defined range, communication error on local bus) or when the Multi Sensor Board is in the maintenance/calibration mode, the measurement operation is interrupted and the status of "special mode" is sent to the GC-06 Controller.

The integrated measuring amplifier converts this change in resistance into a linear output signal. The continuous combustion leads by-and-by to a loss of sensitivity that can be compensated by performing regular calibration of zero and gain. See from section 5.7.

## 2.4 Function Outputs

### SHORT DESCRIPTION OF THE FUNCTION: DIGITAL OUTPUTS WITH THREE RELAYS

| Action  | Reaction Relay 1 (Alarm1) | Reaction Relay 2 (Alarm2) | Reaction Warning light (Alarm 2) | Reaction Horn (Alarm 2) | Reaction Relay 3 (Alarm2 + fault) | Reaction LED   |
|---|---------------------------|---------------------------|----------------------------------|-------------------------|-----------------------------------|----------------|
| Sensor signal < alarm threshold 1   | OFF                       | OFF                       | OFF                              | OFF                     | ON                                | GREEN          |
| Sensor signal > alarm threshold 1   | ON                        | OFF                       | OFF                              | OFF                     | OFF                               | RED            |
| Sensor signal > alarm threshold 2   | ON                        | ON                        | ON                               | ON                      | ON                                | RED            |
| Sensor signal ≥ alarm threshold 2, but button Horn OFF activated            | OFF                       |                           | ON                               | OFF after delay ON      |                                   | RED            |
| Measuring signal < (alarm threshold 2 - hysteresis) but ≥ alarm threshold 1 | ON                        | OFF                       | OFF                              | OFF                     | OFF                               | RED            |
| No alarm, no fault  | OFF                       | OFF                       | OFF                              | OFF                     | ON                                | GREEN          |
| No fault, but maintenance due   | OFF                       | OFF                       | OFF                              | OFF                     | ON                                | GREEN flashing |
| Internal error  | OFF                       | OFF                       | ON                               | OFF                     | OFF                               | YELLOW         |

Note 1: Status OFF = Relay is configured "Alarm ON = Relay" or the MSB2 is free from tension.

Note 2: Alarm thresholds can have the same value, therefore the relays and/or the horn and flashlight can be triggered together.

## 2.5 Relay Mode

Definition of the relay operation mode: The terms energized / de-energized come from the terms energized / de-energized to trip principle (open circuit / closed circuit principle) used for safety circuits. The terms refer to the activation of the relay coil, not to the relay contacts (as they are executed as a changeover contact and available in both principles).

The LEDs attached to the modules show the two states in analogy. (LED off -> relay de-energized)

## 2.6 Relay Function Static / Flash

Definition of the relay function: The function "flashing" represents a connection option for warning devices to improve visibility. If "flashing" is set, this must not be used as a safe output circuit anymore.

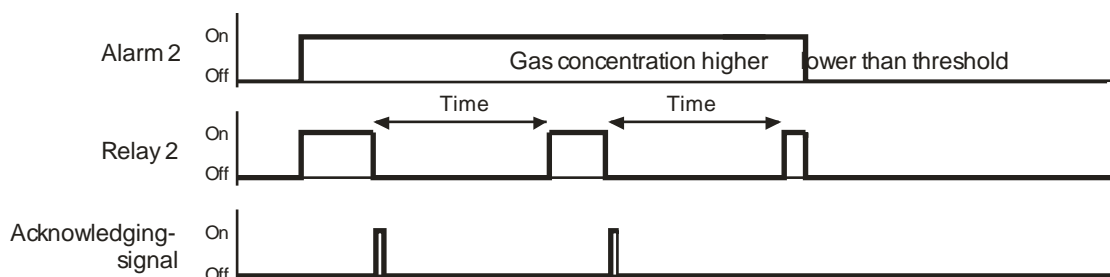
A combination of relay mode energized with flashing operation makes no sense and is therefore suppressed.

## 2.7 Horn Function (not safe output circuit because resettable)

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

Special function: Recurrence of the horn relay

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



### 3 Installation



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 Mounting Instructions

The housing with the Multi Sensor Board comes in closed state. Therefore, before mounting, break out the pre-embossed knockouts to insert the cable entries and the Sensor Cartridge(s). The housing offers different mounting options by a variety of knockout openings 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 entries with reference to the drawing "Knockouts in housing A", fig. 1.

When choosing the mounting site please pay attention to the following:

- The mounting height depends on the relative density of the gas type to be monitored.
- Choose mounting location of the sensor according to the local regulations.
- Consider ventilation conditions! Do not mount the sensor near the airflow (air passages, suction holes etc.).
- Mount the sensor at a location with minimum vibration and minimum variation in temperature (avoid direct sunlight).
- Avoid locations where water, oil etc. may influence proper operation and where mechanical damage might be possible.
- Provide adequate space around the sensor for maintenance and calibration work.

#### 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.

- Open housing cover.
- On the housing bottom part break out the required pre-embossed knockouts for cable glands and Sensor Cartridge.
- Fix the housing bottom part to the wall through the four mounting points according to the drawing "Housing A dimensions" Fig. 2 so that the Sensor Cartridge is always directed vertically to the ground.
- Close the cover.

## 4 Electrical Connection



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

- 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.
- We recommend the following cable types<sup>1</sup>:

|  | Europe                             | USA / Canada   |
|--|------------------------------------|----------------|
| Power supply 230 V   | NYM-J 3 x 1.5 mm <sup>2</sup>      | 14 AWG / 300 V |
| Alarm message 230 V (also possible together with power supply) | NYM-J X x 1.5 mm <sup>2</sup>      | 14 AWG / 300 V |
| Signal message, bus connection to DGC06, warning devices 24 V  | J-Y(St)Y 2x2 x 0.8 mm <sup>2</sup> | min. 300 V     |
| Possibly connected external analog transmitters                | J-Y(St)Y 2x2 x 0.8 mm <sup>2</sup> | min. 300 V     |

<sup>1</sup> The recommendation does not consider local conditions such as fire protection etc.

- Use copper conductors only, for the terminal is only for connection to copper wire.
- Avoid any influence of external interferences by using shielded cables for the bus line, but do not connect the shield.
- When selecting and installing the cables you have to comply with the regulations concerning the RS 485 bus installation. The installations have to be executed in line topology. Cable length and type have to be considered as well.
- 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 wire and mains connected wire must be fixed separately by cable ties or similar, to secure against looseness.
- When choosing the option "Power Supply ≥ 90 VAC" you must 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
- Analog sensors are connected directly to the spring type terminals of the module. The correct polarity must be observed.
- Digital sensors are connected directly to the local bus socket.
- The alarm signals are available as potential-free change-over contacts. If required, the power supply is available at the L socket.
- The exact position of the terminals for the sensors and alarm relays is shown in the connection diagrams.

### 4.1 Wire Connection

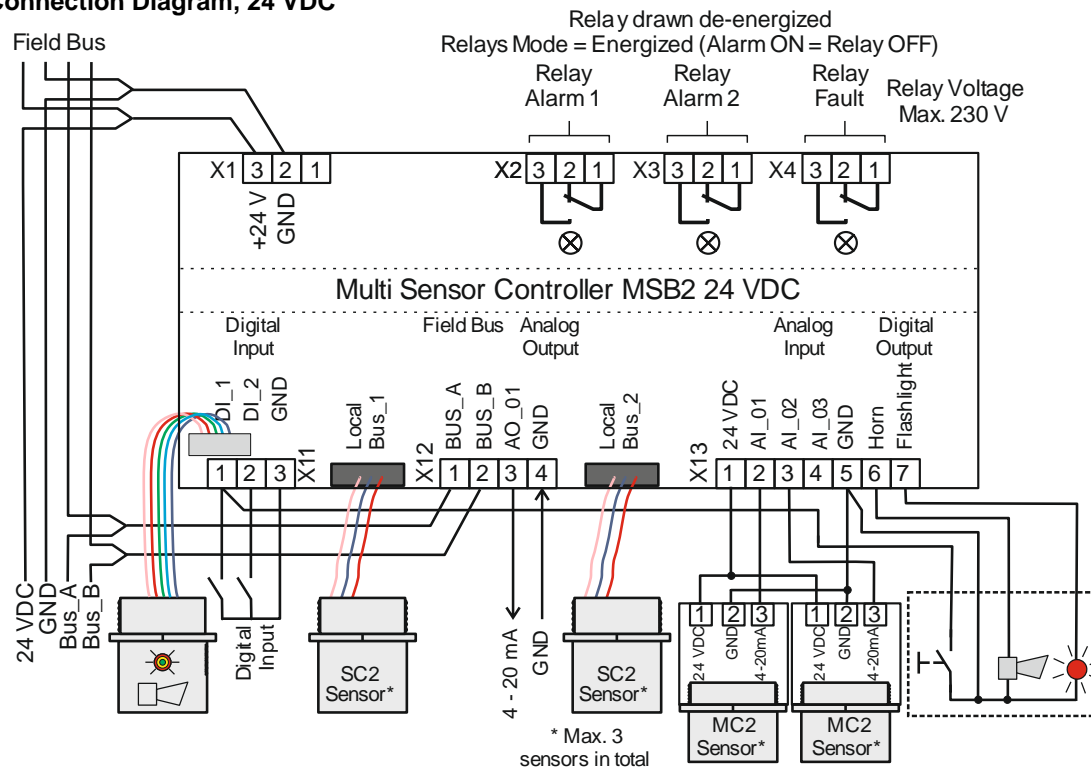
- Open the cover.
- Insert the field bus cable from above and connect it.
- Remove terminal block X4 from MSB, connect cable according to 4.2 Connection Diagram.
- Replug terminal carefully on the MSB2 at X4.
- Close cover.



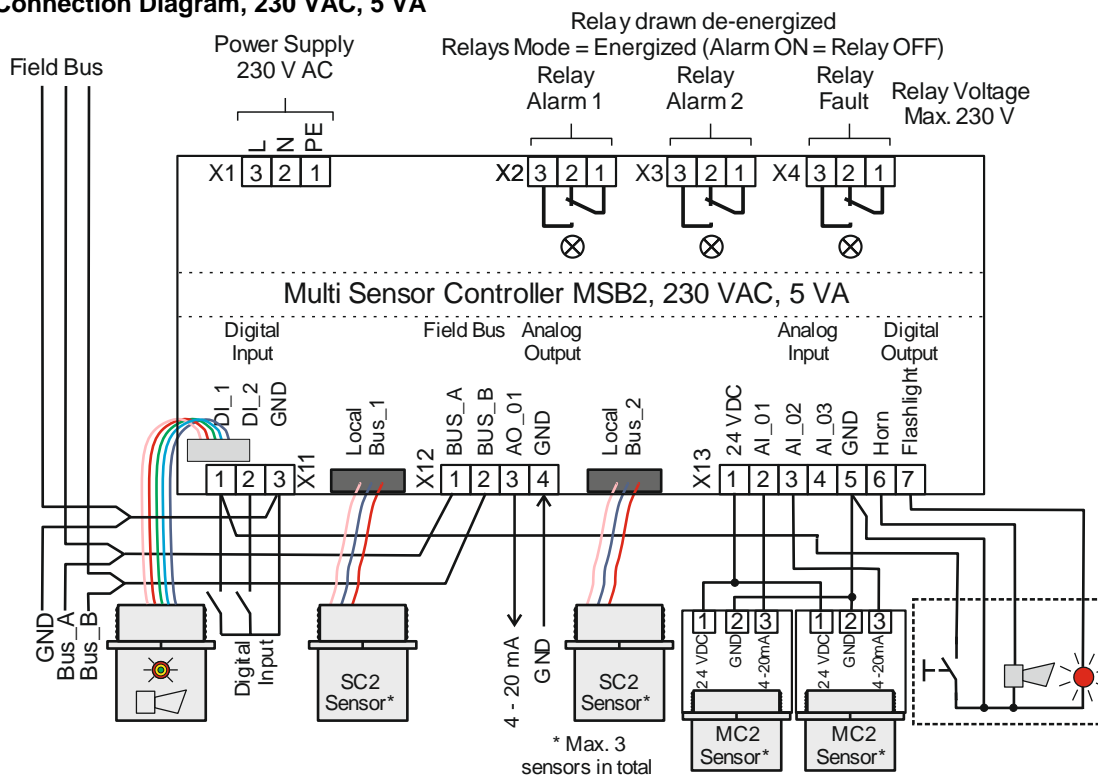
**Connecting the 24 V field bus voltage to the local bus terminal X7 can destroy the Multi Sensor Board completely!**

## 4.2 Connection Diagram

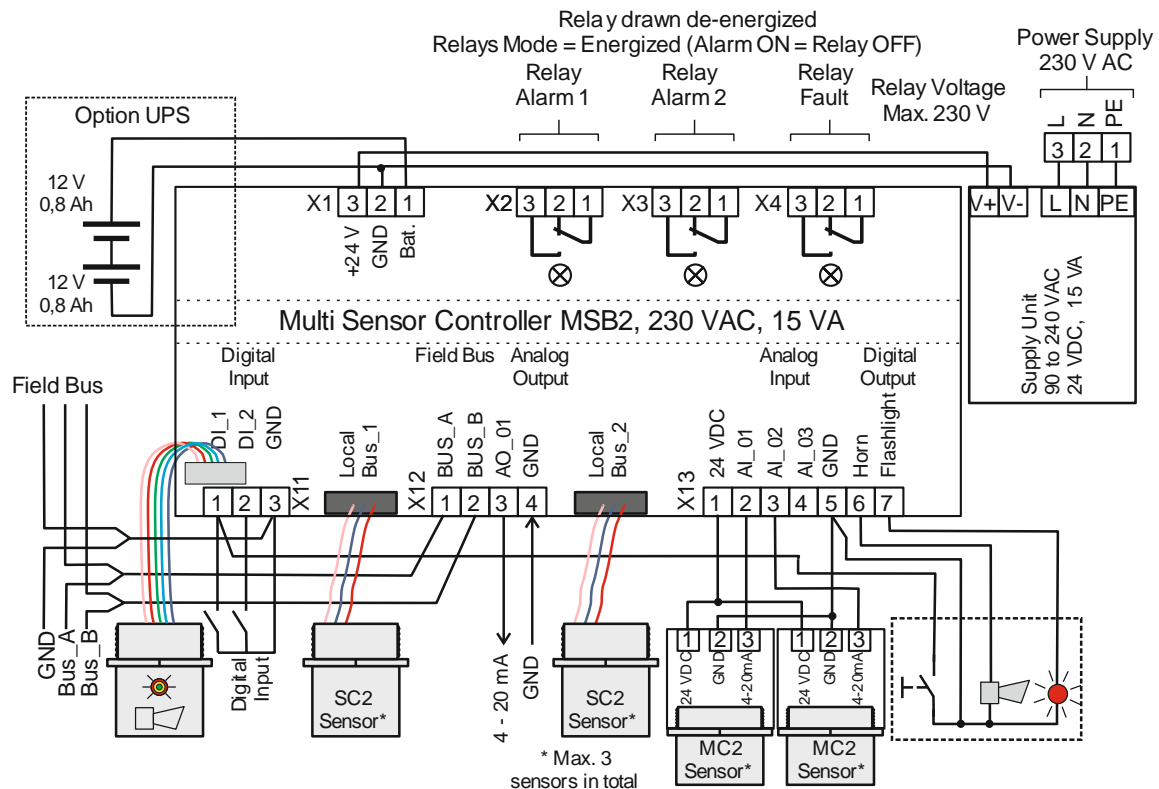
### Connection Diagram, 24 VDC



### Connection Diagram, 230 VAC, 5 VA



## Connection Diagram, 230 VAC, 15 VA



## 5 Commissioning

### 5.1 General Notes

Only trained technicians should perform the following when commissioning:

- Check for correct mounting location.
- Check that the MSB2 board is firmly seated in the housing.
- Check if connection is correct according to connection diagram.
- Check power voltage.
- Install the Sensor Cartridge(s) if not already installed ex works.
- Check Sensor Cartridge connector for correct engagement.
- Address the Multi Sensor Board (MSB2).
- Register the Sensor Cartridge(s) at the MSB2.
- 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 Sensor Cartridge.

### 5.2 Optical Check

- Right cable type used.
- Correct mounting height according to definition in Mounting.
- LED status



## 5.3 Selection Gas Type with Unit

The selection of the desired and connected gas sensor type is made by pre-set values.

If other gas sensor types are connected, you have to adjust them with the configuration tool, because otherwise the device will respond with an error message.

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

This feature increases the user and operating security. There is an entry available per gas type for each unit; at present, there are 100 selection options.

## 5.4 Installation of Sensor Cartridge SC2

The Sensor Cartridge is supplied in a separate package 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 of the sensor and break out knockouts. See Fig. 1
- Insert Sensor Cartridge, O-ring seal must rest on the housing exterior.
- Tighten the Sensor Cartridge with M32 hexagon lock nut.
- Plug in the Sensor Cartridge at X2 or X3 of the sensor board. Observe plug polarity, the plug must engage.

## 5.5 Addressing of SC2

A basic communication address is assigned to the Multi Sensor Board with the help of the service tool DGC-06 or the DGC STL-06 EasyConf software. Using this basic address, the data of the Sensor Cartridge assigned to input 1 are sent via the field bus to the gas controller. Any further SC connected / registered on the Multi Sensor Board automatically gets the next address.

## 5.6 Registration / Assignment of the Sensor Cartridge(s) (SC2)

The MSB2 recognizes automatically the SC(s) physically connected to the Multi 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. In the second step by assigning the gas type and defining the measurement range, the SC is connected to the input.

Up to two different SC2 can be connected at the Multi Sensor Board. The physical position of the SC2 does not have to agree with the input in the menu.

Example: Multi Sensor Board MSB2 with two SC2 for CO, NO<sub>2</sub> with basic address 09

| Input | Mode | Field Bus Address | Gas Type        | Measuring Range | Result  |
|-------|------|-------------------|-----------------|-----------------|---|
| 1     | SC   | DP 09             | CO              | 300 ppm         | CO SC2 assigned to input 1 und thus field bus address DP09              |
| 2     | SC   | DP 10             | NO <sub>2</sub> | 30 ppm          | NO <sub>2</sub> SC2 assigned to input 2 und thus field bus address DP10 |

Only the parameters with blue background have to be worked on for the MSB2 addressing and the SC registration.

Mode:        not active:    = SC assignment to input not possible  
              SC:            = SC assignment possible  
              Analog:        = Input with 4-20 mA signal, assignment possible

Gas type and meas. range:    Selection of gas type and measuring range of the SC connected to the input or of the analog sensor

The registration is only accepted if the assigned gas type/measuring range are identic in the MSB2 and in the SC. Gas type and measuring range of the MSB2 are checked for identity by the GC Controller, too.



Only one SC per gas type must be connected to the same Multi Sensor Board.

## 5.7 Calibration

New SC2 / MC2 Sensor Heads are always delivered factory-calibrated by MSR-E. This is documented by the calibration label indicating date and calibration gas. A repeated calibration is not necessary during commissioning if the device is still in its original packaging (air-tight protection by the red protective cap) and the calibration doesn't date back more than 12 months for CO<sub>2</sub> sensors and 3 months for all other gases.

The calibration of the sensor head is done on the display; for versions without display, you need a PC tool or the STL-06 Service Tool. There is an automatic routine in the calibration menu of the Service Tool STL.

As long as the calibration menu is open and the sensor is gassed with test gas, the alarm release is blocked.

Prior to calibration the sensor must be connected continuously to the power supply for stabilization for a running-in period (see User Manual of Sensor Cartridge).

There is also the possibility to exchange the SC against a calibrated SC on site. The used SC can then be calibrated directly in the office or at the MSR\_E Calibration Service and then reused.



Prior to calibration the Sensor Cartridge must be supplied with power voltage without interruption for warm-up and stabilisation. The warm-up time depends on the sensor element and is shown in the following table for Example: See also User Manual for Sensor Cartridge

| Sensor Cartridge                     | Warm-up (h) | Flow rate (ml/min) |
|--------------------------------------|-------------|--------------------|
| CO                                   | 1           | 150                |
| NO <sub>2</sub>                      | 6           | 150                |
| LPG (C <sub>3</sub> H <sub>4</sub> ) | 4           | 150                |

Table Calibration



Please observe proper handling procedures for compressed gas and test gas bottles (regulations TRGS 220)!



Test gas can be toxic, so never inhale it!  
Symptoms: Dizziness, headache and nausea.  
Procedure if exposed: Remove victim to fresh air, seek medical attention.

## 5.8 Calibration with DGC-06 EasyConf

- Connect DGC-06 EasyConf Interface to the Multi Sensor Board.  
Prior to calibration you have to activate the mode "Special Mode" at the MSB, only then the calibration menu is enabled. During the special mode the MSB2 doesn't issue alerts.
- Select the Sensor Cartridge to be calibrated by selecting the gas type.

### Zero calibration

- The current zero offset and the offset value of the first calibration is read with "Read".
- Slide calibration adapter carefully onto the Sensor Cartridge.
- Apply synthetic air (flow rate according to the table "calibration", 1 bar ± 10%) to the Sensor Cartridge.
- When the value is stable, the new zero offset factor is calculated with "Calibration".

The new offset factor is checked for plausibility and stored in the buffer memory. The current measured value is output with the new offset factor and the offset display is updated.

- With "Save" the new offset factor is written in the SC memory, only then the Zero calibration has been successfully completed. If you exit the menu without pressing "Save", the original offset data for the measured value calculation will continue to be used.

With a zero reading > 10% of measuring range during the zero calibration, zero calibration is not possible.

#### Gain calibration

- Enter test gas concentration (value between 30 and 70 % of the measuring range)
- The current sensor element sensitivity is read with "Read".
- Slide calibration adapter carefully onto the Sensor Cartridge.
- Apply test gas (flow rate according to the table "calibration", 1 bar  $\pm$  10%) to the Sensor Cartridge.
- When the value is stable, the new gain factor is calculated with "Calibration".

The new gain factor is checked for plausibility and stored in the buffer memory. The current measured value is output with the new gain factor and the sensor element sensibility is updated.

- With "Save" the new gain factor is written in the SC memory, only then the gain calibration has been successfully completed. If you exit the menu without pressing "Save", the original gain data for the measured value calculation will continue to be used.

By limiting the gain factor, calibration will not be possible anymore when the sensitivity of the sensor reaches a residual sensitivity of 40 %. Then the Sensor Cartridge has to be replaced

For more information, see the user manual of the DGC-06 EasyConf Software.

### 5.9 Exchange of Sensor Cartridge SC2

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 <> MSB) 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 SC2 connector from the MSB2 (error message will be activated).
- Loosen the locknut.
- Remove used SC2.
- Take calibrated SC2 out of the original packaging, check for gas type, measuring range and valid calibration date.
- Insert the SC2 and retighten with lock nut.
- Insert the SC2 plug into the socket at the MSB2. 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 MSB2. If they match and the communication is correct, the error message will be automatically acknowledged at the Gas Controller.

The yellow LED of the MSB2 flashes with a pulse duration of 1 sec., while the SC connector is disconnected (communication error). After the local bus communication has been re-established and the conformity test has been successful, the LED will go into flashing mode with 3 sec. pulse duration.

- Perform functional test of the exchanged SC with gas generator. On successful completion of the test, the flashing LED goes off after approximately 10 sec.

The sensor element is treated with a defined gas concentration with the help of the gas generator. As a result the measurement signal acknowledges the LED when an internal switching threshold is reached. With this test, the complete function chain "Sensor Element > Sensor Cartridge > Local Bus > MSB > Field Bus > GC Controller" is tested.



## **6 Inspection and Service**

For regular maintenance und 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 VDI-2053, EN 60079-29-1 etc. The inspection interval normally is three months. The recommended service intervals are depended from the connected Sensor Cartridges. If different intervals are valid, always consider the shortest one.

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

### **6.1 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 sensor including cable for damage, vandalism etc.
- Remove dust deposits, especially at the gas inlet.
- The filter at the gas inlet has to be replaced if extremely dirty.
- Check the Unit including measuring head for dust, dirt and moisture deposits and clean it with a dry cloth if necessary.

### **6.2 Service and Calibration**

When performing maintenance, you have to do the calibration and the functional test in addition to the inspection.

### **6.3 Trip Test with Reference Gas**

By applying the reference gas with a concentration > alarm threshold 2, the set alarm thresholds are exceeded, and all output functions are activated. It is necessary to check if the connected output functions are working correctly (e.g. the horn sounds, the fan switches on, devices shut down). By pressing the push-button on the horn, the horn acknowledgment must be checked. After removal of the reference gas, all outputs must automatically return to its initial position.

## **7 Project protection**

To prevent access to the sensitive calibration data by third parties, every customer receives his own internal project key. All projects of the customer are delivered with this key. The key is also stored in each STL-06 tool that the respective customer buys.

If the keys do not match, the following message appears

**NO ACCESS AUTHORIZATION**

The calibration is documented in the User Manual of the Service Tool.



## 8 Troubleshooting

### 8.1 Multi Sensor Board

| Trouble  | Cause   | Solution   |
|--|---|--|
| Green LED isn't on.  | Power voltage not applied.                                      | Measure tension at X4:<br>(16-28 V DC) Pin 1 (+) and 2 (-) |
|  | Polarity not correct at X4.                                     | Connect correctly.   |
|  | Connector X4 not plugged in.                                    | Check the plug.  |
|  | Wire breakage   | Check the wiring.  |
| Green LED doesn't flash.   | MSB2 hasn't got any address.                                    | Check MSB2 address, address correctly.                     |
|  | MSB2: no field bus communication                                | Check field bus wiring, topology and termination.          |
| No measured value at the Tool or Controller  | SC not or wrongly plugged in.                                   | Check SC plug.   |
|  | SC not registered.  | Register SC.   |
|  | SC gas type/measuring range doesn't match with registered ones. | Check SC data<> registration data for conformity.          |
| Message at the Tool / Controller:<br>- 24 V DC voltage <range><br>- 5 V DC voltage <range><br>- Temp. <range><br>- WatchDog triggered. | Internal error  | Replace MSB2.  |

### 8.2 Sensor Cartridge (Messages at the Tool / Controller)

|                          |                          |                                  |
|--------------------------|--------------------------|----------------------------------|
| Measuring signal <range> | Internal error           | Replace SC.                      |
| 5 V DC voltage < range > |                          |                                  |
| Temp. < range >          |                          |                                  |
| WatchDog triggered.      |                          |                                  |
| SC Input 1 ≠ stored type | Wrong SC type at input 1 | Check SC at input 1, replace it. |
| SC Input 2 ≠ stored type | Wrong SC type at input 2 | Check SC at input 2, replace it. |
| SC Input 3 ≠ stored type | Wrong SC type at input 3 | Check SC at input 3, replace it. |

## 9 Technical Data

### 9.1 Multi Sensor Board (MSB2)

|                                       |  |
|---------------------------------------|--|
| <b>Electrical</b>                     |  |
| Power supply                          | 16 - 29 VDC, reverse polarity protected  |
| Power consumption (24 V DC) only MSB2 | 100 mA (2.4 VA)  |
| <b>Analog input</b>                   |  |
| Input signal                          | 4 -20 mA, overload and short-circuit proof, input resistance 200 Ω   |
| Tension for external analog sensors   | 24 V DC, max. 100 mA   |
| <b>Digital input</b>                  |  |
| Signal input                          | Potential-free contact   |
| Function                              | Acknowledge or test function   |
| <b>Analog output signal</b>           |  |
| Signal input                          | Proportional, overload and short-circuit proof, load ≤ 500 Ohm<br>4 - 20 mA = measuring range<br>3.0 <4 mA = underrange<br>> 20 - 21.2 mA = overrange<br>2.0 mA = fault  |
| Output for local bus                  | 5 V DC, 250 mA max.<br>Overload, short-circuit and reverse-polarity protected  |
| <b>Power relays (3)</b>               |  |
|                                       | 240 V AC, 5 A, potential-free, change-over contact (SPDT)  |
| <b>General</b>                        |  |
| Temperature range                     | -35 to + 50 °C (-31 °F to 122 °F)  |
| Humidity range                        | 15 – 90 % RH non condensing  |
| Storage temperature range             | +5 to 40 °C (41 °F to 104 °F)  |
| Storage time                          | Max. 6 months  |
| <b>Serial interface</b>               |  |
| Local bus                             | 1-wire / 19200 Baud  |
| Field bus                             | RS 485 / 19200 Baud  |
| Tool bus                              | 2-wire / 19200 Baud  |
| <b>Physical</b>                       |  |
| Protection class (delivery status) *  | NEMA 4X (IP 65)  |
| Wire connection: Field bus            | Screw-type, min. 0.25 mm <sup>2</sup> , max. 2.5 mm <sup>2</sup> (24 to 10 AWG)  |
| Local bus                             | 3-pin connector  |
| Digital input, analog output          | Screw-type, min. 0.25 mm <sup>2</sup> , max. 1.3 mm <sup>2</sup> (24 to 16 AWG)  |
| Power supply, relays                  | Screw-type, min. 0.25 mm <sup>2</sup> , max. 2.5 mm <sup>2</sup> (24 to 10 AWG)  |
| <b>Directives</b>                     |  |
|                                       | EMC directives 2014/30/EU<br>Low voltage directive 2014/35/EU, CE<br>EN 61010-1:2010<br>Conformity to: EN 50271<br>Option:<br>ANSI/UL 61010-1, CAN/CSA-C22.2 No. 61010-1 |
| <b>Warranty</b>                       | 2 years on Device  |
| <b>Options</b>                        |  |
| <b>LCD Display</b>                    |  |
| LCD                                   | Two lines, 16 characters each, background highlighted in two colours   |
| Operation                             | Menu driven via six pushbuttons  |
| Power consumption                     | 5 V, 60 mA, 0.3 VA   |
| <b>Modbus protocol RTU RS-485</b>     |  |
|                                       | Transmission of current measured values & alarm stages   |

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

## 10 Figures

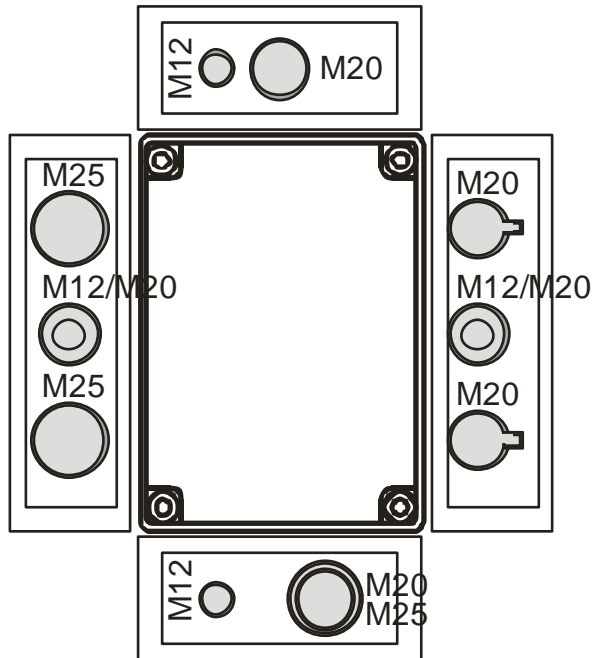


Fig. 1  
Housing A knockouts

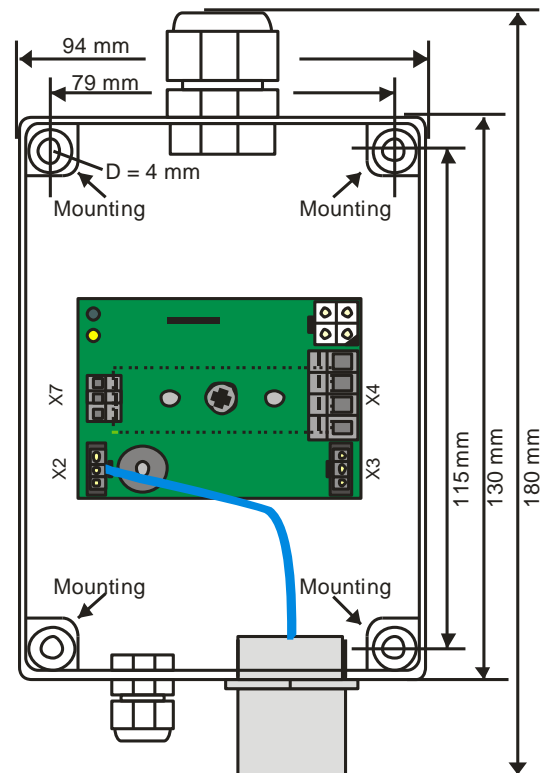


Fig. 2  
Housing A dimensions



Fig. 3  
Calibration adapter



## **11 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.

## **12 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.

### **12.1 Intended Product Application**

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

### **12.2 Installers' Responsibilities**

It is the installer's responsibility to ensure that all PolyGard®2I 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.

### **12.3 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.

### **12.4 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.