Gas Detector Series PolyXeta®2

User Manual

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1 Notes and General Information

1.1 Applicability

1. PolyXeta®2 gas warning device for combustible and toxic gases as well as oxygen, series PX2…with Ex d protection;
2. PolyXeta®2 sensor head for combustible and toxic gases as well as oxygen, series SX.. with Ex d protection

1.2 Intended Use

The PolyXeta®2 fixed gas detectors are designed to detect and warn of toxic and combustible gases and oxygen in the hazardous areas of zones 1 and 2 according to Directive 2014/34/EU (formerly Directive 94/9/EC). The gas detectors are e.g. suitable for use in the chemical, petrochemical and offshore industry, etc. for indoor and outdoor applications within the environmental conditions specified in the technical data.

1.3 For Your Safety

These operating instructions must be read and strictly followed by all persons installing, using, servicing and inspecting the product. Furthermore the operating instructions "Service Tool and Display for µGard®2, PolyGard®2, PolyXeta®2" must be read and obeyed if the PolyXeta®2 has a display or if the Service Tool is used. The product can only fulfil its intended functions if installed, used, serviced, maintained and controlled according to the specifications of MSR-Electronic GmbH.

The factory settings of the measuring point, relay and system parameters and the device address are documented in the configuration card supplied with each device on delivery.

1.4 Installer's and Operator's Responsibilities

It is the installer's and operator's responsibility to ensure that all PolyXeta®2 devices are installed and used in compliance with all national and local regulations and requirements. The gas warning 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 PolyXeta®2 gas detector has been calibrated and tested for functionality at the factory before delivery. When starting up, however, you have to perform and document a function testing using test gas.

The requirements of IEC 60079-29 2 (gas detectors - selection, installation, use and maintenance of devices for the measurement of combustible gases and oxygen) must be observed for installation, operation and maintenance.

1.5 Maintenance

Regular maintenance has to be performed according to the instructions in chapter 9.

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.

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1.7 Approvals

The PolyXeta®2 gas warning device is approved by DEKRA EXAM GmbH for use in potentially explosive atmospheres as well as for the application "Measurement Function for Explosion Protection".

1.7.1 Marking and Certificates according to ATEX Directive 2014/34/EU

Marking: II 2G Ex db IIC T4 Gb
Ⓔx CE 0158
-25 °C < Ta < +60 °C

EC Type Examination Certificate: BVS 15 ATEX E 129 X

Protections: EN 60079-0: 2012 & EN 60079-1: 2014 (Ex-db)

Measurement function: EN 60079-29-1: 2017 for combustible gases (pending) according to Table 1.1 Available gases
EN 50104: 2011 for oxygen (pending)

Function safety: EN 50271: 2010; EN 50402: 2016 and EN 61508: 2010 (Parts 1-3)

1.7.2 Marking and Certificates according to IECEx

Marking: Ex db IIC T4 Gb

-25 °C < Ta < +60 °C

IECEx Certificate Conformity

IECEx BVS 16.0038X

Protections: IEC 60079-0: 2011 & IEC 60079-1: 2014 (Ex-db)

Measurement function: IEC 60079-29-1: 2017 for combustible gases (pending) according to Table 1.1 Available gases

Function safety: IEC 61508: 2010 (Part 1-3)

1.7.3 Terms and Conditions for Safe Use

Temperature range -25 °C < Ta < +60 °C

Mounting position: wall mounting with the sensor head downwards

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1.7.4 Listing of Combustible Gases

The following combustible gases are certified acc. to DIN EN 60079-29-1 (measuring function for explosion protection), currently in progress.		
Sensor head	**Gas**	**Measuring range**
SX1-X-P3400-A	Methane (CH_4)	0 – 100 % LEL
SX1-X-P3427-A	Ethyl Acetate ($C_4H_8O_2$)	0 – 100 % LEL
SX1-X-P3435-A	n-Hexane (C_6H_{14})	0 – 100 % LEL
SX1-X-P3440-A	Hydrogen (H_2)	0 – 100 % LEL
SX1-X-P3480-A	Propane (C_3H_8)	0 – 100 % LEL
SX1-X-P3482-A	Isopropyl Alcohol (C_3H_8O)	0 – 100 % LEL
SX1-X-P3485-A	Acetone (C_3H_6O)	0 – 100 % LEL
SX1-X-P3490-A	Toluene (C_7H_8)	0 – 100 % LEL
Combustible gases not certified according to EN 600079-29-1		
Sensor head	**Gas**	**Measuring range**
SX1-X-P3408-A	Ammonia (NH_3)	0 – 100 % LEL
SX1-X-P3402-A	LPG Liquefied Petrol Gas	0 – 100 % LEL
SX1-X-P3410-A	Ethylene (C_2H_4)	0 – 100 % LEL
SX1-X-P3425-A	Ethanol (C_2H_5OH)	0 – 100 % LEL
SX1-X-P3450-A	Methanol (CH_3OH)	0 – 100 % LEL
SX1-X-P3458-A	Methyl Ethyl Ketone (C_4H_8O)	0 – 100 % LEL
SX1-X-P3460-A	Iso/n-Butane (C_4H_{10})	0 – 100 % LEL
SX1-X-P3468-A	Isobutyl Alcohol ($C_4H_{10}O$)	0 – 100 % LEL
SX1-X-P3475-A	Iso/n-Pentane (C_5H_{12})	0 – 100 % LEL
SX1-X-P3473A	Methyl Acetate ($C_3H_6O_2$)	0 – 100 % LEL
SX1-X-P3491-A	n-Heptane (C_6H_{16})	0 – 100 % LEL
SX1-X-P3496-A	Petrol Vapours	0 – 100 % LEL

Table 1.1: Available sensor heads for combustible gases

1.7.5 Listing of Oxygen and Toxic Gases

Oxygen certified according to EN 50104 (currently in progress)		
Sensor head	**Gas**	**Measuring range**
SX1-X-E1195-A	Oxygen (O_2)	0 – 25 Vol %

Table 1.2: Available sensor heads for oxygen

Toxic gases		
Sensor head	**Gas**	**Measuring range**
SX1-X-E1110-H	Carbon monoxide (CO)	0 – 500 ppm
SX1-X-E1125-A	Ammonia (NH_3)	0 – 100 ppm
SX1-X-E1125-B	Ammonia (NH_3)	0 – 200 ppm
SX1-X-E1125-D	Ammonia (NH_3)	0 – 1000 ppm
SX1-X-E1129-C	Nitric Oxide (NO)	0 – 100 ppm
SX1-X-E1130-B	Nitrogen Dioxide (NO_2)	0 – 20 ppm
SX1-X-E1189-C	Ethylene (C_2H_4)	0 – 200 ppm
SX1-X-E1193-B	Chlorine (Cl_2)	0 – 5 ppm
SX1-X-E1193-D	Chlorine (Cl_2)	0 – 20 ppm
SX1-X-E1196-B	Sulphur Dioxide (SO_2)	0 – 20 ppm
SX1-X-E1197-A	Hydrogen Sulphide (H_2S)	0 – 50 ppm

Table 1.3: Available sensor heads for toxic gases

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2 General Description

2.1 Device Description

The fixed gas detector type "PX2" consists of a sensor head and an I/O unit. It is approved according to ATEX and IECEx and is SIL 2 certified.

The sensor head consisting of the gas sensor and the evaluation, calibration and diagnostic electronics is an independent unit in flameproof stainless steel housing (Ex d) with an external thread NPT ¾ ". All sensor data are stored in the sensor head. After the end of the calibration period or at the end of the sensor life time, the sensor can easily be replaced by a calibrated or a new sensor head.

The I/O unit including the operating power supply communicates with the sensor head via the internal local bus, monitors the communication and translates the measured value of the sensor head into a 4-20 mA signal. The value of the gas concentration and other relevant data and status messages are available on the central bus. The alarm relay is activated when the alarm threshold is exceeded. In case of a fault the fault relay and the analog output change into fault state and the fault message is transmitted via the central bus. An optional display unit with indication of the measurement values and status LEDs can be integrated behind a viewing window. The I/O unit is installed in a flameproof (Ex d) die-cast housing with up to four openings with NPT ¾ " female threads according to standard ANSI B1.20.1 for receiving sensor head and cable glands.

2.2 Measurement Principles

See chapter 11 “Sensor Specification”.

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3 Mounting Instructions

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

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 of the sensor according to the local regulations.
- Consider ventilation conditions! Do not mount the transmitter 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 transmitter at a location with minimum vibration and minimum variation in temperature
- In case of very difficult environmental conditions caused by dripping, splash, rain, condenser water or dusts in the atmosphere, which are above the IP 65 dust and water protection, additional accessories may be necessary to enable the use of the device. Please contact the manufacturer in such cases.
- 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.

Gas types	Relative gas density related to air	Recommended mounting height
Methane, Hydrogen, Ammonia	Less than air (lighter)	Under the ceiling
Ethylene, Oxygen, Carbon Monoxide, Methanol, Nitrogen Monoxide, Hydrogen Sulphide	Corresponds approx. to air	At human breathing height
Propane, Methyl Acetate, Ethyl Acetate, Hexane, Toluen, Isopropyl Alcohol, Acetone, Ethanol, Butane, Methyl Ethyl Ketone, Pentane, Heptane, Petrol Vapours, Liquefied Petrol Gas (LPG), Chlorine, Nitrogen Dioxide, Sulphur Dioxide, Carbon Dioxide	Greater than air (heavier)	Above floor

Table 3.1: Mounting heights

3.2 Installation Work

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

The housing must neither be drilled nor be drilled through.

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

The mounting is done without opening the housing by using the two holes (D = 8 mm) of the fastening strap with suitable screws. The exact dimensions are shown in the drawing "Dimensions and Mounting", fig. 3.1.

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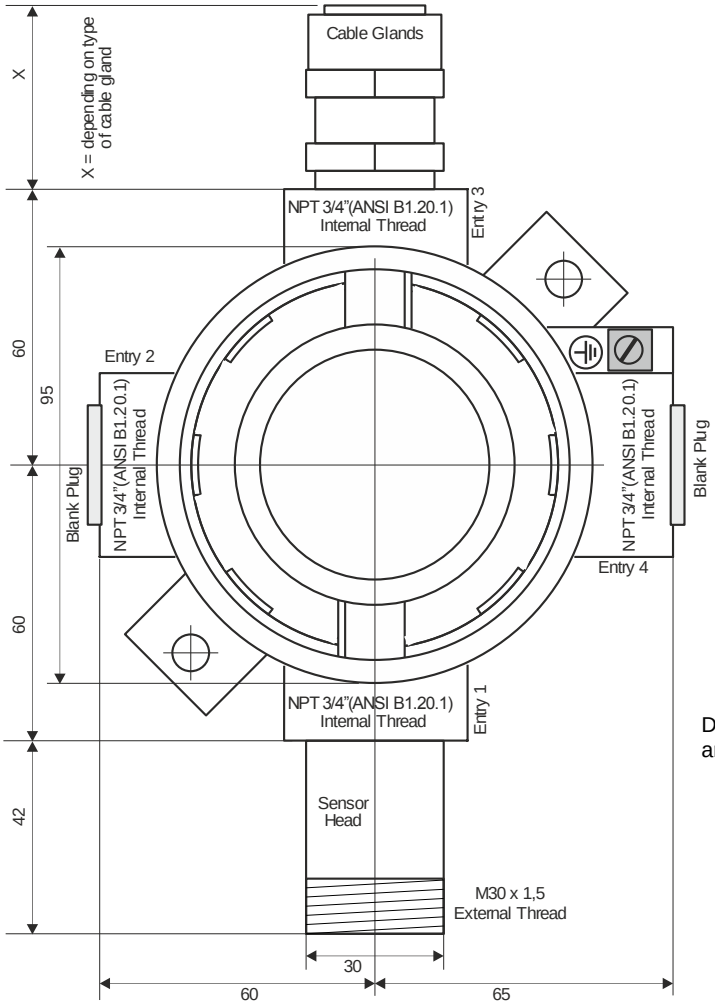

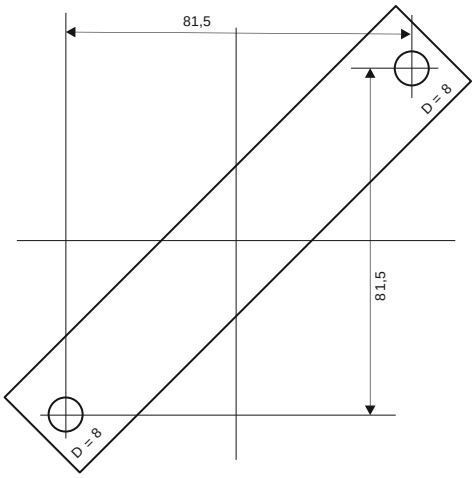

Depending on the housing version the inlets 2 and 4 are tightly closed or closed by blind plugs.

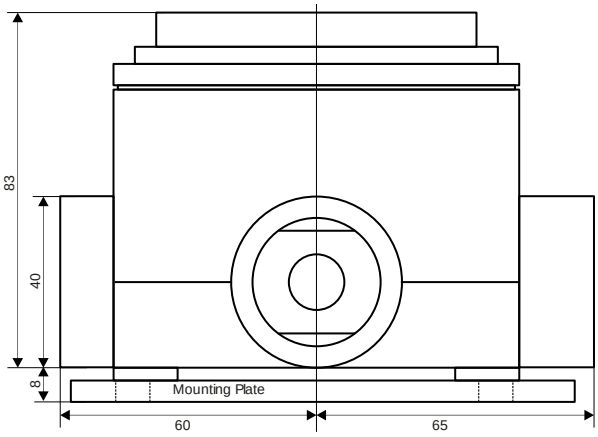

Fig.3.1: Dimensions and Mounting

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4 Electrical Installation

The instrument must only be opened under gas-free and voltage-free conditions.

The enclosed cable gland has to be checked for admissibility for the requested requirements before installation in position “Entry 3”. If the instrument is supplied without cable gland, a special cable gland approved for Ex protection class Ex d and for the requirements of the application has to be mounted there.

When inserting the cables you have to strictly follow the instructions enclosed to the cable glands.

No insulating sealing material must be poured into the NPT ¾ "threads of the cable gland and blanking plugs because the potential equalization between housing and cable gland / blind plugs is via the thread.

The cable gland / blind plugs must be tightened firmly with a suitable tool with a torque moment of 90 Nm. Only when doing so you can ensure the required tightness.

After completion of work, the instrument must be closed again. The cover has to be completely screwed in and secured with the locking screw against inadvertent loosening.

4.1 General Notes

- In the version with display, the terminals are located behind the display. The required disassembly and subsequent assembly of the display is described in chapter 12.
- Only a professional should perform the wiring and the connection of the electrical installation according to the wiring diagram in compliance with the relevant regulations and only when de-energized!
- When connecting cables and conductors, please observe minimum length of 3 m according to EN 60079-14.
- Connect the housing to the equipotential bonding via the external ground terminal.
- Depending on the model there are female threads NPT ¾ inch on the housing at the positions "Entry 2 and 4" for placing additional cable glands. These inlets are factory sealed with original plugs. After completing the installation work, make sure that all unused entries are closed with blind plugs approved for Ex d and for the requirements of the application. Thread adapters for reducing the cable glands or dummy plugs are not admitted.
- All terminals are Ex e type with spring contact and push actuation. The permissible conductor cross section is 0.2 to 2.5 mm^2 for single wires and multi-wire cables.
- Use cables with a braided shield with > 95 % coverage for compliance with the interference immunity. The shield must be connected to the inside connection of the housing with a maximum length of about 35 mm.
- For the recommended cable types, cross sections and lengths please refer to the table 4.1 "Cables".
- The analog output signal of warning devices without display can be used for the measurement control. To carry out these regular checks with the housing closed it is recommended to lead the analog signal out to the safe area via a cable.
- To comply with the requirements of servicing or operating the device without opening it (EN 60079-29-1 4.2.5) it is possible to calibrate or operate the device remotely via the central bus. For this it is necessary to lead the central bus out to the safe area via a cable.

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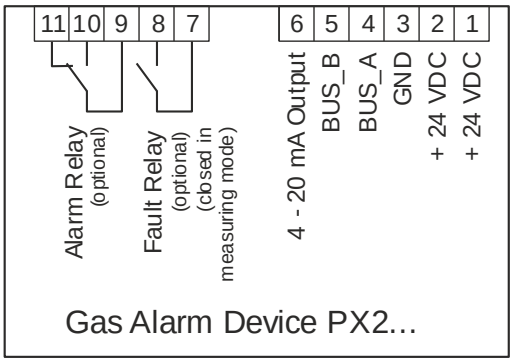
	Cross-section (mm^2)	Max. length (m) for 24 V DC[1]			
			With display	With relay	Relay & display
With sensor head for combustible gases (type PX2-X34…)					
Operating voltage with 4-20 mA signal	0.5	600	500	400	250
	1.0	1000	800	700	500
Operating voltage with central bus[2]	0.5	900	500	400	300
	1.0	900	900	800	700
With sensor head for toxic gases and oxygen (type PX2-E11…)					
Operating voltage with 4-20 mA signal	0.5	1000	800	600	400
	1.0	1500	1200	1000	800
Operating voltage with central bus[2]	0.5	900	900	600	600
	1.0	900	900	900	900

Table 4.1: Cables

[1] The max. cable lengths and our recommendation don't consider any local conditions, like fire protection, national regulations etc.
[2] For the central bus we recommend using the cable JE-LiYCY 2x2x0.8 BD or 4 x2x0.8 BD.

4.2 Connection Diagram



Alarm Relay = R1 Parameter set
Fault Relay = R2 Parameter set

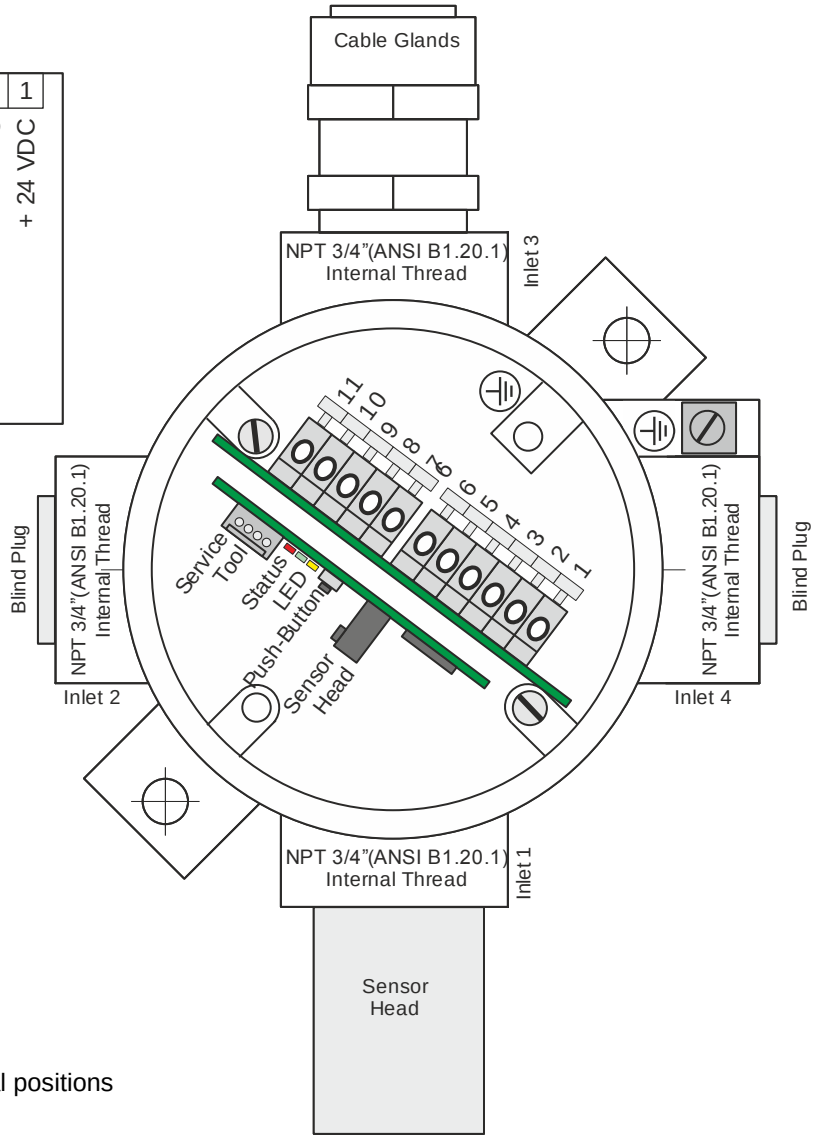


Fig. 4.1: Connection diagram with terminal positions

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5 Commissioning

5.1 General Notes

Before delivery all PX2 gas detectors without exception run through a complete functional test with an initial calibration of the sensors as documented in the enclosed calibration protocol.

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.

5.2 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 as well as in the PolyXeta®2 configuration card. Necessary changes of parameters for adaptation to the application can be done by qualified persons only in the display and if not available by means of the service tool. The requirements under Chapter 8, "Functional Safety / SIL", must be strictly observed for SIL applications.

The parameter functions as well as the menu navigation and operation are described in the User Manuals of “Service Tool and Display” for PolyXeta®2.

Relevant standard parameters	Combustible gases	Oxygen
Meas. range	100 % LEL	0-25 % Vol
Alarm threshold 1	10 % LEL ↑	19 % Vol ↓
Alarm threshold 2	20 % LEL ↑	17 % Vol ↓
Hysteresis	2 % LEL	0.5 % Vol
Alarm 1	Not latching	
Alarm 2	Latching	
Alarm relay 1	Assigned to 1 and 2, energiezed, (Alarm OFF = Relay ON)	

Table 5.1: Relevant Standard Parameters

5.3 Running-in Characteristics

After switching on or after an internal reset of the microcontroller, the PX2 detector 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, the measurement operation starts. External intervention is not possible during this start routine.

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

Start	Status LED			Analog Output	Relays		Central Bus
	Power	Alarm	Fault		Alarm	Fault	
Diagnosis (~ 0,5 sec)				< 2 mA	OFF	Error[4]	Communication STOP
OK							
Warm-up period				< 2 mA	OFF	Error[4]	Communication STOP
OK							
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[8]	[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 5.2: 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.
[8] No influence on the analog signal if the Special Mode was triggered by the operator.

5.4 Functional Test

The functional test has to be carried out and documented in accordance with chapter 9.2 "Functional Control / Calibration and Adjustment".

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6 Operating Modes

The instrument must only be opened under gas-free and voltage-free conditions.

After completion of work, the instrument must be closed again. The cover has to be completely screwed in and secured with the locking screw against inadvertent loosening.

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 PX2 module or in the sensor head 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 sensor element starts the warm-up phase.

The warm-up is necessary for the gas sensing element in the sensor head to assume a stable state after return of the voltage without triggering a pseudo alarm. The duration of the warm-up phase depends on the type of sensor used and can be read from the tables 11.2, 11.4 or 11.6 “Sensor Specification” from the column “Warm-up periods”.

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 5.2 “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 sensor is continuously polled, checked for plausibility, output on the analog output and provided on the central bus. The gas concentration is displayed on the 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 ≥ alarm threshold and if exceeding, the alarm LED and the optional alarm relay are triggered. If the value falls below the alarm threshold minus the set hysteresis again, the alarm is automatically cancelled. With programmed self-hold function the alarm remains active until manual acknowledgment.

The instrument 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. Active dead band suppresses the 4-20 mA signal around the zero point. See chapter 12.5 "Deadband".

If the measurement signal exceeds the zero point, 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.

High gas concentrations can use up the oxygen in sensors working according to the catalytic bead measuring principle. The result is a falling measurement signal because of the reduced gas combustion in the sensor. In this case it cannot be ensured that the measured signal is still correct, the sensor signal is unprecise. Therefore the following "latching" function is always active in catalytic bead sensors for combustible gases.

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In case of overrange, the gas warning device adopts the special mode until acknowledgment with the following states:

- Alarm relay message: Relay in alarm status (if assigned)
- Fault signal relay: Relay in the error status
- Analog output: > 21.2 mA
- Indication on display: Overrange / status LED red
- Field bus: Overrange

When a very high gas concentration has occurred, the sensitivity and zero point of the sensor head may be different even days later. Therefore in this case, you have to check the zero point and the sensitivity of the sensor immediately after the event as well as a few days later and, if necessary, to recalibrate them.

6.2.1 Alarm Acknowledgement

The acknowledgement of the function "Latching" requires that after the alarm has been triggered, the gas-free state has to be ensured with additional measures (for example, portable handset that has already been turned on outside the danger zone). Only after having ascertained that there is no more gas present, you are allowed to reset the pending alarm only locally on the device having released the alarm by manually pressing (5 sec.) the internal button (fig. 4.1) or by activating the "ESCAPE" button on the optional display or the external service tool. The reset may also be made on the optional remote control unit.

6.3 Special Mode

The operator may set the instrument 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 conditions 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 PX2 gas detector takes the special mode in the following cases:

- Internal device fault
- Measurement signal exceeds or falls below limit < 6 % > of reading signal
- 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.

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6.4 Faults

The PX2 detector 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 PX2 device into the safe mode "Fault" in case of an internal or external error. The following table 6.1 shows all possible errors, possible causes, the related troubleshooting and the resulting device status.

When the cause of the error has been eliminated, the PX2 gas detector 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.
Sensor Head (SX1)							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
Operating volt.< 18.5 V> 36.5 V						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				0x8 100 h	Underrange
Meas. value > 106 % of range				> 21,2 mA		0x8 200 h	Overrange
	Gas concentration > meas. range	See 6.2					
Maintenance due	Maintenance date reached	Perform maintenance	No effect		Mainten. message	0x8 080 h*	Maintenance
I / O Unit (PX2)							EP1-
Temperature < -25 °C > +60 °C	Ambient temp.	Temp.!	Error	< 2 mA	Error code is sent	0x8 040 h	Overtemp.
Measured value processing	Internal	Replace PX2 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 SX1 ≠ 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		0x8 020 h	I/O error
	Internal	Replace PX2 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 SX1 sensor head					
Hardware Watch Dog triggered	Internal, < system voltage, µC defect.	Replace PX2 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 PX2 device					
Maintenance due	Maintenance date reached	Perform maintenance	No effect			0x8 080 h*	Maintenance
Special Mode	See chapter "Special Mode"	Cancel cause of Special Mode	Error	< 2 mA**	Comm. STOP	0x8 000 h	

Table 6.1: Error messages

* Is only faded in if an error code is pending.
** No influence on the analog signal if the Special Mode was triggered by the operator.

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7 Notes on Usage

7.1 Ambient Conditions

The PX2 gas detector series is intended for continuous, fixed monitoring of gas-air mixtures under atmospheric conditions.

The PX2 gas detector series is marked with the device category II 2 G and thus approved for use in hazardous areas of zones 1 and 2.

The PX2 gas detector series is approved for an oxygen-enriched atmosphere of maximum 25% vol. oxygen.

Permitted ambient temperature range for version without display: -25 ° C < Ta < +60 ° C

Permitted ambient temperature with display: -20 °C <Ta <+60 °C

Permitted ambient humidity range: 20 to 90 % RH non-condensing. With a humidity level above this limit, reliable gas detection is no longer guaranteed. A functional test according to Chapter 9.2 has to be carried out then.

Operating pressure range: 800 to 1200 mbar ¨

Flow speed: 0 to 6 m/s. Use a special wind screen for stronger air flow.

Mounting position: wall mounting with the sensor downwards to prevent dust and liquids from clogging the gas inlet.

The PX2 gas detector must not be exposed to direct sunlight to avoid overheating.

High concentrations of certain compounds may contaminate the sensor when used for a longer period. In environments contaminated with such substances, calibration has to be performed more frequently to ensure reliable operation.

Dust deposits at the gas inlet can significantly extend the response time. Therefore check the device regularly for dust deposits and clean it, if necessary. In addition, a functional test according to Chapter 9.2 should be carried out after cleaning.

During painting, care should be taken that the gas inlet is not clogged with paint deposits. Emissions of colours, such as solvents, etc. can affect the performance of the sensor or damage the sensor completely. Therefore, we recommend sealing the gas inlet when painting.

After exposure to silicones, silicates, silanes, to substances containing chlorine, iodine, bromine and fluorine and to halides the performance of catalytic sensors for combustible gases can be seriously affected or it can even lead to total failure of the sensor.

In order to get correct measurement results of the combustible gases, an oxygen concentration of more than 10 vol. % is necessary. Oxygen concentrations > 21 vol. % can affect the reading.

If combustible gas sensors are exposed to concentrations exceeding the measuring range, the reduced oxygen concentration leads to a falling measurement signal, although gas may still be present. See in chapter 6.2 Overrange of catalytic bead sensors. Only if you can prove with a gas measuring device that is independent from the affected PX2 detector that there is no more gas present, you are allowed to acknowledge the alarm.

If combustible gas sensors are exposed to concentrations exceeding the measuring range, you have to perform calibration immediately irrespective of the calibration interval.

The life time of toxic gases sensors will shorten when they are exposed to concentrations beyond the measuring range. If so, the sensor requires a recovery period.

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Depending on the type of built-in sensor head the PX2 gas warning device is used for:

- Monitoring of combustible gas-air and vapour-air mixtures below the **L**ower **E**xplosion **L**imit (LEL).

Series PX2-X-X-X**34**XX-A

- Monitoring of the ambient air to detect toxic gases according to the built-in sensor head.

Series PX2-X-X-X**11**XX-X

- Monitoring of oxygen deficiency or enrichment or inerting.

Series PX2-X-X-X**1195**-X

7.2 Further Notes and Restrictions

The maximum operating voltage and the terminal voltage of the relays have to be limited to 30 V by adequate measures.

The maximum switching current of the two relay contacts should be limited to 1 A by appropriate external measures.

Concerning the cable specification, the details of the cross-sections and lengths in the table 4.1 Cables must strictly be followed.

Repairs to pressure-resistant slits are not intended and lead to the immediate loss of the type approval for the pressure-resistant casing.

8 Functional Safety / SIL

If outputs are used as a safety feature, special conditions must be observed. They are described under this point and must be strictly observed.

The measuring cycle interval is < 100 ms. The status of the outputs is updated after each measuring cycle.

Error Definition:

DU = (Dangerous Undetected) Dangerous, undetected error

A negative measurement error of the sensor head of > 10 % of the measuring range is defined as a dangerous error.

DD = (Dangerous Detected) Dangerous, detected error

If an error is detected by the internal diagnostic measures and leads to a safe initial state (fault relay, 2 mA error signal of the analog output, central bus communication stopped), it is defined as detected error.

SD / SU = (Safe Detected / - Undetected) Detected / Undetected error without significant influence

Errors setting the output/s to a safe state, or with no or negligible influence on the device.

8.1 Safety Function Analog Output Signal 4 – 20 mA

The connected evaluation unit monitors the 4- 20 mA output signal if it is < 3 mA or > 21.2 mA.

It is necessary to always check the 4- 20 mA output signal during calibration.

When using the analog output as a safety-related output, you aren't allowed to change the following parameters in the menu "System parameters".

When the deadband is active, the 4-20 mA signal is suppressed around the zero point. See chapter 12.5 "Deadband".

System Parameters		MP Parameters	
Mode:	100	Assignment:	AO 1i
Source:	C (Current Value)		
Mode:	Max		

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Zero-point	4 mA
Full scale value	20 mA
Tolerable[1] underrange	3.0 to 4 mA
Tolerable[1] overrange	20.0 to 21.2 mA
Error overrange	> 21.2 mA (doesn't lead to a 2 mA signal)
Fault and special mode	2 mA
Processor and power failure	< 1 mA

Table 8.1: Range limits of the analog output

[1]Within the specified limits, the measuring signal is carried along; an error is detected if the signal is below (<3 mA) (fault relay reset, AO = 2 mA). An error is also detected, if the signal is above (> 21.2 mA), but the AO remains ≥ 21.2 mA.

Safety-relevant parameters for the PX2 detector

	PX2 & SX1-34XX (combustible gases**)**	**PX2 & SX1-11XX** (toxic gases and oxygen)
Safety function	From gas inlet to analog output	
Measuring range	0 – 100 % LEL	Depending on the gas type
SIL	2	
HFT	0	
TYP	B	
Architecture	1oo1	
PFD	9.26E-05	9.26E-05
SFF	98.25 %	98.25 %
DU	12.6 FIT	12.6 FIT
DD	507.6 FIT	507.6 FIT
SU	199.0 FIT	199.9 FIT
SD	520.2 FIT	520.2 FIT
Proof test interval	≤ 1 year	
MTTR	72 hours	
T1	12 weeks	

Table 8.2: SIL parameters - analog output

8.2 Safety Function Relay Outputs for Operation as a Stand-alone Gas Detector

When using the alarm relays as safety-related output you must also use the fault relay and connect it to a manned station. This is essential in order to detect a device failure and take appropriate measures.

The fault relay is energized during normal operation and the contact is closed. Only the make contact is available at the terminals.

The relay contacts have to be protected against a load > 60 % of the indicated maximum contact current by appropriate external measures.

The maximum contact voltage of the relays has to be limited to 30 V by adequate measures.

When used for safety related warnings the alarm relay must be energized during normal operation, no alarm, (energized mode).

When using the alarm relays as safety-related output, you must use the following parameters.

Relay Parameters		MP Parameters	
Mode:	Used	Alarm threshold	Depending on the gas type & range
Relay mode:	Energized	Evaluation:	Current value
Function:	Static	Alarm delay at ON	0 sec.
Signal source:	Local	Average mode	No
Alarm trig. quantity:	1	Latching	(compulsory 1 for combustible gases)
Function horn:	No	Assignment alarm relay	1

The alarms states of the PX2 warning device, including the alarm relay and the fault relay must always be checked during the calibration.

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Safety-relevant parameters for the PX2 detector

	PX2 & SX1-34XX (combustible gases**)**	**PX2 & SX1-11XX** (toxic gases and oxygen)
Safety function	From gas inlet to relay outputs	
Measuring range	0 – 100 % LEL	Depending on the gas type
SIL	2	
HFT	0	
TYP	B	
Architecture	1oo1	
PFD	2.13E-04	2.13E-04
SFF	94.96 %	94.96 %
DU	39.6 FIT	39.6 FIT
DD	518.8 FIT	518.8 FIT
SU	226.5 FIT	226.5 FIT
SD	558.3 FIT	558.3 FIT
Proof test interval	≤ 1 year	
MTTR	72 hours	
T1	12 weeks	

Table 8.3: SIL parameters - relay output

8.3 Safety Function Central Bus for Operation as a Stand-alone Gas Detector

When using the central bus as safety-related output you must also use the fault relay of the central controller and connect it to a manned station. This is essential in order to detect a device failure and take appropriate measures.

When using the central bus as safety-related output you must employ a SIL 2 certified controller. The function of the central bus must be monitored by the controller.

When using the central bus as safety-related output you must always check the related outputs of the gas warning controller during calibration.

	PX2 & SX1-34XX (combustible gases**)**	**PX2 & SX1-11XX** (toxic gases and oxygen)
Safety function	From gas inlet to central bus output	
Measuring range	0 – 100 % LEL	Depending on the gas type
SIL	2	
HFT	0	
TYB	B	
Architecture	1oo1	
PFD	9.41E-05	9.41E-05
SFF	98.25 %	98.25 %
DU	12.7 FIT	12.7 FIT
DD	520.5 FIT	520.5 FIT
SU	19.1 FIT	195.1 FIT
SD	533.2 FIT	533.2 FIT
Proof test interval	≤ 1 year	
MTTR	72 hours	
T1	12 weeks	

Table 8.4: SIL parameters – central bus

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8.4 SIL Conditions

The application instructions and restrictions of this user manual must be considered. Regional and national regulations for calibration and maintenance must be observed.

The simultaneous use of the 4-20 mA signal and the alarm relay for safety related warnings will not lead to an increased SIL level.

Defective PX 2 gas warning equipment shall be repaired within 72 hours.

For safety-related warnings you also have to employ the fault relay unless the 4- 20 mA signal is solely used for safety-related warning.

Take care to avoid the contamination of the combustible gas sensor with catalytic poisons. If there is a higher risk, it is required to shorten the calibration intervals.

During commissioning you have to carry out a functional test with test gas for the complete system.

Perform a monthly visual inspection.

It is required to check the whole system (Proof Test) according to section 9.3 once a year.

Use zero gas with synthetic air (20 % O_2, rest is N) for zero point test and calibration.

The test gas used at a concentration in the middle of the measuring range must correspond with the gas that is measured with the PX2 warning device.

The maximum calibration interval depends on the monitored gas and thus on the type of sensor head as well as on the ambient conditions.

Replace the sensor head by an original sensor head when the sensitivity is < 50 % during operation.

If the sensor for combustible gases is exposed to a concentration higher than the measuring range, you have to perform calibration irrespectively from the calibration interval at once and a sensitivity test after 24 hours.

The life time of toxic gases sensors will shorten when they are exposed to concentrations above the measuring range. If so, the sensor requires a recovery period.

8.5 Proof Test

At least once a year the entire safety sequence must be checked in order to detect and fix undetected dangerous errors that may have occurred in the meantime.

The proof test must be carried out according to description in section 9.3.

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9 Maintenance and Service

It is obligatory to perform maintenance regularly in order to maintain safety, measuring and warning functions of the PX2 gas detector. 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 PX2 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 certificate.

It is essential to comply with the requirements of EN 60079-29 Part 2 (gas detectors - selection, installation, use and maintenance of apparatus for the measurement of combustible gases and oxygen) for maintenance and servicing.

The opening of the gas warning device results in the cancellation of the explosion protection. In the case of calibration, the general instructions in chapter 4.1 must be strictly followed.

9.1 Visual Inspection

A trained person may carry out the visual inspection which includes at least the following activities:

-- Check the PX2 gas detector including the gas inlet for mechanical damage.

-- Check the gas inlet of the measuring head for dust, dirt and moisture deposits.

-- Check the locking screw of the cover if placed firmly and correctly.

-- Check the operational and status messages of the gas warning devices with displays.

- Operation indication: green LED = ON
- Alarm indication: red LED = OFF (no alarm
- Fault indication : yellow LED = OFF (no fault)

Keep a report about the visual inspection, containing the identification of the gas detector, any defects found and measures taken as well as the date and the name of the person responsible for the visual inspection.

9.2 Functional Control / Calibration and Adjustment

Only a qualified technician must perform the functional tests containing at least the following activities:

Applying the test gas causes the adjustment of the current signal at the analog output and the triggering of the alarm relay. Connected actuators are put on alert.

-Visual inspection according to chapter 9.1

- Check zero-point[1]:
  - Apply zero gas. If the measured value on the display or - for versions without display - on the service tool is outside the permissible range[2], you have to perform the zero calibration.
- Check sensor sensitivity[1]:
  - Apply test gas. If the measured value on the display or - for versions without display - on the service tool is outside the permissible range[2], you have to perform the gain calibration.
- Check response time:
  - Apply test gas. Check the reaction time until the alarm is triggered. If the response time is longer than specified in the table Sensor Specification in the column "Response Time", the sensor head must be replaced.

[1] For warning devices without display, the analog output can alternatively be used for the control of the measured values. The determination of the current signal in relation to the test gas concentration used must be according to the formula [1]. If the measured value (current signal) is outside the permissible range[2], calibration is required.

[2] See Table 11.1, 11.3., 11.5 “Max. Ambient Conditions"

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- Check alarm relay: (Only necessary if the alarm relay is used)
    - Apply test gas with a concentration ≥ of the set alarm threshold. The alarm relay must change into the alarm status and the actuated device goes into alarm.

-- Check analog output: (Only necessary if the analog output is used)
    - Apply test gas. Check the proper reaction of the connected actuator.

-- 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.

9.3 System Check / Proof Test

Measuring and testing equipment used within of the proof test (multimeters, etc.), must be in a proper state. To meet this requirement, the measuring devices have to be calibrated at regular intervals.

The system control has to be carried out by a qualified person at least every 12 months and includes at least the following activities:

- Visual inspection according to chapter 9.1

- Functional check according to chapter 9.2

- Check the relevant parameters for deviations:

    - Alarm threshold(s)
    - Assignment and activation of alarm relays
    - Gas type
    - Measuring range

- Check 4-20 mA output signal: only when current signal is used in the application.

    - Status Fault = < 2 mA:
      Activate the special mode on the display or service tool. The connected evaluation unit must recognize and output the error status.

    - Linearity and accuracy:
      The set value of the analog output signal is determined in dependence of the test gas concentration and the measurement range according to the formula [1].

      Apply test gas: The connected evaluation unit must react according to the current signal calculated with the formula [1].

- Check fault relay:

    - Activate the special mode on the display or service tool. The fault relay changes into the alarm status and the connected fault indication unit must report an alarm.

The system check must be documented by a protocol stating at least:

Identification of the gas detector and the downstream safety equipment, type and concentration of the zero gas and test gases used, display before and after calibration with zero and test gas, parameter deviations from the set values, response time, deficiencies fixed and measures started, as well as the date and name of the person responsible for the system check.

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Calculation of current signal at analog output, depending on the test gas concentration for combustible gases:

Set-point of current signal: (16 mA / measurement range * test gas concentration * factor ZP) + 4 mA [1]

If the current signal differs by ± 0.2 mA from the calculated set point [1], calibration is required.

ZP factor: conversion factor for replacement calibration (target gas / test gas)
Test gas concentration - actual concentration of the test gas

9.3.1 Necessary Equipment and Gases

Gas application kit: Cal01_PX2

Magnetic pen for menu operation: MSR_Pen_PX2, for version with display

Service Tool STL06_PX2 or EasyConf Software PCE06-PX2, for version without display

Kit for withdrawal of gas consisting of flow meter/indicator and pressure regulator/indicator

Calibration of combustible and toxic gases
Zero gas: Synthetic air (20 % O_2, 80 % N, < 10 % RH)
Test gas: Concentration depending on gas type according to table 11.2, 11.4 or 11.6, column Test Gas. Relative measurement inaccuracy ± 2 %, rest is synthetic air < 10 % RH.

Calibration of oxygen
Zero gas: Nitrogen (99,9 % N), < 10 % RH
Test gas: Oxygen concentration (15 – 21 Vol, rest is N, < 10 % RH)

9.4 Calibration

A routine for comfortable zero and gain calibration is integrated in the PX2 gas detector. In the version with built-in display the dialog takes place directly on the display surface. In the version without display the dialog is done via service tool or PC software.

The dialog management on the screen and on the Service Tool are identical and shown in the description PolyXeta 2 STL-06; the dialog management of the PC software can be read in the user manual DGC06_EasyConf.

The test gas is applied until the display indicates a stable value.

The actual calibration process is identical for all three versions.

The zero point and gain calibration do not affect each other.

9.4.1 Preliminaries

The PX 2 warning device including the sensor head has to be continuously powered with the operating voltage before calibration in order to get stable conditions. The run-in period depends on the type of sensor and is shown in table 11.2, 11.4 or 11.6 Sensor Specification.

You have to activate the special mode before calibration.

In special mode new alarms are suppressed and there is no gas monitoring.

If there are no operating commands for more than 15 minutes, the PX2 unit exits the special mode automatically.

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9.4.2 Calibration Procedure

- Screw the calibration adapter onto the sensor head as far as it will go.
- Open the calibration mode in the dialog.

Zero Calibration

- Open the zero calibration dialog.
- Apply the zero gas. Pressure 1000 hPa (1000 mBar) ± 10 %, flow rate according to table 11.2, 11.4 or 11.6 Sensor Specification.
- Perform the zero calibration.
- Save the new values after successful zero point calibration.

Gain Calibration

- Open the test gas dialog and enter the concentration of the test gas used.

  If the calibration gas isn't the same as the target gas (substitute calibration for combustible gases), you have to enter the concentration converted to the target gas. (ZP factor according to table 11.2, Sensor Specification)

- Open the gain calibration dialog.
- Apply the zero gas. Pressure 1000 hPa (1000 mbar) ± 10%, flow rate according to table 11.2, 11.4 or 11.6 Sensor Specification
- Perform the gain calibration.
- Save the new values after successful gain calibration.

It is required to document the successful calibration with a protocol and to attach a label to the detector containing the date for the next calibration.

9.5 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.

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10 Exchange of Sensor Head

Instead of performing a field calibration you can simply and comfortably replace the sensor head in the field by a calibrated one. At the end of sensor life time it is the same procedure.

10.1 General Notes

The instrument must only be opened under gas-free and voltage-free conditions.

No insulating sealing material must be poured into the NPT ¾ "threads of the cable glands because the potential equalization between housing and cable gland is via the thread.

The sensor head must be tightened with a M24 wrench with a torque of 90 Nm. Only when doing so you can ensure the required tightness.

After completion of work, the gas warning device must be closed again. The cover has to be completely screwed in and secured with the locking screw against inadvertent loosening.

10.2 Exchange of Sensor Head

- Select Special Mode.
- Disconnect the sensor head plug in the housing and stretch the cord so that it can follow the rotation of the sensor head.
- Loosen the sensor head with a wrench (M24).
- Unscrew the sensor head carefully; stretch the cable slightly at the same time so that it can follow the rotation.
- Take the new sensor head out of the original packaging.
- Check gas type and measuring range for conformance.
- Check calibration protocol and date for validity.
- Insert the cable of the sensor head into the housing and stretch it slightly.
- Screw the sensor head carefully in; stretch the cable slightly at the same time so that it can follow the rotation.
- Tighten the sensor head firmly with a M24 wrench (torque of 90 Nm).
- Plug the sensor head in again; the communication of sensor head <> I / O board then will start automatically and will be checked for validity.
- Exit special mode.
- The internal diagnostic checks the new sensor head for gas type, measuring range and valid calibration status. If they match, the measurement mode will start automatically.

The replacement of the sensor head is a security relevant intervention requiring the recommissioning of the gas detector.

10.3 Recommissioning

You have to perform the recommissioning after a safety-related intervention, e.g. exchange of the sensor head.

During recommissioning you have to carry out and document all steps according to the chapters 5.1 to 5.4 incl. a functional test.

10.4 Send Sensor Head Back for Calibration

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11 Sensor Specification

11.1 Combustible Gases

The sensor for combustible gases works according to the catalytic bead principle. The sample gas diffuses through the sintered metal into the sensor measuring chamber containing an active and a passive sensor element. The sample gas burns on the heated, active sensor element and provokes an increase in temperature by the oxidation process. This change in temperature causes a proportional change in the electrical resistance that can be taken as a measure of the gas concentration. The passive sensor element is exposed to the same environmental conditions as the active sensor element and acts as a compensation of environmental influences such as temperature changes etc.

Gas measured	Combustible gases and vapours
Measuring range	100 % LEL
Temperature range max. signal change (basis 20 °C)	-25 °C to +60 °C ± 5 % of range or ± 15 % of reading
Humidity range max. signal change (basis 50 % RH)	20 to 90 % RH (not condensing) ± 5 % of range or ± 30 % of reading
Pressure range max. signal change (basis 100 h Pa)	80 to 120 k Pa ± 5 % of range or ± 30 % of reading
Flow speed: Incl. wind shield max. signal change	0 to 3 m /s Up to 6 m/s ± 5 % of range or ± 10 % of reading

Table 11.1: Maximum ambient conditions of sensors for combustible gases

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Sensor head	CAS No.	Target gas		Test gas	Factor ZP[2]	Relative sensitivity[2]		LEL/ %v/v[6]	Admissible range for calibration				Re-action time[3]	Re-sponse time ↑ t_{90} [4]	Re-sponse time ↓ t_{90} [4]	Run-in time [5]	Flow rate	Warm-up time
		Meas. range	Gas type	Range					Value indication		4- 20 mA signal							
									Zero	Gain	Zero	Gain						
SX1-		% LEL		% LEL		Methane	Prop.		% LEL	Test gas	(mA)		Sec	SX1-		% LEL		
P3400-A	74-82-8	0 - 100	Methane[1]	40 - 60	1.0	1.00	1.54	4.40	0 - 1	± 3 %	3.8-4.2	± 0.2 mA of set value	30	< 16	< 27	96	500	110
P3480-A	74-98-6		Propane[1]	20 - 40	1.4	0.70	1.00	1.70		* 1.4 ± 3 %			30	< 31	< 42	96	500	110
P3435-A	110-54-3		Hexane[1]	20 – 40	2.0	0.50	0.77	1.00		* 2.0 ± 3 %			30			96	500	110
P3440-A	1333-74-0		Hydrogen[1]	40 - 60	1.11	0.90	1.38	4.00		* 1.11 ± 3 %			30	< 10	< 15	96	500	110
P3475-A	109-66-0		Iso/n-Pentane[1]	20 - 40	2.22	0.45	0.70	1.40		* 2.22 ± 3 %			30			96	500	110
P3473	79-20-9		Methyl acetate	20 - 40	1	--	--	1.70		± 3 %			30			96	500	110
P3410-A	74-85-1		Ethylene[1]	40 – 60	1	--	--	2.30		± 3 %			30			96	500	110
P3460-A	106-97-8		Iso/n-Butane[1]	20 - 40	1	--	--	1.50		± 3 %			30			96	500	110
P3408-A	7664-41-7		Ammonia		1	--	--	15.4		± 3 %			30	< 20	< 60	96	500	110
P3427-A	141-78-6		Ethyl acetate[1]	20 - 40	1	--	--	2.00		± 3 %			30			96	500	110
P3402-A			LPG	20 - 40	1	--	--	1.70		± 3 %			30			96	500	110
P3482-A	67-63-0		Iso/Propyl alcohol[1]	15 - 25	1	--	--	2.00		± 3 %			30			96	500	110
P3490-A	108-88-3		Toluene[1]	15 - 25	1	--	--	1.00		± 3 %			30			96	500	110
P3485-A	67-64-1		Acetone[1]	20 - 40	1	--	--	2.50		± 3 %			30			96	500	110
P3425-A	64-17-5		Ethanol	20 – 30	1	--	--	3.10		± 3 %			30			96	500	110
P3450-A	67-56-1		Methanol	40 - 60	1	--	--	6.00		± 3 %			30			96	500	110
P3458-A	78-93-3		MEK	20 - 30	1	--	--	1.50		± 3 %			30			96	500	110
P3491-A	142-82-5		n-Heptane	20 - 40	1	--	--	1.05		± 3 %			30			96	500	110
P3496-A			Petrol vapours	20 - 40	1	--	--	1.10		± 3 %			30			96	500	110

Table 11.2: Sensor specifications of combustible gases

[1] Certified according to EN 600079-29-1 by DEKRA EXAM GmbH.
[2] The cross-sensitivity may vary depending on the sensor types in a range of ± 8 %. The indicated values are only valid for new sensors.
[3] Time up to which a predetermined reaction (display of reading or alarm) of the gas warning device can be observed
4 Specifications for Methane, Propane und Hexane; for other gases there may be longer periods. The values are only valid for new sensor heads. The response time of the entire system results from the response times of all parts of the overall system.
[5] Time the sensor needs to be supplied continuously with the operating voltage before calibration.
[6] Source: EN 60079-20-1

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11.2 Oxygen

The sensor works according to the principle of a galvanic fuel cell. The sample gas diffuses through the sintered metal into the measuring cell and reaches the cathode. Anode and cathode are in electrical contact, therefore, due to the oxidation, electric current flows that is proportional to the oxygen partial pressure. The current is evaluated by the subsequent measuring amplifier and converted into a linear output signal. The electrolyte, the cathode material and the composition of the anode are designed so that the oxygen diffusing towards the cathode is electrochemically reduced. The electrochemical process causes the electrolyte to be used up by and by. Therefore the sensor life is limited.

Sample gas	Oxygen
Measuring range	25 Vol %
Temperature range Max. signal change (basis 20 °C)	-25 °C to +60 °C ± 5 % meas. range or ± 0.5 Vol % of reading
Humidity range Max. signal change (basis 50 % RH)	20 to 90 % RH (not condensing) ± 2.5 % meas. range or ± 0.2 Vol % of reading
Pressure range Max. signal change (basis 100 k Pa)	80 to 120 k Pa ± 2.2 % meas. range or ± 0.2 Vol % of reading
Flow speed: With wind shield Max. signal change	0 to 3 m /s to 6 m/s ± 2.5 % meas. range or ± 0.2 Vol % of reading

Table 11.3: Max. ambient conditions for sensors detecting oxygen

Sensor Head	Target Gas		Test Gas		Factor	Admissible Range for Calibration				Reaction time	Run in time[2]	Flow rate	Warm up time	Response time t_{90}			
	Meas. Range	Gas Type		Range	ZP	Reading		4- 20 mA Signal									
						Zero	Gain	Zero	Gain					↑ t_{20}	↑ t_{90}	↓ t_{20}	↓ t_{90}
SX1-	Vol %			Vol %		Vol %	Test Gas	(mA)		Sec.	h	ml/min	Sec.↑	Sec.			
E1195-A[1]	0 - 25	Oxygen		15-21	1	± 0.1	± 0.2 Vol%	3.8-4.2	< ± 0.2 mA of set value	30	24	500	20	< 6	< 22	< 6	< 16

Tab. 11.4: Sensor specifications oxygen

[1] Certified according to EN 50104.
[2] Time the sensor needs to be supplied continuously with the operating voltage for stabilisation before calibration. The response time of the entire system results from the response times of all parts of the overall system.

[3] The values are only valid for new sensor heads.

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11.3 Toxic Gases

The built-in sensor is a sealed electro-chemical cell with three electrodes, sensing, counter and reference. The ambient air to be monitored diffuses through the sintered metal into the liquid electrolyte of the sensor. The chemical process of the measurement is an oxidation where one molecule of the target gas is exchanged for one molecule of oxygen. The reaction drives the oxygen molecule to the counter electrode. This leads to a current signal (nA) between the sensing and reference electrodes. The current signal is linear to the concentration of present gas, is evaluated by the connected measuring amplifier and converted into a linear output signal. Electrochemical processes lead by-and-by to a loss of sensitivity. Therefore regular calibration of zero-point and gain is necessary.

Sample gas	Toxic gases and vapours, see table
Measuring range	ppm (see table)
Temperature range Max. signal change	-25 °C to +60 °C ± 5 % meas. range or ± 15 % of reading[2]
Humidity range Max. signal change	20 to 90 % RH (not condensing) ± 5 % meas. range or ± 30 % of reading[2]
Pressure range Max. signal change	800 to 1200 k Pa ± 2.2 % meas. range or ± 0.2 30 % of reading[2]
Flow speed: With wind shield Max. signal change	0 to 6 m /s to 6 m/s ± 5 % meas. range or ± 10 % of reading[2]

Table 11.5: Max. ambient conditions for sensors for toxic gases

Sensor Head	Target Gas	Test Gas		Factor	Admissible Range for Calibration				Reaction time	Run in time[1]	Flow rate	Warm up time	Response time ↑ t_{90} [2]	Response time ↓ t_{90} [2]
	Meas. Range	Gas Type	Range	ZP	Reading		4- 20 mA Signal							
					Zero	Gain	Zero	Gain						
SX1-	ppm		ppm		ppm	Test Gas	(mA)		Sec.	Hours	ml/min	Sec.	Sec.	
E1110-H	0 - 500	Carbon Monoxide	200-300		0 - 10				30	72	500	20	< 25	< 40
E1125-A	0 - 100	Ammonia	40 - 60		0 - 2				30	120	500	20	< 200	< 200
E1125-B	0 - 200	Ammonia	80 - 120		0 - 3				30	120	500	20	< 200	< 200
E1125-D	0 - 1000	Ammonia	400 600		0 -10				30	120	500	20	< 200	< 200
E1129-C	0 - 100	Nitrogen Monoxide	40 - 60		0 - 2			< ± 0.2	30	120	500	20	< 25	< 40
E1130-B	0 - 20	Nitrogen Dioxide	8 - 12	1	0 - 0.5	± 3 %	3.8 - 4.2	mA of	30	120	500	20	< 160	< 140
E1189-C	0 - 200	Ethylene	80 - 120		0 - 2			set value	30	120	500	20		
E1193-B	0 - 5	Chlorine	2 - 4		0 - 0.2				30	120	500	20		
E1193-D	0 - 20	Chlorine	8 - 12		0 - 0.5				30	120	500	20		
E1196-B	0 - 20	Sulphur Dioxide	8 – 12		0 - 0.2				30	120	500	20		
E1197-A	0 - 50	Hydrogen Sulphide	20 - 30		0 - 0.5				30	120	500	20	< 60	< 40

Table 11.6: Sensor specifications for toxic gases
[1] Time the sensor needs to be supplied continuously with the operating voltage before calibration.
[2] The values are only valid for new sensor heads. The response time of the entire system results from the response times of all parts of the overall system.

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12 Display

12.1 Assembly, Disassembly

For terminal connection and exchange of sensor head you have to dismount the display.
This work may be carried out only when the device is voltage-free.

Disassembly

- Open cover.
- Push the white retaining bracket upwards (arrow 1, red) and lift the display board slightly.
- Take the board left and right (arrow 2, blue) with two fingers (NOT BY THE FOIL) and pull it carefully to the front.
- Put the display board in a dry, clean and protected place.

Now you have access to the connector of the sensor head and can exchange it.

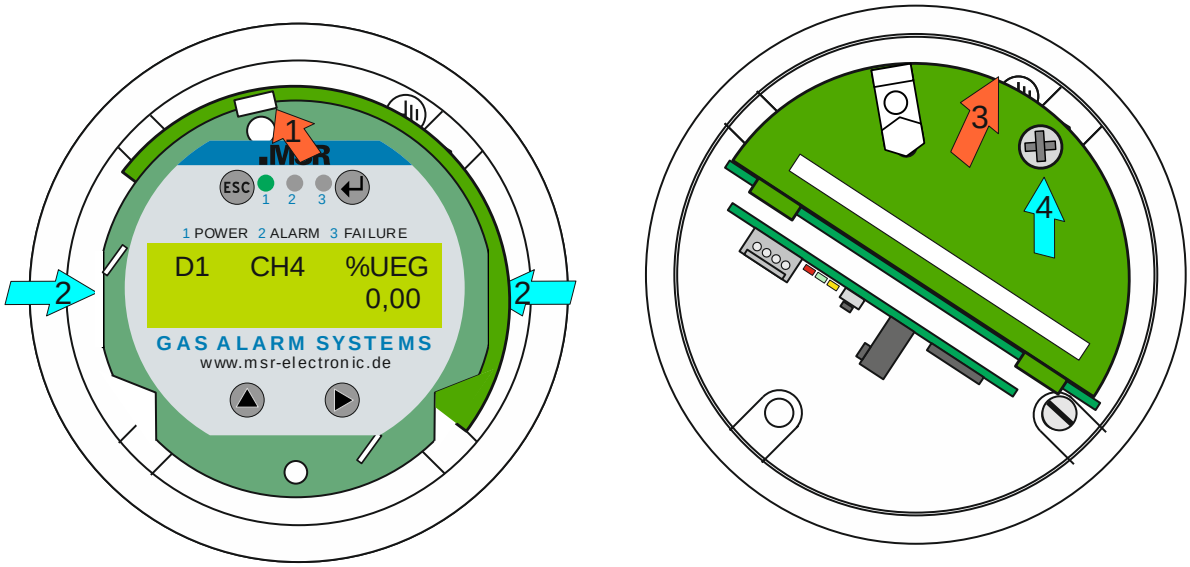
It is still necessary to dismount the cover and the mounting plate in order to connect the terminals.

- Unscrew the mounting screw (arrow 4, blue).
- Take cover plate by the retaining brackets, pull it a bit to the front and then push it to the top (arrow 3, red) until the plate leaves the two retaining slots.
- Put the plate in a safe place.

Assembly

- Hold cover plate to the front in a slight angle and insert the two brackets into the retaining slots above the terminals of the board as far as it goes.
- Push the board carefully inwards until it rests on the mounting bolt.
- Secure it with the screw (arrow 1 blue).

- Hold the display PCB horizontally above the transmitter circuit board, so that it fits with the hole in the mandrel of the white retaining bracket and with the two slots in the guide brackets.
- Press evenly and gently until the retaining bracket clicks into place.



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12.2 Status LED

The status LEDs indicate the operating state. See also section 5.3 Running-in characteristics.

Green:	Continuous:	= Operating voltage
	Flashing:	= Maintenance message
Yellow:	Continuous:	= Failure
	Slowly flashing:	= Warming-up
	Fast flashing:	= Special mode
Red:		=Alarm

The backlight of the display changes from green to red when an alarm is active.

12.3 Operation

Operation is done form the outside without opening the housing cover via the four control icons by moving the Magnet_Pen briefly over the respective control icon.

12.4 Menu

The device parameters and measured values can be read in the menu. Parameter changes and interventions are password protected and thus not possible for unauthorized persons. The menu navigation and functions are described in the User Manual PolyXeta®2 STL-06.

12.5 Deadband

The unwanted noise of the measured value around the zero point, caused by the basic drift of the sensor, can be suppressed by activating a deadband with a range of max. 5 % of the measuring range.

The suppression also affects the analog output, because the measured value must not assume a different display depending on the output.

When opening the calibration mode, the deadband function switches automatically off.

The deadband can be set in the System Parameters Menu in the range from 0 (dead band off) to max. 5. See User Manual of PolyXeta®2 STL-06.

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13 List of Spare Parts, Accessories

13.1 List of Spare Parts

Item	Sensor Head	Measuring Range	Order No.	Covered by test certificate
01	Methane (CH_4)	0 – 100 % LEL	SX1-X-P3400-A	Yes
02	LPG Liquefied Petrol Gas	0 – 100 % LEL	SX1-X-P3402-A	No
03	Ethylene (C_2H_4)	0 – 100 % LEL	SX1-X-P3410-A	No
04	Ethyl Acetate ($C_4H_8O_2$)	0 – 100 % LEL	SX1-X-P3427-A	Yes
05	n-Hexane (C_6H_{14})	0 – 100 % LEL	SX1-X-P3435-A	Yes
06	Hydrogen (H_2)	0 – 100 % LEL	SX1-X-P3440-A	Yes
07	Iso/n-Butane (C_4H_{10})	0 – 100 % LEL	SX1-X-P3460-A	No
08	Iso/n-Pentane (C_5H_{12})	0 – 100 % LEL	SX1-X-P3475-A	No
09	Propane (C_3H_8)	0 – 100 % LEL	SX1-X-P3480-A	Yes
10	Isopropyl Alcohol (C_3H_8O)	0 – 100 % LEL	SX1-X-P3482-A	Yes
11	Acetone (C_3H_6O)	0 – 100 % LEL	SX1-X-P3485-A	Yes
12	Toluen (C_7H_8)	0 – 100 % LEL	SX1-X-P3490-A	Yes
13	Ammonia (NH_3)	0 – 100 % LEL	SX1-X-P3408-A	No
14	Ethanol (C_2H_5OH)	0 – 100 % LEL	SX1-X-P3425-A	No
15	Methanol (CH_3OH)	0 – 100 % LEL	SX1-X-P3450-A	No
16	Methyl Ethyl Ketone (C_4H_8O)	0 – 100 % LEL	SX1-X-P3458-A	No
17	Methyl Acetate ($C_3H_6O_2$)	0 – 100 % LEL	SX1-X-P3473-A	No
18	Isobutyl Alcohol ($C_4H_{10}O$)	0 – 100 % LEL	SX1-X-P3468-A	No
19	n-Heptane (C_6H_{16})	0 – 100 % LEL	SX1-X-P3491-A	No
20	Petrol Vapours	0 – 100 % LEL	SX1-X-P3496-A	No

Table 13.1: Sensor head for combustible gases

01	Oxygen (O_2)	0 – 25 Vol %	SX1-X-E1195-A	Yes

Table 13.2: Sensor head for oxygen

01	Carbon Monoxide (CO)	0 – 500 ppm	SX1-X-E1110-H	No
02	Ammonia (NH_3)	0 – 100 ppm	SX1-X-E1125-A	No
03	Ammonia (NH_3)	0 – 200 ppm	SX1-X-E1125-B	No
04	Ammonia (NH_3)	0 – 1000 ppm	SX1-X-E1125-D	No
05	Nitrogen Monoxide (NO)	0 – 100 ppm	SX1-X-E1129-C	No
06	Nitrogen Monoxide (NO_2)	0 – 20 ppm	SX1-X-E1130-B	No
07	Ethylene (C_2H_4)	0 - 200 ppm	SX1-X-E1189-C	No
08	Chlorine (Cl_2)	0 – 5 ppm	SX1-X-E1193-B	No
09	Chlorine (Cl_2)	0 – 20 ppm	SX1-X-E1193-D	No
10	Sulphur Monoxide (SO_2)	0 - 20 ppm	SX1-X-E1196-B	No
11	Hydrogen sulphide (H_2S)	0 – 50 ppm	SX1-X-E1197-A	No

Table 13.3: Sensor head for toxic gases

Pos.	Display		Order Number	Covered by test certificate
01			PX2-X-2-XXXXX-X	Yes

Table 13.4 Display

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13.2 Accessories

Item	Description	Order No.	Covered by test certificate
01	Gas application kit for PolyXeta®2 sensor head series SX1, consisting of stainless steel adapter and Viton hose	Cal01_PX2	No
02	Magnetic Pen for contactless menu operation	MSR_Pen_PX2	Yes
03	Portable Service Tool for display, calibration and parameter changes	STL06-PX2-X7	No
04	PC Software Set for display, calibration, addressing and parameter changes	PCE06-PX2-XF	No
05	Cable gland for ATEX / IECEx protection type Ex d, zone 1, out of brass, with certificate	ZU-PX2-CG-SS	Yes
06	Cable gland for ATEX / IECEx protection type Ex n, zone 2, out of plastic PA	ZU-PX2-CG-PL	No
07	Dummy plugs PT ¾“ female thread, (ANSI B1.20.1) for closing not needed inlet holes, protection Ex d	ZU-PX2-CG-SP	Yes
08	Weather protection	On request	No
09	Calibration gases: Gas type and concentration in dependence of the sensor head type	On request, please specify the sensor head type	No
10	Gas withdrawal kit with flowmeter and pressure regulator Type depends on the bottle type and size	On request	No
11	Housing cover closed for enclosure type XD-JB85	On request	Yes
12	Housing cover with viewing window for enclosure type XD-JB85	On request	Yes

Table 13.5: Accessories

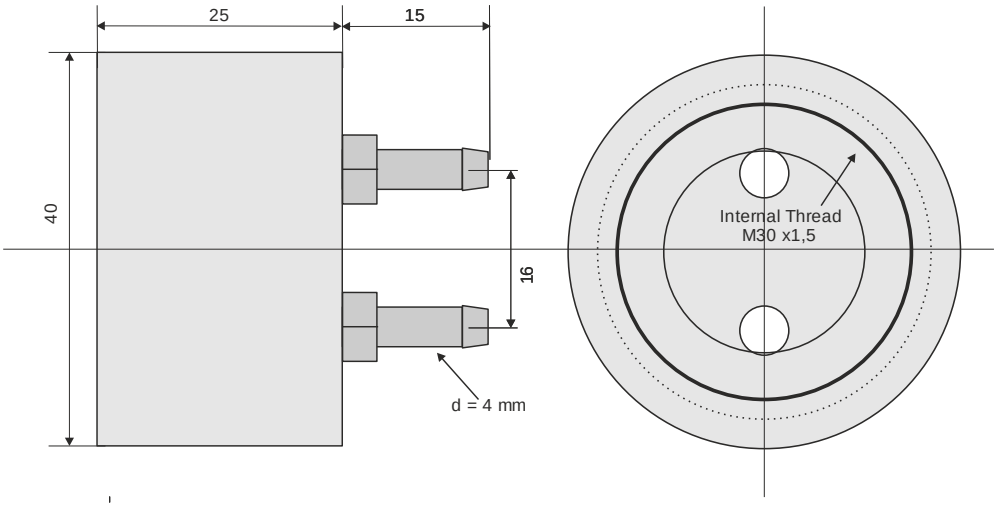

Fig.13.1: Calibration Adapter

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14 Specifications

Electrical	
Power supply	20 - 28 V DC. reverse polarity protected
Maximum supply current (for 24 V DC)	130 mA
Power consumption max.	3.3 W
Analog output signal 4-20 mA	Proportional, overload and short-circuit protected, max. load 500 Ohm. The max. load is the sum of the cable loop resistance and the input resistance of the actuator. Range limits: see table 8.1
Fault message relay (SPNC) Alarm relay (SPDT)	Max. 30 V AC / DC, 1 A Min. 12 V AC /DC, 0.1A
General (operation and explosion protection)	
Temperature range	-25 °C to +60 °C (-13 °F to 140 °F)
Humidity range	20 – 90 % RH not condensing
Pressure range	800 to 1200 mbar (80 to 120 kPa)
Storage conditions, also for spare parts and accessories	
Temperature range	-10 °C to +40 °C (14 °F to 104 °F)
Humidity range	40 - 70 % RH not condensing
Pressure range	800 to 1200 mbar (80 to 120 kPa)
Storage time	Max. 6 months
Serial interface central bus	
Transceiver	19200 Baud
Physical	
Gas warning device	
Housing / colour (Standard)	Aluminum die-cast / RAL 7032, epoxy coating
Additional CSA approval	Explosion proof Class I, Div 1, Groups A, B, C and D
Dimensions (W x H x D)	125 x 162 x 83 mm (4.92 x 6.38 x 3.27 in.)
Weight	Ca. 1.3 kg (2.87 lb.)
Protection class	IP 67
Cable gland	Standard 1 x, option 2 or 3 x NPT ¾“
Option: Housing / colour	Stainless steel 1.4401 / natural
Dimensions (W x H x D)	145 x 166 x 107 mm (5.71 x 6.54 x 4.21 in.)
Weight	Ca. 2.5 kg (5.51 lb.)
Protection class	IP 67
Cable entry	Standard 2 x NPT ¾“
Installation	Wall mounting
Terminal connection	Spring-type terminals 0.08 to 2.5 mm^2 AWG 28 - 12 (Ex e)
Sensor head	
Housing / colour	Stainless steel 1.44004 / natural
Dimensions (D x T)	30 x 56 mm (1.18 x 2.20 in.)
Weight	Ca. 0.15 kg (0.33 lb.)
Protection class	IP 64
Sinter Element Material: Min. density Dimensions (D x T) Max. pore size	 Stainless steel 1.4404 4.15 g/cm³ acc. to ISO 2738 18 x 6 mm 125 µm

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Approvals and certificates	
EC type examination certificates (electrical explosion protection)	BVS 15 ATEX E 129 X IECEx BVS 16 0038X
Ignition protection type	Ex d II C T4 -25 °C < Ta < +60 °C
Marking	II 2G Ex d IIC T4 Gb
Functional safety (SIL 2) acc. to DIN EN 61508:2011	Report No. 20160120 DEKRA EXAM GmbH
EMC testing	EN 50270-2015¨ interference immunity & interference emission: Type 2 (industrial use)
Warranty	1 year

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15 Type Examinations, Declarations of Conformity

(1) EG-Baumusterprüfbescheinigung

(2) Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen - Richtlinie 94/9/EG

(3) Nr. der EG-Baumusterprüfbescheinigung: **BVS 15 ATEX E 129 X**

(4) Gerät: **Gasmessgerät Typ PX2-1-.-....-. mit Sensorkopf Typ SX1..**

(5) Hersteller: **MSR-Electronic GmbH**

(6) Anschrift: **Würdingerstraße 27a, 94060 Pocking**

(7) Die Bauart dieses Gerätes sowie die verschiedenen zulässigen Ausführungen sind in der Anlage zu dieser Baumusterprüfbescheinigung festgelegt.

(8) Die Zertifizierungsstelle der DEKRA EXAM GmbH, benannte Stelle Nr. 0158 gemäß Artikel 9 der Richtlinie 94/9/EG des Europäischen Parlaments und des Rates vom 23. März 1994, bescheinigt, dass das Gerät die grundlegenden Sicherheits- und Gesundheitsanforderungen für die Konzeption und den Bau von Geräten und Schutzsystemen zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen gemäß Anhang II der Richtlinie erfüllt. Die Ergebnisse der Prüfung sind in dem Prüfprotokoll BVS PP 15.2221 EG niedergelegt.

(9) Die grundlegenden Sicherheits- und Gesundheitsanforderungen werden erfüllt durch Übereinstimmung mit

EN 60079-0:2012 + A11:2013 **Allgemeine Anforderungen**
EN 60079-1:2007 **Druckfeste Kapselung „d"**

(10) Falls das Zeichen „X" hinter der Bescheinigungsnummer steht, wird in der Anlage zu dieser Bescheinigung auf besondere Bedingungen für die sichere Anwendung des Gerätes hingewiesen.

(11) Diese EG-Baumusterprüfbescheinigung bezieht sich nur auf die Konzeption und die Baumusterprüfung des beschriebenen Gerätes in Übereinstimmung mit der Richtlinie 94/9/EG.
Für Herstellung und Inverkehrbringen des Gerätes sind weitere Anforderungen der Richtlinie zu erfüllen, die nicht durch diese Bescheinigung abgedeckt sind.

(12) Die Kennzeichnung des Gerätes muss die folgenden Angaben enthalten:

Ex II 2G Ex d IIC T4 Gb

DEKRA EXAM GmbH
Bochum, den 05.11.2015

Zertifizierungsstelle

Fachbereich

Seite 1 von 2 zu BVS 15 ATEX E 129 X
Dieses Zertifikat darf nur vollständig und unverändert weiterverbreitet werden.

DEKRA EXAM GmbH, Dinnendahlstraße 9, 44809 Bochum, Deutschland
Telefon +49.234.3696-105, Telefax +49.234.3696-110, zs-exam@dekra.com

(13) Anlage zur

(14) **EG-Baumusterprüfbescheinigung**
BVS 15 ATEX E 129 X

(15) 15.1 Gegenstand und Typ

Gasmessgerät Typ Typ PX2-1-.-....-. mit Sensorkopf Typ SX1..
Die Punkte in der Typenbezeichnung betreffen Bauartfestlegungen, die keinen Einfluss auf den Explosionsschutz haben.

15.2 Beschreibung

Das Gasmessgerät mit Sensor besteht aus einem Sensorkopf mit Sinterelement und einem Gerätegehäuse, beide ausgeführt in der Zündschutzart Druckfeste Kapselung „d". Es dient zum Aufspüren und Warnen vor brennbaren und toxischen Gasen in explosionsgefährdeten Bereichen in der Temperaturklasse T4.
Der Sensorkopf besteht aus einem Edelstahl Gehäuse mit eingebauter Elektronik und einem Pellistor – bzw. elektrochemischen Sensor hinter einem 6 mm breiten Sinterelement. Das Sinterelement gewährleistet die druckfeste Kapselung bei gleichzeitiger Messgaszufuhr. Auf der gegenüberliegenden Seite des Gehäuses werden durch eine Aderleitungsdurchführung mit Verguss die Anforderungen für die druckfeste Kapselung „d" erfüllt. Der Sensorkopf wird mit dem Gewinde NPT ¾", in ein druckfestes Gehäuse zur Aufnahme der Auswerteelektronik und der Klemmen zum Anschließen der Versorgungsspannung und Feldgeräte, eingeschraubt.

Auflistung aller verwendeten Komponenten mit älterem Normenstand

Gegenstand und Typ	Zertifikat	Normenstand
Gehäusemit Fenster Typ XD-JB85win	FTZU 05 ATEX 0262 U	EN 60079-0:2009 EN 60079-1:2007

15.3 Kenngrößen

Elektrische Daten

Bemessungsspannung	DC 16 -28 V / AC 18 V +/- 20 %, 50/60 Hz
Bemessungsstromstärke	DC 130 mA
Bemessungsleistung des Gehäuses	3,7 W
Bemessungsleistung des Sensorkopfes	1 W
Umgebungstemperaturbereich	-25 °C bis +60 °C

(16) Prüfprotokoll

BVS PP 15.2221 EG, Stand 05.11.2015

(17) Besondere Bedingungen für die sichere Anwendung

Die Messfunktion für den Explosionsschutz gemäß Anhang II, Absatz 1.5.5, der Richtlinie 94/9/EG ist nicht Teil dieser EG-Baumusterprüfung.

Die Spaltlängen der zünddurchschlagsicheren Spalte dieses Betriebsmittels sind teils länger und die Spaltweiten der zünddurchschlagsicheren Spalte sind teils kleiner als in Tabelle 2 von EN 60079-1:2007 gefordert. Bei Reparaturen der spaltbildenden Teile sind die Maße der Festlegung der Bauart der EG-Baumusterprüfbescheinigungen FTZU 05 ATEX 0262U mit den Nachträgen 1 bis 5 und FTZU 07 ATEX 0002U mit den Nachträgen 1 bis 3 einzuhalten.

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IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	IECEx BVS 16.0038X issue No.:0	Certificate history:
Status:	**Current**	
Date of Issue:	**2016-06-08** Page 1 of 4	
Applicant:	**MSR-Electronic GmbH** Würdingerstraße 27a 94060 Pocking **Germany**	
Electrical Apparatus: *Optional accessory:*	**Gas detector with sensor head type PX2-1-.-….-., sensor head type SX1..**	
Type of Protection:	**Equipment protection by flameproof enclosures "d"**	
Marking:	Ex d IIC T4 Gb	
Approved for issue on behalf of the IECEx Certification Body:	H.-Ch. Simanski	
Position:	Head of Certification Body	
Signature: *(for printed version)*		
Date:	8.6.2016	

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DEKRA
On the safe side.

Phone: 0049(0)8531/9004-0 Fax: 0049(0)8531/9004-54
MSR-Electronic GmbH, Würdinger Str. 27, D 94060 Pocking www:msr-electronic.de

ZERTIFIKAT

(1)

(2) Nummer des Typenzertifikates: **ZP/C022/16**

(3) Produkt: **PolyXeta2, ATEX/IECEX Zertifizierte Sensoren für Zone 1 und 2**
Gleiche Baureihe für Tox und Combustible Sensoren

(4) Hersteller: **MSR-Electronic GmbH**

(5) Anschrift: **Würdingerstr. 27 + 27a**
94060 Pocking

(6) Die Bauart dieser Produkte sowie die verschiedenen zulässigen Ausführungen sind in der Anlage zu diesem Typenzertifikat festgelegt.

(7) Die Zertifizierungsstelle der DEKRA EXAM GmbH bescheinigt, dass diese Produkte die grundlegenden Anforderungen gemäß den unter Punkt 8 aufgeführten Norm(en) erfüllen. Die Ergebnisse der Prüfung sind in dem Prüfbericht 20160120 niedergelegt.

(8) Die zutreffenden Anforderungen werden durch Übereinstimmung mit folgender / folgenden Norm(en) erfüllt:

DIN EN 61508-1:2011 **DIN EN 61508-2:2011** **DIN EN 61508-3:2011**

(9) Dieses Typenzertifikat bezieht sich nur auf die Konzeption und die Prüfung der beschriebenen Produkte in Übereinstimmung mit der / den genannten Norm(en). Für Herstellung und Inverkehrbringen der Produkte sind gegebenenfalls weitere Anforderungen zu erfüllen, die nicht durch diese Bescheinigung abgedeckt sind.

(10) Dieses Typenzertifikat ist bis zum 24.08.2021 gültig.

DEKRA EXAM GmbH
Bochum, den 25.08.2016

Zertifizierungsstelle

Fachbereich

Seite 1 von 3 zu ZP/C022/16
Dieses Zertifikat darf nur vollständig und unverändert weiterverbreitet werden.

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16 Decommissioning

A used sintered element must not be reused.

Impacts of decommissioning on the plant to be monitored are not part of this description.

The decommissioning is done by switching off the operating voltage. Programmed data and parameters are not lost. If the gas detector is set into operation again after a prolonged shutdown, it will be necessary to perform recommissioning according to chapter 5.

17 Device Disposal

This device is not registered for use in private households. Therefore it mustn't be disposed of with the household waste. It can be sent back for disposal to your national distribution organization. Don't hesitate to contact them if there are any questions on disposal.

18 Definitions

Warm-up time (stabilization time)

Time span from switching on the device PX2 in a specific atmosphere to the moment when the measured value reaches the specified deviations and is stable.

Reaction time

Time up to which a predetermined reaction (display of reading or alarm) of the gas warning device can be observed.

Run-in time

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

Response time t90

Time span from the occurrence of a gas mixture at the gas inlet to the moment when the display shows 90 %.

Zero gas

Test gas containing neither the target gas nor troublesome impurities (synthetic air: 20% O_2, rest N).

Target gas

Gaseous substance to be determined in the measurement gas and to be warned against.

Test gas

Gas mixture of known composition used for testing and calibrating the PX 2 sensor head.

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19 History of Document Versions

Version	Date	Author	Reason for change / Comments
1.0	03.09.2015	G. Niedermeier	Basic version
1.1	06.10.2017	G. Niedermeier	Update according to EN 60079-29-1-2012
1.2	31.03.2018	G. Niedermeier	Update according to EN 60079-29-1-2017
2.0	15.06.2018	G. Niedermeier	Update according to EN 60079-1 2014

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