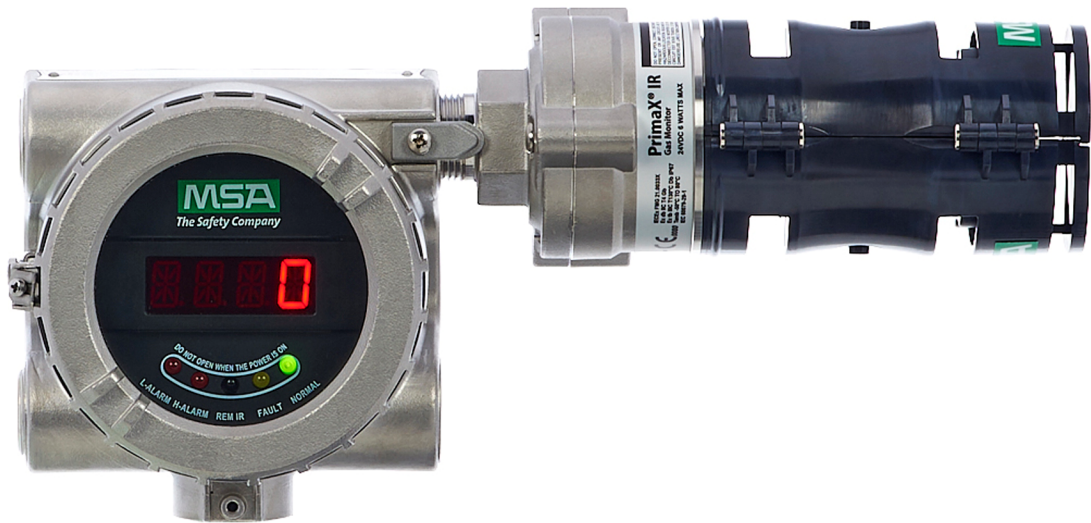




Addendum to Operating Manual
PrimaX® IR+
Gas Detector



Order No.: 10217781/00

Print Spec: 10000005196 (EO)

CR:800000065363

⚠ WARNING!

These instructions must be provided to users before use of the product and retained for ready reference by the user. Read this manual carefully before using or maintaining the device. The device will perform as designed only if it is used and maintained in accordance with the manufacturer's instructions. Otherwise, it could fail to perform as designed, and persons who rely on this device could sustain serious injury or death.

The warranties made by MSA with respect to the product are voided if the product is not installed and used in accordance with the instructions in this manual. Please protect yourself and your employees by following the instructions.

Please read and observe the WARNINGS and CAUTIONS inside. For additional information relative to use or repair, call 1-800-MSA-2222 during regular working hours.

⚠ WARNING!

Use only genuine MSA replacement parts when performing any maintenance procedures provided in this manual. Failure to do so may seriously impair sensor and gas monitoring performance, alter flameproof/explosion proof characteristics or void agency approvals.

Information in this manual is supplemental to the full product manuals, read and understand the operating manual (10246567) for the relevant product.

Failure to follow this warning can result in serious personal injury or death.

The Declaration of Conformity can be found under the following link: <https://MSAsafety.com/DoC>.

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1 Hazardous Location Information

1.1 IECEx Marking Information

IECEx FMG 21.0033X

Ex db IIC T4 Gb Ta = -40°C to +75°C

Ex tb IIIC T130°C Db Ta = -40°C to +75°C

IEC 60079-29-1

IP66/IP67

1.2 ATEX Marking Information

FM21ATEX0083X

II 2 G Ex db IIC T4 Gb Ta = -40°C to +75°C

II 2 D Ex tb IIIC T130°C Db Ta = -40°C to +75°C



EN 60079-29-1

IP66/IP67

1.3 UKEx Marking Information

FM22UKEX0134X

II 2 G Ex db IIC T4 Gb Ta = -40°C to +75°C

II 2 D Ex tb IIIC T130°C Db Ta = -40°C to +75°C

EN 60079-29-1

IP66/IP67

1.4 INMETRO Marking Information

UL-BR 12.0043X

Ex db IIC T4 Gb Ta = -40°C to +75°C

Ex tb IIIC T130°C Db Ta = -40°C to +75°C

IP66/IP67

2 Product Overview

2.1 Intended use of the Equipment

The PrimaX IR+ Gas Detection Controller is a device designed for monitoring and managing gas levels in industrial and hazardous environments. Its primary purpose is to interface with gas sensors that utilize a 4-20mA signal. The PrimaX IR+ receives input from compatible gas sensors via the 4-20mA signal output from a sensor like the MSA PrimaX IR product. These sensors may include combustible gas detectors, toxic gas detectors, or oxygen sensors. It continuously monitors the sensor data and provides real-time information about gas concentrations on the display and when gas levels exceed predefined thresholds (such as dangerous or alarm levels), the controller triggers visual and relay alarms.

For technical support please contact MSA at 1-800-672-4678 or at 1000 Cranberry Woods Drive Cranberry Township, PA 16066.

2.2 Gas Detection Technical Specification

Accuracy: +/- 1% for 0-100% LEL range

Response Time: T90 < 15 sec.

Voltage at the PrimaX IR +: 24 VDC nominal: 20-30VDC

Ambient Temperature Range: -40°C to +75°C

Storage Temperature: -40°C to +75°C

Relative Humidity: 15 to 95% (Non-condensing)

Firmware Version: 0.03

Hardware Version: 0

3 Installation

3.1 General Installation Instructions

NOTE: Review the full user manual for complete installation instructions:

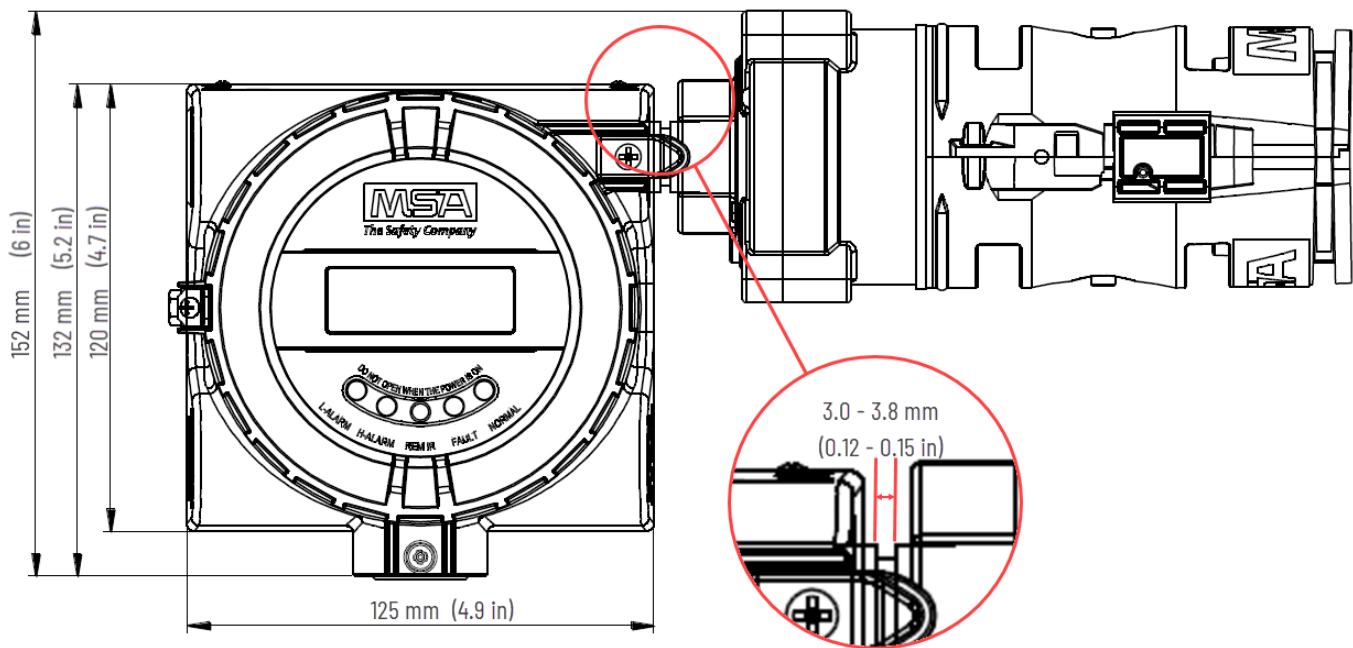
If the gas sensor module connected to the PrimaX IR + controller utilizes a diffusion type sensor which should be located close to either the expected source or destination of the gas hazard. If the gas is heavier than air, the sensor module should be installed within 24 inches of the ground or floor. If it is lighter than air, move it above 6'. Read and understand the user instructions for the sensor that will be connected to the PrimaX IR + controller.

After optimum locations are determined based on the above recommendations, consideration should be given to placing the sensor modules in locations which are accessible for calibration service. Slight adjustments to the location of the sensor module may have little impact on effectiveness but major effect on accessibility.

- Modules should be placed in areas accessible for calibration.
- The cover should face out from the wall for easy access.
- Protect the device from extreme vibration.

3.2 Mechanical Installation

The device's dimensions are shown below and are depicted with an MSA PrimaX IR sensor installed:



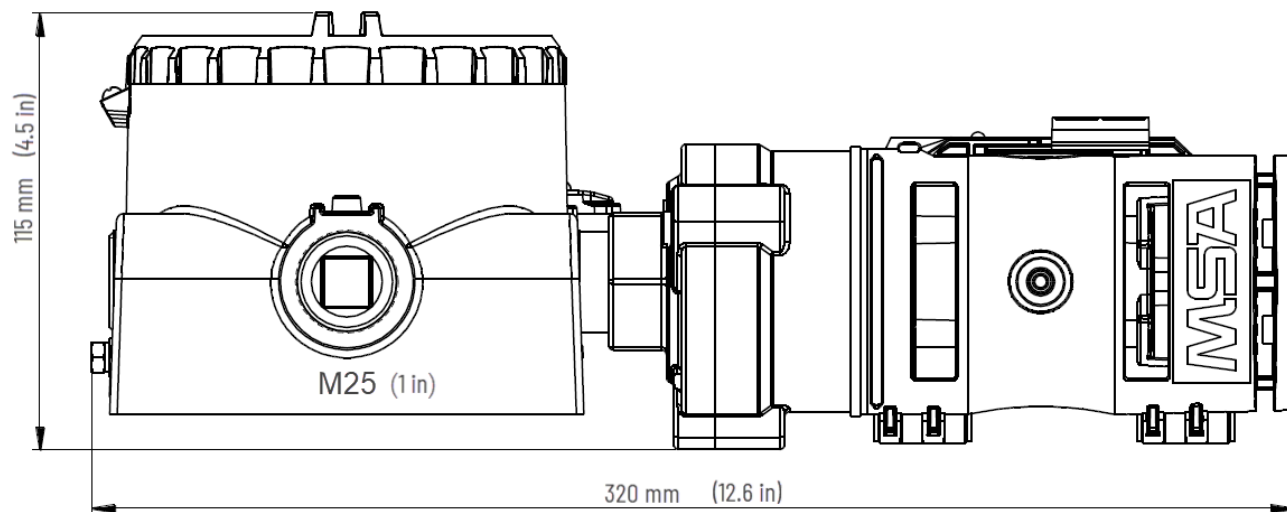
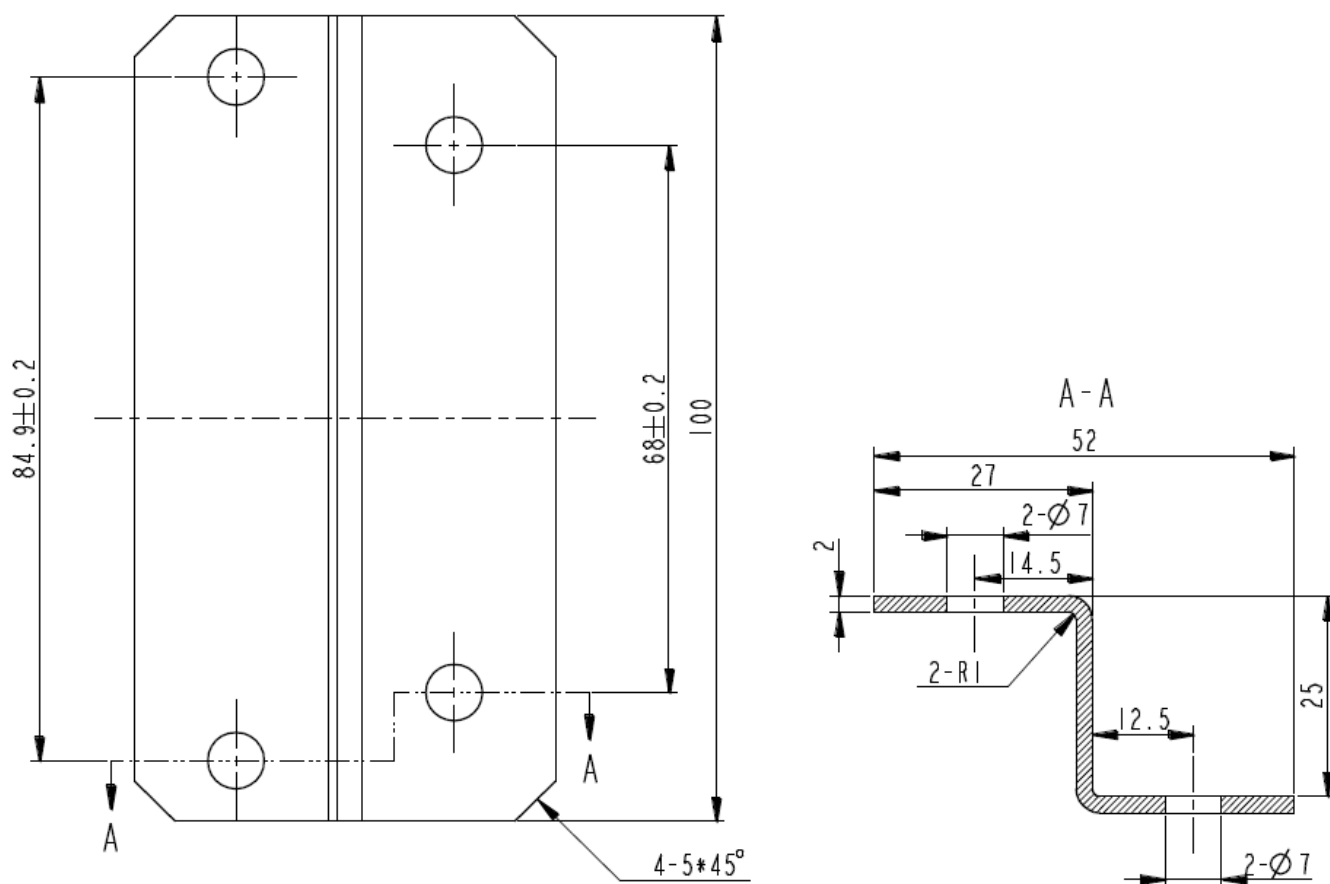


Figure 1 Optional mounting bracket (mm)



3.3 Wiring Installation Information

WARNING!

- The device must be installed only in compliance with the applicable regulations, otherwise it may not operate as intended. Proper installation should prevent water and dirt from entering the unit via the wires or conduit.
- Before wiring the device, disconnect the power source supplying the device and ensure no hazardous atmosphere present; otherwise, electrical shock or ignition of a hazardous atmosphere could occur.
- Install wiring in accordance with the electrical code of the country in use, the local authority having jurisdiction and these installation instructions, as applicable.
- Do not make any connections to the device main board or junction box input, output, and relay connections while under power. Making connections under power could lead to electrical shock or ignition of a hazardous atmosphere.
- Ensure that water and dirt are not able to enter the unit via the wire or conduit. If the unit is installed in a location known to be wet or damp, it is good practice to loop or bend the entry into the unit that prevents water incursion.
- The internal grounding terminal located in the base of the transmitter enclosure must be used for equipment grounding. The external grounding terminal is only to be used as a supplemental bonding connection where local authorities permit or require such a connection.
- Never remove or replace a Sensor while under power or when explosive hazards are present.

Failure to follow these warnings can result in serious personal injury or death.

3.3.1 Power Requirements

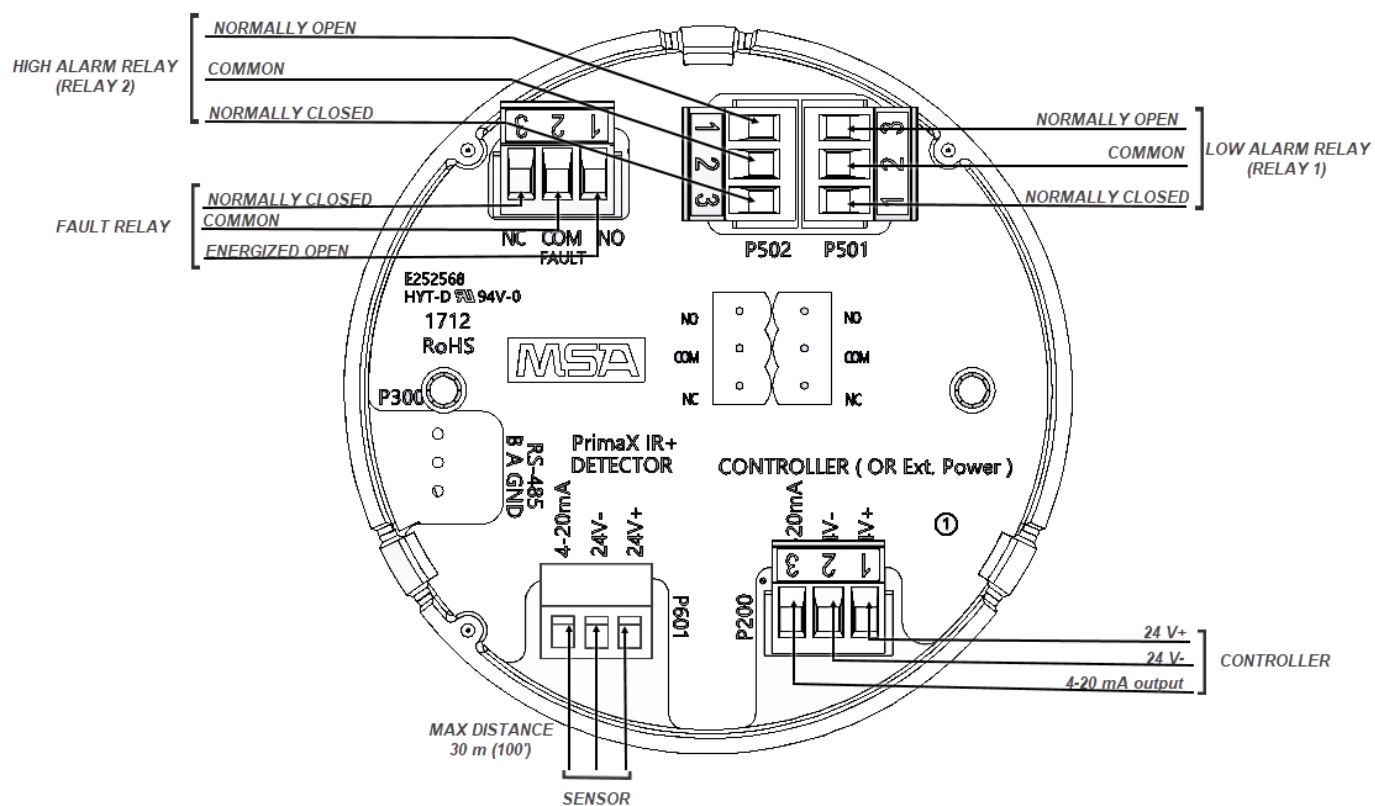
The PrimaX IR + is rated for input voltage of 20 to 30 VDC at 6 watts max power consumption. Use a SELV DC Supply.

Power wiring limits: 18 to 14 AWG (1.0 mm² to 2.5 mm²)

The alarm and fault relays are rate up to 30 VDC 2 amps non inductive loads. Read the full product manual for full information on the use and set up of optional relays.

Review the wiring diagrams below for intended model installation.

3.3.2 Wiring Diagram



4 Operation

4.1 Use and Set up

NOTE: Read the referenced operating manual (10246567) for complete use and set up information.

4.1.1 Environmental Considerations

Review approval marking above and ensure that the intended product meets the requirements for the area that the PrimaX IR + will be installed.

Product can be used indoors or outdoors

Product must be installed at altitudes below 2000 meters

Overvoltage category II equipment

Equipment can be installed in wet locations

Pollution Degree II

Ambient Temperature Limits: -40°C to +75°C

Relative Humidity Limits: 15 – 95 %

Pressure Limits: 86 kPa – 108 kPa

4.1.2 Maintenance

NOTE: Read the referenced operating manual for complete maintenance instructions.

Cleaning

When required use a damp cloth to remove any dirt or debris as required.

Calibration

The PrimaX IR + cannot initiate calibration, please review the user manual for the sensor that is connected to the PrimaX IR + controller for the calibration procedures and frequency.

Review the operating manual for full sensor calibration procedures and frequency.

Troubleshooting

Trouble codes are listed in the operating manual.

4.1.3 Repair

WARNING!

Use only genuine MSA replacement parts when performing any maintenance procedures provided in this manual. Failure to do so may seriously alter flameproof/explosionproof characteristics or void agency approvals. Failure to follow this warning could cause the product to fail to perform as designed and persons who rely on this product for their safety could sustain serious personal injury or loss of life.

Repair or alteration of the PrimaX IR + beyond the scope of the maintenance procedures provided in this manual or by anyone other than authorized MSA service personnel, could cause the product to fail to perform as designed and persons who rely on this product for their safety could sustain serious personal injury or loss of life.

Failure to follow these warnings can result in serious personal injury or death.

See Specific Conditions of use section in this manual or on the certificate file for additional information for any repair or maintenance.

Replacement Parts

See operating manual (10246567) for replacement parts when required.

5 Gas Detection Instructions

NOTE: Read and understand local installation codes and requirements including EN/IEC 60079-29-2.

5.1 Measuring Gas

Refer to the operating manual (10246567) for the sensors that is connected to the PrimaX IR + controller for measuring gas information.

5.2 Cross Sensitivity

Refer to the operating manual (10246567) for the sensors that is connected to the PrimaX IR + controller for cross sensitivity information.

5.3 Time of Response

Refer to the operating manual (10246567) for the sensors that is connected to the PrimaX IR + controller for specific time or response information.

The PrimaX IR + t(90) is ≤15 sec when connected to a PrimaX IR sensor

5.4 Warmup Time

60 Seconds

5.5 Test Gas and Calibration Time

Refer to the operating manual (10246567) for the sensors that is connected to the PrimaX IR + controller for specific test gas and calibration time information.

5.6 Electro-Magnetic Compatibility

Use shielded cable such as Alpha Cable # 1451/16 or equivalent and bond shielding to metallic enclosure.

5.7 Fault Codes

Fault Display	Description
E-01	Safety Critical Fault
E-02	General Fault
E-03	Dirty Optics
E-04	Power Up - Sensor Calibration
E-05	Cleaning Mode
E-06	Overrange
E-07	Flash - Self Check Fault
E-08	RAM - Self Check Fault
E-09	CRC Fault
E-10	WDT Fail
E-11	ADC Fault
E-12	Temp Sensor Fail
E-13	Relay Fault
E-14	Task Fault
E-15	Relay SPI Fault
E-16	Information Flash Write Fault

Fault Display	Description
E-17	External Reference Check Fault
E-18	Periodic Flash Check Fault
E-19	Periodic RAM Check Fault
E-20	ADC12 Stuck High Fault
E-21	ADC10 Stuck High Fault
E-22	Periodic PC Check Fault
E-23	Periodic Stack Check Fault
E-24	Periodic Register Check Fault
E-25	Periodic SFR Check Fault
E-26	Periodic Voltage Check Fault
E-27	Interrupt Fault
E-28	RAM Data Fault

6 Specific Conditions of Use

- The flameproof joints of the equipment are not intended to be repaired. For maintenance or repair, contact the manufacturer.
- The $\frac{3}{4}$ " NPT fixture has to be sealed with 2 layer PTFE sealing tape or according to the instructions of the manufacturer of the enclosure with NPT thread; when removed, new PTFE sealing has to be used after reinstalling.

7 Specific Conditions For the Safe Use in SIL Application

Safety relevant parameters for the PrimaX IR Pro Gas Monitor.

Hardware safety integrity level (SIL)	SIL 2
Systematic Capability (SC)	SC 3
Type	B
Safety structure	1oo1 or 1oo2
HFT	0
Safe Failure Fraction (SFF) each of element	>95%
λ S (Detected safe failure rate)	1724fit
λ DU (Undetected dangerous failure rate)	119fit
λ D (Dangerous failure rate)	2519fit
λ DD (Detected dangerous failure rate)	2400fit
PFD, PFH	See table
MTTR	72 hr.
Proof test interval (PTI)	See table
Ambient Temperature	40°C
Hardware version	1.0
Software version	0.03

PTI	PFD1oo1	PFD1oo1 % SIL2	PFH1oo1	PFH1oo1 % SIL2	PFD1oo2	PFD1oo2 % SIL3	PFH1oo2	PFH1oo2 % SIL3
16week	2.69x10 ⁻⁴	2.69%	1.1x10 ⁻⁷	11.0%	1.71x10 ⁻⁵	1.71%	6.02x10 ⁻⁹	6.02%
52week	6.99x10 ⁻⁴	6.99%	1.19x10 ⁻⁷	11.9%	3.56x10 ⁻⁵	3.56%	6.10x10 ⁻⁹	6.10%

Possible structures and acquirable SILs

The following table shows which structure has to be selected to fulfill the requirements of a specific SIL.

LDM = Low Demand Mode

HDM = High Demand or Continuous Mode

SIL level	SIL 1		SIL 2		SIL 3	
Structure	LDM	HDM	LDM	HDM	LDM	HDM
Structure 1oo1	X	X	X	X		
Structure 1oo2	X	X	X	X	X	X

Depending on the selected configuration and the sensor version, the following safety-relevant parameters have to be considered while implementing the safety loop:

Special conditions for SIL 2

- The use of the device in a High Demand or Continuous Mode is allowed only in a 1oo2 – structure.
- The 4 ~ 20 mA output of the device must be monitored regarding deviations.

Special conditions for SIL 3

- The use of the device is allowed only in a 1oo2 - structure.
- The 4-20 mA output of the device must be monitored regarding deviations.