Dräger PEX 3000

Dräger. Technology for Life®

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1 Safety-related information

These instructions for use may be downloaded in other languages from the Technical Documentation Service database (www.draeger.com/ifu) in electronic form, or ordered as a printed copy (order no. 93 00 062 / 93 00 063) from Dräger.

For the use of the sensing heads, observe the instructions for use and data sheets for the sensors being used.
The instructions for use and the data sheets for the sensors being used can be downloaded in electronic format from the Database for Technical Documentation (www.draeger.com/ifu).

1.1 General safety information

- Before using this product, carefully read the instructions for use.
- Strictly follow the instructions for use. The user must fully understand and strictly observe the instructions. Use the product only for the purposes specified in the Intended use section of this document.
- Do not dispose of the instructions for use. Ensure that they are retained and appropriately used by the product user.
- Only trained and competent users are permitted to use this product.
- Comply with all local and national rules and regulations associated with this product.
- Only specialist, trained personnel are permitted to check, repair and maintain the product as described in the instructions for use.
  Any maintenance work that is not described in the instructions for use is only permitted to be carried out by Dräger or personnel trained by Dräger. Dräger recommends concluding a service contract with Dräger.
- Only use genuine Dräger spare parts and accessories when performing maintenance work, or the proper functioning of the product may be impaired.
- Do not use a faulty or incomplete product. Do not modify the product.

Use in areas subject to explosion hazards

Devices or components for use in explosion-hazard areas which have been tested and approved according to national, European or international explosion protection regulations may only be used under the conditions specified in the approval and with consideration of the relevant legal regulations. The devices or components may not be modified in any manner. The use of faulty or incomplete parts is forbidden. The appropriate regulations must be observed at all times when carrying out repairs on these devices or components.

Comply with regulations on electrical equipment in explosion-hazard areas and with approval conditions!

2 Conventions in this document

2.1 Meaning of the warning notes

The following warning notes are used in this document to notify users of possible dangers. The meanings of the warning notes are defined as follows:

Alert icon	Signal word	Consequences in case of nonobservance
⚠	WARNING	Indicates a potentially hazardous situation. If not avoided, it could result in death or serious injury.
⚠	CAUTION	Indicates a potentially hazardous situation. If not avoided, it could result in physical injury. It may also be used to alert against unsafe practices.
	NOTICE	Indicates a potentially hazardous situation. If not avoided, it could result in damage to the product or environment.

3 Principles of operation

3.1 Feature description

The PEX 3000 transmitter consists of a housing, an ex-sensor and corresponding electronics.

The housing made of conductive plastic prevents electrostatic charge-up and is resistant to solvents.

The ex-sensor is a transducer for measuring the partial pressure of combustible gases and vapours present in the atmosphere. It functions according to the heat-of-reaction principle. The monitored ambient air is diffused through the wire mesh disc into the ex-sensor. This is where the combustible gases and vapours are catalytically burned at a heated detector element (pellistor). The oxygen required for combustion is taken from the ambient air. The combustion heat generated heats the detector element up further. This heating up results in a change in the resistance of the detector element. This change is proportional to the partial pressure of the combustible gases and vapours.

The ex-sensor accommodates another heated, diffusion-limited detector element which, in contrast to the first detector element, reacts significantly less to the presence of combustible gases and vapours. Both detector elements, however, are similarly affected by environmental influences such as temperature, humidity or air pressure. Because both detector elements are part of a Wheatstone bridge circuit, the environmental influences are compensated for in the sensor's bridge signal.

The voltage measured on the ex-sensor is amplified by the electronics, indicated on the display and converted into a 4 to 20 mA signal which is transmitted to the controller.

The refresh rate of the measured values in the display and the 4 to 20 mA signal is 80 ms.

3.2 Intended use

The PEX 3000 transmitter is intended to be used for the stationary, continuous monitoring of mixtures of combustible gases and vapours with air under atmospheric conditions. The full scale value is 100% or 10% of the lower explosion limit (LEL). The transmitter is connected to a suitable controller by means of a 3-core-cable, the measured signal during normal operation is between 3.8 and 20.5 mA.

The PEX 3000 type XTR 0090 and XTR 0091 transmitters (remote version) are intended to operate a remote Dräger sensing head.

Dräger sensing head	Measuring range	Order number
Polytron SE Ex PR M1 DQ	100% LEL	6812711
Polytron SE Ex PR M2 DQ	100% LEL	6812710
Polytron SE Ex LC M1 DD	10% LEL	6812722
Polytron SE Ex LC M2 DD	10% LEL	6812721
Polytron SE Ex PR NPT1 DQ	100% LEL	6812800
Polytron SE Ex HT M DQ	100% LEL	6812720

The operation of the PEX 3000 in combination with the above-mentioned remote sensing heads does not differ from the operation of the PEX 3000 with integral sensor and is not explicitly considered in these instructions for use. Likewise, the operation of further housing versions, e.g. of the types XTR 0001 and XTR 0011 (drilling templates, see page 45) is not explicitly described.

The transmitters must not be operated at ambient temperatures of less than -40 °C. For PEX 3000 type XTR 0000, XTR 0001, XTR 0010 and XTR 0011 transmitters, the upper maximum permitted temperature depends on the temperature class. For the T6 temperature class, this is 40 °C, or 55 °C for T5 and 65 °C for T4. For PEX 3000 type XTR 0090 and XTR 0091 transmitters, the upper maximum permissible temperature is generally 65 °C.

The transmitter is approved for device categories II 2G and II 2D and can be installed in zones 1 or 2 and in zones 21 or 22. Observe the installation instructions.

The transmitter is not suitable for use in oxygen-enriched atmospheres.

In conjunction with a suitable controller unit with preset alarm thresholds acoustic or optical alarm devices can be activated or automatic countermeasures can be initiated before the detected gases or vapours can form dangerous flammable mixtures with air.

3.3 Information for safe use

⚠ WARNING

In gas explosion-hazard areas (zones 1 and 2) the transmitter's cover is only permitted to be opened for maintenance purposes.

⚠ WARNING
In dust explosion-hazard areas (zones 21 and 22) there is no dust explosion protection if the housing cover is opened in a live state. The Ex area has to be temporarily de-classified, if necessary! Appropriate precautions must be made. Before closing the cover, ensure that the transmitter is free of dust.

Only certified sensors or certified remote sensing heads are allowed to be connected to the transmitter's br/br, ge/yw and sw/bk connection terminals.

Observe the following instructions for the measuring function:

1. The heat of reaction measuring principle, which is based on the catalytic oxidation of a combustible gas, is essentially ambiguous because, at high measuring gas concentrations, there is not enough oxygen in the sensor to oxidise the combustible gas. As a result, the measured signal decreases at high gas concentrations and can lead to values within the measuring range. A connected controller unit must be operated with display devices, measured value outputs (if available), and alarm thresholds operating self-retaining if the measuring range is exceeded.
2. The heat of reaction measuring principle requires a minimum oxygen concentration of 12 vol%, otherwise the displayed measured values will be too low because of oxygen deficiency.

3.4 Measuring function for explosion protection in acc. with 2014/34/EU and SI 2016/1107.

The PEX 3000 transmitter type XTR 000x and remote versions XTR 009x in combination with the sensing head Polytron SE Ex ... DQ have been approved in respect to the measuring function for explosion protection in acc. with EN 60079-29-1 for the following gases and vapours: acetone, acetylene, ammonia, petrol 065/095 (FAM regular petrol), benzene, 1.3-butadiene, *n*-butane, *n*-butyl acetate, diethyl ether, dimethyl ether, acetic acid, ethanol, ethene (ethylene), ethyl acetate, ethylene oxide, *n*-hexane, methane, methanol, methyl ethyl ketone (MEK), methyl methacrylate, *n*-nonane, *n*-octane, *n*-pentane, propane, *i*-propanol, propene (propylene), propylene oxide, toluene, hydrogen and *o*-xylene.

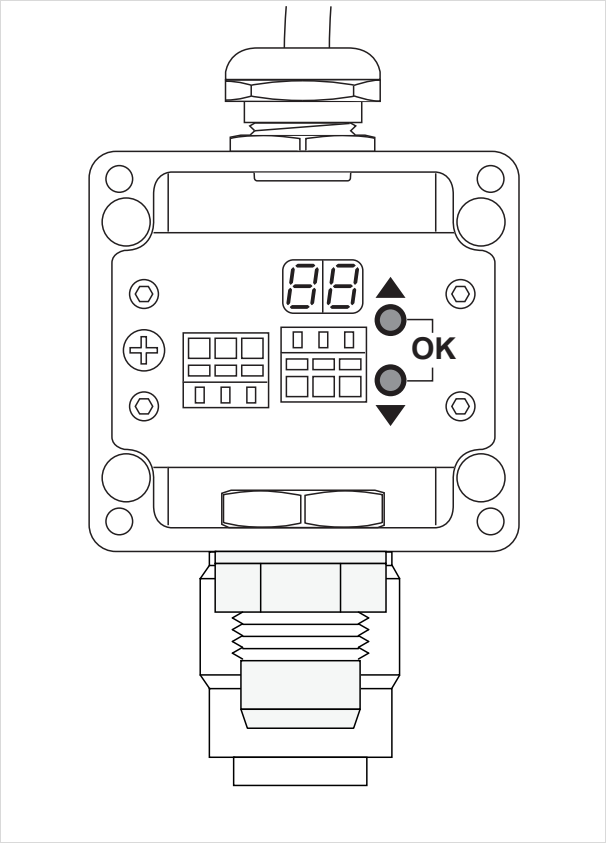
The PEX 3000 transmitter type XTR 001x and remote versions XTR 009x in combination with the sensing head Polytron SE Ex LC ... DD have been approved in respect to the measuring function for explosion protection in acc. with EN 60079-29-1 for the following gases and vapours: methane, propane, acetylene, benzene, *i*-butene, ethene, *n*-nonane, propene and hydrogen.

4 Control

4.1 Operate menu

The transmitter features a two-digit 7-segment display and two scroll keys (key ▲ and key ▼) to navigate through the described menus. Pressing both scroll keys simultaneously equals pressing an OK button, indicated as "keys (+▼)" in the following. The ▼ key is also marked with an M to indicate that you can press this key to go from measuring mode to the calibration menu or the maintenance menu. Both these menus can only be exited using the ▲ key. Display and scroll keys are accessible after opening the housing.

⚠ WARNING
Dust explosion protection is not ensured after having opened the transmitter's housing. The Ex area has to be temporarily de-classified, if necessary!



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4.2 Information on the display

In the measuring mode, the two-digit display shows the currently measured concentration in % LEL (0 to 99 or 0.0 to 9.9% LEL).

Adjustment and maintenance

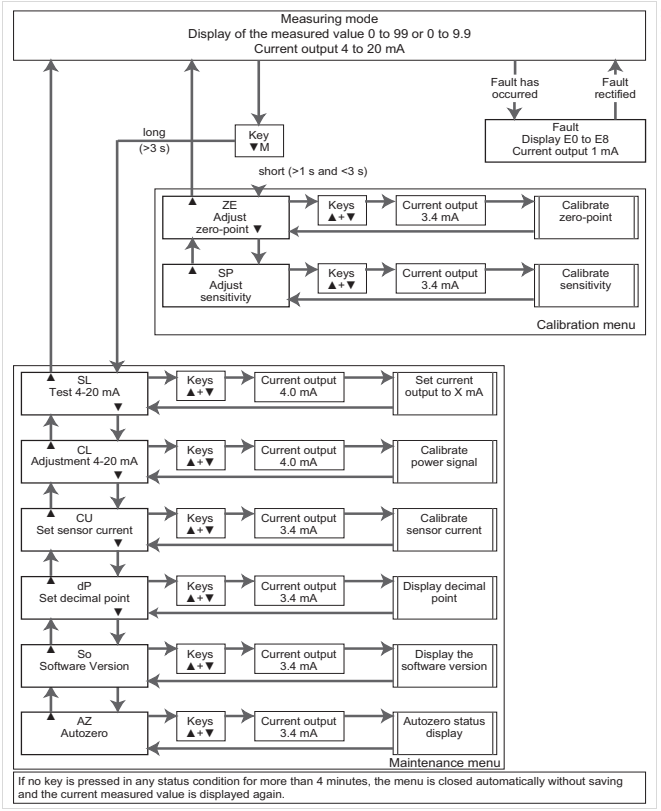
If the transmitter enters the calibration or maintenance menu, this is indicated by a displayed point (bottom right) flashing at approx. 1 Hz.

Faults

Faulty states are indicated by alternatively showing two horizontal lines and the current error code (E0 through E8).

Turn-on behaviour

All 14 LED segments and both points are activated for 5 seconds directly after turning on. This is a lamp test to make sure that the LED segments are functioning. Then, the display shows two horizontal lines and the measured value for approx. one minute before it switches to measuring mode. During this time, the calibration and maintenance menu cannot be accessed.



4.3 Calibration menu

To enter the calibration menu, press the ▼ key for more than one second but less than three seconds. The display shows a flashing point on the bottom right indicating the calibration mode.

4.3.1 ZE – Calibrate the zero-point

1. Navigate using the ▲ or ▼ keys until the display shows ZE ("ZEro") and confirm by pressing the (▲+▼) keys. The output signal switches to 3.4 mA.
   – The display shows the currently measured gas concentration (negative values are displayed up to "–5" or "–,9").
2. Apply zero gas to the sensor and wait for signal stabilisation (max. 3 minutes).
3. Press the (+▼) keys to save the displayed value as a new zero-point.
4. Press the (▲+▼) keys once again to exit the function. The ZE display appears once again.
5. Press the ▼ key to the calibrate the sensitivity or
6. Press the button to switch back to the measuring mode.

4.3.2 SP – Calibrate the sensitivity

1. Navigate using the ▲ or ▼ keys until the display shows SP ("SPan") and confirm by pressing the (▲+▼) keys.

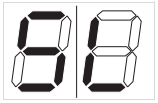
– The display shows the test gas concentration used during the previous adjustment in % LEL.
– Use the ▲ or ▼ key to set the concentration of the test gas currently in use between 20 and 99% LEL in 1% LEL steps (or 0.1% LEL steps between 2.0 and 9.9% LEL). Pressing the keys for a longer period activates the repeat function.

2. Press the (▲+▼) keys, apply test gas to the sensor and wait until the displayed measured value has stabilised (maximum of 3 minutes).
3. Press the (▲+▼) keys to recalculate and save the internal amplification.
4. Press the (▲+▼) keys to display a reference value for the sensor's sensitivity (constantly amplified bridge signal).
5. Press the (▲+▼) keys to exit the function. The display shows SP once again.
6. Press the ▲ key twice to return to measuring mode.

4.4 Maintenance menu

To enter the maintenance menu, press the ▼ key for more than 3 seconds until the display shows "SL" and the point in the bottom right corner flashes to indicate the maintenance state.

4.4.1 SL – set current output to X mA



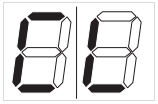
41503

This function can be used to set the transmitter's output signals to specific constant values for test purposes.

ℹ This function can trigger alarms at the controller!

1. Navigate using the ▲ or ▼ keys until the display shows SL ("Set Loop") and confirm by pressing the (▲+▼) keys.
   – The current output of the transmitter is set to 4 mA, the display shows "04".
2. Use the ▲ or ▼ key to adjust the current output to values between 1 and 22 mA in steps of 1 mA. Pressing the keys for a longer period activates the repeat function.
3. Press the (▲+▼) keys to exit the function. The display shows SL once again.
4. Press the ▲ key once to return to measuring mode.

4.4.2 CL – Adjusting the current output



41504

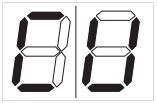
This function can be used to calibrate the transmitter's current output, i.e. a current of 4 mA corresponds to a display of 0% LEL and a current of 20 mA corresponds to 100% LEL or 10% LEL. Generally, the output signal can be measured on the controller side as a voltage drop across the input resistance, if not the 4 to 20 mA loop has to be disconnected to install an ammeter for this purpose.

⚠ **WARNING**
If the current loop is disconnected at the transmitter for test purposes, the explosion protection is interrupted!

1. Use the ▲ or ▼ key to navigate until the display shows CL ("Calibrate Loop").
2. Press the (▲+▼) keys. This sets the lower reference point, the display shows "04" corresponding to 4 mA.
3. Read the current on the measuring instrument or on the controller.
4. Press the ▲ or ▼ key to adjust the current output such that the ammeter reads a current of 4 mA as accurately as possible (between 3.95 and 4.05 mA). Pressing the keys for a longer period activates the repeat function.
5. Press the (▲+▼) keys. This saves the lower reference point and the menu switches over to the upper reference point. The display shows "20" corresponding to 20 mA.
6. Read the current on the measuring instrument or on the controller.

7. Press the ▲ or ▼ key to adjust the current output such that the ammeter reads a current of 20 mA as accurately as possible (between 19.95 and 20.05 mA). Pressing the keys for a longer period activates the repeat function.
8. Press the (▲+▼) keys. This saves the upper reference point and exits the function. The display shows CL once again.
9. Press the ▲ key twice to return to measuring mode.

4.4.3 CU – Adjust the sensor current


41505

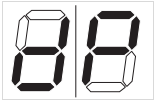
This function is used to adjust the sensor current if the necessary sensor current is different from the ex-factory adjustment. Ex-factory settings are:

In combination with the sensing head Polytron SE Ex PR / HT ... DQ:	255 mA
In combination with the sensing head Polytron SE Ex LC ... DD:	276 mA

⚠ WARNING
Adjustment of the sensor current must be followed by the re-calibration of the zero-point and sensitivity!

1. Navigate using the ▲ or ▼ keys until the display shows CU ("CUrrent") and confirm by pressing the (▲+▼) keys.
   – The display shows the last two digits of the currently adjusted sensor current, e.g. the display shows "70" for a sensor current of 270 mA.
2. Use the ▲ or ▼ key to adjust the sensor current between 240 mA (display shows "40") and 300 mA (display shows "00") in 1 mA steps. Pressing the keys for a longer period activates the repeat function.
3. Press the keys (▲+▼) to select the displayed sensor current as the newly set sensor current. The value is saved and this function is exited. The display shows CU once again.
4. Press the ▲ key three times to return to measuring mode.

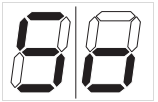
4.4.4 dP – turning the decimal point on


41507

This function is used to select the decimal point in the display if the DrägerSensor LC M or the remote transmitter with the sensing head SE Ex LC ... DD is used with a measuring range of 0 to 9.9% LEL. The decimal point is only displayed for gas concentration displays in % LEL.

1. Navigate using the ▲ or ▼ keys until the display shows dP ("decimal Point") and confirm by pressing the keys (▲+▼). The decimal point is now displayed if already selected. The flashing point on the bottom right is switched off.
2. Use the ▲ or ▼ key to turn the decimal point on or off.
3. Press the keys (▲+▼) to save the current status and exit the function. The display shows dP. The activated decimal point is not displayed, rather the point at the bottom right flashes once again.
4. Press the ▲ key four three times to return to measuring mode.

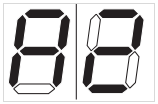
4.4.5 So – Display software version


41508

To document necessary software modifications, this function can be used to display the software version implemented in the transmitter.

1. Navigate using the ▲ or ▼ key until the display shows So ("Software") and confirm by pressing the keys (▲+▼).
   – The display shows a figure between "0.1" and "9.9", indicating the current software version of the transmitter.
2. Press the (▲+▼) keys to exit the function. The display shows So once again.
3. Press the ▲ key five three times to return to measuring mode.

4.4.6 AZ – Switch on automatic zero-point correction



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The transmitter has automatic zero-point correction (Autozero) from software version 2.4. This can partially correct zero-point deviations owing to long-term drift of the sensor and to environmental influences depending on the time of day and improve the quality of the measured values.

The correction rate and the absolute limit of the automatic zero-point correction are based on the tolerances of EN/IEC 60079-29-1.

ℹ The automatic zero-point correction is not part of the metrological suitability test in accordance with EN 60079-29-1 and is deactivated at the factory. Dräger recommends activating the automatic zero-point correction.

1. Navigate using the ▲ or ▼ keys until the display shows AZ ("AutoZero") and confirm by pressing the (▲+▼) keys.
   – The display shows "on" or "of" depending on the current setting.
2. Use the ▲ or ▼ key to turn the Autozero on or off.
3. Press the keys (▲+▼) to save the setting and exit the function. The display shows AZ once again.
4. Press the ▲ key five three times to return to measuring mode.

5 Operation

ℹ Although the transmitter was factory-tested before delivery, the commissioning after installation must include the zero-point and sensitivity adjustment. The commissioning process must be concluded with a functional test of the complete gas detection system.

5.1 Installing the transmitter

NOTICE

The PEX 3000 transmitter is an EMC class A item of equipment. The transmitter may cause radio interference in the domestic area; in this case, the operator may be requested to implement appropriate measures.

5.1.1 Mounting

PEX 3000 type XTR 000x use position: The gas inlet area of the sensor should preferably point downwards.

PEX 3000 type XTR 001x use position: The gas inlet area of the sensor must point downwards.

If it is ceiling-mounted, a mounting bracket must be used.

– Mount the transmitter in vertical position at a location with little vibration and maximum temperature stability (no direct sunlight) in the vicinity of a possible leak.
– Consider the full scope of environmental conditions to which the transmitter is exposed. Prevent external influences such as splash water, oil, corrosive aerosols (salt mist), etc., and the possibility of mechanical damage.
– Leave at least 30 cm free space beneath the transmitter to provide accessibility for calibration work.

NOTICE

Certain substances in the atmosphere to be monitored may impair the sensitivity of the sensor (DrägerSensor PR M DQ or LC M) installed in the transmitter.

The following substances are known at present:

1. Catalyst poisons in high concentrations or for prolonged exposure times, for example sulphur and phosphorus compounds, silicon compounds, metal-organic vapours
2. Corrosive substances such as ammonia and halogenated hydrocarbons (releasing halogens such as bromine, chlorine or fluorine upon catalytic oxidation),

The sensors used are based on measuring elements (pellistors), which are poison-resistant (PR) and thus have a longer life span than conventional sensors if catalyst poisons occur. However, there is still the rule to shorten the test or calibration intervals if catalyst poisons are expected to occur in the atmosphere to be monitored.

Pay attention to the ventilation conditions!

– Always arrange the sensing head and transmitter in the air flow between a possible leak or collection point and possible source of ignition.

Note the density of the gas!

– For gases with densities lower than that of air, such as hydrogen, methane or ammonia, the transmitter must be located above a possible leak or at the highest points where greater concentrations of gas may be found.
– For gases and vapours with densities greater than that of air, the transmitter must be installed beneath a possible leak or at the lowest points where these gases and vapours may be present.

5.1.2 Mounting the transmitter

– The transmitter is secured with screws (diameter: 4 mm) inserted through the housing (see "Drilling templates", page 45).

5.2 Installing electrical connections

⚠ CAUTION

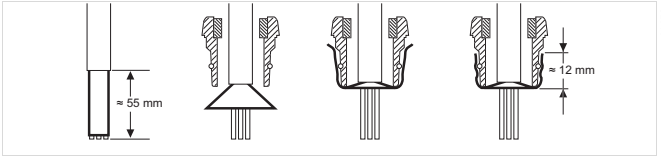
Electrical wiring is only to be laid and connected by an expert in compliance with the pertinent regulations and laws concerning electrical equipment in potentially explosive atmospheres as well as the approval conditions.

Connection between the transmitter and controller

– The maximum cable lengths for input resistances of 250 Ohms can be found in the following table.

	Core cross-section			
minimum supply voltage at controller side	**0.5 mm² (36 Ohm/km)**	**0.75 mm² (24 Ohm/km)**	**1.0 mm² (18 Ohm/km)**	**1.5 mm² (12 Ohm/km)**
18 V	416 m	625 m	833 m	1249 m
20 V	555 m	833 m	1110 m	1666 m
22 V	694 m	1041 m	1388 m	2082 m
24 V	833 m	1249 m	1666 m	2498 m
26 V	972 m	1457 m	1943 m	2915 m
28 V	1110 m	1666 m	2221 m	3331 m

– With a 3-core screened cable, shield braiding with cover ≥80%, outer diameter min. 7 mm, max. 12 mm. Connect shielding to the earth clamp of the controller, keeping this as short as possible.
– Place the cable shielding around the plastic cone as shown in the figure and insert it into the metal cable gland. By tightening the cable gland,the shielding is in electrical contact with the conductive inner lining of the transmitter housing. This measure ensures the required RF-immunity according to EN 50 270.



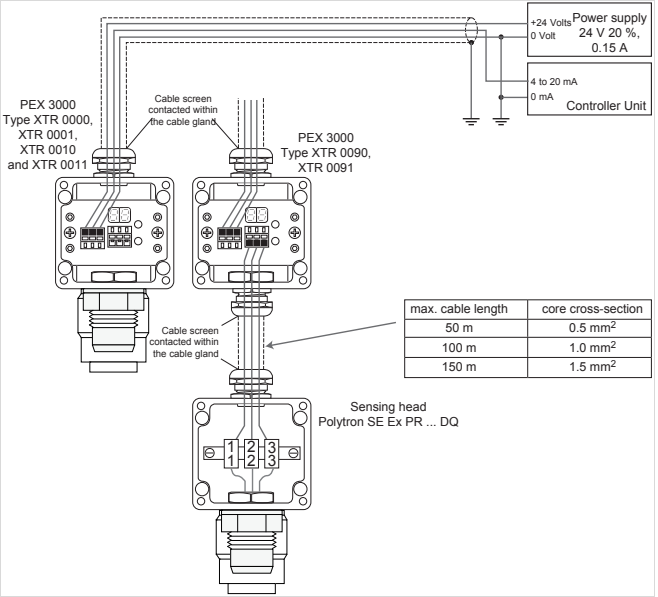
⚠ WARNING

The cable gland is approved for fixed-location installation only. It is suitable for line diameters of 7 to 12 mm.

– Remove the transmitter’s housing lid
– Connection between the transmitter and controller as shown in the figure.

Type XTR 0090 and XTR 0091:

– Connection between sensing head SE Ex and the transmitter as shown.
– The power supply may also be an integral part of the controller unit.



max. cable length	core cross-section
50 m	0.5 mm^2
100 m	1.0 mm^2
150 m	1.5 mm^2

Connection to the controller:
Connect terminal +24 V to +24 volts
Connect terminal SIG to 4 to 20 mA input
Connect terminal 0 V to 0 Volt

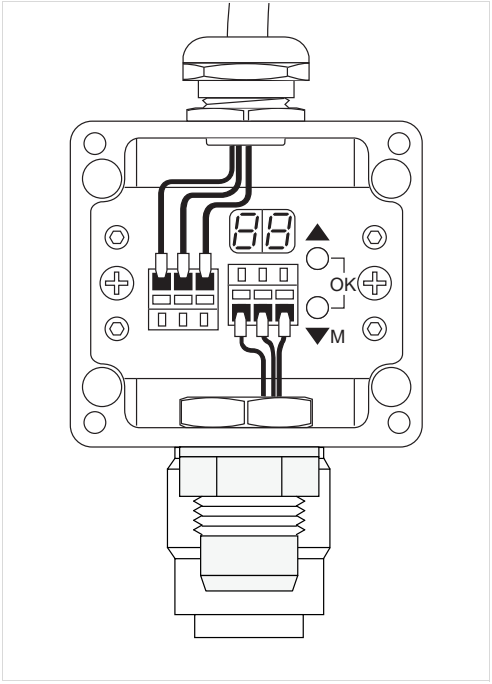
Connection to the sensing head:
Connect terminal br/br to terminal 1
Connect terminal ge/yw to terminal 2
Connect terminal sw/bk to terminal 3

Cable routing inside the transmitter

– Connect the insulated single conductors (min. conductor length 55 mm) to the spring terminal clamp, the end stripped by around 5 mm, keeping them as short as possible.
– For the wiring of the power supply and signal transmission, only use cables with a cross-section of at least 0.75 mm^2. Cables with a cross-section of 0.5 mm^2 can be used if fitted with an insulated ferrule (Zoller+Fröhlich, type V3AE0005, V3AE0037 or equivalent). This ensures that the degree of protection IP 30 is preserved if the housing is opened for maintenance purposes.

Only types XTR 0090 and XTR 0091:

– For the wiring between the gas measurement transmitter and gas sensing head (e.g. sensing head SE Ex ... DQ), only use cables with a cross-section of at least 0.75 mm^2. Cables with a cross-section of 0.5 mm^2 can be used if fitted with an insulated ferrule (Zoller+Fröhlich, type V3AE0005, V3AE0037 or equivalent). This ensures that the degree of protection IP 30 is preserved if the housing is opened for maintenance purposes.

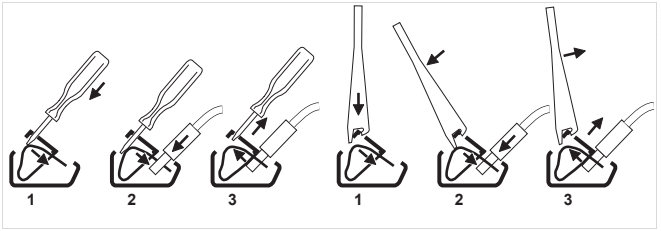


⚠ CAUTION

Blank cables must not stick out of the spring terminals. The method of explosion protection during maintenance is based on the condition that it is not possible to touch blank cable parts with a probe of 2.5 mm diameter (definition of IP 30).

41480

Handling the spring terminal clamps in the transmitter



41484

1. Insert the screwdriver (width 3 mm) or supplied special tool (see also order list, (see "Order list", page 46)) into the terminal.
2. Push the spring down. This opens the lower part of the terminal. Insert the stripped cable end or ferrule (if necessary) into the lower part.
3. Remove the screwdriver or special tool from the upper part. The electrical connection is established by the force of the spring.

⚠ CAUTION

The spring terminal clamps are connected to the 4 to 20 mA converter. Improper handling might damage the spring terminal clamps so that the complete converter would have to be replaced.

5.3 Commissioning the transmitter

– Open the housing lid of the transmitter.

⚠ WARNING

Dust explosion protection is not ensured after having opened the transmitter's housing. The Ex area has to be temporarily de-classified, if necessary!

5.3.1 Turning on the supply voltage

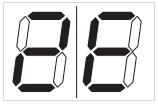
– After turning on the supply voltage, all 14 LED segments including both points are activated for approx. 5 seconds to make sure that they are not faulty ("Lamp test"). Internal test routines run in the transmitter during this period, the transmitter's output signal is 1 mA.
– After this, the display changes, with approx. 1 Hz, between two horizontal lines and the currently measured gas value. During this time the transmitter's output is 3.4 mA.
– After one minute the transmitter is ready for operation. If the zero-point is not undercut by more than 5% LEL or 1% LEL, it displays the current measured value, and the output signal corresponds to the measured value.
– Type XTR 0090 or XTR 0091 with sensing head SE Ex LC M ...DD: Adjust sensor current to 276 mA by means of the function "CU – Sensor Current Adjustment" ((see "CU – Adjust the sensor current", page 32)).
– Allow the transmitter to warm up before adjustment: DrägerSensor PR M DQ for at least 30 minutes (warm-up time of the sensor), DrägerSensor LC M for at least 120 minutes (warm-up time of the sensor)

5.3.2 Calibrating the transmitter

For this chapter:

– Mentioning type XTR 0000 also includes type XTR 0001 as well as the transmitters type XTR 0090 or XTR 0091 with remote sensing head Polytron SE Ex PR ... DQ or HT M DQ (100% LEL).
– Mentioning type XTR 0010 also includes type XTR 0011 as well as the transmitters type XTR 0090 or XTR 0091 with remote sensing head Polytron SE Ex LC ... DD (10% LEL).

5.3.2.1 Calibrate zero-point



To enter the calibration menu, press the ▼ key for more than one second but less than three seconds. The display shows ZE and a flashing point on the bottom right indicating the calibration mode.

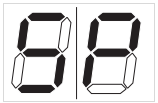
– Confirm with keys (▲+▼). The measured signal is set to 3.4 mA to indicate the calibration mode to the controller.
– Apply gas to the sensor – either
  – without calibration adapter: Ensure that the transmitter is in clean ambient air (no combustible gases or vapours present), or
  – with calibration adapter: Supply zero gas (clean air) at a flow rate of approx. 0.5 L/min via the calibration adapter.
  ⇒ The transmitter's display shows the current measured value for zero gas and for clean ambient air, which generally differs slightly from zero. Negative values down to "–5"% LEL or "–,9"% LEL (type XTR 0010) are displayed.
– Wait until the reading has stabilised (max. 3 minutes) and press keys (▲+▼). This converts the current sensor signal to the zero-point, and the display shows the newly set zero-point (ideally "0").
– Press (+▼) to save the updated zero-point and to terminate the zero adjustment.

⚠ WARNING

After a sensor replacement, the transmitter's zero-point may initially be negatively misaligned so much that it cannot be displayed as a negative value. The display then shows "--". In this case, press keys (+▼) to save the new zero-point and perform the zero adjustment again, if necessary.

– Press keys (+▼) to terminate the zero adjustment. The display shows ZE once again.
– Press the ▲ key to return to the measuring mode or the ▼ key to calibrate the sensitivity.

5.3.2.2 Calibrate sensitivity



The zero-point must be calibrated before the sensitivity adjustment!

– In the calibration menu, navigate using the ▲ or ▼ key until the display shows SP ("SPan") and confirm by pressing the (▲+▼) keys. The measured signal is set to 3.4 mA to indicate the calibration mode to the controller.

⇒ The display shows the test gas concentration used during the previous adjustment in % LEL.

– Use the ▲ or ▼ key to set the concentration of the test gas currently in use between 20 and 99% LEL in 1% LEL steps.

– For the type XTR 0010, a decimal point appears, i.e. the concentration of the test gas can be adjusted between 2.0 and 9.9% LEL in steps of 0.1% LEL.

– Pressing the keys for a longer period activates the repeat function.

Recommended test gas concentration:

Transmitter	Full scale value	Test gas concentration
Type XTR 0000	100% LEL	30 to 70% LEL
Type XTR 0010	10% LEL	3 to 7% LEL

⚠ CAUTION

The test gas must consist of the gas component to be monitored and air. Calibration gases filled in nitrogen are unsuitable for this task!

– Press the (▲+▼) keys and – depending on the transmitter type – apply the recommended test gas concentration (see table) at a flow rate of approx. 0.5 L/min via the calibration adapter.

– Wait until the reading has stabilised (max. 3 min) and press the (▲+▼) keys to calculate the necessary internal amplification of the transmitter. The display shows the measured value with the newly calculated amplification factor; however, this has not yet been saved. The original amplification factor is restored if the calibration function is automatically exited by waiting for more than 4 minutes in this status.

NOTICE

After sensor replacement, the internal amplification of the transmitter can be so high that the measured value cannot be displayed. The display will then show "99" or "9.9". In this case, press the keys (▲+▼) to recalculate the necessary internal amplification, save it, and repeat the sensitivity adjustment.

– Press the (▲+▼) keys. This finally saves the newly calculated amplification. The display shows a reference value for the sensitivity (sensitivity) of the sensor (constantly amplified bridge signal). If this reference value is lower than 10 it is displayed with a decimal point.

– The actual sensitivity of the sensor in mV per % LEL can be obtained by multiplying the reference value by a factor 2 and dividing it by 100 (or for the type XTR 0010, dividing it by 10), e.g.:
  – If, after adjusting the type XTR 0000 with 52% LEL propane, a reference value of 45 is displayed, the actual sensitivity of the DrägerSensor PR M DQ for propane is 45 * 2 / 100 = 0.9 mV/%LEL.
  – If, after adjusting the type XTR 0010 with 4.4% LEL ethanol, a reference value of 32 is displayed, the actual sensitivity of the DrägerSensor LC M for ethanol is 32 * 2 / 10 = 6.4 mV/%LEL. This value is higher by a factor of 5 than for the DrägerSensor PR M DQ because of the internal amplification of the DrägerSensor LC M.

– The reference value and/or the actual sensor sensitivity should always be recorded in mV/%LEL for test purposes.

NOTICE

If the reference value is less than half the value recorded during commissioning of the sensor or if the measured value does not stabilise within 3 minutes, the sensor should be replaced (see "Replacing the sensor", page 40).

– Press the (▲+▼) keys to exit the sensitivity adjustment.

– Press the ▲ key twice to return to measuring mode. The flashing point on the bottom right is deactivated.

5.3.2.3 After completing the adjustment

– The display shows the current gas concentration in % LEL and the transmitter once again emits the concentration-dependent 4 to 20 mA signal.

– Refit the upper part of the casing, ensuring that the atmosphere is free of dust and fasten the cover screws.

5.4 Operation

In line with the gas concentration, the current loop produces a current between 4 and 20 mA, or

Current	Meaning
0 mA	Cable is broken or power supply has failed
1 mA	Fault (see "Troubleshooting", page 39)
3.4 mA	Calibration signal
3.8 mA to 20.5 mA	Measured signal in normal operation
4 mA	Measured signal zero-point
20 mA	Measured signal full scale value
20.5 mA	Over range by more than 3% of full scale value

5.4.1 Using a sensor membrane or the dust guard filter

Type XTR 0000/0001: To protect against moisture and dust and to reduce sensitivity to wind and airflow, a sensor membrane can be attached to the gas inlet of the DrägerSensor PR M DQ 68 14 140 (see order list, part number 83 26 840). The sensor membrane has no impact on the sensor's response time (exceptions include long-chain vapours such as *n*-nonane). The influence on the sensitivity is negligible. If the sensor membrane is attached, it must then be recalibrated with the membrane. The sensor membrane must be checked visually before each adjustment and replaced if necessary.

In the case of very significant dust accumulation and high aerosol exposure, the DrägerSensor PR M DQ 68 14 140 can be used with a dust guard filter (see order list, part number 68 10 537). This is simply pressed into the opening before the sensor's wire mesh disc and is latching. The dust guard filter has no impact on the sensor's response time (exceptions include long-chain vapours such as *n*-nonane). The influence on the sensitivity is negligible. If a dust guard filter is used, it must also be used during the adjustment procedure. The dust filter should be replaced before adjustment.

ℹ The sensor membrane and dust guard filter must not be combined.

6 Troubleshooting

Fault	Cause	Remedy
Display off	Cable faulty	Check cable to the controller.
Transmitter cannot be calibrated	Sensor faulty or poisoned	Replacing the sensor.
Measuring current is 1 mA, display shows E0, E1, …. or E8	Transmitter signals a fault	See following table.

Error code	Cause	Remedy
E0	Supply voltage is below 12 V or above 30 V.	Correction of the supply voltage.
E1	Hardware error	Replace 4 to 20 mA converter module.
E2	Memory error, error when exporting calibration information	Repeat calibration procedure. If calibration fails again: Hardware error. Replace converter module.
E3	Sensor not connected or defective	Check sensor connection and replace sensor, if necessary.
E4	Sensor signal below –5% LEL or lower than –0.9% LEL	Calibrate the zero-point and sensitivity.
E5	Error during zero-point calibration (e.g. offset too high)	Check zero gas and sensor and replace sensor, if necessary.

Error code	Cause	Remedy
E6	Error during sensitivity calibration (e.g. sensor sensitivity <0.08 mV/%LEL)	Repeat the procedure, check the test gas and sensor and replace sensor, if necessary.
E7	Error while calibrating the 4 to 20 mA output signal	Repeat calibration, check the measurement setup for errors.
E8	System error	Replace 4 to 20 mA converter module.

If it is not possible to eliminate the faults by employing the remedial measures described, or if other faults occur, the transmitter must be checked by specialists and repaired, if necessary.

7 Maintenance

7.1 Maintenance

ℹ Comply with EN 60079-29-2 and the relevant national laws and regulations.

Daily

– Visual inspection to establish operational readiness.

During commissioning

– Perform zero-point and sensitivity adjustment.
– Check the signal transmission to the controller and alarm triggering.

At regular intervals,

as specified by those responsible for the gas detection system, and not exceeding an interval of 6 months:

– Perform zero-point and sensitivity adjustment.
– Check the signal transmission to the controller and the triggering of the alarms (SL function – set the current output to X mA, (see "SL – set current output to X mA", page 31)).

In particular, regular checks must be performed to ensure that the sensor's gas inlet is in a condition that does not impair the gas infeed due to corrosion or deposits (dust, oil, aerosol).

Every six months

– Inspection by specialists.

The inspection intervals must be established in each individual case, depending on technical safety considerations, engineering conditions, and the technical requirements of the equipment. We recommend that a service contract be obtained with Dräger and that all repairs also be carried out by them.

If necessary

– Replacing the sensor.

7.2 Replacing the sensor

Only use sensors which are listed in the order list. Type XTR 0000, XTR 0001: DrägerSensor PR M DQ, order number 68 14 140, type XTR 0010, XTR 0011: DrägerSensor LC M DD, order number 68 10 350.

⚠ WARNING

The transmitter must be de-energised before replacing the sensor. Otherwise explosion protection and the integrity of the sensor are not ensured, as this might be damaged during live connection.

– Observe the national regulations for the installation of electrical apparatus in explosion-hazard areas (in Europe EN 60 079-14).
– Disconnect the transmitter from the power supply or remove the controller's channel card from the rack.
– Loosen four screws on the top of the transmitter and remove the upper part of the casing.
– Disconnect the sensor lines from the connection terminals. Use a screwdriver (width of 3 mm) or special tool to open the spring terminals (see "Handling the spring terminal clamps in the transmitter", page 36).
– Unscrew the hexagon nut from the old ex-sensor.

– Remove the old ex-sensor from the housing and replace with a new ex-sensor. Shorten the sensor cables on the new sensor to 55 mm, strip approx. 6 mm and apply the isolated ferrules provided (Zoller+Fröhlich, type: V3AE0003 or equivalent). This ensures that the degree of protection IP 30 is preserved if the housing is opened for maintenance purposes.
– Screw the new sensor into the hexagon nut (via the housing opening) and fasten with thread-locking fluid (e.g. Loctite no. 221). To preserve the IP degree of protection, ensure the flawless fit of the sensor sealing ring.
– Connect the ex-sensor's cables (brown, yellow, black) to the corresponding br/br, ge/yw and sw/bk terminal. Use a screwdriver (width of 3 mm) or special tool to open the spring terminals (see "Handling the spring terminal clamps in the transmitter", page 36).
– Refit the upper part of the casing, ensuring that the atmosphere is free of dust and fasten the cover screws.
– Turn the transmitter on again and/or re-insert the controller's channel card into the rack.
– Observe the warm-up time of the new ex-sensor:
  DrägerSensor PR M DQ, at least 30 minutes
  DrägerSensor LC M, at least 120 minutes

After replacing the ex-sensor, the transmitter must be calibrated (see "Calibrating the transmitter", page 37).

8 Disposal

This product must not be disposed of as household waste. This is indicated by the adjacent symbol.
You can return this product to Dräger free of charge. For information please contact the national marketing organizations or Dräger.

9 Technical data

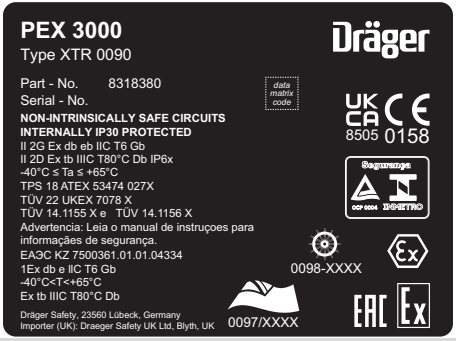
Measuring range	Type XTR 0000, XTR 0001: 0 to 99% LEL
	Type XTR 0010, XTR 0011: 0 to 9.9% LEL
	Type XTR 0090, XTR 0091 with sensing head SE Ex PR / HT ... DQ: 0 to 99% LEL
	Type XTR 0090, XTR 0091 with sensing head SE Ex LC ... DD: 0 to 9.9% LEL
Signal transmission to the controller	Measuring current of 4 mA to 20 mA
Supply voltage U_n	12 to 30 V DC, nominal 24 V DC, approx. 105 mA at 24 V DC
Power consumption incl. ex-sensor	≤2.5 W
Cable entry	for cable diameters between 7 and 12 mm
Conductor cross-section	0.5 to 1.5 mm^2
Dimensions (W x H x D)	Type XTR 0000, XTR 0010: approx. 80 x 150 x 60 mm
	Type XTR 0001, XTR 0011: approx. 110 x 150 x 60 mm
Weight	approx. 600 g (type XTR 0090, XTR 0091: approx. 450 g)
Degree of protection (according to EN 60529)	IP 66
Ambient conditions during operation:	

— Ambient temperature	all types min.: –40 °C
	Type XTR 0000, XTR 0001, XTR 0010, XTR 011 max.: T4: +65 °C, T5: +55 °C, T6: +40 °C
— Pressure	700 to 1300 hPa
	in explosion-hazard area: 800 to 1100 hPa
— Humidity	0 to 95% rel. humidity, non-condensing
during storage	–40 to +65 °C
	700 to 1300 hPa
	0 to 90% rel. humidity, non-condensing

Device marking in accordance with 2014/34/EU	Type XTR 0000, XTR 0001, XTR 0010 or XTR 0011

	Year of manufacture from serial number [1)]

Device marking in accordance with 2014/34/EU	Type XTR 0090 or XTR 0091



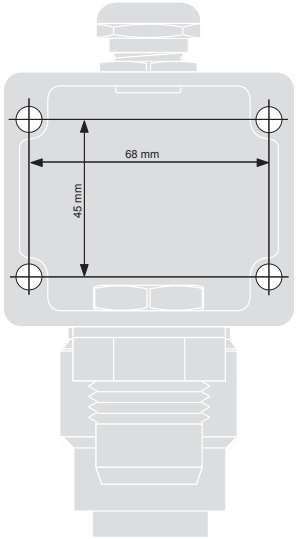
Year of manufacture from serial number [1)]

Electromagnetic compatibility	acc. to 2014/30/EU, pursuant to EN 50 270

1) Composition of the serial number: The third letter of the serial number indicates the year of manufacture: M = 2019, N = 2020, P = 2021, R = 2022, S = 2023, T = 2024, U = 2025, W = 2026, X = 2027, Y = 2028, Z = 2029, etc. (letters G, I, O and Q are not used)
Example: Serial number ARMB-0001: The third letter is M, i.e. the device was manufactured in 2019.

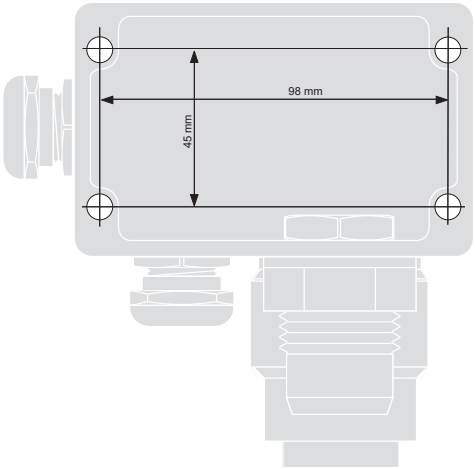
Drilling templates

Type XTR 0000 / XTR 0010 / XTR 0090



42108

Type XTR 0001 / XTR 0011 / XTR 0091



42109

10 Order list

Name and description	Order no.
Transmitter	
PEX 3000, type XTR 0000 small housing, measuring range 0 to 100% LEL	8318280
PEX 3000, type XTR 0010 small housing, measuring range 0 to 10% LEL	8318290
PEX 3000, type XTR 0090 small housing, remote transmitter	8318380
PEX 3000, type XTR 0001 large housing, measuring range 0 to 100% LEL	8318360
PEX 3000, type XTR 0011 large housing, measuring range 0 to 10% LEL	8318370
PEX 3000, type XTR 0091 large housing, remote transmitter	8318390
Polytron SE Ex PR M1 DQ sensing head	6812711
Polytron SE Ex PR M2 DQ sensing head	6812710
Polytron SE Ex PR NPT1 DQ sensing head for conduit tubing 3/4" NPT, without cable gland	6812800
Polytron SE Ex LC M1 DD sensing head	6812722
Polytron SE Ex LC M2 DD sensing head	6812721
Polytron SE Ex HT M DQ sensing head	6812720
Accessories	
Calibration adapter	6806978
Dust filter for DrägerSensor PR M DQ (only for type XTR 0000 and XTR 0001), packing unit 10 pcs.	6810537

Name and description	Order no.
E-set membrane 21.50x14.50, 2 pcs	8326840
Operating tool to open the spring terminals, plastic	8318376
Process adapter[1] (Stainless steel, with M30x1.5 union nut) for DrägerSensor PR M DQ and DrägerSensor PR NPT DQ	6812470
Process adapter (stainless steel, with M36x1.5 union nut) for DrägerSensor LC M and DrägerSensor LC NPT	6812465
Remote calibration adapter DQ[1]	6812480
Remote calibration adapter LC	6812482
Spare parts [2]	
DrägerSensor PR M DQ Replacement sensor for type XTR 0000 and XTR 0001	6814140
DrägerSensor LC M Replacement sensor for type XTR 0010 and XTR 0011	6810350
Converter module ET 420 Complete	8318377

1) Part of the suitability test in accordance with EN 60079-29-1 for the sensing heads with DQ sensors.
2) The storage time of the spare parts is unlimited. This also applies for the sensors, if they are stored in the original packaging under the conditions specified on page 42.

43496

EU-Konformitätserklärung
EU-Declaration of Conformity

Dokument Nr. / *Document No.* SE20325-06

Wir / *we* Dräger Safety AG & Co. KGaA, Revalstraße 1, 23560 Lübeck, Germany

erklären in alleiniger Verantwortung, dass das Produkt
declare under our sole responsibility that the product

Gasmesstransmitter Typ XTR 000*, XTR 001*, XTR 009* (PEX 3000)
Gas Detection Transmitter type XTR 000, XTR 001*, XTR 009* (PEX 3000)*

mit der EU-Baumusterprüfbescheinigung / Expertise
is in conformity with the EU-Type Examination Certificate / Expertise
TPS 18 ATEX 53474 027X
MEDB00005C0

ausgestellt von der notifizierten Stelle mit der Kenn-Nr.
issued by the Notified Body with Identification No.
TÜV SÜD Product Service GmbH Ridlerstraße 65 D-80339 München 0123

DNV SE Brooktorkai 18 D-20457 Hamburg 0098

und mit den folgenden Richtlinien unter Anwendung der aufgeführten Normen übereinstimmt
and is in compliance with the following directives by application of the listed standards

Bestimmungen der Richtlinie *provisions of directive*		**Nummer sowie Ausgabedatum der Norm** *Number and date of issue of standard*
2014/34/EU	**ATEX-Richtlinie** *ATEX Directive*	EN IEC 60079-0:2018, EN 60079-1:2014, EN IEC 60079-7:2015+A1:2018, EN 60079-31:2014, EN 60079-29-1:2016
2014/90/EU	**Schiffsausrüstungs-Richtlinie** *Marine Equipment Directive*	EN IEC 60079-0:2018, EN 60079-29-1:2016, IEC 60092-504:2016, IEC 60533:2015
2014/30/EU	**EMV-Richtlinie** *EMC Directive*	EN 50270:2015+AC:2016 susceptibility: type 2 emission: type 1
2011/65/EU 2015/863/EU	**RoHS-Richtlinie** *RoHS Directive*	EN IEC 63000:2018

Überwachung der Qualitätssicherung Produktion durch:
Surveillance of Quality Assurance Production by:
DEKRA Testing and Certification GmbH Handwerkstr. 15 D-70565 Stuttgart 0158

DNV SE Brooktorkai 18 D-20457 Hamburg 0098

Zertifikat-Nr.:
Certificate No.:
MEDD00000TF, Rev. No.: xx

Lübeck, 2021-09-28

Ort und Datum (jjjj-mm-tt)
Place and date (yyyy-mm-dd)

Dr. Marcus Romba
Head of Electronic Engineering
Head of Product Qualification
R&D Safety

57870

UK Declaration of Conformity

Document No. 11167705-00

We Dräger Safety AG & Co. KGaA, Revalstraße 1, 23560 Lübeck, Germany

declare under our sole responsibility that the product

Gas Detection Transmitter type XTR 000*, XTR 001*, XTR 009* (PEX 3000)

is in conformity with the UK-Type Examination Certificate / Expertise
(Schedule 3A Part 1)
TÜV 22 UKEX 7078 X
DNV MERB00005C0

issued by the Approved Body with Identification No.
TUV Rheinland UK Ltd Friars Gate (Third Floor) 1011 Stratford Road Shirley, Solihull B90 4BN 2571

DNV UK Ltd. 30 Stamford Street Vivo Building London SE1 9LQ United Kingdom 0097

and is in compliance with the following UK regulations by application of the listed standards

Statutory Instrument		**Number and date of issue of designated standard**
SI 2016/1107	**Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres**	EN 60079-0:2018, EN 60079-1:2014, EN 60079-7:2015+A1:2018, EN 60079-31:2014, EN 60079-29-1:2016, EN 50271:2018
SI 2016/1025	**Marine Equipment Regulation**	EN IEC 60079-0:2018, EN 60079-29-1:2016, IEC 60092-504:2016, IEC 60533:2015
SI 2016/1091	**Electromagnetic Compatibility (EMC)**	EN 50270:2015+AC:2016 susceptibility: type 2 emission: type 1
SI 2012/3032	**The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment**	EN IEC 63000:2018

Surveillance of Quality Assurance Production by
(Schedule 3A Part 2)
DEKRA Certification UK Ltd Stokenchurch House, Oxford Road, Stokenchurch, HP14 3SK United Kingdom 8505

DNV UK Ltd. 30 Stamford Street Vivo Building London SE1 9LQ United Kingdom 0097

Certificate No.:
MERD00000TF, Rev. No.: xx

Lübeck, 2023-04-04

Place and date (yyyy-mm-dd)

Ingo Pooch
Head of R&D Safety

11 FCC (only for USA)

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

– Reorient or relocate the receiving antenna.? Increase the separation between the equipment and receiver.
– Connect the equipment into an outlet on a circuit different from that to which the receiveris connected.
– Consult the dealer or an experienced radio/TV technician for help.

This device complies with part 15 of the FCC Rules. Operation is subject to the following twoconditions:

(1) This device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

FCC responsible party:
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7256 S. Sam Houston W. Parkway
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e-mail: DIHouston.Approvals@draeger.com

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