

Transmitter PEX 3000

Instructions for Use



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For Your Safety

The lines highlighted by grey shading contain appropriate instructions for the commissioning, service, inspection and testing the operability, especially considering the safety.

Strictly follow the Instructions for Use

Any use of the transmitter requires full understanding and strict observation of these instructions.

The transmitter is only to be used for purposes specified here.

Maintenance

The instrument must be inspected and serviced regularly by trained service personnel.

We recommend that a service contract be obtained with DrägerService and that all repairs also be carried out by them.

Only authentic Dräger spare parts may be used for maintenance.

Observe chapter "Maintenance".

Use in areas subject to explosion hazards

Equipment or components which are used in potentially explosive atmospheres and have been tested and approved according to national, european or international regulations may be used only under the conditions specified in the approval or the relevant legal regulations.

Modifications of components or the use of faulty or incomplete parts are not permitted.

In the case of repairs to equipment or components of this type, the national regulations must be observed.

Liability for proper function or damage

The liability for the proper function of the instrument is irrevocably transferred to the owner or operator to the extent that the instrument is serviced or repaired by personnel not employed or authorised by DrägerService or if the instrument is used in a manner not conforming to its intended use.

Dräger Safety cannot be held responsible for damage caused by non-compliance with the recommendations given above.

The warranty and liability provisions of the terms of sale and delivery of Dräger Safety are likewise not modified by the recommendations given above.

Dräger Safety AG & Co. KGaA

Intended Use

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

The Transmitter PEX 3000 type XTR 0090 and XTR 0091 (Remote-Version) is intended to be used in combination with a remote Dräger sensing head, e.g. Polytron SE Ex PR M (100 % LEL) or Polytron SE Ex LC M (10 % LEL).

As the operation of the PEX 3000 in combination with the mentioned remote sensing heads does not really differ from the operation of the PEX 3000 with built-in sensors, they are not explicitly considered in these instructions for use. Likewise also the operation of further housing types, e.g. of the types XTR 0001 and XTR 0011 (drilling templates see page 29) is not explicitly described.

The transmitters must not be used at ambient temperatures lower than $-40\text{ }^{\circ}\text{C}$. For the transmitters PEX 3000 type XTR 0000, XTR 0001, XTR 0010, and XTR 0011 the maximum ambient temperature is depending on the temperature classes and is $40\text{ }^{\circ}\text{C}$ for temperature class T6, $55\text{ }^{\circ}\text{C}$ for temperature class T5, and $65\text{ }^{\circ}\text{C}$ for temperature class T4.

For the transmitters PEX 3000 type XTR 0090 and XTR 0091 the permissible maximum ambient temperature is $65\text{ }^{\circ}\text{C}$ generally.

The transmitter is approved acc. to the device categories **II 2G** and **II 2D** and can be operated in hazardous areas zone 1 and zone 2 as well as zone 21 and zone 22. Observe installation instructions.
Not to be used in oxygen enriched atmospheres.

In conjunction with a suitable controller unit with pre-adjusted alarm thresholds acoustic and visible alarm devices or automatic countermeasures can be activated before the detected gases or vapours can form dangerous flammable mixtures with air.

Hints for safe use

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

In potentially gas-explosive areas (zones 1 and 2) the energised transmitter is only allowed to be opened for maintenance purposes.

In potentially dust-explosive areas (zones 21 and 22) there is no explosion protection if the energised transmitter is opened. The Ex area has to be temporary declassified if necessary!
Before closing the transmitter make sure the atmosphere is free of dust.

The following conditions for safe use have to be observed:

1. Basically, the measuring principle of heat of reaction which is based on the catalytic oxidation of a flammable gas, is ambiguous because at high gas concentrations there is not enough oxygen in the sensor necessary for the oxidation process. So the measuring signal decreases at high gas concentrations and even can lead to measuring signal within the measuring range again. A connected controller must be operated with alarm devices, outputs, and alarm thresholds operating as latched if the measuring range is exceeded.
2. The measuring principle of heat of reaction needs a minimum oxygen concentration of 12 % by vol., otherwise the measuring values will be too low because of oxygen deficiency.

Measuring function for the explosion protection acc. to 94/9/EC

In the 1st supplement to the EC-type examination certificate TPS 04 ATEX 1 003 X the transmitters PEX 3000, type XTR 00x and XTR 009x, with Ex-sensor PR M (part-no. 68 09 225) have been approved in respect to the measuring function for explosion protection acc. to EN 61779 part 1 and part 4, for the following gases and vapours:

Methane, Propane, Acetone, Ammonia, Petrol 065/095 (FAM Standard Gasoline), Benzene, 1,3-Butadiene, n-Butane, n-Butyl acetate, Cyclopropane, Diethyl ether, Dimethyl ether, Ethanol, Ethene (Ethylene), Ethyl acetate, Ethylene oxide, n-Hexane, Methanol, Methyl ethyl ketone (MEK), n-Nonane, n-Octane, n-Pentane, i-Propanol, Propene (Propylene), Propylene oxide, Toluene, and Hydrogen.

Especially the PEX 3000 has undergone a safety related assessment concerning the internal software and digital techniques, based on the harmonized standard EN 50271.

Important remark

Although the transmitter has been factory-tested before delivery, the commissioning after installation must include the zero- and span-adjustment.

The commissioning has to be terminated by a function test of the complete gas detection system.

Installing Transmitter

Mounting

Orientation: The measuring signal of the transmitter is depending on the inclination. The transmitter must be mounted such that the sensor's gas entrance area of the sensor is pointing downwards. If to be mounted at the ceiling a mounting bracket must be used.

- Install transmitter in vertical position at a location with little vibration and maximum temperature stability (no direct sun light) in the vicinity of a possible leak.
- Consider the complete scope of environmental conditions influencing the transmitter. Avoid external influences such as splashing water, oil, corrosive aerosols (salty fogs) etc. and the possibility of mechanical damage.
- Leave at least 30 cm free space beneath the transmitter to provide accessibility for calibration work.

Remark

Certain substances in the atmosphere to be monitored may impair the sensitivity of the sensors (Ex-Sensor PR M or Ex-Sensor LC M) installed in the transmitter:

The following substances are known at present:

- a) polymerizing substances such as acrylo nitrile, butadiene and styrene,
- b) corrosive compounds such as ammonia and halogenated hydrocarbons (releasing halogenes such as bromine, chlorine or fluorine when being oxidised),
- c) catalyst poisons such as sulphurous and phosphorous compounds, silicon compounds, and metal-organic vapours.

The sensors used are based on measuring elements (pellistors) which are poison-resistant and so have a longer lifetime 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 ventilation!

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

Pay attention to the density of gas!

- In case of gases, the density of which is lower than that of air, such as hydrogen, methane or ammonia the transmitter or sensing head must be located above a possible leak or at the highest points at which major concentrations of gas may be found.
- In case of gases and vapours with a density greater than that of air, the sensing head or transmitter must be installed beneath a possible leak or at the lowest points at which such gases and vapours may be present.

Mounting the transmitter

- By means of four screws (diameter 4 mm) through the holes of the housing (drilling template see page 29).

Installing Electrical Connections

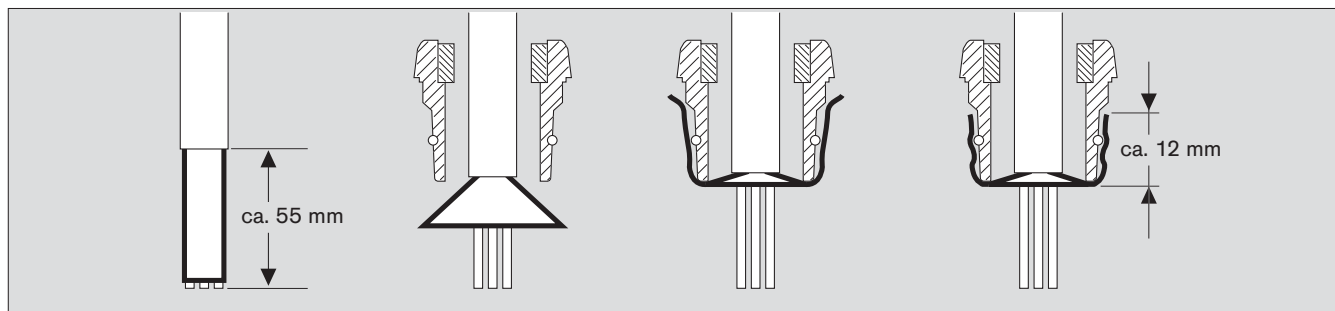
- Electrical wiring is only to be laid and connected by an expert paying attention to the pertinent regulations and laws concerning electrical equipment in potentially explosive atmospheres as well as the approval conditions.

Connection between transmitter and controller unit

The maximum cable length for loads of 250 Ohms can be extracted from the following table:

minimum supply voltage at controller side	core cross-section			
	0.5 mm ² (36 Ohms/km)	0.75 mm ² (24 Ohms/km)	1.0 mm ² (18 Ohms/km)	1.5 mm ² (12 Ohms/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

- By means of 3-core screened cable, (braided screen, cover $\geq 80\%$), outer diameter min. 7 mm, max. 12 mm. Connect Shielding as short as possible to earth clamp of the controller unit.
- By means of the connecting cone within the cable gland the cable-screen has to be contacted to the internal conductive surface of the enclosure as shown. With this the required RF-immunity according to EN 50 270 is ensured.

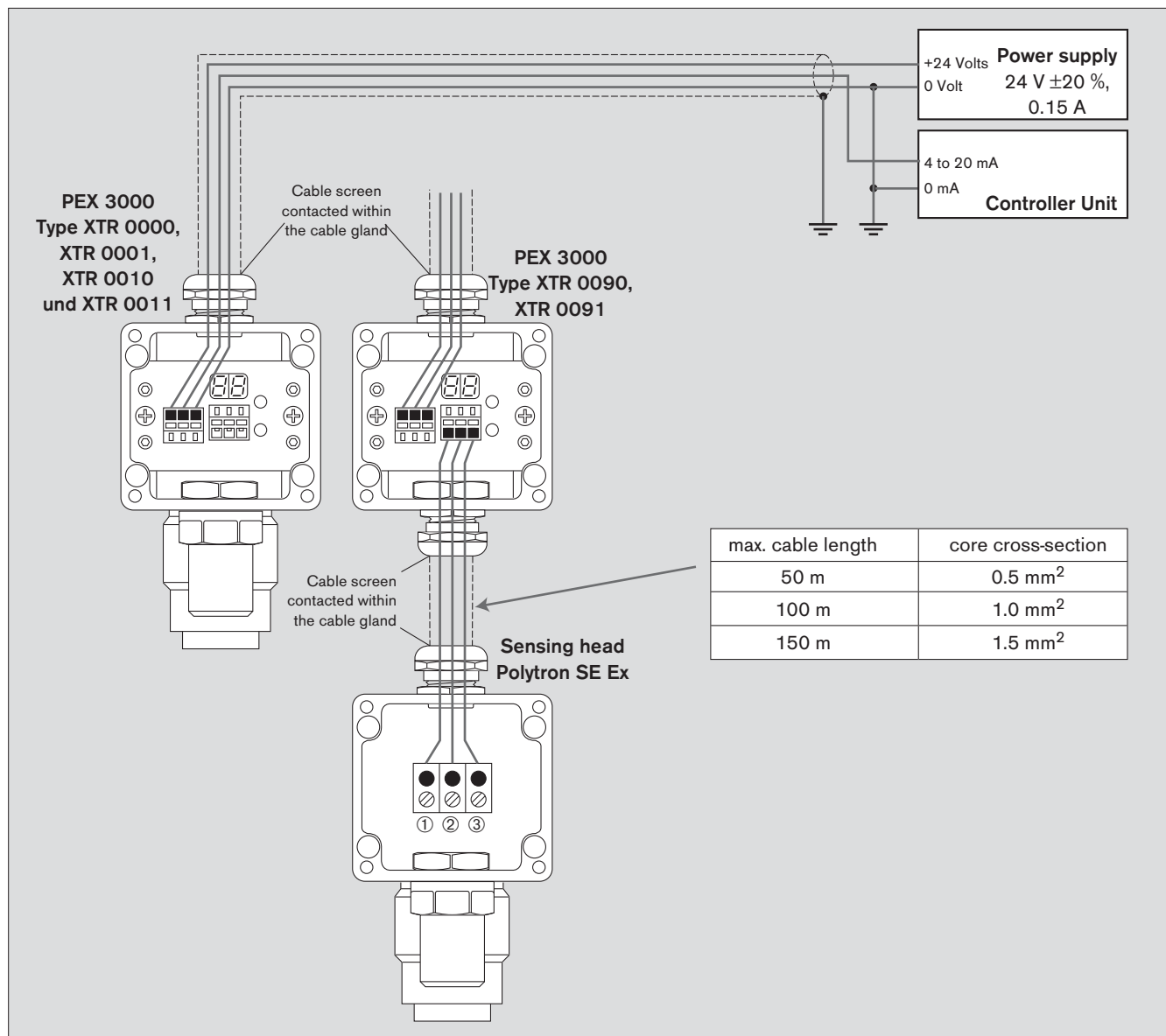


Remark:
The cable gland is explicitly approved for fixed installations and outer cable diameters between 7 and 12 mm.

- Remove cover of the transmitter.
- Connection between transmitter and central controller as shown.

Type XTR 0090 and XTR 0091:

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



PEX 3000, all types

Connection to central controller:

- Connect terminal +24V to +24 Volt
- Connect terminal SIG to 4 bis 20 mA input
- Connect terminal 0 V to 0 Volt

PEX 3000, types XTR 0090 and XTR 0091

Connection to sensing head

- Connect terminal br/br to terminal 1
- Connect terminal ge/yw to terminal 2
- Connect terminal sw/bk to terminal 3

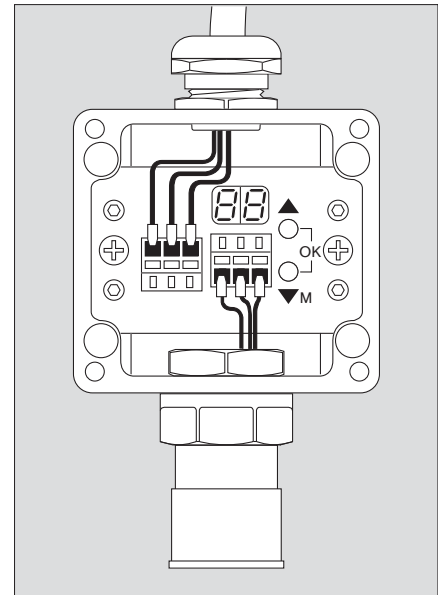
Internal wiring in the transmitter's enclosure

Connect the individual conductors (conductor length min. 55 mm, 5 mm insulation stripped) to the spring terminal clamp so that it is short. Use ferrules in case of stranded cables.

- For the wiring of power supply and signal loop cables only cables with a cross-section of at least 0.75 mm² may be used. Cables with a cross-section of 0.5 mm² may only be used if they are equipped with an isolating ferrule (e.g. Zoller+Fröhlich, Type V3AE0005, V3AE0037 or equivalent). This ensures an IP-rating of IP 30 if the transmitter housing is opened for maintenance purposes.

Only Type XTR 0090 and XTR 0091:

- For the wiring between transmitter and sensing head (e.g. Sensing Head SE Ex PR M) use only cables with a cross-section of at least 0.75 mm². Cables with a cross-section of 0.5 mm² may only be used if they are equipped with an isolating ferrule (e.g. Zoller+Fröhlich, Type V3AE0005, V3AE0037 or equivalent). This ensures an IP-rating of IP 30 if the transmitter housing is opened for maintenance purposes.

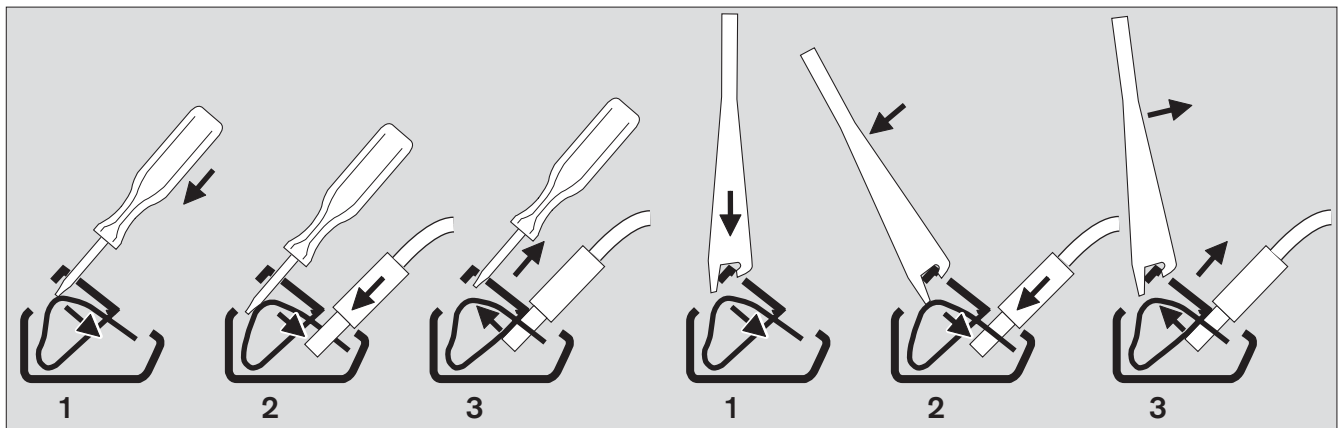


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Remark:

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

Use of spring terminal clamps in the transmitter



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- 1 Insert screw driver (width 3 mm) or attached special tool (see also order list, page 27) into the spring terminal clamp.
- 2 Press spring downwards to open the clamp in the lower part. Insert stripped cable end or ferrule (if necessary) into the lower part.
- 3 Remove screw driver or special tool from the upper part. The electrical connection is ensured by the constant pressure force of the spring.

Attention:

The spring terminal clamps are an integral part of the 4 to 20 mA-converter. Improper handling might damage the terminal clamps so that the complete converter would have to be replaced.

Menu structure

The transmitter PEX 3000 is provided with a 7-segment-LED-display and two scroll keys (key ▲ and key ▼) to navigate through the described menus.

Pressing both the scroll keys simultaneously results in an OK-function, indicated as "keys (▲+▼)" in the following.

Key ▼ is additionally marked with a capital M to indicate that you can enter the Menu functions when pressing this key.

Both these menus can only be escaped by means of the key ▲.

Display and scroll keys are accessible after opening the transmitter's enclosure (see picture).

Attention:

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

Remarks concerning the display

During normal operation the 2-digit display shows the current gas concentration in % LEL (00 to 99 or 0.0 to 9.9 % LEL).

Calibration and maintenance

If the calibration or maintenance menu is entered this is indicated by a displayed point (bottom right) flashing with approx. 1 Hz.

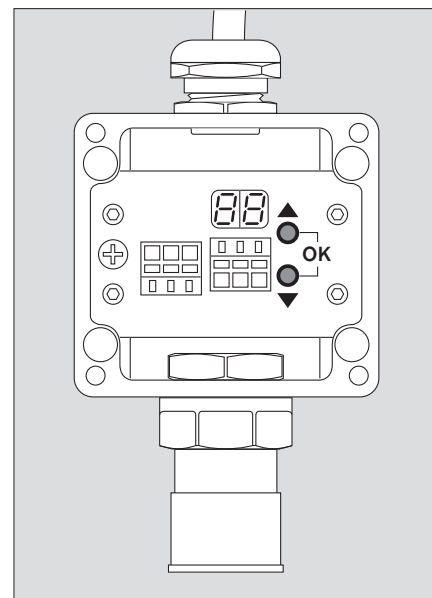
Faults

Faulty states are indicated by alternatively showing 2 horizontal lines and the current error code (E0 through E8).

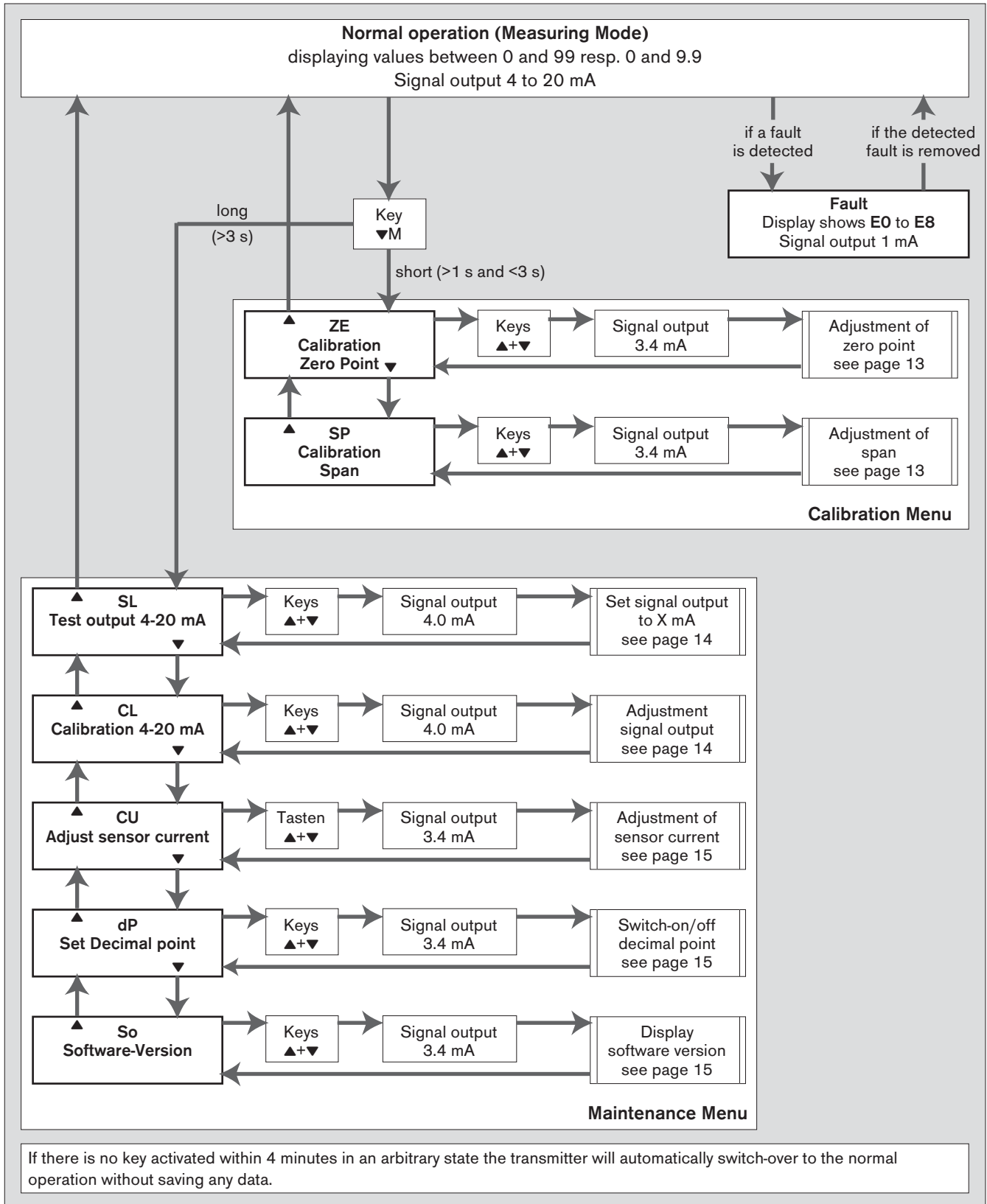
Behaviour after switch-on

All the 14 LED segments and both the decimal points are activated for 5 seconds directly after switching power on. This is a lamp test to make sure that the LED segments are functioning.

For a further minute the display changes showing two horizontal lines and the currently measured concentration. During this time the calibration- and maintenance-menus cannot be entered. After a minute the transmitter switches into normal operation.



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Calibration Menu

- To enter the calibration menu press the key ▼ for more than one second but less than 3 seconds. The display shows a flashing point on the right bottom indicating the calibration mode.

ZE – Zero Adjustment

- Navigate by means of keys ▲ or ▼ until the display shows ZE ("ZEro") and enter the menu by pressing the keys (▲+▼). The output signal switches to 3.4 mA.
- The display shows the currently measured gas concentration (negative values are displayed as long as they are not lower than "–9").
- Apply zero gas to the sensor and wait for signal stabilisation (max. 3 minutes.)
- Press keys (▲+▼) to save the displayed value as an up-dated zero point
- Press keys (▲+▼) again to terminate this function. The display shows ZE again.
- Press key ▼ step into sensitivity adjustment
or
- Press key ▲ to step back into measurement mode.



SP – Span Adjustment

- Navigate by means of keys ▲ or ▼ until the display shows SP ("SPan") and enter the menu by pressing the keys (▲+▼).
- The display shows the span gas concentration used during the previous calibration procedure in % LEL.
- Adjust the concentration of the currently used span gas concentration by means of key ▲ or ▼ in steps of 1 % LEL between 20 and 99 % LEL (or in steps of 0.1 % LEL between 2.0 and 9.9 % LEL). Pressing the keys for longer activates a repeat function.
- Press keys (▲+▼), apply span gas to the sensor and wait for signal stabilisation (max. 3 minutes).
- Press keys (▲+▼) to calculate the necessary internal amplification and save it.
- Press keys (▲+▼) to display a reference value to characterise the sensitivity of the sensor (constantly amplified bridge signal).
- Press keys (▲+▼) to terminate this function. The display shows SP again.
- Press key ▲ twice to step back into measurement mode.



Maintenance Menu

- To enter the maintenance menu press key ▼ for more than 3 seconds until the display shows "SL" and the point on the right bottom flashes to indicate the maintenance mode.

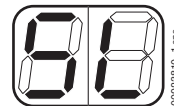
SL – Set Output to x mA

By means of this function the transmitter's output signals can be set to certain constant values.

Attention:

This function can activate alarm conditions at controller unit!

- Navigate by means of keys ▲ or ▼ until the display shows SL ("Set Loop") and press keys (▲+▼) to enter.
 - The signal output of the transmitter is set to 4 mA, the display shows "04".
- By means of the keys ▲ or ▼ the signal output can be adjusted between 1 and 22 mA in steps of 1 mA. Pressing the keys for longer activates a repeat function.
- Press keys (▲+▼) to terminate this function. The display shows SL again.
- Press key ▲ to step back into measurement mode.



CL – Calibration of Output Signal

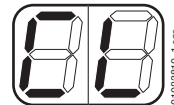
By means of this function the signal output of the transmitter can be adjusted such that a current of 4 mA corresponds to 0 % LEL and a current of 20 mA corresponds to 100 % LEL or 10 % LEL.

Generally the output signal can be measured at the controller side as voltage drop across the input resistance, if not the 4 to 20 mA-loop has to be interrupted to install an amp meter for this purpose.

Attention:

If the current loop is interrupted for this purpose the explosion protection is not ensured!

- Navigate by means of keys ▲ or ▼ until the display shows CL ("Calibrate Loop").
- Press keys (▲+▼) to adjust the lower reference point, the display shows "04" corresponding to 4 mA.
 - Measure the current by means of the amp meter.
- By means of the keys ▲ or ▼ adjust the signal output such that the amp meter reads a current of 4 mA as accurate as possible (between 3.95 mA and 4.05 mA).
- Press keys (▲+▼). By this the lower reference point is saved and the menu switches over to the upper reference point. The display shows "20" corresponding to 20 mA.
 - Measure the current by means of the amp meter.
- By means of the keys ▲ or ▼ adjust the signal output such that the amp meter reads a current of 20 mA as accurate as possible (between 19.95 mA and 20.05 mA). Pressing the keys for longer activates a repeat function.
- Press keys (▲+▼) to save the upper reference point and terminate this function. The display shows CL again.
- Press key ▲ twice to step back into measurement mode.

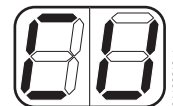


CU – Sensor Current Adjustment

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

Ex-factory values are:

Type XTR 0000, XTR 0001, XTR 0090 and XTR 0091:	270 mA
Type XTR 0010 and XTR 0011:	276 mA



Attention: Adjustment of the sensor current must be followed by calibration of zero point and span!

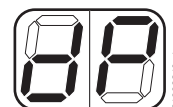
- Navigate by means of keys ▲ or ▼ until the display shows CU ("CUrrent") and press keys (▲+▼) to enter.
- The display shows the last two digits of the currently adjusted sensor current, e.g. the display shows "70" for a sensor current of 270 mA.
- By means of key ▲ or key ▼ the sensor current can be adjusted between 240 mA (display shows "40") and 300 mA (display shows "00") in steps of 1 mA. Pressing the keys for longer activates a repeat function.
- Press keys (▲+▼) to up-dated the sensor current to the value displayed. The value is saved and this function is terminated. The display shows CU again.
- Press key ▲ three times to step back into measurement mode.

dP – Set Decimal Point

This function is used to set the decimal point in case of using an Ex-sensor LC M (Type XTR 0010 or XTR 0011) or remote-transmitter Type XTR 0090 and XTR 0091 with sensing head SE Ex LC M)) with a measuring range 0 to 9.9 % LEL.

The decimal point is only displayed for gas-concentrations in % LEL.

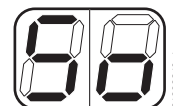
- Navigate by means of keys ▲ or ▼ until the display shows dP ("decimal Point") and press keys (▲+▼) to enter. The decimal point is displayed if already activated. The flashing point on the right bottom is switched off.
- Switch the decimal points on or off by means of key ▲ or ▼.
- Press (▲+▼) to save the up-dated status and to terminate this function. The display shows dP again with a flashing point on the right bottom. An activated decimal point is not displayed.
- Press key ▲ four times to step back into measurement mode.



So – Display Software Version

To document necessary software modifications with this function the current software version can be displayed.

- Navigate by means of keys ▲ or ▼ until the display shows So ("Software") and press keys (▲+▼) to enter.
- The display shows a figure between "01" and "99", indicating the current software version.
- Press keys (▲+▼) to terminate this function. The display shows So again.
- Press key ▲ five times to step back into measurement mode.



Start-up

- Remove cover of the transmitter's enclosure.

Attention:

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

Switch on supply voltage

- After having switched on the transmitter all the LED segments including both the decimal points are activated for approx. 5 seconds to make sure that they are not faulty. During this internal test routines start running, the transmitter's output signal is 1 mA.
- After this the display shows two horizontal lines and the currently measured gas concentration alternately, changing with approx. 1 Hz. During this the transmitter's output is 3.4 mA.
- After one minute the transmitter is ready.
If the reading is not lower than 5% of the full scale deflection, the actual measured value is displayed constantly, and the output signal is proportional to the reading.

Type XTR 0090 or XTR 0091 in connection with the sensing head SE Ex LC M:

- Adjust sensor current by means of the function "CU – Sensor Current Adjustment" (see page 15) to 276 mA.
- Transmitter should be operated at least 10 minutes (warm-up time of the sensor) before calibration.

Calibrating 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 SE Ex PR M (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 SE Ex LC M (10 % LEL).

Zero point adjustment

To enter the calibration menu press the key ▼ for more than one second but less than 3 seconds. The display shows a flashing point on the right bottom indicating the calibration mode.



- Navigate by means of keys ▲ or ▼ until the display shows ZE ("ZEro") and enter the menu by pressing the keys (▲+▼). The output signal is set to 3.4 mA to signal the calibration procedure mode to the controller unit.
- Apply zero gas to the sensor –
 - without calibration adapter:
Ensure that the transmitter is in clean ambient surroundings (no flammable gases or vapours present),
 - or
 - with calibration adapter:
Supply clean air at a flow rate of approx. 0.5 L/min via the calibration adapter.
- The transmitter's display shows the currently measured gas concentration which in general is slightly different from zero. Negative values down to "–9" % LEL or "–.9" (type XTR 0010) are displayed.
- Wait until the reading has stabilised (max. 3 minutes) and press keys (▲+▼). By this the current sensor signal is converted into an up-dated zero point also shown on the display (ideally "0").
- Press keys (▲+▼) to save the up-dated zero point and to terminate the zero adjustment function.

Remark:

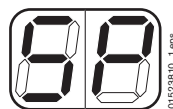
After a sensor replacement the zero point might be misaligned so much that the display shows "–". In this case press keys (▲+▼) to save preliminary zero and again follow the above zero adjustment procedure.

- Press keys (▲+▼) to exit this function. The display shows ZE again.
- Press key ▲ to switch back to the measurement mode or press key ▼ to perform the sensitivity adjustment.

Sensitivity adjustment

Before sensitivity adjustment the zero point must be adjusted!

- Navigate by means of keys ▲ or ▼ until the display shows SP ("SPan") and enter the menu by pressing the keys (▲+▼). The output signal is set to 3.4 mA to signal the calibration procedure mode to the controller unit.
 - The display shows the span gas concentration used during the previous calibration procedure in % LEL.
- By means of the keys ▲ or ▼ the concentration of the currently used span gas can be adjusted between 20 and 99 % LEL in steps of 1 % LEL.
 - The display of type XTR 0010 shows a decimal point, so the gas concentration of the currently used span gas can be adjusted between 2.0 and 9.9 % LEL in steps of 0.1 % LEL.
 - Pressing the keys for longer activates a repeat function.



Recommended span gas concentration:

Transmitter	Full scale deflection	Span gas concentration
Typ XTR 0000	100 % LEL	30 to 70 % LEL
Typ XTR 0010	10 % LEL	3 to 7 % LEL

Attention:

**The span gas must be a mixture of the gas to be monitored in air!
Mixtures with nitrogen are not suitable!**

- Press (▲+▼) and – depending on the current transmitter type (see table) – apply the recommended gas concentration at a flow rate of ca. 0.5 L/min via the calibration adapter.
- Wait until the reading has stabilised (max. 3 min) and press keys (▲+▼) to calculate the necessary internal amplification.

The display shows the measured value with the newly calculated amplification factor, which however has not been saved yet. So the original amplification factor will be restored if the calibration menu is automatically exited by waiting for longer than four minutes.

Remark:

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

- Press keys (▲+▼). The newly calculated amplification factor is finally saved. The display shows a reference value proportional to the sensitivity of the sensor (constantly amplified bridge signal). If this value is lower than 10 it is displayed with decimal point.
 - The true 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 with the type XTR 0010 divide it by 10), e.g.:
 - If after sensitivity adjustment of the type XTR 0000 by means of 52 % LEL propane a reference value of 45 is displayed, so the true sensitivity of the Ex-sensor PR M for propane is $45 \cdot 2 / 100 = 0.9 \text{ mV/\% LEL}$.

- If after sensitivity adjustment of the type XTR 0010 by means of 4.4 % LEL ethanol a reference value of 32 is displayed, so the true sensitivity of the Ex-sensor LC M for ethanol is $32 * 2 / 10 = 6,4$ mV/% LEL. This value is 5-fold higher than with the Ex-sensor PR M because of the internal amplification of the Ex-sensor LC M.
- The reference value and/or the true sensor sensitivity should be recorded for test purposes.

Remark:

If the reference value is less than half value recorded during commissioning or if the measured value does not stabilise within 3 minutes, the sensor is defective and should be replaced (see page 22).

- Press keys (▲+▼) to exit this function.
- Press key ▲ twice to switch back to the measurement mode. The flashing point on the right bottom is deactivated.

Following completion of calibration:

- The display shows the current gas concentration in % LEL and the transmitter's 4 to 20 mA-output is proportional to the current gas concentration in % LEL.
- Observe the atmosphere is free of dust and re-install the upper section of the housing by means of the four screws..

Operation

- Corresponding to the gas concentration the transmitter produces is a current between 4 and 20 mA, especially

Output current	Meaning
0 mA	Cable is broken or power supply has failed
1 mA	Failure: <ul style="list-style-type: none">● Zero underrange by more than 5 % of full scale value● Failure of electronics● Broken cable or short-circuit in the sensor circuit
3.4 mA	Calibration signal
3.8 mA to 20.5 mA	Output signal normal operation
4 mA	Output signal zero
20 mA	Output signal full scale value
20.5 mA	Overrange by more than 3 % of full scale value

Shut downs

In the event of shut-downs, e.g. when performing maintenance and inspection work, the transmitter is ready for use again after approx. 10 minutes (sensor warm-up time) following a renewed switch-on of the system.

- Calibrate the transmitter again if necessary.

Use of dust filter

Type XTR 0000:

A dust filter can be used with the Ex-sensor PR M (see order list, part-number 68 10 537).

This is simply pressed into the opening of the sensor in front of the sinter disk and is self-clamping. This dust filter will increase the sensor's response time only slightly. There is nearly no influence on the sensor's sensitivity by the dust filter.

If a dust filter is used it has also to be used during the calibration procedure. It is recommended to use a freshly installed dust filter before starting the calibration procedure.

Service

- Observe standard EN 50073 and/or the relevant national laws and regulations.

Daily

- Visual inspection to establish readiness for operation.

Commissioning

- Check zero- and sensitivity adjustment, page 17 to page 18.
- Check signal transmission to the controller and correct triggering of alarms.

At regular intervals,

as specified by those responsible for the gas detection system (and which should not exceed an interval of six months):

- Check zero- and sensitivity adjustment, page 17 to page 18.
- Check signal transmission to the controller and make sure correct triggering of alarms (maintenance function SL – Set output to x mA, page 14).

Especially it must regularly be ensured that gas can freely penetrate the sinter disk and that there are neither corrosion nor deposits of dust, oil or aerosols.

Every six months

- Arrange for inspection by trained personnel

The inspection intervals in each individual case are influenced and if necessary shortened by technical safety considerations, engineering processes and the technical requirements of the equipment.

We recommend a DrägerService contract which also covers repairs.

If necessary

- Replace sensor, page 22.

Maintenance

Sensor Replacement

- Use sensors only which are listed in the order list page 27.
Type XTR 0000, XTR 0001: Ex-Sensor PR M, part-no. 68 09 225,
Type XTR 0010, XTR 0011: Ex-Sensor LC M, part-no. 68 10 350.

Attention:

The transmitter must be de-energised before disconnecting the sensor. Otherwise then explosion protection is infringed and the sensor might be impaired during connecting procedure.

- Observe national regulations for the installation of electrical apparatus in potentially explosive atmospheres devices (in Europe EN 60 079-14).
- De-energise transmitter or remove the corresponding channel module of the central controller.
- Loosen four screws on the top of the transmitter's housing and remove the upper section.
- Disconnect the sensor leads from the terminals. Use screw driver (3 mm width) or special tool to open the spring terminals. (see page 10 about handling spring terminals).
- Unscrew hexagon nut of the old sensor.
- Remove old Ex-Sensor out of the housing and replace by a new Ex-sensor. Shorten the sensor leads to 55 mm, strip approx. 6 mm insulation and fix the attached isolated ferrules (Zoller+Fröhlich, Type: V3AE0003 or equivalent). This ensures an IP-rating of IP 30 if the transmitter housing is opened for maintenance purposes.
- Screw in new sensor through the corresponding and secure with locking sealant, e.g. Loctite No. 221. To maintain the IP-rating observe that the sensor's O-ring is tightly fitted.
- Connect the sensor's leads (brown, yellow, black) to the corresponding spring terminals marked br/br, ge/yw und sw/bk. Use screw driver (3 mm width) or special tool to open the spring terminals. (see page X about handling spring terminals).
- Observe the atmosphere is free of dust and re-install the upper section of the housing by means of the four screws.
- Energise transmitter again and re-install the corresponding channel module of the central controller.
- Observe warm-up time of the new sensor of about 10 minutes.

Attention:

After replacement of the Ex-sensor the transmitter must be calibrated (see transmitter calibration, page 17).

Fault - Cause - Remedy

Fault	Cause	Remedy
Display off	Cable faulty	Check cable to central controller.
Transmitter cannot be calibrated	Sensor faulty or poisoned	Replace sensor, page 22.
Signal output is 1 mA, display shows E0, E1,, or E8	Transmitter is faulty	See following table.

Failure code	Cause	Remedy
E0	Supply voltage is below 12 V DC or above 30 V DC.	Connect transmitter to proper voltage.
E1	Hardware failure	Replace 4 to 20 mA-Converter module.
E2	Storage failure, failure while reading the calibration information	Repeat calibration procedure. If failure repeatedly occurs: Hardware failure. Replace converter module.
E3	Sensor not connected or defective	Check sensor connection and if needed replace sensor.
E4	Sensor signal lower than -5 % LEL or lower than -0.5 % LEL	Adjust zero and sensitivity.
E5	Failure during zero adjustment (e.g. if the offset is too high)	Check zero gas and sensor or replace sensor.
E6	Failure during sensitivity adjustment (e.g. if the sensor signal is lower than 0.08 mV/% LEL)	Repeat sensitivity adjustment, check test gas concentration or replace sensor.
E7	Failure while adjusting the 4 to 20 mA-output current	Repeat procedure, check electrical installation.
E8	System failure	Replace 4 to 20 mA-Converter module.

Should it not be possible to eliminate the malfunctions occurring by employing the remedial measures described, or should other faults occur:

Check transmitter and, if necessary, arrange repair by trained service personnel.

Design and measuring principle

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

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

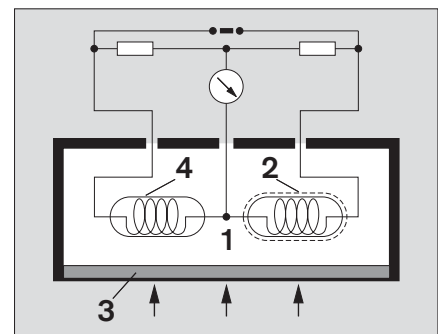
The Ex-sensor is a transducer for measuring the partial pressure of flammable gases and vapours present in the atmosphere. They use the heat-of-reaction principle. The monitored air is diffusing through the sintered metal disc into the Ex-sensor. This is where the mixture of flammable gases and vapours are catalytically combusted at a heated detector element (pellistor). The oxygen required for combustion is obtained from the monitored air. The detector element is additionally heated by the resultant heat of reaction. This heat in turn causes a change in the resistance of the detector element, which is proportional to the concentration of the flammable gas or vapour.

In addition to the catalytically active detector element, the Ex-sensor accommodates an inactive compensator element, which is likewise heated. Both elements are parts of a Wheatstone bridge. Environmental effects such as temperature, humidity or heat conductivity of the ambient air to be monitored, have identical effects on both the elements, whereby these effects on the measuring signal are almost completely compensated.

The sensor signal is amplified by the electronics, indicated on the display and converted into a 4 to 20 mA signal which is passed to the central controller.





Principle of Operation

- 1 Measuring chamber
- 2 Detector element
- 3 Sintered metal
- 4 Compensator element



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 M: 0 to 99 % LEL Type XTR 0090, XTR 0091 with sensing head SE Ex LC M: 0 to 9.9 % LEL
Signal transmission to central controller	output current 4 mA to 20 mA
Supply voltage U_n	12 to 30 V DC, 24 V DC nominal, approx. 105 mA at 24 V DC
Power consumption incl. Ex-sensor	≤ 2.5 W
Cable gland	for cable diameters between 7 and 12 mm
Cable core 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)
Environmental conditions	
during operation:	
– ambient temperature	all types min.: -40 °C type XTR 0000, XTR 0001, XTR 0010, XTR 0011 max.: T4: +65 °C, T5: +55 °C, T6: +40 °C type XTR 0090, XTR 0091: max.: T6: +65 °C
– pressure	700 to 1300 hPa in potentially explosive atmospheres: 800 to 1100 hPa
– humidity	5 to 95 % rel. humidity, non condensing
during storage:	
	-40 to +65 °C 700 to 1300 hPa 5 to 95 % rel. humidity, non condensing

Device description acc. to 94/9/EC	Typ XTR 0000, XTR 0001, XTR 0010 or XTR 0011
	 0158  II 2G EEx de IIC T6/T5/T4 II 2D IP 6x T85/T100/T135 °C $-40\text{ °C} \leq T_a \leq +40/+55/+65\text{ °C}$ TPS 04 ATEX 1 003 X NON-INTRINSICALLY SAFE CIRCUITS INTERNALLY IP30 PROTECTED Year of manufacturing ¹⁾ Dräger Safety, D-23560 Lübeck, Germany
Device description acc. to 94/9/EC	Typ XTR 0090 or XTR 0091
	 0158  II 2G EEx de IIC T6 II 2D IP 6x T85 °C $-40\text{ °C} \leq T_a \leq +65\text{ °C}$ TPS 04 ATEX 1 003 X NON-INTRINSICALLY SAFE CIRCUITS INTERNALLY IP30 PROTECTED Year of manufacturing ¹⁾ Dräger Safety, D-23560 Lübeck, Germany
Electromagnetic compatibility	acc. to 89/336/EWG, acc. to EN 50 270
Typ XTR 0000, XTR 0001, XTR 0090 and XTR 0091 with sensing head SE Ex PR M:	influence $\leq 5\%$ LEL (propane)
Typ XTR 0010, XTR 0011, XTR 0090 and XTR 0091 with sensing head SE Ex LC M:	influence $\leq 0,5\%$ LEL (propane)

¹⁾ The year of manufacturing is coded by the third capital letter of the serial number on the type plate:
 U = 2004, W = 2005, X = 2006, Y = 2007, Z = 2008, A = 2009, B = 2010, C = 2011, etc.
 Example: Serial number ARUL-0054, the 3rd capital letter is U, so the year of manufacturing is 2004.

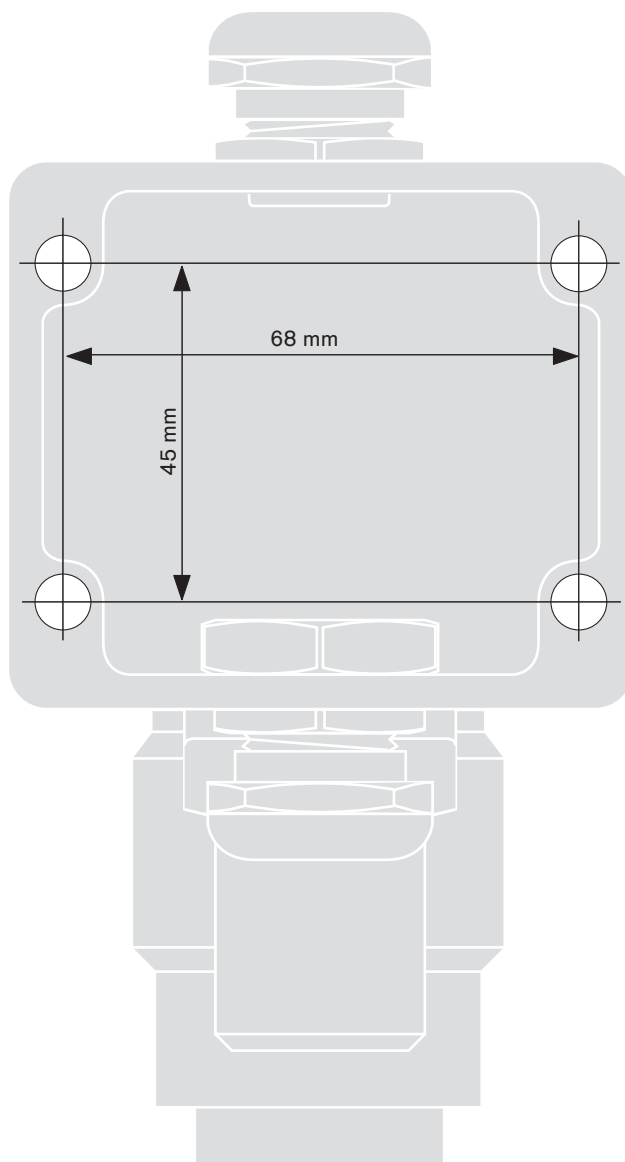
Order list

Name and description	Part-No.
Transmitter	
Transmitter PEX 3000, Typ XTR 0000 small housing, measuring range 0 to 100 % LEL	83 18 280
Transmitter PEX 3000, Typ XTR 0010 small housing, measuring range 0 to 10 % LEL	83 18 290
Transmitter PEX 3000, Typ XTR 0090 small housing, Remote-Transmitter	83 18 380
Transmitter PEX 3000, Typ XTR 0001 big housing, measuring range 0 to 100 % LEL	83 18 360
Transmitter PEX 3000, Typ XTR 0011 big housing, measuring range 0 to 10 % LEL	83 18 370
Transmitter PEX 3000, Typ XTR 0091 big housing, Remote-Transmitter	83 18 390
Sensig head SE Ex PR M 0 to 100 % LEL, to combine with XTR 0090 / 0091	68 09 758
Sensing head SE Ex LC M 0 to 10 % LEL, to combine with XTR 0090 / 0091	68 10 486
Accessories	
Calibration adapter	68 06 978
Calibration chamber to produce flammable vapours in the range of approx. 50 % LEL	68 02 206
Dust filter for DrägerSensor Ex PR M (only for type XTR 0000 and XTR 0001), packing unit 10 pcs.	68 10 537
Special tool to open the spring terminals, plastic	83 18 376
Accessories ¹⁾	
DrägerSensor Ex PR M spare part sensor for type XTR 0000 and XTR 0001	68 09 225
DrägerSensor Ex LC M spare part sensor for type XTR 0010 and XTR 0011	68 10 350
Converter Module ET 420 complete	83 18 377

¹⁾ The storage time of the spare parts is unlimited. This is also valid for the spare part sensors as long as they are stored in their original package under conditions specified on page 25.

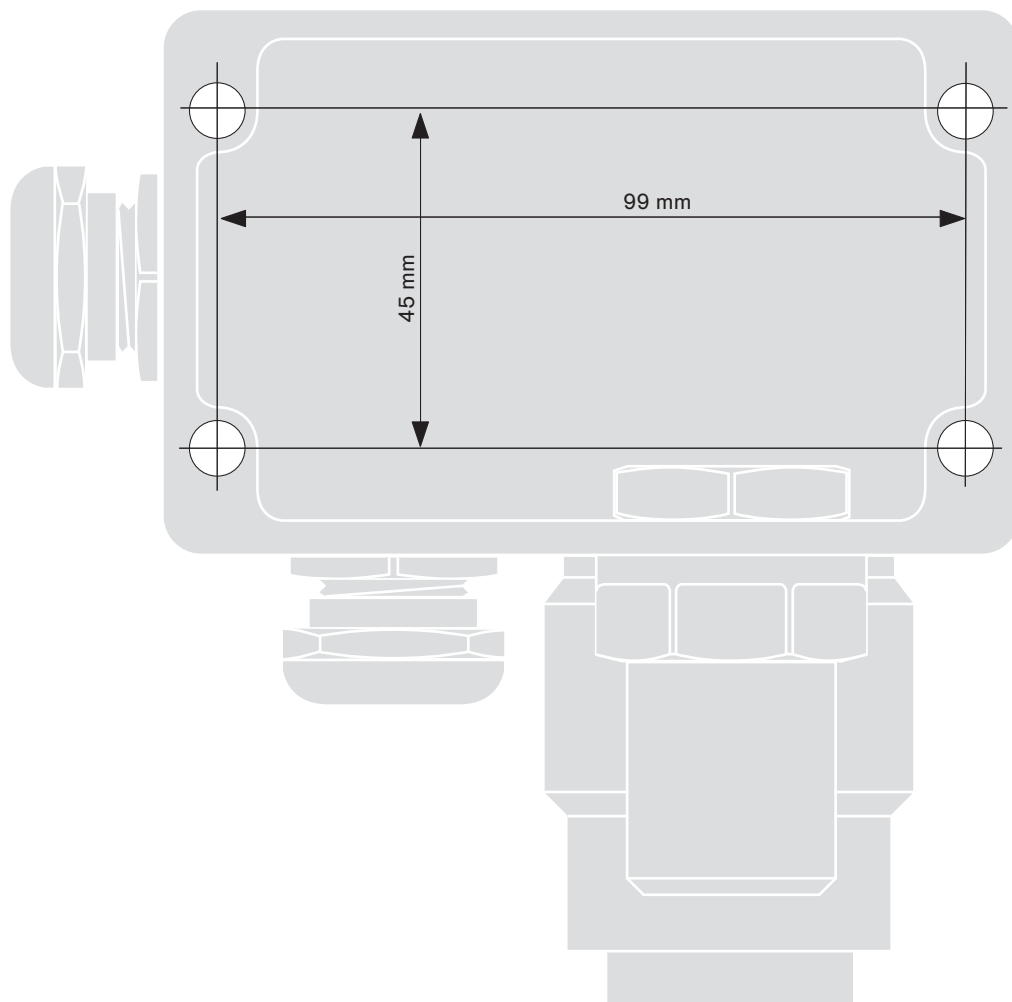
Drilling templates

Type XTR 0000 / XTR 0010 / XTR 0090



02023810_1_dkxaps





Type XTR 0001 / XTR 0011 / XTR 0091



02123810_1_de.eps

EC-Type examination certificate

ZERTIFIKAT • CERTIFICATE • 認証証書 • CERTIFICADO • CERTIFICAT

- (1) EC Type Examination Certificate
- (2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres – **Directive 94/9/EC**
- (3) EC Type Examination Certificate Number:
TPS 04 ATEX 1 003 X
- (4) Equipment: Ex-Transmitter XTR 000x, XTR 001x, and XTR 009x
- (5) Manufacturer: Dräger Safety AG & Co. KGaA
- (6) Address: D-23560 Lübeck
- (7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.
- (8) TÜV Product Service, TÜV SÜD Group, notified body No. 0123 in accordance with Article 9 of the Council Directive 94/9/EC of March 23rd 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II of the Directive.
The examination and test results are recorded in the confidential report DL 65161 T.
- (9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:
- | | |
|-------------------------------|---------------------------|
| EN 50014: 1997 +A1 +A2 | EN 50018: 2000 |
| EN 50019: 2000 | EN 50281-1-1: 1999 |
- (10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.
- (11) This EC Type Examination Certificate relates only to the design and the construction of the specified equipment in accordance with Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and supply of this equipment.
- (12) The marking of the equipment shall include the following:
- XTR 000x and XTR 001x:
- | | |
|---|--|
|  II 2G EEx de IIC T6/T5/T4 |  II 2D IP6X T85/100/135°C |
|---|--|
- XTR 009x:
- | | |
|---|--|
|  II 2G EEx de IIC T6 |  II 2D IP6X T85°C |
|---|--|



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München, 2004-11-17


J. Blum



Page 1 / 2

EC Type Examination Certificate without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by TÜV Product Service, TÜV SÜD Group. In case of dispute, the German text shall prevail.

The document is internally administrated under the following number: Ex5 04 10 53474 003

**TÜV PRODUCT SERVICE GMBH • Zertifizierstelle • Ridlerstrasse 65 • D-80339 München
Gruppe TÜV Süddeutschland**



- (13) **Schedule**
- (14) **EC Type Examination Certificate TPS 04 ATEX 1 003 x**

(15) Description of equipment:

The transmitters XTR 000x, XTR 001x and XTR 009x are foreseen for the continuous stationary monitoring of mixtures of combustible gases and vapours with air. Concerning the transmitters XTR 000x and XTR 001x, the sensor is directly attached to the enclosure. Transmitter XTR 009x is designed for operation with a remote measuring head.

Electrical data:

Supply voltage $U_n = 12\text{ V to }30\text{ V}$

- (16) Test report: DL 65161 T

(17) Special conditions for safe use:

In gas hazardous area, the cap of the energised transmitter shall only be opened for maintenance reasons. In gas hazardous area, it is not permitted to connect or disconnect any cables.

In dust explosive area, it is not permitted to open the cap of the energised transmitter.

The safety relevant data of the transmitter are to be considered.

The ambient temperature range of the transmitter XTR 000x and XTR 001x deviates from the standard temperature range. The detailed information is shown in the following table. The minimum ambient temperature range is $T_{u,min} = -40^\circ\text{C}$.

Ambient temperature $T_{u,max}$	Temp. class resp. max. temp. of enclosure
40°C	T6 resp. T85°C
55°C	T5 resp. T100°C
65°C	T4 resp. T135°C

The ambient temperature range of transmitter XTR 009x deviates also from the standard temperature range and amounts generally $-40^\circ\text{C} \leq T_u \leq 65^\circ\text{C}$.

(18) Essential health and safety requirements:

Met by standards

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München, 2004-11-17

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The document is internally administrated under the following number: Ex5 04 10 53474 003

1st Extension for EC Type Examination Certificate



(2) EC Certificate of Conformity Number:

TPS 04 ATEX 1 003 X

(3) Equipment: Ex-Transmitter XTR 000x and XTR 009x with Dräger Sensor Ex PR M



(4) Manufacturer: Dräger Safety AG & Co. KGaA

(5) Address: D- 23560 Lübeck

(6) Description:

The Ex-transmitters XTR 000x and XTR009x are to be used for the continuous stationary monitoring of mixtures combustible gases and vapours in air under atmospheric conditions. The measurement end value is 100% lower explosion limit (LEL). The transmitter is connected to the central unit by a three-conductor cable.

The test results of the extension are recorded in the confidential reports DL 66451 T and M-G 1037-00/05.

(8) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 61779-1: 2000 EN 61779-4: 2000 EN 50271: 2001

The extension comprises the following gases and vapours:
Methane, propane, acetone, acetylene, ammonia, petrol 065/095 (FAM normal gasoline), benzene, 1,3-butadiene, n-butane, n-butyl acetate, cyclopropane, diethyl ether, dimethyl ether, ethanol, ethene, ethyl acetate, ethylene oxide, n-hexane, methanol, methyl ethyl ketone (MEK), n-nonane, n-octane, n-pentane, i-propanol, propene, propylene oxide, toluene, and hydrogen.

The extension is valid for the software-version 2.2.

The adjustment of the alarm thresholds in the downstream central unit respectively in the plotting unit has to be carried out in accordance with EN 61779-1, chapter 3.2.3.

A warning signal respectively an indication for exceeding of the threshold (< 99% LEL) shall be realized by a higher output signal in the downstream central unit respectively in the evaluation unit.

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München, 2005-09-06

T. Lammel

Page 1 / 1

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The document is administrated under the following number: Ex5 04 10 53474 003

**TÜV PRODUCT SERVICE GMBH • Zertifizierstelle • Ridlerstrasse 65 • D-80339 München
Gruppe TÜV Süddeutschland**

EC-Declaration of Conformity

Drägersafety

Konformitätserklärung Declaration of Conformity

Wir / We Dräger Safety AG & Co. KGaA
Revalstraße 1
D-23560 Lübeck
Deutschland / Germany

erklären, dass die Produkte / declare that the products

Gasmesstransmitter / Gas detection transmitter
PEX 3000, Type XTR 00xx

gemäß den Bestimmungen der Richtlinie 94/9/EG (Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen) übereinstimmt mit dem Baumuster der EG-Baumusterprüfbescheinigung

following the provisions of Directive 94/9/EC (Equipment and protective systems intended for use in potentially explosive atmospheres) is in conformity with the type of the EC-type-examination certificate

TPS 04 ATEX 1 003 X

für / for Gerätegruppe und -kategorie / Equipment Group and Category: **II 2G, II 2D**
Zündschutzart / Type of Protection: **de, IP6X**
Explosionsgruppe / Explosion Group: **IIC**
Temperaturklasse / Temperature Class: **T6/T5/T4, T85/100/135 °C**

ausgestellt von der benannten Stelle / issued by the notified body

TÜV Product Service GmbH
Zertifizierstelle
Ridlerstraße 65
D-80339 München
Kennnummer / identification number 0123.

Das Produkt wurde unter einem Qualitätssicherungssystem hergestellt, endabgenommen und geprüft, das zugelassen wurde von der benannten Stelle

The product has been manufactured, finally inspected and tested under a quality system which has been approved by the notified body

DMT - Gesellschaft für Forschung und Prüfung mbH
Zertifizierungsstelle
Am Technologiepark 1
D-45307 Essen
Kennnummer / identification number 0158.



Ralf Drews
Gasmesstechnologie Entwicklung
Dräger Safety AG & Co. KGaA

Lübeck, 15.11.2004

Dokument-Nr. / document no.: SE20325 "00"
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