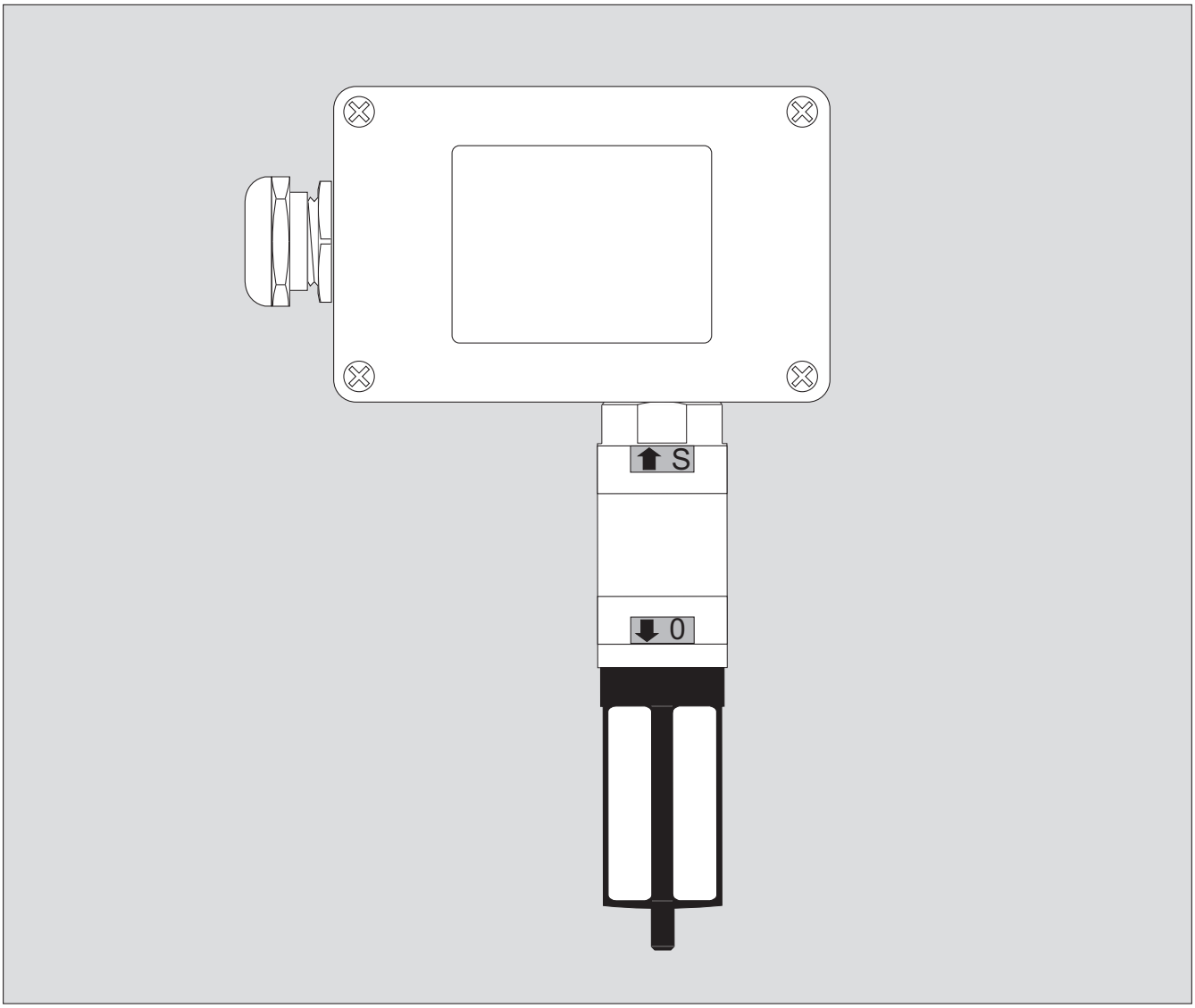
Dräger PIR 3000

en Infrared Gas Transmitter
Instructions for Use



Contents

For Your Safety

Strictly follow these Instructions for Use
Any use of this gas transmitter requires full understanding of the information provided and strict adherence to the instructions given.
The gas transmitter is only to be used for the purposes specified here.

Maintenance
Maintenance jobs may only be carried out by trained service personnel.
We recommend signing a service contract to have all maintenance jobs carried out by Dräger.
Always use original Dräger parts for maintenance.
Be sure to read the information provided in the chapter "Maintenance".

⚠ WARNING
Explosion hazard! Do not open sensor housing. There is a risk of ignition in explosive atmospheres. The sensor housing contains live parts. Unauthorised opening can lead to a safety-related failure of the sensor. The sensor does not contain any parts that can be serviced by the user.

Accessories
Only use accessories mentioned in the order list.

Safe Connection of Electrical Devices
Never connect this device to other electrical devices not mentioned in these Instructions for Use before consulting the manufacturer or an expert.

Use in Potentially Explosive Atmospheres
Devices or components used in potentially explosive atmospheres after being tested and approved according to national, European or international regulations may only be used under the conditions specified in the approval and under observation of relevant legal regulations.
Never modify the electrical equipment.
Never use defective or incomplete parts. Always take relevant regulations into account when repairing devices or components.

Safety symbols used in these Instructions for Use
These Instructions for Use contain a number of warnings for risks and hazards which might occur when using the instrument. These warnings contain signal words which will alert you to the degree of hazard you may encounter. These signal words and corresponding hazards are as follows:

⚠ WARNING
Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

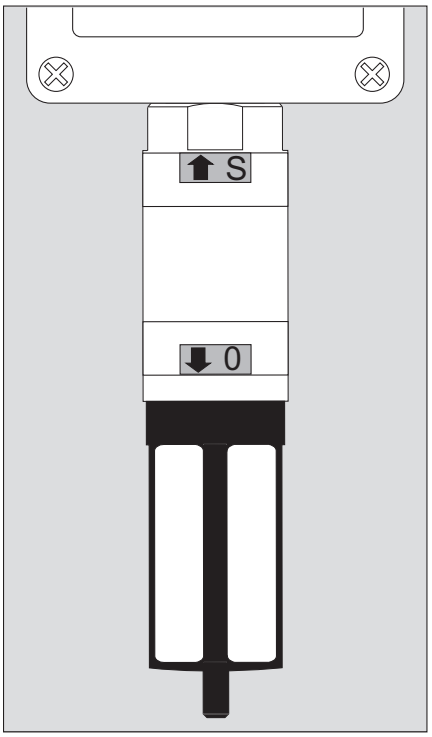
⚠ CAUTION
Indicates a potentially hazardous situation which, if not avoided, could result in physical injury, or damage to the product or environment. It may also be used to alert against unsafe practices.

NOTICE
Indicates additional information on how to use the product.

Intended Use

The Dräger PIR 3000 infrared gas transmitter is a device used for stationary, continuous monitoring of the concentration of carburetted, combustible gases and vapours in the ambient air.
The gas transmitter is preconfigured for the gases methane, propane and ethylene. The operating range respectively covers 0 to 100 %LEL (**L**ower **E**xplosion **L**imit). An analogue, 4 to 20 mA output signal is used as measuring value output.
The Dräger PIR 3000 infrared gas transmitter is designed for use in rough ambient conditions and is suited for installation in hazardous areas of zones 1, 2, 21 and 22 according to the device categories 2G, 3G, 2D, 3D or Class I & II, Div. 1 for hazardous areas. For further information, please observe the installation instructions.

In connection with a central device (e.g. Dräger REGARD channel card 4...20 mA):
— warning before explosive concentration level is reached
— automatic initiation of countermeasures which avert the explosion hazard (e.g. switching on a ventilation)
— device error warning



Explosion-Protection Approvals

The explosion-protection approvals are valid for use of the device in gas/vapour-air mixtures of combustible gases and vapours under atmospheric conditions. The explosion-protection approvals are not valid for use in oxygen-enriched atmospheres. Unauthorised opening of the enclosure invalidates the explosion-protection approval.

— ATEX

Type IDS 0001

II 2G Ex db IIC T6 Gb CE 0158
II 2D Ex tb IIIC T80°C Db IP6X
–40 °C ≤ Ta ≤ +65 °C

Type ITR 001X

II 2G Ex db IIC T6 Gb CE 0158
II 2D Ex tb IIIC T80°C Db IP6X
–40 °C ≤ Ta ≤ +60 °C

Types IDS 0011 and ITR 000X:

II 2G Ex db eb IIC T6 Gb CE 0158
II 2D Ex tb IIIC T80°C Db IP6X
–40 °C ≤ Ta ≤ +65 °C

year of construction (by serial number) [1)]
BVS 05 ATEX E 143X

— IECEx

Type IDS 0001:
Ex db IIC T6, Ex tb IIIC T80°C Db IP6X
–40 °C ≤ Ta ≤ +65 °C

Type ITR 001X

Ex db IIC T6 Gb, Ex tb IIIC T80°C Db IP6X
–40 °C ≤ Ta ≤ +60 °C

Types IDS 0011 and ITR 000X:
Ex db eb IIC T6, Ex tb IIIC T80°C Db IP6X
–40 °C ≤ Ta ≤ +65 °C

BVS 05.0011X

— UL
(Underwriters Laboratories Inc.)

Type IDS 0001:
Class I, Div. 1, Groups A, B, C, D
Class II, Div. 1, Groups E, F, G

CLASSIFIED UL C US
9N54

— CSA

Type IDS 0001:
Class I, Div. 1, Groups A, B, C, D
C22.2, No. 152

LR97594

1) The year of manufacture is indicated by the third letter of the serial number on the type plate: X = 2006, Y = 2007, Z = 2008, A = 2009, B = 2010, C = 2011, D = 2012, etc.
example: serial number ARXH-0054, the third letter is U, so the year of manufacture is 2006.

The appendix has a copy of the ATEX certificate, which offers relevant information on safety regulations under subjects such as "Subject matter and type", "Description", "Characteristic quantity" and "Terms/conditions of safe use".

Installing the Gas Transmitter

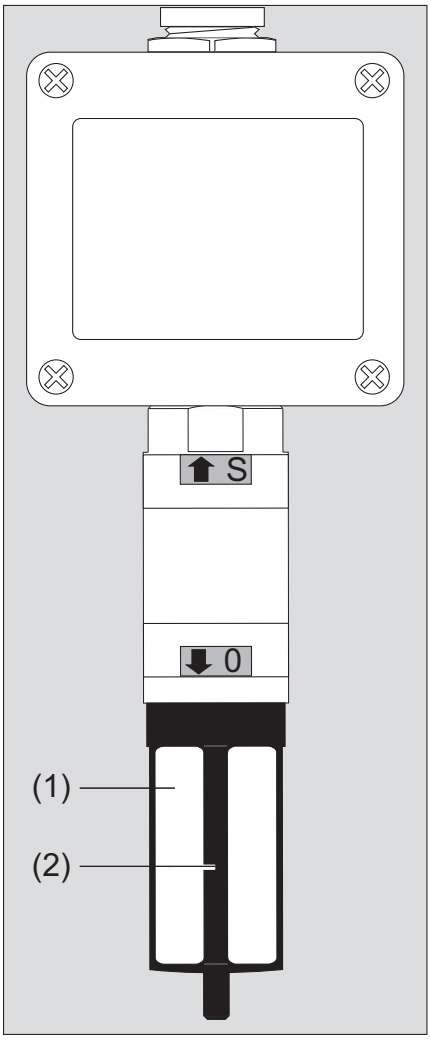
Only trained service personnel (e.g. of Dräger) may install the gas transmitter under observation of relevant regulations.
Installation and commissioning are described in the "Dräger PIR 3000 Installation Instructions" which are supplied with the gas transmitter.

Mounting Location

The protecting effect of the gas transmitter depends on the selection of the mounting location. By taking the site's air flow conditions into account, the best possible mounting location should be chosen as close as possible to where a decisively noticeable rise in gas concentration can be expected in case of a leakage, i. e.
— as close as possible to the potential leakage place
— when monitoring gases and vapours which are lighter than air: above the potential leakage place
— when monitoring gases and vapours which are heavier than air: near to ground.

In addition, it must be assured that:
— the air circulation in the gas transmitter vicinity is not hindered
— the danger of mechanical damage is reduced as far as possible
— the gas transmitter is sufficiently accessible for maintenance purposes. Especially the configuration via magnetic pin requires a clearance of approx. 20 cm around at least half of the sensor perimeter.

The gas transmitter can be mounted horizontally as well as vertically.



Mechanical Installation

When used according to BVS 05 ATEX E 143 X, please note:

- The gas sensor type IDS 0001 (NPT) can be attached to casings with the type of protection flameproof enclosure "d" that have a free volume of 2 litres and a reference pressure that does not exceed 20 bar. The mechanical strength of the attachment and the explosion and construction-related testing of the connection thread must be carried out within the framework of the approval process of the electrical equipment to which the sensor is attached.
- The gas sensor type IDS 0011 (metric thread) is designed for attachment on a casing with the type of protection increased safety "e". The mechanical strength and the degree of protection IP 6X of the attachment must be ensured during approval of the electrical equipment to which it is attached.
- The junction boxes of the gas sensors IDS 00** must feature sufficient mechanical stability to ensure that the vibrations transmitted to the sensor by the casing are not amplified.

Terminal box

The gas transmitter is designed to be directly attached to a terminal box. Approved connector boxes of the following makes are available as gas transmitter accessories: Ex d (explosion proof, 3/4" NPT) and Ex e (increased safety, M25) - (see "Order List" on page 27).

- To maintain the housing protection class, the enclosed O-ring seal must be used for an Ex e-type explosion protection connection.
  Use a thread locking adhesive, e.g. Loctite® to prevent the M25 nut (torque of 15 Nm ±3 Nm) from self-loosening.
- Use approved plugs to close any unused cable entry openings at the terminal box.

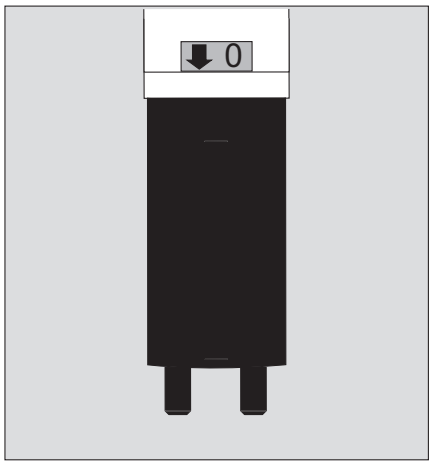
Splash Guard and Calibration Adapter

We recommend using the supplied accessories - splash guard **(1)** and calibration adapter **(2)** - to increase protection against water jets and contamination.

The splash guard is held by a fixture provided with screw-thread, which is also used as calibration adapter.
Make sure that the calibration adapter is correctly seated. To this end, manually tighten the calibration adapter to a point where the sealing line leaves a permanent mark on the splash guard.

Gas Exposure / Process Adapter (see "Accessories/Spare parts" on page 27**)**

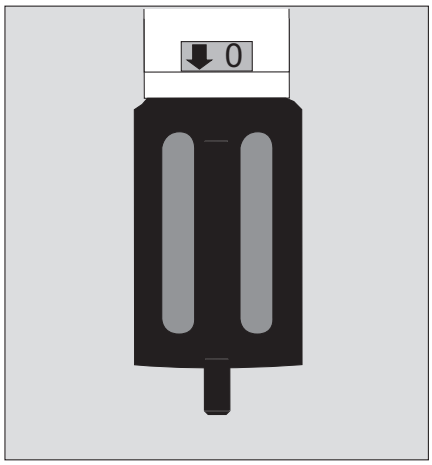
For continuous flow operation of the gas transmitter, the calibration adapter can be replaced with an optional gas exposure / process adapter.
— Suitable for flow rates between 1 and 3 L/min.
— Within the specified technical measurement characteristics suitable for pressure differences relative to ambient pressure of up to ±300 hPa.
— Use external pump to ensure gas flow.
— External flow monitoring required.
— Also suitable for calibration gas application.



Assembly:
- Unscrew the calibration adapter from the gas transmitter. While doing so, leave splash guard on the gas transmitter.
- Screw gas exposure / process adapter onto the gas transmitter and tighten firmly by hand.
- In the case of pipelines and hose lines carrying gas ensure that there is stability with regard to ambient conditions and material compatibility for the substances flowing through them.
- With regard to the length of the pipelines or hose lines observe the increase in the response time.
- Ensure the compatibility of the connection spouts to be used regarding the pipeline and hose line dimensions.
- Check the gas-carrying system for leaks, e.g. with a soap bubble test.

Dirt Deflector (see "Accessories/Spare parts" on page 27**)**

Instead of the calibration adapter, a double-walled dirt deflector can optionally be fitted to the gas transmitter. This is recommended if there is an increased risk of contamination from e.g. salt crusts, oil films, resin or similar substances, and also generally for outdoor applications. In addition to the dirt deflector, the use of a splash guard is strongly recommended.
- Also suitable for calibration gas application.



Assembly:
— Unscrew the calibration adapter from the gas transmitter. While doing so, leave splash guard on the gas transmitter.
— Manually tighten the dirt deflector on the gas transmitter to a point where the sealing line leaves a permanent mark on the splash guard.

Electrical Installation

NOTICE
If present: If the connector of the gas transmitter is not required, it must be removed prior to the electrical installation. To do so, cut the cables with a suitable tool directly in front of the connector, strip the insulation, and attach suitable ferrules.

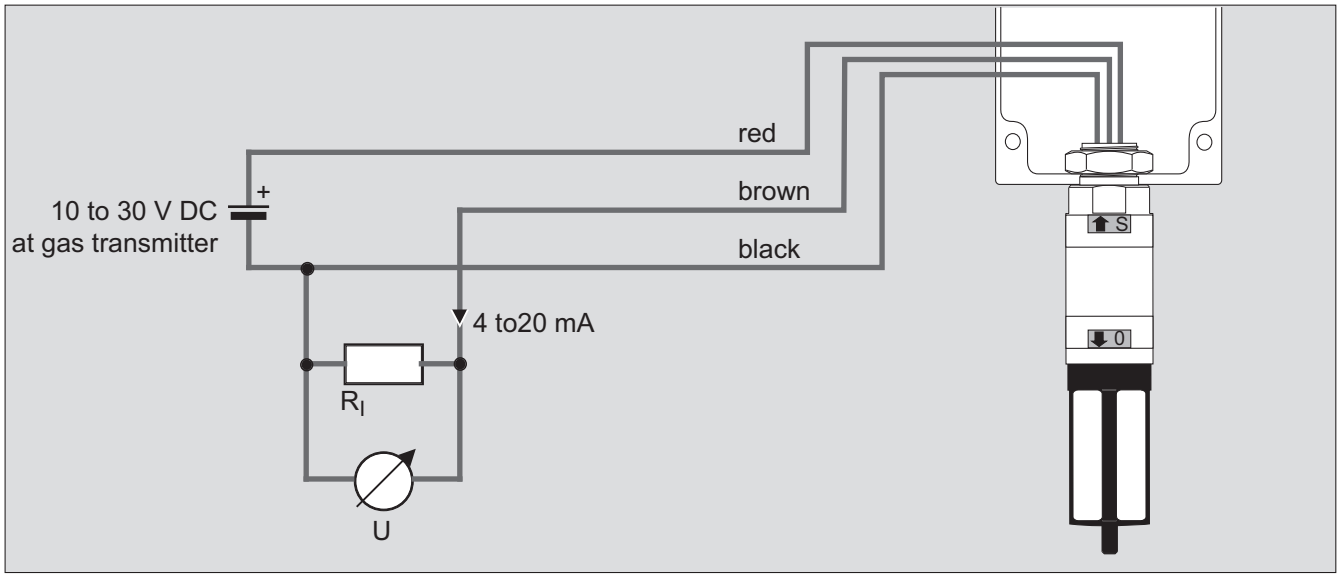
The entire wiring must correspond with applicable local regulations concerning the installation of electrical devices in potentially explosive atmospheres. In case of doubt, consult the responsible authorities before installing the device.
We recommend a three-core, screened connection cable (mesh wire shield with a shielding factor of ≥80 %).

NOTICE
Earth leakages on two phases can cause EMC problems. To avoid these problems, the cable screen may only be connected to earth potential on one side (either at the central unit or at the gas transmitter). In most cases, connecting the cable screen to the PE terminal of the terminal box has proven to work better than connecting it to the central device..

- The leads for the sensor are factory sealed.
- If the corresponding connection is available:
  Electrically connect the terminal box to earth.
- For installation in conduit: cast conduit seals and allow to harden.
- When installing a complete set (see "Order List" on page 27):
  depending on the housing type of the terminal box there are the following permissible conductor cross sections:

Order No. 68 11 160: 1.0 to 2.5 mm^2	Order No. 68 11 270: 0.5 to 4.0 mm^2	Order No. 68 11 180: 0.2 to 4.0 mm^2

Connection Diagram:



Colour code of connecting terminals and/or leads at the gas transmitter:

1 = black = – (common reference potential)
2 = brown = signal output 4 to 20 mA
3 = red = + (10 to 30 V DC)

— The leads between central device and gas transmitter must have a sufficiently low resistance to ensure the correct supply voltage at the gas transmitter. The maximum resistance per core is calculated as follows:

$R = 2.5 \times U_C - 25$

with R: maximum resistance per core
U_C: voltage supplied by central device in volts (usually depends on the supply voltage of the central device)

Example: With U_C = 24 V, the result is a maximum resistance per core of R = 35 Ω.

NOTICE
Cable resistance deviations caused by temperature influences, transition resistances of terminals, etc. can also contribute to the fact that the calculated cable length can not be fully used.

— The maximum resistance of the loop R_l (sum of the internal resistance of the central device and of the cable resistance of the signal line) depends on the transmitter supply voltage as described below:

Supply voltage at the transmitter	**maximum resistance of the loop R_l**
10 V	200 Ω
12 V	300 Ω
14 V	390 Ω
16 V	480 Ω

When used according to BVS 05 ATEX E 143 X, please note:

- After attachment of the sensor to a casing with the type of protection increased safety "e", the air gaps and creepage distances must comply with the requirements specified in 4.3 (Table 1) or 4.4 of EN 60079-7. The single core cables must be routed and connected in a way that is mechanically protected and complies with the temperature resistance of the wires as specified in 4.5, 4.7.2 and 4.8 of EN 60079-7.
- From an electrostatic point of view (transition resistance < 10^6 ohm) the sensor casing must be conductively connected to the equipotential bonding of the casing to which it is attached as soon at it is attached. If equipotential bonding is required, it must be provided with the attachment.

Commissioning

The Dräger PIR 3000 infrared gas transmitter is preconfigured and ready for use after installation.

- Deactivate the alarm call to the central device to avoid false alarms.
- When the supply voltage is applied, the gas transmitter automatically performs a self check (10 seconds), then automatically uses the factory-preset calibration (see page 11) and gas category.
  For the duration of the self test, a signal of 1 mA is issued.
- Wait for the running-in period of one minute to expire. No settings can be changed at the gas transmitter during this period. The gas transmitter will emit a 1 mA signal for the duration of the running-in period.
- Check signal transmission and adjust if required (see "Checking the signal transmission, checking the alarm trigger and displaying the gas category" on page 17).
- Check setting of the gas category for the intended use. If required, set the gas category (see "Changing the gas category " on page 18).
- Check the calibration of the gas warning system (see "Calibration" on page 11).
- Reactivate the alarm call to put the system back to normal operating state.

NOTICE
To prevent moisture condensation on the optic surfaces of the device, parts of the transmitter housing are heated from the inside. This can increase the surface temperature by approx. 5 ^{o}C.

Operational Characteristics

The gas transmitter generates an output signal which is proportional to the measured gas concentration. The factor of proportionality between displayed value and the measured gas concentration is determined by the span calibration of the gas transmitter (see "Manual Span Calibration of the Output Signal." on page 15).

The gas transmitter regularly runs self tests for numerous internal functions. As soon as a divergence from normal operation is detected, the device will issue a fault message.

Output Signals of the Device:

Display of	**Output Signal**
zero point	4 mA
full scale deflection	20 mA
under-range	3.8 mA to 4 mA
over-range	20.0 mA to 20.5 mA
span gas signal to indicate begin and successful termination of gas transmitter calibration via magnetic pin	3 mA
Fault and inlet signal (during self check and running-in period)	1 mA
Warning (while increasing the Drift of the zero point into the negative range)	2 mA

Calibration

A functional check and - if necessary - a calibration must be carried out regularly for gas warning systems (see page 20, Maintenance).

Zero gas and test gas are to be applied for functional check and calibration of the infrared gas transmitter Dräger PIR 3000. To this end, the gas is applied either with
- the calibration adapter in connection with the splash guard (see page 5, part of the scope of delivery) or
- the gas exposure / process adapter (see page 6 and order list) or
- the dirt deflector in connection with the splash guard (see order list).

The required gas flow rate for functional check and calibration is as follows:
- 0.5 to 1 L/min. for the calibration adapter with splash guard and the dirt deflector with splash guard in closed rooms at wind speeds up to 5 m/s (3 Beaufort),
- 1 to 2 L/min. for the calibration adapter with splash guard and the dirt deflector with splash guard at wind speeds up to 27 m/s (10 Beaufort),
- 0.5 to 3 L/min. for the gas exposure / process adapter.

Make sure that the calibration adapter is correctly seated. To this end, manually tighten the calibration adapter to a point where the sealing line leaves a permanent mark on the splash guard.

Nitrogen, synthetic air or fresh air (hydrocarbon content <50 ppm) can be used for zero point calibration.

Commercially available calibration gas can be used to calibrate the respective gas category (methane, propane, ethylene). The highest accuracy is achieved using test gas concentrations of 40 to 70 percent of the measurement span.

The infrared gas transmitter Dräger PIR 3000 can also be used to measure other gases than mentioned above. For detailed information, refer to "Substitute Gas Calibration" on page 16.

- Select the measured gas in the corresponding table and determine the corresponding gas category.
- Set the gas transmitter to the determined gas category.

Where possible, calibration gas should match with the measured gas for span calibration. In exceptional cases, span calibration can be carried out using a suitable substitute gas and the associated calibration factor. The suitable substitute gas as well as the associated calibration factor is shown in the table "Substitute Gas Calibration" on page 16.

- Select the substitute gas (gas category) and the calibration factor in table "Substitute Gas Calibration" on page 16.
- Multiply the concentration of the substitute gas by the calibration factor to get the gas concentration to be set.

Example:

Measured gas:	n-octane
Gas category:	Propane (see table "Substitute Gas Calibration", page 16)
Calibration factor:	1.8 (in table "Substitute Gas Calibration", page 16)
Span gas concentration:	40 %LEL propane (bottle concentration)
Setting:	40 %LEL x 1.8 (calibration factor) = 72 %LEL

⚠ CAUTION

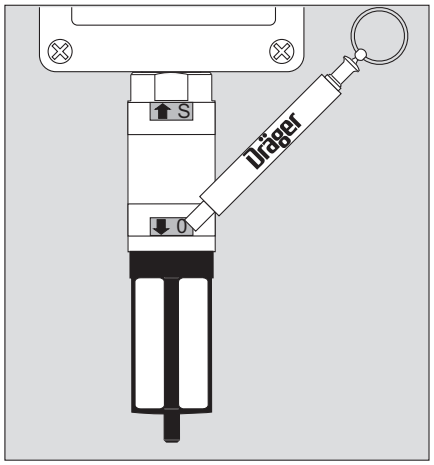
Never inhale test gas. Danger to health!
Observe the safety information in the corresponding safety data sheets. Ensure that gases are vented or otherwise guided outside the building.

Configuration of the Gas Transmitter via Magnetic Pin

A magnetic pin can be used to change the settings of the Dräger PIR 3000 infrared gas transmitter (see "Accessories/Spare parts" on page 27) as follows:
— Automatic zerosetting.
— Manual zero calibration of the output signal. [1)]
— Manual span calibration of the output signal. [1)]
— Checking the signal transmission, check the alarm trigger and displaying the gas category. [1)]
— Changing the gas category. [1)]

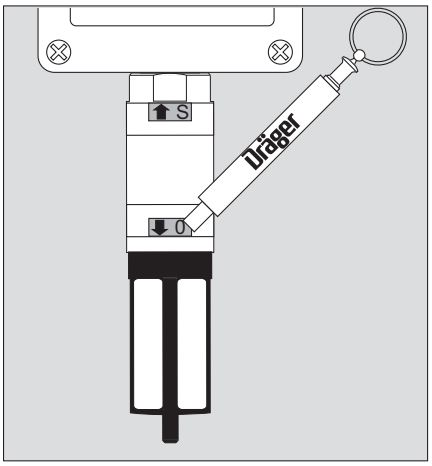
Automatic Zerosetting

- Deactivate alarm activation of the central device.
- Expose the gas transmitter to nitrogen, synthetic air, and/or fresh air via calibration adapter and wait until measurement value stabilises.
- Place the magnetic pin onto the transmitter surface area marked by the " ⇩0 " icon and hold it there (within the black frame) for at least five seconds. After five seconds, the output signal of the gas transmitter switches to the display of the span gas signal (3 mA) for as long as the magnetic pin is held against it. At the same time, a zerosetting of the optical measuring unit is carried out automatically.
- Remove the magnetic pin. After 30 seconds, the device exits the automatic zerosetting routine. As confirmation of the automatic zerosetting, the output signal changes back to the span gas signal (3 mA). This signal is indicated for the same period of time as when starting the automatic zerosetting routine.
- Activate alarm activation of the central device.



1) A second person is required as helper for these tasks.

Manual Zero Calibration of the Output Signal.



- Deactivate alarm activation of the central device.

1 Expose the gas transmitter to nitrogen, synthetic air, and/or fresh air via calibration adapter and wait until measurement value stabilises.

2 Place the magnetic pin onto the transmitter surface area marked by the " ⇩0 " icon and hold it there (within the black frame) for at least five seconds. After five seconds, the output signal of the gas transmitter switches to the display of the span gas signal (3 mA) for as long as the magnetic pin is held against it. At the same time, a zerosetting of the optical measuring unit is carried out automatically.

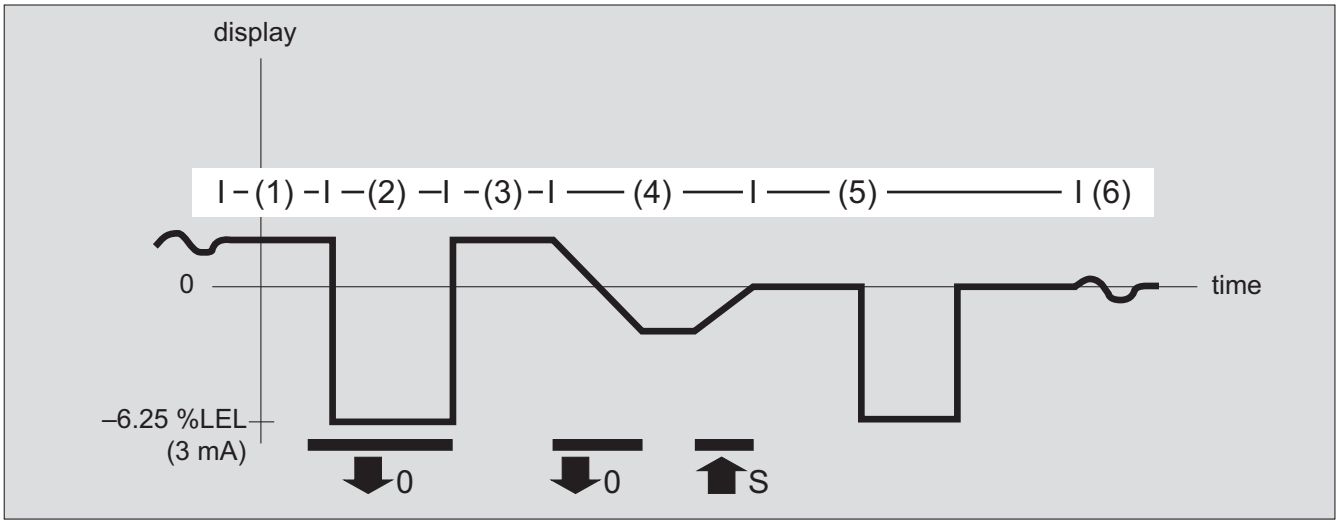
3 Remove the magnetic pin. The output signal of the gas transmitter moves back to the previously displayed value. The device is now set to zero point calibration routine. Within this routine, the output signal will decrease resp. increase, depending on whether the magnetic pin is placed on one of the areas marked with either the " ⇩0 " or the " ⇧S " icon.

4 Adjust the zero point signal by placing the magnetic pin on one of the areas marked with either the " ⇩0 " or the " ⇧S " icon.

5 Remove the magnetic pin. The device terminates the zero point calibration routine after 30 seconds without further settings being carried out. As confirmation of the successful calibration, the output signal changes back to the span gas signal (3 mA). This signal is indicated for the same period of time as when starting the zerosetting calibration routine.

6 Terminate exposure to gas.

- Reactivate alarm activation of the central device.

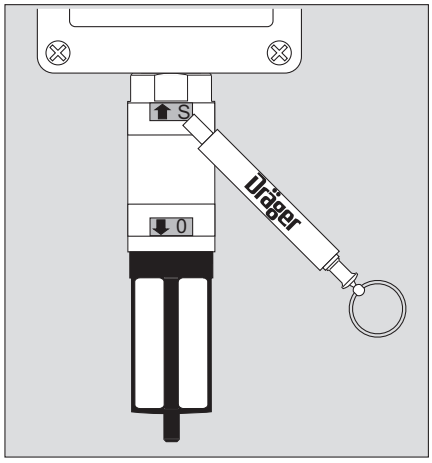


NOTICE
The calibration is automatically terminated and new calibration parameters are not saved if the gas concentration measured by the gas transmitter changes during the calibration procedure (e.g. because the calibration gas cylinder fell empty during the calibration procedure). In this case, the gas transmitter returns to normal operation without displaying the span gas signal as confirmation.

Manual Span Calibration of the Output Signal.

The span calibration of the gas transmitter is only possible under the following conditions:

— The last zero calibration of the device was less than one hour ago.
— The span gas concentration is sufficiently high to effect a display on the device of at least approx. 20 %LEL.



- Deactivate alarm activation of the central device.

1 Use calibration adapter to expose gas transmitter to test gas and wait until measurement value stabilises.

2 Place the magnetic pin onto the transmitter surface area marked by the " ⇧S " icon and hold it there (within the black frame) for at least 5 seconds. The output signal of the gas transmitter changes to the display of the span gas signal (3 mA).

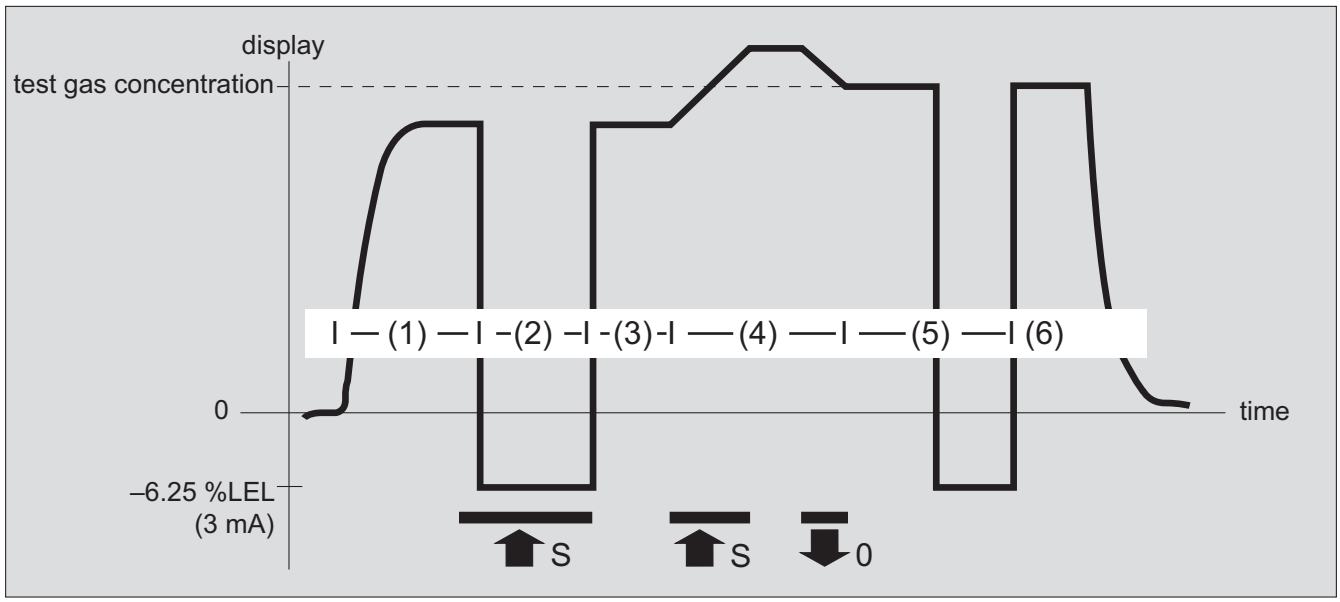
3 Remove the magnetic pin. The output signal of the gas transmitter moves back to the normally displayed value. The device is now set to span calibration routine. While in this routine, the display will decrease resp. increase, depending on whether the magnetic pin is placed on either of the areas marked by the " ⇩0 " or " ⇧S " icons.

4 Adjust the output signal by placing the magnetic pin on one of the areas marked by the " ⇩0 " or " ⇧S " icons.

5 Remove the magnetic pin. The device terminates the span calibration routine after 30 seconds without further changes being made and saves the new calibration parameter. The output signal momentarily switches back to the span gas signal display to confirm a successful calibration.

6 Stop the exposure to gas, then wait for the display to fall back to zero.

- Reactivate alarm activation of the central device.



NOTICE
The calibration is automatically terminated and new calibration parameters are not saved if the gas concentration measured by the gas transmitter changes during the calibration procedure (e.g. because the calibration gas cylinder fell empty during the calibration procedure). In this case, the gas transmitter returns to normal operation without displaying the span gas signal as confirmation.

Substitute Gas Calibration

The infrared gas transmitter Dräger PIR 3000 can also be used to measure other gases and vapours. The following table shows the required information (see also "Calibration" on page 11).

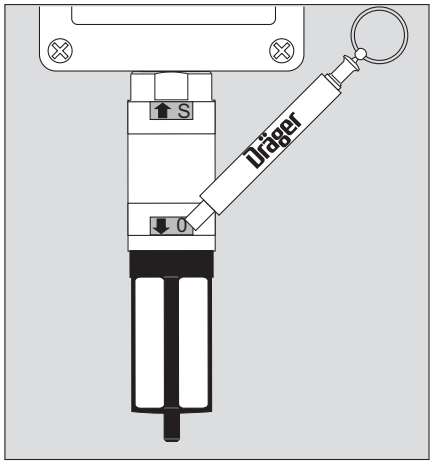
Measured gas[1)]	CAS-No.	Measuring range[1)] [%LEL]	Gas Category Substitute Gas	Calibration factor [2) 3)]	Response time $t_{0...50}$
acetone	67-64-1	0 to 100	ethylene	0.7	≤ 24 s
i-butane	75-28-5	0 to 100	propane	1.6	≤ 21 s
n-butane	106-97-8	0 to 100	propane	1.2	≤ 23 s
ethanol	64-17-5	0 to 100[4)]	propane	0.9	≤ 21 s
ethyl acetate	141-78-6	0 to 100	ethylene	0.4	≤ 35 s
ethyl acetate	141-78-6	0 to 100[4)]	propane	1.4	≤ 35 s
n-hexane	110-54-3	0 to 100	propane	1.8	≤ 32 s
methanol	67-56-1	0 to 100[4)]	ethylene	0.2	≤ 21 s
n-nonane	111-84-2	0 to 100	propane	1.9	≤ 89 s
n-Octane	111-65-9	0 to 100	propane	1.8	≤ 67 s
n-pentane	109-66-0	0 to 100	propane	1.5	≤ 28 s
i-propyl alcohol	67-63-0	0 to 100	propane	1.3	≤ 24 s
propene (propylene)	115-07-1	0 to 100	ethylene	0.4	≤ 19 s
toluene	108-88-3	0 to 100	ethylene	0.6	≤ 49 s

1) The measuring function for the explosion protection according to EN 60079-29-1 is proven, see EC-Type Examination certificate BVS 05 ATEX E 143X and associated additions.
2) The LEL values were used according to IEC 60079-20-1. Other LEL values may apply for the device settings at the location of use.
3) Typical tolerance: ±5 %.
4) When the following substances are measured at concentrations above 70 % LEL, the deviations of the measured values exceed the permitted deviations in accordance with EN 60079-29-1.

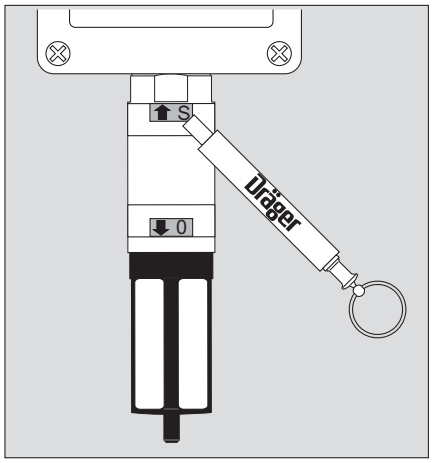
Checking the Signal Transmission, Checking the Alarm Trigger and Displaying the Gas Category

The gas transmitter can create an output signal of 80 % of the full scale value, even without exposure to test gas. This 80% signal can be used to
— check the signal transmission of the central device,
— match central device and sensor signal,
— check the alarm triggering of the gas warning system.

After issuing the 80% signal, the gas category set at the gas transmitter is displayed before the gas transmitter returns to normal operation.



- De-energising the alarm activation of the central device (not during alarm testing).
- Expose the gas transmitter to nitrogen, synthetic air, and/or fresh air via calibration adapter and wait until measurement value stabilises.
- Place the magnetic pin onto the transmitter surface area marked by the " ⇩0 " icon and hold it there (within the black frame) for at least 5 seconds. After five seconds, the output signal of the gas transmitter changes to 3 mA (span gas signal) and remains there for as long as the magnetic pin is held against it. At the same time, a zerosetting of the optical measuring unit is carried out automatically.
- Remove the magnetic pin. After 30 seconds, the device exits the automatic zerosetting routine. As confirmation of the automatic zerosetting, the output signal changes back to the span gas signal (3 mA). This signal is indicated for the same period of time as when starting the automatic zerosetting routine. After that, the output signal of the gas transmitter changes to 4 mA (0 % signal).
- Check the display of the central device: set point 0 %LEL.
- If required, manually set the zero point at the gas transmitter to a display of 0 %LEL.



- Place the magnetic pin onto the transmitter surface area marked by the " ⇧S " icon (within the black frame) and hold it there. After ten seconds, the output signal of the gas transmitter changes to 16.8 mA (80% signal) and remains there for as long as the magnetic pin is held against it.
- Check the display of the central device: set point 80 %LEL.
- If required, adjust the span at the central device until the central device displays 80 %LEL. While doing so, observe the information in the operating manual of the central device pertaining to this subject.

- Remove the magnetic pin. The gas transmitter changes to an output signal which displays the currently set gas category according to the following table:

Gas category	mA	Display [%LEL]
methane	7.2	20
propane	10.4	40
ethylene	13.6	60

— This signal is maintained for 30 seconds. The gas transmitter will then switch back to normal operation.
— The central device display now matches the output signal of the gas transmitter.
- Reactivate alarm activation of the central device.

NOTICE
Using the 80% signal to match central device and transmitter signal without test gas is no replacement for the span calibration of the gas warning system.

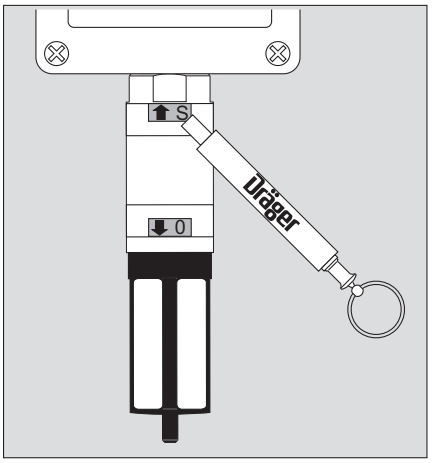
Changing the gas category

The gas transmitter supports the linearized and temperature compensated display of a wide spectrum of gases and vapours. Depending on the measured gas, you can select one of the three gas categories "methane", "propane" or "ethylene" stored in the software. A table which allocates a row of checked gases and vapours is available in the table "Substitute Gas Calibration" on page 16.

Changing the gas category is only possible under the following conditions:
— The device was less was started up less than an hour ago.
— The last zero calibration of the gas transmitter was less than an hour ago.
— The gas concentration measured by the device is below 10 %LEL (expose to zero gas if necessary).

To change the gas category of commissioned gas transmitters, interrupt the power supply for a short period of time, wait for the running-in period of one minute to expire, and then carry out an automatic zero calibration (see "Automatic Zero Calibration" on page 13).

Then:
- Deactivate alarm activation of the central device.
- Place the magnetic pin onto the transmitter surface area marked by the " ⇧S " icon (within the black frame) and hold it there.
  After ten seconds, the output signal of the gas transmitter changes to 16.8 mA (80% signal) and remains there for as long as the magnetic pin is held against it.



- Remove the magnetic pin. The gas transmitter changes to an output signal which displays the currently set gas category according to the following table:

Gas category	mA	Display [%LEL]
methane	7.2	20
propane	10.4	40
ethylene	13.6	60

This signal is maintained for 30 seconds. Within this period of time, the magnetic pin can be placed upon the area marked by the " ⇧S " icon to select the next gas listed in the table. In the process, the output signal of the gas transmitter changes to the value which corresponds with the newly selected value which corresponds with the gas category.

The gas transmitter returns to normal operation if no further entry with the magnetic pin is performed for 30 seconds.

- Check span calibration (see page 15).
- Reactivate alarm activation of the central device.

Maintenance

Regular intervals
are to be determined for the following tasks by the persons responsible for the gas warning system while taking local regulations into account:

- Visual inspection to look for damage and contamination. Special attention is required for gas entrance to the gas transmitter. Anything that blocks the gas entrance to the transmitter, e.g. dirt, ice, precipitation, etc., can prolong the response times or even completely disable the gas transmitter. Recommended inspection interval: 3 months.
- Visual inspection of the splash guard. If required, dismount gas exposure / process adapter and/or dirt deflector. Clean or replace damaged splash guard.
- Visual inspection of gas exposure / process adapter. Clean or replace damaged gas exposure / process adapter.
- Visual inspection of the dirt deflector. Clean or replace damaged dirt deflector.
- Check signal transmission and adjust if required (see "Checking the signal transmission, checking the alarm trigger and displaying the gas category" on page 17).
- Check the calibration of the gas warning system (see "Calibration" on page 11). Recommended calibration interval: 6 months.
- Observe standard DIN EN 60079-29-2 (provided binding).

Extending the maintenance intervals is possible if local conditions are taken into account, and if the recommended maintenance intervals require cleaning, maintenance or setup work. However, we do not recommend maintenance intervals that are longer than 12 months.

Yearly
Inspection by competent personnel. The inspection intervals are to be individually determined with regard to safety regulations, process control conditions and device-related requirements. We strongly recommend that a service contract be signed with Dräger to have them handle repairs and maintenance.

Faults, Cause and Remedy

Fault	Cause	Remedy
No output signal	Gas transmitter is not powered up	Check power supply and polarity.
	Gas transmitter defective	Have Dräger check the gas transmitter.
Transmitter output signal and central device display do not match	Central device and gas transmitter are not matched	Match central device and gas transmitter, see "Calibration" on page 11.
Output signal 1 mA	Ambient temperature too high resp. too low	Operate gas transmitter within the specified temperature range, see "Technical Data" on page 22.
	Gas transmitter defective	Have Dräger check the gas transmitter.
High linearity error	Wrong gas category set	Change the gas category, see "Changing the gas category" on page 18.
Possible calibration range at central device exhausted	Calibration range at central device too small	Calibrate system at gas transmitter.

Technical Data

General Details

Functional Principle	Compensated Infrared Absorption
Standard operating range	0 – 100 %LEL
Standard sensitivity	0.16 mA/%LEL
Standard gas categories	methane, propane, ethylene
Output signal	4 to 20 mA
Power supply	10 to 30 V DC
Switch-on current (2 ms)	≤0.5 A
Power consumption	≤2 W
Connecting thread	M25x1.5 or 3/4" NPT
Material	stainless steel SS 316
Weight	approx. 550 g
Dimensions	see "Dimensions" on page 25
Terminal box of complete set:	
Cable gland	M20x1.5 brass, nickel-plated for cable with Ø 7-12 mm (order no. 68 11 160 and 68 11 270) or 3/4"‘ NPT thread (order no. 68 11 180).
Permissible conductor cross-sections:	1.0 to 2.5 mm^2 (Order No. 68 11 160) or 0.5 to 4.0 mm^2 (Order No. 68 11 270) or 0.2 to 4.0 mm^2 (Order No. 68 11 180)
Environmental operating ranges	–40 to 65 °C 700 to 1300 hPa 0 to 100 % rel. hum.
Environmental storage ranges	–40 to 70 °C 700 to 1300 hPa 0 to 100 % rel. hum., non-condensing
IP rating	IP 66, IP 67, NEMA 4X&7
CE marking	devices and protection systems for intended use in potentially explosive atmospheres (directive 2014/34/EU); electromagnetic compatibility (directive 2014/30/EU)

Measuring Technique Characteristics

digital resolution of measurement values	0±0.5 %LEL		
repeatability	≤ ±2 %LEL		
linearity error	≤ ±5 %LEL		
temperature influence, –40 to 65 °C			
zero point	≤ ±3 %LEL		
span (rel. change of display at 50 %LEL)	≤ ±0.06 % / °C		
humidity influence, 0 to 100 % rel. hum. at 40 °C			
zero point	≤ ±3 %LEL		
span	≤ ±5 %LEL		
pressure influence, 700 to 1300 hPa			
zero point	≤ ±2 %LEL		
span (rel. change of display at 50 %LEL)	≤ ±0.17 % / hPa		
time to start up	approx. 60 seconds		
warm-up phase	approx. 2 hours		
Stabilisation time (when feeding test gas)	≥ 45 seconds[1)]		
Update rate of the output for measuring value outputs	1 second		
Measurement value setting times	Methane	Propane	Ethene (Ethylene)
without splash guard $t_{0...50}$	≤ 18 seconds	≤ 18 seconds	≤ 14 seconds
without splash guard $t_{0...90}$	≤ 30 seconds	≤ 39 seconds	≤ 35 seconds
with splash guard $t_{0...50}$	≤ 20 seconds	≤ 24 seconds	≤ 20 seconds
with splash guard $t_{0...90}$	≤ 35 seconds	≤ 60 seconds	≤ 59 seconds
with splash guard and mud flap $t_{0...50}$	≤ 22 seconds	≤ 26 seconds	≤ 31 seconds
with splash guard and mud flap $t_{0...90}$	≤ 56 seconds	≤ 70 seconds	≤ 79 seconds
with splash guard and process adapter (1.0 to 1.5 l/min.) $t_{0...50}$	≤ 20 seconds	≤ 22 seconds	≤ 20 seconds
with splash guard and process adapter (1.0 to 1.5 l/min.) $t_{0...90}$	≤ 46 seconds	≤ 51 seconds	≤ 54 seconds
Expected service life	>10 years		

1) The stabilisation time can increase depending on the flow rate and the hose length.

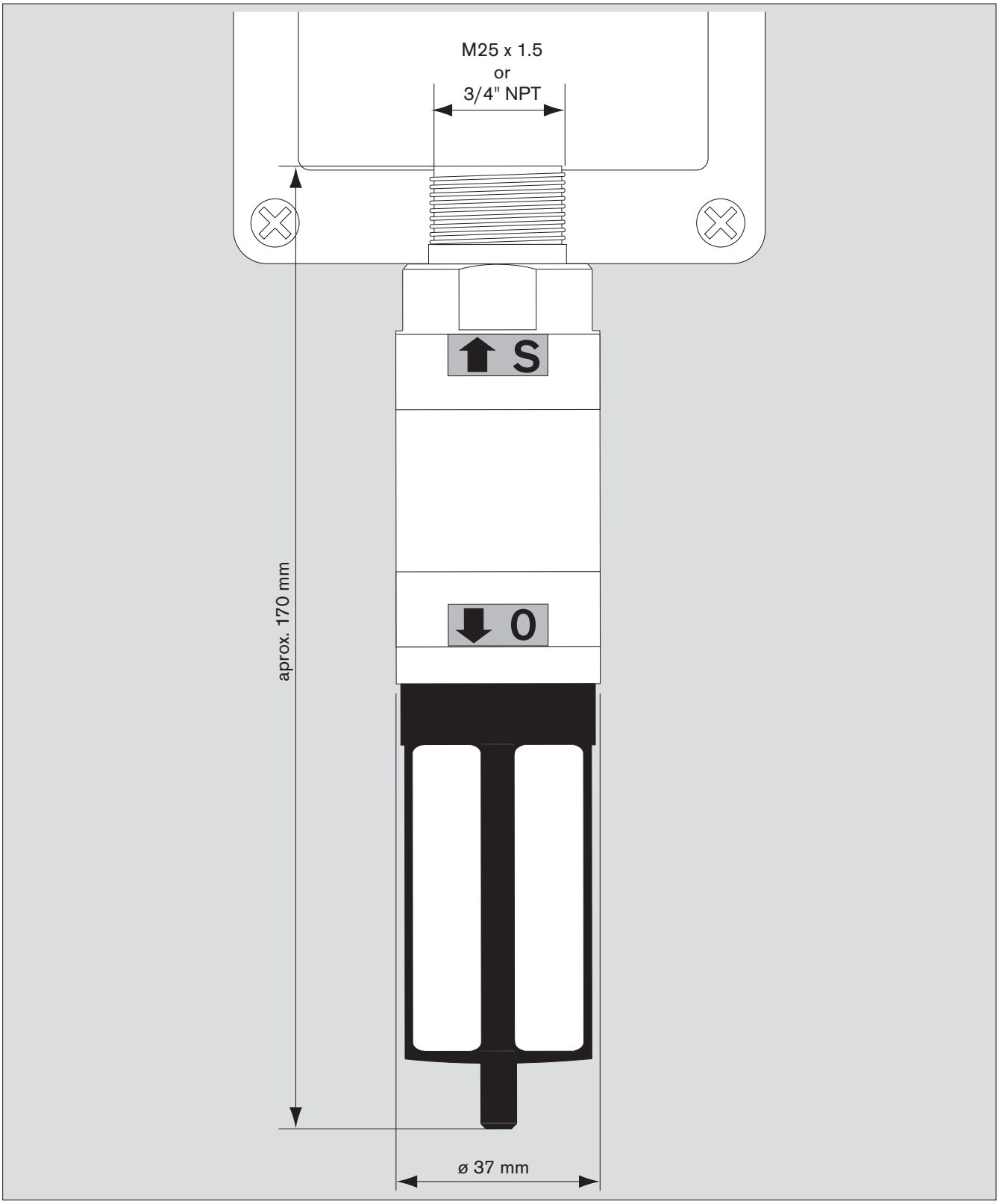
Cross Sensitivities

The gas transmitter measures the concentration of hydrocarbons. Factory-preset calibration parameters are available for methane, propane and ethylene gases. However, other hydrocarbons can also be measured. The following text has examples of typical display values for some types of hydrocarbon, with the gas transmitter calibrated in the respectively stated gas category.

Name of substance[1)]	CAS-No.	LEL according to IEC [Vol.%]	Gas category	Display of 50 %LEL [2) 3)] in %LEL of target gas category
acetone	67-64-1	2.5	ethylene	75
benzene	71-43-2	1.2	ethylene	58
1.3-butadiene	106-99-0	1.4	ethylene	47
i-butane	75-28-5	1.3	propane	32
n-butane	106-97-8	1.4	propane	42
n-butanol	71-36-3	1.4	propane	30
n-butene	106-98-9	1.6	propane	48
n-butyl acetate	123-86-4	1.3	propane	30
n-butyl acrylate	141-32-2	1.2	propane	31
chlorobenzene	108-28-5	1.3	ethylene	25
cyclopentane	287-92-3	1.4	propane	46
diethyl ether	115-10-6	2.7	propane	64
1.4-dioxane	123-91-1	1.4	propane	21
ethanol	64-17-5	3.1	propane	56
ethylene	74-85-1	2.3	ethylene	50
ethyl acetate	141-78-6	2.0	propane	36
ethyl acetate	141-78-6	2.0	ethylene	>100
ethylbenzene	100-41-4	0.8	propane	26
n-hexane	110-54-3	1.0	propane	28
methane	74-82-8	4.4	methane	50
methanol	67-56-1	6.0	propane	>100
methanol	67-56-1	6.0	ethylene	>100
1-methoxy-2-propanol	107-98-2	1.6	propane	41
methyl-i-butylcetone	108-10-1	1.2	propane	26
methyl ethyl ketone (butanone)	78-93-3	1.5	propane	31
methyl methacrylate	80-62-6	1.7	propane	38
n-nonane	111-84-2	0.7	propane	28
n-octane	111-65-9	0.8	propane	30
i-pentane	78-78-4	1.3	propane	38
n-pentane	109-66-0	1.1	propane	35
propane	74-98-6	1.7	propane	50
i-propyl alcohol	67-63-0	2.0	propane	37
propene (propylene)	115-07-1	2.0	propane	33
propene (propylene)	115-07-1	2.0	ethylene	>100
propylene oxide	75-56-9	1.9	propane	54
styrene	100-42-5	1.0	ethylene	44
tetrahydrofuran	109-99-9	1.5	propane	44
toluene	108-88-3	1.0	ethylene	85
o-xylene	95-47-6	1.0	ethylene	68

1) Substances, for which an explosion protection measuring function has been determined, are listed in the EC-Type Examination certificate BVS 05 ATEX E 143X and the associated addendums.
2) The LEL values were used according to IEC 60079-20-1. Other LEL values may apply for the device settings at the location of use.
3) Typical tolerance: ±5 %.

Dimensions



Description of Design

The Dräger PIR 3000 infrared gas transmitter is a gas transmitter designed to determine the concentration of gases and vapours in the ambient air. The principle of measurement is based on the concentration-dependent absorption of infrared radiation in measured gases.

The monitored ambient air diffuses through sintered material into the flameproof housing of a measuring cuvette. The broadband light emitted by the radiator passes through the gas in the cuvette and is reflected by the cuvette walls from where it is directed towards the inlet window of a dual element detector. One channel of the detector measures the gas-dependent light transmission of the cuvette (measuring channel), the other channel is used as reference. The ratio between measuring and reference signal is used to determine the gas concentration in the cuvette. The cuvette is heated to avoid condensation of the atmosphere's moisture content.

Internal electronics and software are used to calculate the concentration. The gas transmitter sends a standard 4 to 20 mA output signal.

Due to its robust design and the measuring method, the gas transmitter has long maintenance and calibration intervals (see "Maintenance" on page 20). A gas sensitivity drift is very unlikely due to the infrared-optical principle of measurement and in addition, the zero point stability is enhanced by an automatic tracking system.

Order List

Designation and description	**Order No.**
Dräger PIR 3000 infrared gas transmitter	
Dräger PIR 3000 [1] connecting thread 3/4" NPT, type IDS 0001	**68 11 080**
Dräger PIR 3000 compl. set d [2] connecting thread 3/4" NPT, type ITR 0010	**68 11 180**
Dräger PIR 3000 compl. set d CCCF [2] connecting thread 3/4" NPT, type ITR 0010	**68 12 505**
Dräger PIR 3000 [1] connecting thread M 25 x 1.5, type IDS 0011	**68 10 810**
Dräger PIR 3000 compl. Set e [3] connecting thread M 25 x 1.5, type ITR 0001	**68 11 160**
Dräger PIR 3000 compl. Set e2 [4] connecting thread M 25 x 1.5, type ITR 0002	**68 11 270**
Accessories/Spare parts	
Splash guard	**68 10 796**
Calibration adapter	**68 10 859**
Gas exposure / process adapter	**68 11 330**
Dirt deflector	**68 11 135**
Assembly set e	**68 11 427**
Assembly set d	**68 11 426**
Pipe connection set (duct mount)	**68 10 995**
Magnetic rod	**45 44 101**
Terminal box design type Ex d (flameproof enclosure, 3/4" NPT, Ø10.0 cm)	**68 11 161**
Terminal box in Ex e design (increased safety, M25, 11.0 x 7.5 x 5.5 cm)	**68 11 299**
Terminal box in Ex e design (increased safety, M25, 12.0 x 12.0 x 7.4 cm)	**68 11 159**
Cable gland set M20	**68 11 323**
Instructions for Use	**90 23 812**
Installation Instructions	**90 23 813**

1) Splash guard and calibration adapter belong to the scope of delivery.
2) The complete set includes the terminal box (68 11 161), the splash guard as well as the calibration adapter, already preassembled.
3) The complete set includes the terminal box (68 11 299), the splash guard as well as the calibration adapter, already preassembled.
4) The complete set includes the terminal box (68 11 159), the splash guard as well as the calibration adapter, already preassembled.

ATEX - Approval

Translation

(1) **EC-Type Examination Certificate**

(2) **- Directive 94/9/EC -**
Equipment and protective systems intended for use in potentially explosive atmospheres

(3) **BVS 05 ATEX E 143 X**

(4) **Equipment:** **Gas detection sensors type IDS 0011 resp. type IDS 0012 resp. type IDS 0001 resp. type IDS 0002 and Gas detection heads type ITR 0001 resp. type ITR 0002 resp. type ITR 0010 resp. type ISH 0001 resp. type ISH 0002 resp. type ISH 0010**

(5) **Manufacturer:** **Dräger Safety AG & Co. KGaA**

(6) **Address:** **23560 Lübeck**

(7) The design and construction of this equipment and any acceptable variation thereto are specified in the schedule to this type examination certificate.

(8) The certification body of EXAM BBG Prüf- und Zertifizier GmbH, notified body no. 0158 in accordance with Article 9 of the directive 94/9/EC of the European Parliament and the Council of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction f equipment and protective systems intended for use in potentially explosive atmosphreres, given in Annex II to the Directive.
The examination and test results are recorded in the test and assessment report BVS PP 05.2107 EG.

(9) The Essential Health and Safety Requirements are assured by compliance with:

EN 50014:1997 + A1 – A2	General Requirements
EN 50018:2000 +A1	Flameproof enclosure
EN 50019:2000	Increased safety
EN 60079-7:2003	Increased safety
EN 50281-1-1:1998	Dust explosion protection

(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, examination and tests of the specified equipment in accordance to Directive 94/9/EC.
Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

II 2G EEx d IIC T6 resp. II 2G EEx de IIC T6
II 2D IP 6X T 80 °C

EXAM BBG Prüf- und Zertifizier GmbH
Bochum, dated 26. September 2005

Signed: Jockers — Certification body

Signed: Eickhoff — Special services unit

Dinnendahlstraße 9 44809 Bochum Telefon-Phone 0234/3696-105 Telefax-Fax 0234/3696-110

(13) Appendix to

(14) # EC-Type Examination Certificate

BVS 05 ATEX E 143 X

(15) 15.1 Subject and Type

Gas detection sensors type IDS 0001 resp. IDS 0011 resp. type IDS 0002 resp. type IDS 0012 and Gas detection heads type ITR 0001 resp. type ITR 0002 resp. type ITR 0010 resp. type ISH 0001 resp. type ISH 0002 resp. type ISH 0010

Gas detection sensors type IDS 0011 resp. type IDS 0012 providing M25 thread connection for attachment to an enclosure increased safety „e“

Gas detection sensors type IDS 0001 resp. type IDS 0002 providing NPT ¾“ thread connection for attachment to a flameproof enclosure „d“

Gas detection heads type ITR 0001 resp. type ISH 0001 with type of protection increased safety „e“ by use of enclosure type 07-5185-1100/7555 according EC-type Examination Certificate PTB 01 ATEX 1014 U (certified per PTB 01 ATEX 1104 and IBEXU00ATEX1081 as a complete terminal box).

Gas detection heads type ITR 0002 resp. type ISH 0002 with type of protection increased safety „e“ by use of enclosure type PL 612 according EC-Type Examination Certificate BAS 01 ATEX 2107 X.

Gas detection heads type ITR 0010 resp. type ISH 0010 with type of protection flameproof enclosure „d“ by use of enclosure type SL 26.1N according EC-Type Examination Certificate CESI 03 ATEX 059 U resp. CESI 02 ATEX 091.

15.2 Description

The sensors type IDS 0001 resp. type IDS 0011 resp. type IDS 0002 resp. type IDS 0012, manufactured using type of protection flameproof enclosures „d“, provide measurement of combustible gases and vapors under atmospheric conditions. The sensors are suitable for use in an ambient temperature range of -40 °C to +65 °C.

The non-intrinsically safe power supply of the sensors enters the enclosure via a resin bushing. The sensor type IDS 0011 resp. type IDS 0012 may be attached to an enclosure of type of protection increased safety „e“ that is certified for this purpose. The sensor type IDS 0001 resp. IDS 0002 is dedicated for the attachment to a flameproof enclosure „d“. The mechanical strength of the attachment to the flameproof enclosure as well as the explosion relevant and constructional assessment of the connection thread shall be made in conjunction with the certification of the electrical apparatus to which the sensor is attached.

The gas detection heads type ITR 0001 resp. type ISH 0001 and type ITR 0002 resp. type ISH 0002 consist of a gas detection sensor type IDS 0011 resp. type IDS 0012 and an attached terminal box with type of protection increased safety „e“, fitted with terminals that are certified for this purpose. The gas detection heads type ITR 0001 resp. type ISH 0001 and type ITR 0002 resp. type ISH 0002 provide measurement of combustible gases and vapors under atmospheric conditions and are suitable for use in an ambient temperature range of -40 °C to +65 °C.

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The gas detection heads type ITR 0010 resp. type ISH 0010 consist of a gas detection sensor type IDS 0001 resp. type IDS 0002 and an attached terminal box, comprising terminals with type of protection flameproof enclosures „d“. The gas detection heads type ITR 0010 resp. type ISH 0010 provide measurement of combustible gases and vapors under atmospheric conditions and are suitable for use in an ambient temperature range of -40 °C to +60 °C.

15.3 Parameters

15.3.1 Supply of the gas detection sensors and gas detection heads

Voltage	up to	30 V
Power	up to	2 W

15.3.2 Temperatures

Ambient Temperature Range for
Gas detection sensors type IDS 0001 resp. type IDS 0011 resp. type IDS 0002 resp. type IDS 0012 and
Gas detection heads type ITR 0001 resp. type ISH 0001 resp. type ITR 0002 resp. type ITR 0002 -40 °C to + 65 °C

Ambient Temperature Range for
Gas detection heads type ITR 0010 resp. type ISH 0010 -40 °C to + 60 °C

Gas detection sensors type IDS 0001 resp. type IDS 0011 resp. type IDS 0002 resp. type IDS 0012		
Maximum permissible Temperature at resin at maximum permissible power and ambient temperature	75	°C
Maximum permissible Temperature of wires at maximum permissible power and ambient temperature	70	°C

(16) Test and assessment report
BVS PP 05.2107 EG, dated 26.09.2005

(17) Special conditions for safe use
The gas detection sensors type IDS 0001 resp. type IDS 0011 resp. type IDS 0002 resp. type IDS 0012 and the gas detection heads type ITR 0001 resp. type ISH 0001 and type ITR 0002 resp. ISH 0002 are suitable for use in an ambient temperature range of -40 °C to +65 °C.

The gas detection heads type ITR 0010 resp. type ISH 0010 are suitable for use in an ambient temperature range of -40 °C to +60 °C.

The gas detection sensor type IDS 0001 resp. IDS 0002 (NPT-thread) is suitable for the attachment to an enclosure with type of protection flameproof enclosures „d“. The free internal volume is limited to 2 liters and the maximum reference pressure may not exceed 20 bar. The mechanical strength of the attachment to the flameproof enclosure as well as the explosion relevant and constructional assessment of the connection thread shall be made in conjunction with the certification of the electrical apparatus to which the sensor is attached.

The gas detection sensor type IDS 0011 resp. type IDS 0012 (metric thread) is suitable for the attachment to an enclosure with type of protection increased safety „e“. The mechanical strength and the ingress protection IP 6X of the attachment shall be ensured by the certification of the electrical apparatus to which the sensor will be attached. After attachment of the sensor to an enclosure with type of protection increased safety „e“, the clearance and creepage distances must comply with clause 4.3 (Table 1) of

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EN 50019 resp. clauses 4.4 and 4.5 of EN 60079-7. The wires of the sensors shall be routed and connected according clauses 4.2, 4.5.1 and 4.8 of EN 50019 resp. clauses 4.3, 4.61 and 4.9 of EN 50079-7 mechanically protected and by observation of the temperature rating of the wires.

The sensors shall be appropriately screwed into the enclosure wall and secured against self-loosening. After attachment, the sensor's enclosure shall be connected to the equipotential bonding of the terminal box in an electrostatic manner (resistance < 10^6 Ohms). If equipotential bonding is necessary, it shall be ensured by the attachment.

The measurement function for explosion protection in accordance with EN 61779-1 and EN 61779-4 is not subject of this EC-Type Examination Certificate.

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EXAM
BBG Prüf- und Zertifizier GmbH

Translation

1st Supplement

(Supplement in accordance with Directive 94/9/EC Annex III number 6)

to the EC-Type Examination Certificate
BVS 05 ATEX E 143 X

Equipment: **gas sensors type IDS 0001, IDS 0002, IDS 0011 or IDS 0012 and gas detection heads type ITR 0001, ITR 0002 or ITR 0010, ISH 0001, ISH 0002 or ISH 0010**

Manufacturer: **Dräger Safety AG & Co. KGaA**

Address: **D - 23560 Lübeck**

Description

The Essential Health and Safety Requirements with respect to the measuring function for explosion protection are assured by application of:

EN 61779-1:2000 + A11:2004
EN 61779-4:2000
EN 50271:2001

This supplement to the EC-type examination certificate covers the measuring function for methane, propane and ethylene with the measuring range 0 - 100 % LEL.
This supplement to the EC-type examination certificate covers devices with software version 2.03.

Test report

Test report PFG-no. 41300506P dated 24/10/2006

Special conditions for safe use

- See EC-type examination certificate BVS 05 ATEX E 143 X
- Junction boxes used for the gas sensors IDS 00** shall have a sufficient mechanical stability in order to avoid mutual excitations of box and sensor if exposed to vibrations.
- The interconnection of the gas sensors type IDS 0002 or IDS 0012 or gas detection heads type ISH 0001, ISH 0002 or ISH 0010 with a control unit shall be certified separately.

EXAM BBG Prüf- und Zertifizier GmbH
Bochum, dated 27/10/2006

Signed: Jockers
Certification body

Signed: Kiesewetter
Special services unit

Dinnendahlstrasse 9 44809 Bochum Telefon-Phone 0234/3696-105 Telefax-Fax 0234/3696-110 e-mail ZS@bg-exam.de

EXAM
BBG Prüf- und Zertifizier GmbH

Translation

2nd Supplement

(Supplement in accordance with Directive 94/9/EC Annex III number 6)

to the EC-Type Examination Certificate
BVS 05 ATEX E 143 X

Equipment: **gas sensors type IDS 0002 or IDS 0012 and gas detection heads type ISH 0001, ISH 0002 or ISH 0010**

Manufacturer: **Dräger Safety AG & Co. KGaA**

Address: **D - 23560 Lübeck**

Description

This supplement to the EC-type examination certificate covers the interconnection of the gas sensors or gas detection heads with control units type Polytron SE Ex.
The Essential Health and Safety Requirements with respect to the measuring function for explosion protection are assured by application of:

EN 61779-1:2000 + A11:2004
EN 61779-4:2000
EN 50271:2001

This supplement to the EC-type examination certificate covers the measuring function for methane, propane and ethylene with the measuring range 0 - 100 % LEL.
This supplement to the EC-type examination certificate covers gas sensors and gas detection heads with software version 2.03.

Test report

Test report PFG-no. 41300506P dated 24/10/2006

Special conditions for safe use

- See 1. supplement to the EC-type examination certificate BVS 05 ATEX E 143 X

EXAM BBG Prüf- und Zertifizier GmbH
Bochum, dated 27/10/2006

Signed: Jockers
Certification body

Signed: Kiesewetter
Special services unit

Dinnendahlstrasse 9 44809 Bochum Telefon-Phone 0234/3696-105 Telefax-Fax 0234/3696-110 e-mail ZS@bg-exam.de

[redacted]

EXAM
BBG Prüf- und Zertifizier GmbH

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

44809 Bochum, 27. October 2006
PFG-Kie

EXAM BBG Prüf- und Zertifizier GmbH

Certification body

Special services unit

Dinnendahlstrasse 9 44809 Bochum Telefon-Phone 0234/3696-105 Telefax-Fax 0234/3696-110 e-mail ZS@bg-exam.de

[redacted]

DEKRA

Translation

3rd Supplement

(Supplement in accordance with Directive 94/9/EC Annex III number 6)

to the EC-Type Examination Certificate
BVS 05 ATEX E 143 X

Equipment: **gas sensors type IDS 0001, IDS 0002, IDS 0011 or IDS 0012 and gas detection heads type ITR 0001, ITR 0002 or ITR 0010, ISH 0001, ISH 0002 or ISH 0010**

Manufacturer: **Dräger Safety AG & Co. KGaA**

Address: **D-23560 Lübeck**

Description

The Essential Health and Safety Requirements with respect to the measuring function for explosion protection are assured by application of:

EN 61779-1:2000 + A11:2004
EN 61779-4:2000

This supplement to the EC-type examination certificate covers for operation in gas category propane the measuring function for the gases und vapours i-butane, n-butane, n-pentane, n-hexane, n-octane, n-nonane and i-propanol in the measuring range 0 - 100 % LEL and ethanol and ethyl acetate in the measuring range 0 - 70 % LEL.

This supplement to the EC-type examination certificate covers for operation in gas category ethylene the measuring function for the gases und vapours propylene, toluene, acetone and ethyl acetate in the measuring range 0 - 100 % LEL and methanol in the measuring range 0 - 70 % LEL.

This supplement to the EC-type examination certificate covers devices with software version 2.07.

Test report

Test report PFG-no. 41300506P NI dated 19/05/2008

Special conditions for safe use

- see 1. supplement to the EC-type examination certificate BVS 05 ATEX E 143 X

DEKRA EXAM GmbH
Bochum, dated 19/05/2008

Signed: Jockers
Certification body

Signed: Kiesewetter
Special services unit

Dinnendahlstrasse 9 44809 Bochum Telefon-Phone 0234/3696-105 Telefax-Fax 0234/3696-110 e-mail zs-exam@dekra.com

Translation

4th Supplement

(Supplement in accordance with Directive 94/9/EC Annex III number 6)

to the EC-Type Examination Certificate
BVS 05 ATEX E 143 X

Equipment: **gas sensors type IDS 0002 or IDS 0012 and gas detection heads type ISH 0001, ISH 0002 or ISH 0010**

Manufacturer: **Dräger Safety AG & Co. KGaA**

Address: **D-23560 Lübeck**

Description

This supplement to the EC-type examination certificate covers the interconnection of the gas sensors or gas detection heads with control units type Polytron SE Ex.

The Essential Health and Safety Requirements with respect to the measuring function for explosion protection are assured by application of:

EN 61779-1:2000 + A11:2004
EN 61779-4:2000

This supplement to the EC-type examination certificate covers for operation in gas category propane the measuring function for the gases und vapours i-butane, n-butane, n-pentane, n-hexane, n-octane, n-nonane and i-propanol in the measuring range 0 - 100 % LEL and ethanol and ethyl acetate in the measuring range 0 - 70 % LEL.

This supplement to the EC-type examination certificate covers for operation in gas category ethylene the measuring function for the gases und vapours propylene, toluene, acetone and ethyl acetate in the measuring range 0 - 100 % LEL and methanol in the measuring range 0 - 70 % LEL.

This supplement to the EC-type examination certificate covers gas sensors and gas detection heads with software version 2.07.

Test report

Test report PFG-no. 41300506P NI dated 19/05/2008

Special conditions for safe use

- see 1. supplement to the EC-type examination certificate BVS 05 ATEX E 143 X

DEKRA EXAM GmbH
Bochum, dated 19/05/2008

Signed: Jockers — Certification body

Signed: Kiesewetter — Special services unit

Dinnendahlstrasse 9 44809 Bochum Telefon-Phone 0234/3696-105 Telefax-Fax 0234/3696-110 e-mail zs-exam@dekra.com

DEKRA

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

44809 Bochum, 19. May 2008
PFG-Kie

DEKRA EXAM GmbH

Certification body

Special services unit

Dinnendahlstrasse 9 44809 Bochum Telefon-Phone 0234 3696-105 Telefax-Fax 0234 3696-110 e-mail zs-exam@dekra.com

DEKRA

Translation

5th Supplement

(Supplement in accordance with Directive 94/9/EC Annex III number 6)

to the EC-Type Examination Certificate
BVS 05 ATEX E 143 X

Equipment: **Gas detection sensors types IDS 0001, IDS 0002, IDS 0011, IDS 0012 and Gas sensing heads types ITR 0001, ITR 0002, ITR 0010, ISH 0001, ISH 0002, and ISH 0010**

Manufacturer: **Dräger Safety AG & Co. KGaA**

Address: **23560 Lübeck, Germany**

Description

The gas detection sensors now also comply with the current status of the standards applicable and may modified according to the documents stated in the pertinent Test and Assessment Report.

The Essential Health and Safety Requirements of the modified equipment are assured by compliance with:

EN 60079-0:2006	General requirements
EN 60079-1:2004	Flameproof Enclosure 'd'
EN 60079-7:2003	Increased Safety 'e'
EN 61241-0:2006	General requirements
EN 61241-1:2004	Protection by Enclosures

The marking of the equipment shall include the following:

II 2G Ex d IIC T6 (Type IDS 0001, IDS 0002, IDS 0011, IDS 0012, ITR 0010 and ISH 0010)
II 2G Ex de IIC T6 (Type ITR 0001, ITR 0002, ISH 0001 and ISH 0002)
II 2D Ex tD A21 IP6X T80°C

Special conditions for safe use

The gas detection sensors of the following types: IDS 0001, IDS 0011, IDS 0002, and IDS 0012, as well as the gas sensing heads of the following types: ITR 0001, ISH 0001, ITR 0002 and ISH 0002 are suitable for use in ambient temperature ranges of -40 °C to +65 °C.

The gas sensing heads type ITR 0010 and type ISH 0010 are suitable for use in ambient temperature ranges of -40 °C to +60 °C.

The gas detection sensors type IDS 0001 and type IDS 0002 (NPT thread) are suitable to be attached to an enclosure of the type of protection Flameproof Enclosure 'd', if there free volume does not exceed two litres and if the reference pressure is lower than 20 bar. The mechanical strength of the attachment and the inspection of the connecting thread regarding aspects of explosion protection and construction have to be carried out as part of the approval of the equipment to which the sensor will be attached.

DEKRA EXAM GmbH Dinnendahlstrasse 9 44809 Bochum Germany Phone +49 234/3696-105 Fax +49 234/3696-110 E-mail zs-exam@dekra.com
(until 31.03 2007 EXAM BBG Prüf- und Zertifizier GmbH)

The gas detection sensors type IDS 0011 and type IDS 0012 (metric thread) are suitable to be attached to an enclosure of the type of protection Increased Safety 'e'. The mechanical strength and the compliance with the degree of protection IP6X have to be ensured of the as part of the approval of the electrical equipment intended for the attachment. If the sensor is attached to an enclosure of type of protection Increased Safety 'e', the clearance and creepage distances have to meet the requirements stated in 4.3 (Table 1) of EN 60079-7 or 4.4 and 4.5 of EN 60079-7. The wiring and the connecting of the sensor conductors have to be carried out mechanically protected according to 4.2, 4.3, 4.5.2, 4.6.1, 4.8 and 4.9 of EN 60079-7 and have to consider the temperature resistance of the conductors.

The sensors have to be properly screwed into the enclosure wall and to be fastened against accidental loosening. The sensor enclosure attached has to be connected to the potential equalisation of the enclosure attached in an electrostatically conductive manner (contact resistance < 10^6 Ohm). If a potential equalisation is necessary, it has to be ensured by the attachment.

The measuring function for the purpose of explosion protection according to Annex II section 1.5.5 of Directive 94/9/EC is not subject of this supplement.

Test and assessment report

BVS PP 05.2107 EG as of 23.03.2009

DEKRA EXAM GmbH
Bochum, dated 23rd March 2009

Signed: Simanski
Certification body

Signed: U. Hauke
Special services unit

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

44809 Bochum, 23rd March 2009
BVS-Kr /Ld / Her A 20080911

DEKRA EXAM GmbH

Certification body

Special services unit

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(until 31.03.2007 EXAM BBG Prüf- und Zertifizier GmbH)

Translation

(1) # 6. Supplement to the EC-Type Examination Certificate

(2) Equipment and protective systems intended for use in potentially explosive atmospheres - Directive 94/9/EC
Supplement accordant with Annex III number 6

(3) No. of EC-Type Examination Certificate: **BVS 05 ATEX E 143 X**

(4) Equipment: **gas sensors type IDS 0001, IDS 0002, IDS 0011, IDS 0012 and gas detection heads type ITR 0001, ITR 0002, ITR 0010, ISH 0001, ISH 0002, ISH 0010**

(5) Manufacturer: **Dräger Safety AG & Co. KGaA**

(6) Address: **D-23560 Lübeck**

(7) The design and construction of this equipment and any acceptable variation thereto are specified in the appendix to this supplement.

(8) The certification body of DEKRA EXAM GmbH, notified body no. 0158 in accordance with Article 9 of the Directive 94/9/EC of the European Parliament and the Council of 23 March 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 to the Directive. The examination and test results are recorded in the test report PFG-no. 41300506P NII.

(9) The Essential Health and Safety Requirements are assured by compliance with:

EN 60079-29-1:2007
EN 50271:2001

This supplement to the EC-type examination certificate covers the measuring function for the gases and vapours listed in the 1. and 3. supplement to this EC-type examination certificate.
This supplement to the EC-type examination certificate covers devices with software version 2.11.

(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 appendix to this certificate.

(11) This supplement to the EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to Directive 94/9/EC.
Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

Not changed

DEKRA EXAM GmbH
Bochum, dated 27. May 2011

Signed: Simanski
Certification body

Signed: Kiesewetter
Special services unit

DEKRA EXAM GmbH Dinnendahlstrasse 9 44809 Bochum Phone +49.234.3696-105 Fax +49.234.3696-110 zs-exam@dekra.com

(13) Appendix to

(14) **6. Supplement to the EC-Type Examination Certificate**
BVS 05 ATEX E 143 X

(15) 15.1 Subject and type

gas sensors type IDS 0001, IDS 0002, IDS 0011, IDS 0012
and gas detection heads type ITR 0001, ITR 0002, ITR 0010, ISH 0001, ISH 0002, ISH 0010

15.2 Description

This supplement to the EC-type examination certificate concerns re-testing according to EN 60079-29-1, modifications of the design and the accessory weather guard. The equipment can be modified according to the descriptive documents as mentioned in the pertinent test report.

15.3 Parameters

See EC-type examination certificate BVS 05 ATEX E 143 X and supplement 5

(16) Test and assessment report

PFG-no. 41300506P NII as of 27.05.2011

(17) Special conditions for safe use

- See 1. supplement to the EC-type examination certificate BVS 05 ATEX E 143 X

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

DEKRA EXAM GmbH
44809 Bochum, 27. May 2011
PFG-Kie/Bre

Certification body

Special services unit

DEKRA EXAM GmbH Dinnendahlstrasse 9 44809 Bochum Phone +49.234.3696-105 Fax +49.234.3696-110 zs-exam@dekra.com

Translation

(1) 7th Supplement to the EC-Type Examination Certificate

(2) Equipment and protective systems intended for use in potentially explosive atmospheres - Directive 94/9/EC
Supplement accordant with Annex III number 6

(3) No. of EC-Type Examination Certificate: **BVS 05 ATEX E 143 X**

(4) Equipment: **Gas sensor types IDS0001 resp. IDS0002 resp. IDS0011 resp. IDS0012 and gas sensing heads type ITR 0001 resp. ITR0002 resp. ITR 0010 resp. ISH0001 resp. ISH 0002 resp. ISH 0010**

(5) Manufacturer: **Dräger Safety AG & Co. KGaA**

(6) Address: **Revalstraße 1, 23560 Lübeck, Germany**

(7) The design and construction of this equipment and any acceptable variation thereto are specified in the appendix to this supplement.

(8) The certification body of DEKRA EXAM GmbH, notified body no. 0158 in accordance with Article 9 of the Directive 94/9/EC of the European Parliament and the Council of 23 March 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 to the Directive. The examination and test results are recorded in the test and assessment report BVS PP 05.2107 EG.

(9) The Essential Health and Safety Requirements are assured by compliance with:

EN 60079-0:2009 General requirements
EN 60079-1:2007 Flameproof enclosure
EN 60079-7:2007 Increased safety
EN 60079-31:2009 Protection by enclosures „t"

(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 appendix to this certificate.

(11) This supplement to the EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to Directive 94/9/EC.
Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

II 2G Ex d IIC T6 Gb
(Type IDS 0001, IDS 0002, IDS 0011, IDS 0012, ITR 0010 and ISH 0010)
II 2G Ex de IIC T6 Gb
(Type ITR 0001, ITR 0002, ISH 0001 and ISH 0002)
II 2D Ex tb IIIC T80°C Db
IP6X

DEKRA EXAM GmbH
Bochum, dated 06th August 2012

Signed: Dr. Eickhoff — Certification body

Signed: Dr. Wittler — Special services unit

DEKRA EXAM GmbH Dinnendahlstrasse 9 44809 Bochum Phone +49.234.3696-105 Fax +49.234.3696-110 zs-exam@dekra.com

(13) Appendix to

(14) **7th Supplement to the EC-Type Examination Certificate**
BVS 05 ATEX E 143 X

(15) 15.1 Subject and type

Gas sensors type IDS 00**

- 1 : measuring value in mA
- 2 : measuring value in mV
- 0 : Variant flameproof enclosure with 3/4" NPT thread
- 1 : Variant increased safety with M25 thread

Gas sensings head type I** 00**

- 01 : Bartec housing in type of protection increased safety
- 02 : Hawke housing in type of protection increased safety
- 10 : Cortem housing in type of protection flameproof enclosure
- SH : measuring value in mV
- TR : measuring value in mA

15.2 Description

The gas sensors und gas sensing heads are also in compliance with the actual valid standard editions. They can be manufactured according the documentation listed in the related test and assessment report.

15.3 Parameters

Unchanged

(16) Test and assessment report

BVS PP 05.2107 EG as of 06.08.2012

(17) Special conditions for safe use Installation instructions

The gas sensor types IDS0001 resp. IDS0002 resp. IDS0011 resp. IDS0012 and gas sensing heads type ITR 0001 resp. ITR0002 resp. ISH0001 resp. ISH 0002 are usable for an ambient temperature range of -40 °C up to +65 °C.

The gas sensing heads type ITR 0010 resp. type ISH 0010 are usable for an ambient temperature range of -40 °C up to +60 °C.

The gas sensor types IDS 0001 and IDS 0002 (NPT thread) shall be connected to enclosures type of protection flameproof "d" whose internal free volume does not exceed 2 litres and whose reference pressure does not exceed 20 bar.
The mechanical strength of the assembly as well as the flameproof properties of the connecting NPT thread shall be verified by the type test of the enclosure to which the sensor is attached.

The gas sensor types IDS 0011 und IDS 0012 (metric thread) are suitable for mounting to enclosures of type of protection increased safety "e".
The mechanical strength and the IP 6X grade of protection of the assembly shall be verified by the type test of the enclosure to which the sensor is attached.

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The clearances and creepage distances shall comply with the requirements of 4.3 (Table 1) and 4.4 of EN 60079-7.
The wiring and the connection of the wires of the sensor shall be performed according to 4.5, 4.7.2 and 4.8 of EN 60079-7 mechanical protected and corresponding to the temperature resistance of the wire.

The threaded joint between the gas sensor and enclosure shall be properly mounted and protected against unintended loosing.

After assembly, the sensor housing shall be connected to potential ground of the enclosure in an electrostatically conductive manner (contact resistance < 10^6 Ohm). If equipotential bonding is necessary, it shall be provided by the assembly.

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

DEKRA EXAM GmbH
44809 Bochum, 04.09.2012
BVS-Ld/Ar A 20110288

Certification body

Special services unit

DEKRA EXAM GmbH Dinnendahlstrasse 9 44809 Bochum Phone +49.234.3696-105 Fax +49.234.3696-110 zs-exam@dekra.com

(13) Appendix to

(14) **8th Supplement to the EC-Type Examination Certificate**
BVS 05 ATEX E 143 X

(15) 15.1 Subject and type

Gas sensors type IDS 00**

- 1 : measuring value in mA
- 2 : measuring value in mV
- 0 : Variant flameproof enclosure with 3/4" NPT thread
- 1 : Variant flameproof enclosure with M25 thread

Gas sensings head type I** 00**

- 01 : Bartec housing in type of protection increased safety
- 02 : Hawke housing in type of protection increased safety
- 10 : Cortem housing in type of protection flameproof enclosure
- SH : measuring value in mV
- TR : measuring value in mA

15.2 Description

The sensor types IDS 0001, IDS 0011, IDS 0002 and IDS 0012 in type of protection flameproof enclosure "d" serve for the measurement of combustible gases and vapours under atmospheric conditions. The sensors are suitable for operation in ambient temperatures from -40 °C to +65 °C.
The power of the sensors is supplied by non-intrinsically safe circuits via a cast resin cable feed through. The sensor types IDS 0011 and IDS 0012 are designed for mounting to enclosures with type of protection increased safety "e" that are certified for this purpose. The sensor types IDS 0001 and IDS 0002 are designed for mounting to enclosures with type of protection flameproof enclosure "d". The mechanical strength of the assembly as well as the flameproof properties of the connecting thread shall be verified by the type test of the enclosure to which the sensor is attached.

The gas sensing head types ITR 0001 and ITR 0002 resp. ISH 0001 and ISH 0002 consist of a gas sensor of type IDS 0011 resp. IDS 0012 and an attached enclosure of type of protection increased safety "e". The gas sensing head types ITR 0001, ITR 0002, ISH 0001 and ISH 0002 serve for the measurement of combustible gases and vapours under atmospheric conditions and are suitable for operation in ambient temperature ranges from -40 °C to +65 °C.

The gas sensing head types ITR 0010 and ISH 0010 consist of a gas sensor of type IDS 0001 resp. IDS 0002 and an attached enclosure of type of protection flameproof enclosure "d". The gas sensing head types ITR 0010 and type ISH 0010 serve for the measurement of combustible gases and vapours under atmospheric conditions and are suitable for operation in ambient temperature ranges from -40 °C to +60 °C

Reason for this supplement is the update of the used standards.

Listing of all components used referring to older standards

Subject and type	Certificate	Standards
Housing	PTB 08 ATEX 1062 U	EN 60079-0:2012 EN 60079-7:2007
Terminals	PTB 99 ATEX 3117 U	EN 60079-0:2004 EN 60079-7:2007
Terminals	PTB 98 ATEX 3129 U	EN 60079-0:2012 EN 60079-7:2007
Terminals	DEMKO 14 ATEX 1338 U	EN 60079-0:2012 EN 60079-7:2007

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telephone +49.234.3696-105, Fax +49.234.3696-110, zs-exam@dekra.com

15.3 Parameters

15.3.1 Supply of the gas sensors and gas sensing heads

Voltage	up to	30 V
Power	up to	2 W

15.3.2 Temperatures

Ambient temperature range for gas sensor	type IDS 0001, type IDS 0011, type IDS 0002, type IDS 0012 and	
gas sensing heads	type ITR 0001, type ISH 0001, type ITR 0002, type ISH 0002	-40 °C up to + 65 °C
Ambient temperature range for gas sensing heads type ITR 0010 and type ISH 0010		-40 °C up to + 60 °C

Gas sensor type IDS 0001, type IDS 0011, type IDS 0002 and type IDS 0012

Maximum temperature of cast resin at maximum allowed power and ambient temperature	75	°C
Maximum temperature of supply leads at maximum allowed power and ambient temperature	70	°C

(16) Test and Assessment Report

BVS PP 05.2107 EG as of 2016-03-30

(17) Special conditions for safe use

17.1 The gas sensor types IDS0001 resp. IDS0002 resp. IDS0011 resp. IDS0012 and gas sensing heads type ITR 0001 resp. ITR0002 resp. ISH0001 resp. ISH 0002 are usable for an ambient temperature range of -40 °C up to +65 °C.

17.2 The gas sensing heads type ITR 0010 resp. type ISH 0010 are usable for an ambient temperature range of -40 °C up to +60 °C.

17.3 The gas sensor types IDS 0001 and IDS 0002 (NPT thread) shall be connected to enclosures type of protection flameproof "d" whose internal free volume does not exceed 2 litres and whose reference pressure does not exceed 20 bar. The mechanical strength of the assembly as well as the flameproof properties of the connecting NPT thread shall be verified by the type test of the enclosure to which the sensor is attached.

17.4 The gas sensor types IDS 0011 und IDS 0012 (metric thread) are suitable for mounting to enclosures of type of protection increased safety "e". The mechanical strength and the IP 6X grade of protection of the assembly shall be verified by the type test of the enclosure to which the sensor is attached.

17.5 The clearances and creepage distances shall comply with the requirements of 4.3 (Table 1) and 4.4 of EN 60079-7. The wiring and the connection of the wires of the sensor shall be performed according to 4.5, 4.7.2 and 4.8 of EN 60079-7 mechanical protected and corresponding to the temperature resistance of the wire.

17.6 The threaded joint between the gas sensor and enclosure shall be properly mounted and protected against unintended loosing.

17.7 After assembly, the sensor housing shall be connected to potential ground of the enclosure in an electrostatically conductive manner (contact resistance < 10^6 Ohm). If equipotential bonding is necessary, it shall be provided by the assembly.

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We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

DEKRA EXAM GmbH
44809 Bochum, 2016-03-30
BVS-Pe/Nu A 20140928

Certification body

Special services unit

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telephone +49.234.3696-105, Fax +49.234.3696-110, zs-exam@dekra.com

IECEx - Approval

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	IECEx BVS 05.0011X	issue No.:3	Certificate history: Issue No. 3 (2016-4-6) Issue No. 2 (2012-8-9) Issue No. 1 (2009-3-23) Issue No. 0 (2005-11-23)
Status:	Current		
Date of Issue:	2016-04-06	Page 1 of 5	

Applicant: **Dräger Safety AG & Co. KGaA**
Revalstraße 1
23560 Lübeck
Germany

Electrical Apparatus: **Gas sensor types IDS0001, IDS0002, IDS0011 and IDS0012 and gas sensing heads type ITR 0001, ITR0002, ITR 0010, ISH0001, ISH 0002 and type ISH 0010**
Optional accessory:

Type of Protection: **Equipment protection by flameproof enclosures "d", Equipment dust ignition protection by enclosure "t", Equipment protection by increased safety "e"**

Marking: Ex db IIC T6 Gb or Ex db eb IIC T6 Gb
Ex tb IIIC T80°C Db

Approved for issue on behalf of the IECEx Certification Body: H.-Ch. Simanski

Position: Head of Certification Body

Signature: (for printed version)

Date: 6.4.2016

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:

DEKRA EXAM GmbH
Dinnendahlstrasse 9
44809 Bochum
Germany

DEKRA
On the safe side.

IECEx Certificate of Conformity

Certificate No.: IECEx BVS 05.0011X

Date of Issue: **2016-04-06** Issue No.: **3**

Manufacturer: **Dräger Safety AG & Co. KGaA**
Revalstraße 1
23560 Lübeck
Germany

Additional Manufacturing location (s):

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

STANDARDS:
The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

IEC 60079-0 : 2011 Edition: 6.0	Explosive atmospheres - Part 0: General requirements
IEC 60079-1 : 2014-06 Edition: 7.0	Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
IEC 60079-31 : 2013 Edition: **2**	Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"
IEC 60079-7 : 2015 Edition: 5.0	Explosive atmospheres – Part 7: Equipment protection by increased safety "e"

*This Certificate **does not** indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.*

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

Test Report:
DE/BVS/ExTR06.0028/03

Quality Assessment Report:

DE/BVS/QAR06.0001/11

IECEx Certificate of Conformity

Certificate No.: IECEx BVS 05.0011X

Date of Issue: **2016-04-06** Issue No.: **3**

Schedule

EQUIPMENT:
Equipment and systems covered by this certificate are as follows:

Subject and type
See Annex

Description
The sensor types IDS 0001, IDS 0011, IDS 0002 and IDS 0012 in type of protection flameproof enclosure "d" serve for the measurement of combustible gases and vapours under atmospheric conditions. The sensors are suitable for operation in ambient temperatures from -40 °C to +65 °C.
The power of the sensors is supplied by non-intrinsically safe circuits via a cast resin cable feed through. The sensor types IDS 0011 and IDS 0012 are designed for mounting to enclosures with type of protection increased safety "e" that are certified for this purpose. The sensor types IDS 0001 and IDS 0002 are designed for mounting to enclosures with type of protection flameproof enclosure "d". The mechanical strength of the assembly as well as the flameproof properties of the connecting thread shall be verified by the type test of the enclosure to which the sensor is attached.
The gas sensing head types ITR 0001 and ITR 0002 resp. ISH 0001 and ISH 0002 consist of a gas sensor of type IDS 0011 resp. IDS 0012 and an attached enclosure of type of protection increased safety "e". The gas sensing head types ITR 0001, ITR 0002, ISH 0001 and ISH 0002 serve for the measurement of combustible gases and vapours under atmospheric conditions and are suitable for operation in ambient temperature ranges from -40 °C to +65 °C.
The gas sensing head types ITR 0010 and ISH 0010 consist of a gas sensor of type IDS 0001 resp. IDS 0002 and an attached enclosure of type of protection flameproof enclosure "d". The gas sensing head types ITR 0010 and type ISH 0010 serve for the measurement of combustible gases and vapours under atmospheric conditions and are suitable for operation in ambient temperature ranges from -40 °C to +60 °C.

Listing of all components used referring to older standards

Subject and type	Certificate	Standards
Housing	IECEx PTB 09.0008 U[1]	IEC 60079-0:2011 Ed. 6 IEC 60079-7:2006 Ed. 4
Terminals	IECEx PTB 07.0007 U[1]	IEC 60079-0:2007 Ed. 5 IEC 60079-7:2006 Ed. 4
Terminals	IECEx PTB 04.0003 U[1]	IEC 60079-0:2011 Ed. 6 IEC 60079-7:2006 Ed. 4
Terminals	IECEx ULD 05.0008 U[1]	IEC 60079-0:2004 Ed. 4 IEC 60079-7:2001 Ed. 3

[1] No applicable technical differences
[2] Technical differences evaluated and found satisfactory

CONDITIONS OF CERTIFICATION: YES as shown below:

1. The gas sensor types IDS0001 resp. IDS0002 resp. IDS0011 resp. IDS0012 and gas sensing heads type ITR 0001 resp. ITR0002 resp. ISH0001 resp. ISH 0002 are usable for an ambient temperature range of -40 °C up to +65 °C.
2. The gas sensing heads type ITR 0010 resp. type ISH 0010 are usable for an ambient temperature range of -40 °C up to +60 °C.
3. The gas sensor types IDS 0001 and IDS 0002 (NPT thread) shall be connected to enclosures type of protection flameproof "d" whose internal free volume does not exceed 2 litres and whose reference pressure does not exceed 20 bar. The mechanical strength of the assembly as well as the flameproof properties of the connecting NPT thread shall be verified by the type test of the enclosure to which the sensor is attached.
4. The gas sensor types IDS 0011 und IDS 0012 (metric thread) are suitable for mounting to enclosures of type of protection increased safety "e". The mechanical strength and the IP 6X grade of protection of the assembly shall be verified by the type test of the enclosure to which the sensor is attached.
5. The clearances and creepage distances shall comply with the requirements of 4.3 (Table 1) and 4.4 of IEC 60079-7. The wiring and the connection of the wires of the sensor shall be performed according to 4.5, 4.7.2 and 4.8 of IEC 60079-7 mechanical protected and corresponding to the temperature resistance of the wire.
6. The threaded joint between the gas sensor and enclosure shall be properly mounted and protected against unintended loosing.
7. After assembly, the sensor housing shall be connected to potential ground of the enclosure in an electrostatically conductive manner (contact resistance < 10^6 Ohm). If equipotential bonding is necessary, it shall be provided by the assembly.

IECEx Certificate of Conformity

Certificate No.: IECEx BVS 05.0011X

Date of Issue: **2016-04-06** Issue No.: **3**

EQUIPMENT(continued):

Parameters

1. Supply of the gas sensors and gas sensing heads

Voltage	up to	30	V
Power	up to	2	W

2. Supply of the gas sensors and gas sensing heads

Ambient temperature range for gas sensor types IDS 0001, IDS 0002, IDS 0011 and IDS 0012 as well as gas sensing heads types ITR 0001, ITR 0002, ISH 0001 and ISH 0002 -40 °C to +65 °C

Ambient temperature range for gas sensing heads type ITR 0010 and type ISH 0010 -40 °C to +60 °C

Gas sensor types IDS 0001, IDS 0011, IDS 0002 and IDS 0012:
Maximum temperature of cast resin at maximum allowed power and ambient temperature 75 °C
Maximum temperature of supply leads at maximum allowed power and ambient temperature 70 °C

IECEx Certificate of Conformity

Certificate No.: IECEx BVS 05.0011X

Date of Issue: **2016-04-06** Issue No.: **3**

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DETAILS OF CERTIFICATE CHANGES (for issues 1 and above):

- The updating of the applicable standards.
- Added types ITR 0010 and ISH 0010 with separately tested and certified flameproof enclosure IECEx CES 15.0012U.

Annex: BVS_05_0011X_Dräger_Annex_issue_3.pdf

IECEx Certificate of Conformity

Certificate No.: **IECEx BVS 05.0011 X issue No.: 3**
Annex
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Subject and type

Gas sensors type IDS 00**

1	: measuring value in mA
2	: measuring value in mV
0	: Variant flameproof enclosure with 3/4“ NPT thread
1	: Variant flameproof enclosure with M25 thread

Gas sensings head type I** 00**

01	: Bartec housing in type of protection increased safety
02	: Hawke housing in type of protection increased safety
10	: Cortem housing in type of protection flameproof enclosure
SH	: measuring value in mV
TR	: measuring value in mA

UL - Approval

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Gas and Vapor Detection Equipment Classified for Use in Hazardous Locations

See General Information for Gas and Vapor Detection Equipment Classified for Use in Hazardous Locations

DRAGER SAFETY AG & CO KGAA E180059
REVALSTRASSE 1
23560 LUEBECK, GERMANY

Class I, Groups A, B, C and D; Class II, Groups E, F and G.

Gas monitors, Models P3S (Polytron 3000), P3U (Polytron 7000). Intrinsically safe when installed in accordance with Draeger Control Drawing SE20105.

Model MiniWarn. Intrinisically safe when used with Drager battery pack, Part Nos. 6408180, 6408120, 6408133, 6408116 and optionally with MiniWarn pump, Part No. 6408112. The monitor is not for use with an oxygen enriched atmosphere.

Gas sensors , Models IDS0001 and IDS0002.

Handheld gas detectors , Models Pac 1000, Pac 3000, Pac 5000, Pac 7000, intrinsically safe when used with one of the following Lithium batteries: Panasonic Part No. CR123A, Energizer Part No. EL123 or EL123A, Varta/Powerone Part No. CR123A or Duracell Part No. 123 or 123 Photo.

Handheld gas detector , Model LQG 00xx Series, intrinsically safe when used with manufacturer\'s battery pack designated ABT 00xx (provided with one of the following battery types: GP Type 180AAHC-NiMH, Energizer Type E91-LR6 or ANZI-15A, Energizer Type EN91-LR6 or ANZI-15A, Varta Type 4106 PowerOne LR6 or ANZI-15A) or manufacturer\'s rechargeable battery pack designated HBT 00xx.

Class I, Groups A, B, C, and D; Class II, Groups F and G.

Portable gas analyzer, Model Micropac. Intrinsically safe when used with one self contained Lithium size "AA" battery manufactured by Sonnenschein Part No. SL760 or Tadaran Part No. TL760. The battery is nonuser replaceable.

Class I, Groups A, B, C and D.

Gas analyzer, Model CMS. Intrinsically safe when used with four 1.5V size AA alkaline batteries.

Gas monitor, Model Multiwarn II. Intrinsically safe when used with Drager battery pack, Part No. 6408240, 8313353, 8315485 or 8315505. The monitor is not for use in an oxygen enriched atmosphere.

Gas monitor , Model X-am 7000. Intrinsically safe when used with Draeger X-am 7000 NiMH, 4.8V, 3Ah or 6Ah battery packs or Draeger X-am 7000 Alkaline, 6V battery pack. The monitor is not for use in an oxygen enriched atmosphere.

Portable combustible gas and oxygen deficiency detector, Model Pac Ex 2, intrinsically safe when used with manufacturer's rechargeable battery pack, Part No. 8316112 or alkaline pack, Part No. 8316111, containing four Duracell Part No. MN2400 or Energizer Part No. E92, Size AAA cells.

Portable pump for combustible gas and oxygen deficiency detector, Model Pac Ex2 Pump, intrinsically safe when used three Duracell MN2400 or Energizer E92 AAA alkaline batteries.

Portable combustible gas, oxygen deficiency and toxic gas detector , Model X-am-3000, intrinsically safe when used with manufacturer's rechargeable battery pack, Part Nos. 4543582 or 8317709, or alkaline pack, Part Nos. 4543583 or 8317716 containing four Duracell Part No. MN1500 or Energizer Part No. E91, Size AA, Type LR6, 1.5 V alkaline cells.

Last Updated on 2006-03-28

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Gas and Vapor Detection Equipment Classified for Use in Hazardous Locations Certified for Canada

See General Information for Gas and Vapor Detection Equipment Classified for Use in Hazardous Locations Certified for Canada

DRAGER SAFETY AG & CO KGAA E180059
REVALSTRASSE 1
23560 LUEBECK, GERMANY

Class I, Groups A, B, C and D; Class II, Groups F and G.

Portable gas analyzer, Model Micropac. Intrinsically safe when used with one self contained Lithium size "AA" battery manufactured by Sonnenschein Part No. SL760 or Tadaran Part No. TL 760. The battery is nonuser replaceable.

Class I, Groups A, B, C and D; Class II, Groups E, F and G.

Gas sensors , Models IDS0001 and IDS0002.

Handheld Gas Detectors , Models Pac 1000, Pac 3000, Pac 5000, Pac 7000, intrinsically safe when used with one of the following Lithium batteries: Panasonic Part No. CR123A, Energizer Part No. EL123 or EL123A, Varta/Powerone Part No. CR123A, or Duracell Part No. 123 or 123 Photo.

Class I, Groups A, B, C and D.

Gas analyzer, Model CMS. Intrinsically safe when used with four 1.5V size AA alkaline batteries.

Classification Marking: Classified by Underwriters Laboratories Inc., as to fire, electrical shock and explosion hazards only.

Last Updated on 2006-03-28

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CSA - Approval

CSA INTERNATIONAL

Certificate of Compliance

Certificate: 1727857 (LR 97594) **Master Contract:** 160220

Project: 1727857 **Date Issued:** 2006/02/10

Issued to: **Draeger Canada Limited**
7555 Danbro Cres
Mississauga, ON L5N 6P9
Canada
Attention: Mr. Sasha Vuksanov

The products listed below are eligible to bear the CSA Mark shown

Issued by: Mr. Glenn Black

Glenn Black

Authorized by: Patricia Pasemko, Operations Manager

Patricia Pasem P.)

PRODUCTS

CLASS 4828 01 - SIGNAL APPLIANCES - - Combustible Gas Detection Instruments-For Hazardous Locations

Class I, Groups A, B, C and D:

Model IDS0001, input rated 10 to 30 V dc, 2 W, output rated 4-20 mA . May be used with splash guard p/n 68 10 796 and calibration adapter p/n 68 10 859

Model IDS0002, input rated 2 to 5 V dc, 1 W, output mv (Pellistor Mimic) electronics. Must be used with Draeger Regard Controller SE Ex channel card. May be used with splash guard p/n 68 10 796 and calibration adapter p/n 68 10 859.

DQD 507 Rev. 2004-06-30

CSA INTERNATIONAL

Certificate:	1727857 (LR 97594)	**Master Contract:**	160220
Project:	1727857	**Date Issued:**	2006/02/10

APPLICABLE REQUIREMENTS

CSA Std C22.2 No. 30-M1986 - Explosion-Proof Enclosures for Use in Class I Hazardous Locations

CSA Std C22.2 No.152-M1984 - Combustible Gas Detection Instruments

CSA Std C22.2 No.157-92 - Intrinsically Safe and Non-Incendive Equipment for Use in Hazardous Locations

CSA Std C22.2 No.142-M1987 -Process Control Equipment

MARKINGS

- CSA Monogram;
- Submittor Identification;
- Model Number;
- Serial Number, Date Code or Month and Year of Manufacture;
- Hazardous locations designation;
- Electrical rating;
- Read Manual;
- Wording regarding for use in ambient temperatures of -40°C to +65°C;
- The words "Leads factory sealed ";

DQD 507 Rev. 2004-06-30

CSA INTERNATIONAL

Supplement to Certificate of Compliance

Certificate: 1727857 **Master Contract:** 160220

The products listed, including the latest revision described below, are eligible to be marked in accordance with the referenced Certificate.

Product Certification History

Project	Date	Description
1727857	2006/02/10	Original Certification

Declaration of Conformity

CE

EU-Konformitätserklärung
EU-Declaration of Conformity

Dräger

Dokument Nr. / *Document No.* SE20435-05

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

Gassensor Typ IDS 00*1 (PIR 3000),
Gasmesstransmitter Typ ITR 00 (PIR 3000 complete set)**
Gassensor Typ IDS 00*2 (DrägerSensor IR)
Gasmesskopf Typ ISH 00 (DrägerSensor IR complete set)**

*Gas Sensor type IDS 00*1 (PIR 3000)*
*Gas Detection Transmitter type ITR 00** (PIR 3000 complete set)*
*Gas Sensor type IDS 00*2 (DrägerSensor IR)*
*Gas Detection Head type ISH 00** (DrägerSensor IR complete set)*

mit der EG-Baumusterprüfbescheinigung / Expertise
is in conformity with the EC-Type Examination Certificate / Expertise
BVS 05 ATEX E 143 X
DNV GL 11480-14 HH

ausgestellt von der notifizierten Stelle mit der Kenn-Nr.
issued by the Notified Body with Identification No.
DEKRA EXAM GmbH
Dinnendahlstraße 9
D-44809 Bochum
0158
DNV GL 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 60079-0:2012+A11:2013, EN 60079-1:2014, EN 60079-7:2015, EN 60079-31:2014, EN 60079-29-1:2007, EN 50271:2010
96/98/EC [1] **2014/90/EU** [2] **2015/559/EU**	**Schiffsausrüstungs-Richtlinie** *Marine Equipment Directive*	EN 60079-0:2012+A11:2013 , EN 60079-29-1:2007, IEC 60092-504:2001+Cor.1:2011, IEC 60533:1999
2014/30/EU	**EMV-Richtlinie** *EMC Directive*	EN 50270:2006 (type 2)

[1] gültig bis / valid to 2016-09-17, [2] gültig ab / valid from 2016-09-18

Überwachung der Qualitätssicherung Produktion durch
Surveillance of Quality Assurance Production by
DEKRA EXAM GmbH
Dinnendahlstraße 9
D-44809 Bochum
0158
DNV GL SE
Brooktorkai 18
D-20457 Hamburg
0098

Lübeck, 2016-07-07

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

i.V.

Ingo Pooch
Head of
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Safety Products
Connect & Develop

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