Dräger Polytron® 8000 Series

Explosion proof instrument (Ex d) Instrument for increased safety (Ex e)

Technical Manual

⚠ **WARNING**
To properly use this product, read and comply with these instructions for use.

Dräger. Technology for Life®

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Contents

1 Introduction

This document is a supplement to the instructions for use for the following gas detectors:

- Polytron® 8100 EC
- Polytron® 8200 CAT
- Polytron® 8310 IR
- Polytron® 87x0 IR
- Polytron® 8700 IR
- Polytron® 8720 IR

1.1 Target group

This manual is intended for experts who are specialized in plant design, certified electricians, or persons instructed by certified electricians who are also familiar with the applicable standards.

2 Safety-related information

Before using this product, carefully read the associated instructions for use. This document does not replace the instructions for use.

2.1 Safety statements

- Before using this product, carefully read these Instructions for Use and those of the associated products.
- Strictly follow the instruction for use. The user must fully understand and strictly observe the instructions. Use the product only for the purposes and under the conditions specified in this document.
- Comply with all local and national laws, rules, and regulations associated with this product.
- Only trained and competent personnel are permitted to inspect, repair and service the product as detailed in these instructions for use. Further maintenance work that is not detailed in these instructions for use must only be carried out by Dräger or personnel qualified by Dräger.
- Dräger recommends a Dräger service contract for all maintenance activities and that all repairs are carried out by Dräger.
- Use only genuine Dräger spare parts and accessories. Otherwise the proper functioning of the product may be impaired.
- Do not dispose of the Instructions for Use. Ensure that they are retained and appropriately used by the product user.
- Only trained and competent users are permitted to use this product.
- Maintenance must be performed as described, see 11 Maintenance.
- Only operate the product within the framework of a risk-based alarm signaling concept.
- Before connecting this instrument to electrical devices not mentioned in the IFU consult Dräger
- Notify Dräger in the event of any component fault or failure.
- The instruments or components may not be modified in any manner.
- The use of faulty or incomplete parts is forbidden.
- The appropriate regulations must be observed at all times when carrying out repairs on these instruments or components.
- Follow the directions of EN 60079-29-2 for the measurement of flammable gases and oxygen.
- Follow the directions of EN 45544-4 for the measurement of toxic gases.

Polytron® 8100 EC-specific:

- **WARNING**: Risk of ignition of flammable or explosive atmospheres! Substitution of components may impair Intrinsic Safety.

2.2 Operating area and conditions

- For SIL applications observe the Polytron® 8xx0 Safety Manual.
- When exposed to a directed flow of air mixed with gas, the measured values can be increased. See the corresponding sensor data sheet for deviation values.

– Observe the specifications and restrictions in the Instructions for Use and/ or data sheets for the sensors.
– **CAUTION** Risk of ignition of flammable or explosive atmospheres! Not tested in oxygen enriched atmospheres (>21% O_2).
– **Using the product in areas subject to explosion hazards:** Instruments or components for use in explosion-hazard areas which have been tested and approved according to national, European or international Explosion Protection Regulations may only be used under the conditions specified in the approval and with consideration of the relevant legal regulations.

Hazardous areas classified by divisions:

– The device is intended to be used in hazardous areas Class I, Div. 1 or Div. 2, where gases of groups A, B, C, D and temperature class T4 or T6 may be present. Temperature classes depend on the maximum ambient temperature. The device must not be operated within ambient temperatures outside the temperature range marked on the device.
– The device is intended to be used in hazardous areas Class II, Div. 1 or Div. 2, where dusts of groups E, F, G may be present. The device must not be operated within ambient temperatures outside the temperature range marked on the device.

Hazardous areas classified by zones:

– The device is intended to be used in hazardous areas classified Zone 1 or Zone 2 where gases of explosion groups IIA, IIB or IIC and temperature class T4 or T6 may be present. Temperature classes depend on the maximum ambient temperature. The device must not be operated within ambient temperatures outside the temperature range marked on the device.
– The device is intended to be used in hazardous areas classified Zone 21 or Zone 22 where dusts of explosion Groups IIIA, IIIB or IIIC and dust temperatures of T80°C or T130°C (T135°C for Polytron® 5100 EC and Polytron® 8100 EC) may be present. Dust temperatures depend on the maximum ambient temperature. The device must not be operated within ambient temperatures outside the temperature range marked on the device.

2.3 Mechanical installation

– Strict compliance must be given to the local, state, national codes and regulations that govern the installation of gas monitoring equipment.
– The physical data of the gas or vapor to be detected and the specifics of the application, (e.g. possible leaks, air movement/draft, etc.) must be taken into account.
– The future use of accessories and maintenance equipment must be kept in mind.
– The access of the gas or vapor to the sensor must not be obstructed.
– The instrument must not be exposed to radiant heat that will cause the temperature to rise beyond the limits stated in 17.6 Environmental parameters. The use of a reflecting shield is recommended.

- The instrument may be equipped with a dust plug at the conduit entry. This plug is not explosion proof nor meant to be watertight, and must be removed before connecting the instrument to a sealed conduit or installation of a flameproof cable gland.
- Unused openings must be closed with a plug. For correct tightening torques of conduit hubs, cable glands, plugs and sensor see 17.7 Tightening torque.
- For non-conduit installations, an approved cable gland must be used (e.g. Hawke A501/421/A/¾" NPT or equivalent)
- **WARNING:** Only for conduit installations: To reduce the risk of Ignition of Hazardous Atmospheres, the conduit must be sealed within 45 cm (18") of the enclosure.
- The flameproof / explosion proof joints are not in accordance with the relevant minimum or maximum values of EN/IEC 60079-1. The joints are not intended to be re-worked by the user.
  To increase the safety of the instrument, the values are designed to be safer than specified in EN/IEC 60079-1. E. g. the width of the flameproof joint is longer than the required minimum values and the gap of the flameproof joint is smaller than the required maximum values.

Polytron® 8100 EC-specific:

- Recommended sensor orientation: downwards (As shown in figures C and E on the fold-out page).

Polytron® 8200 CAT-specific:

- Preferred orientation of the sensor: downwards. If the sensor inlet is secure from mechanical damage, dirt and water ingress, any other orientation is permissible.
- For CSA-conform operations only:
  The use of the optional splash guard (6812510) is mandatory to comply with CSA approvals.

Polytron® 87x0 IR-specific:

- Preferred orientation of the Dräger PIR 7x00 sensor must be observed (See figure F on the fold-out page). Larger deviations and the use of the pre-installed splash guard will increase the response time (see Instructions for Use for PIR 7x00).
- Any other orientation is only permissible if the PIR 7x00 is used without splash guard, e.g. for applications in ducts. If installed in a duct, there is an increased risk of deposits building up on the optical surfaces.
- The use of the pre-installed splash guard is recommended to protect the sensor from water and dust.
- If the pre-installed splash guard (part number 6811911 or 6811912) is used, it must be ensured that the status indicator lights are in a vertical line and the Dräger logo of the splash guard must be horizontal. A maximum deviation of ±10 degree from the horizontal position is permissible.
- Liquids and/or build up of deposits on the optical surfaces of the PIR 7x00 may result in a warning or fault.
- For the explosion proof version it is recommended to use a spacer (part number 6812617) when the instrument is mounted on a wall or to a level structure.

2.4 Electrical installation

- Strict compliance must be given to the electrical codes that govern the routing and connection of electrical power and signal cables to gas monitoring equipment.
- Ferrules must be used.
- The conductors for the power supply must have an adequately low resistance to ensure the correct supply voltage at the instrument.
- Wire insulation must be stripped by 5 to 7mm.
- Secondary circuit intended to be supplied from an isolating source (N/A for relay circuits).
- When installed at locations exceeding ambient temperatures of 55 °C, use only appropriate wiring, specified for at least 25 °C above the maximum ambient temperature.
- The device variants incorporating a FISCO fieldbus interface as well as the Gas Detection Transmitters type ETR 02…5** must be supplied by circuits that are limited to overvoltage category I/II/III in accordance with IEC 60664 1.

Analog interface

- To ensure proper operation of the instrument, the impedance of the 4 to 20 mA signal loop must not exceed 500 Ohms. Depending on the operating voltage and according to the application (e. g. HART® operation), certain minimum impedances must be observed 17.2 Signal transmission to control unit.

Relay option

- At voltages >30 V AC or >42.4 V DC, the relay cables must be enclosed in protective tubing, or double-insulated cables must be used.
- The wiring for the optional relay module must be selected and fused according to the rated voltages, currents and environmental conditions.
- To ensure that a fault is recognized - without having to look at the instrument - an alarm device must be connected to the fault relay.
- Voltage differences can cause insulation faults. Do not mix electric loads with different voltage types (AC or DC). Using DC loads, ensure that relay contacts only control devices with the same DC voltage rating. Using AC loads, ensure that relay contacts are only connected to devices sharing a common phase.

2.5 Commissioning

- Ensure wiring for relays and connections for sensor are made before applying power.
- Before leaving the instrument for normal operation, check the configuration and calibration for the proper settings.

For safe operation according to BVS 13 ATEX G 001 X and PFG 14 G 001 X the instrument must remain in default alarm settings as listed below.

- The relays must be set to ***Normally energ.*** and the A2 alarm (main alarm) must be set to ***Latching*** and ***Non-acknowledgeable*** or ***Pre-Acknowledgeable***.
- The A1 alarm (pre alarm) may only be set to ***Acknowledgeable*** when it is used for triggering an acoustic alarm device.

2.5.1 Calibration

- For proper operation, never adjust the span before completing zero adjustment. Performing these operations out of order will cause the calibration to be faulty.
- If the intended operation is at high altitudes, the reading will be lower than the reading at sea level (reduced partial pressure). A new span calibration is recommended if the altitude or the ambient pressure is changed. The factory calibration is set to sea level.
- Dräger recommends calibrating instruments with target gas. This method is more accurate than a surrogate gas calibration. A surrogate gas calibration may only be performed as an alternative if a target gas calibration is not possible.
- Methane and hydrogen should be calibrated with target gas only and not calibrated with a surrogate gas.

For Polytron® 8310 IR:

- The user must also read the Instructions for Use for DrägerSensor IR, part number 9023981

2.6 During operation

- After modifying parameters with the PolySoft PC software or another software, verify all parameters by downloading from the instrument or by checking them on the Polytron® 8xx0.
- IP ratings do not imply that the equipment detects gas during and after exposure to those conditions. In case of dust deposits and submersion/jet water, check the calibration and the proper functioning of the device.

Risk of ignition of flammable or explosive atmospheres!

- **CAUTION:** High off scale readings may indicate an explosive concentration. (Only for instruments measuring combustible atmospheres.)
- **WARNING:** Do not open when energized

Polytron® 8100 EC-specific:

Response time t20 can exceed the limits of EN 50104 for small concentration changes.

2.6.1 Maintenance

- The maintenance intervals must be established for each individual installation. Depending on safety considerations and application specific conditions the instrument is used in, these might need to be shortened.
- Refer to the maintenance section in the transmitter instructions for use.

3 Conventions in this document

3.1 Meaning of the warnings

The following warnings are used in this document to alert the user to potential dangers. A definition of the meaning of each warning is as follows:

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

3.2 Typographical conventions

Text Texts in bold type identifies labels on the device and screen texts.

► This triangle indicates the possibilities for avoiding the hazard in warnings.

> The greater-than sign indicates a navigation path in a menu.

This symbol indicates information that facilitates the use of the product.

3.3 Trademarks

Trademark	Trademark owner
Polytron®	Dräger
DrägerSensor®	Dräger
PROFIBUS®	PROFIBUS Nutzerorganisation e. V.
HART®	HART Communication Foundation
FOUNDATION™	Fieldbus Foundation

The following webpage lists the countries in which Dräger's trademarks are registered: www.draeger.com/trademarks.

4 Description

4.1 Product overview explosion proof instrument (Ex d)

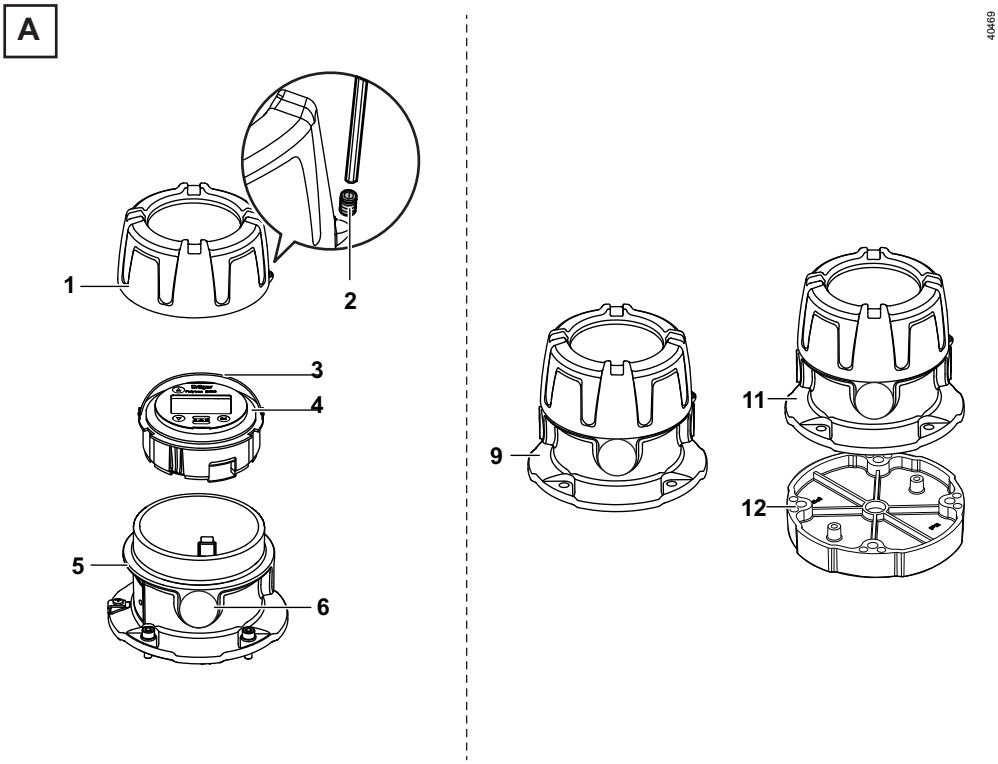


Fig. 1 Product overview of the explosion proof instrument, no sensor attached

A 1	Enclosure lid
A 2	Set screw (2 mm Allen screw)
A 3	Handle
A 4	PCB unit (and optional relay)
A 5	Enclosure bottom
A 6	Port for Sensor
A 9	Explosion proof instrument
A 11	Explosion proof instrument to be extended with mounting spacer for Polytron® 87x0 IR
A 12	Mounting spacer (only Polytron® 87x0 IR)

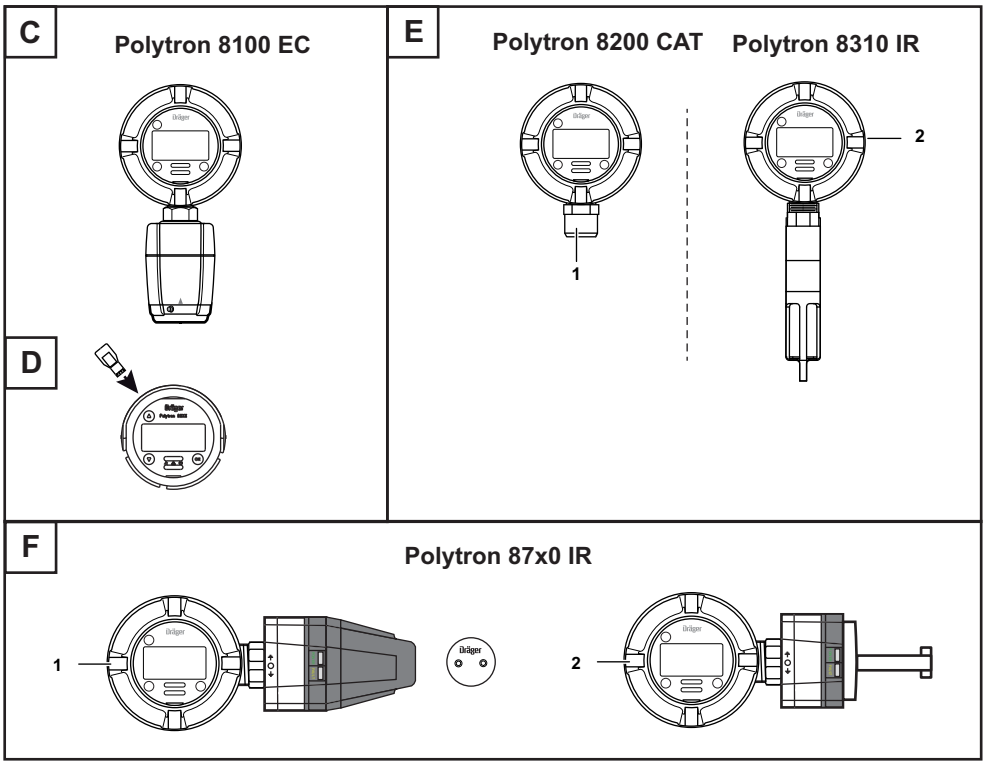


Fig. 2 Polytron® 8xx0 versions

C	Polytron® 8100 EC
D	Sensor dongle connection (only Polytron® 8100 EC)
E 1	Polytron® 8200 CAT
E 2	Polytron® 8310 IR
F 1	Polytron® 87x0 IR with splash guard
F 2	Polytron® 87x0 IR without splash guard

4.2 Feature description

Polytron® 8xx0 instruments are housed in a rugged stainless steel or aluminum enclosure for indoor and outdoor applications.

There are 3 main versions of the Polytron® 8xx0 family:

– Polytron® 8100 EC is intended for electrochemical sensors (EC sensors).
– Polytron® 8200 CAT / Polytron® 8310 IR is intended for catalytic Ex sensors (CatEx sensors) and infrared Ex sensors (IREx sensors).
– Polytron® 87x0 IR is intended for PIR 7x00 sensors.

Gas concentrations, status messages, and menu choices are displayed on a backlit graphic LC-display and 3 colored LEDs.

With the non-relay version the red LED flashes to inform visually and no relay is energized. To energize the A1 or A2 relay the optional relay board must be installed.

Navigation through the menu is done by taping a magnetic wand on the glass at the appropriate indicator. The instrument can be configured, calibrated and maintained non-intrusively without declassifying the area.

The instrument can be operated as current source or sink.

There are more Polytron® 8xx0 versions that are not covered by this manual. For information see the corresponding transmitter documentation:

– Polytron® 8900 UGLD is intended for ultrasonic sensors
– Combination of Pulsar 7000 and Polytron® 8000

4.3 Configuration possibilities

4.3.1 Interfaces

- 4 to 20 mA analog (per NAMUR recommendation NE43)
- Relay board
- Digital HART® output signal
- Foundation™ Fieldbus[1)]
- PROFIBUS® PA[1)]
- Modbus RTU[1)]

4.3.2 Software Dongles

The following software dongles are available for the Polytron® 8100 EC:

Sensor test dongle 83 17 619	Activates the sensor self-test(only for certain sensors)
Diagnostic dongle 83 17 860	Activates the sensor self-test, the display of the sensor vitality and the sensor diagnostic functions (only for certain sensors and functions)

4.3.3 Explosion protection

The Polytron® 8xx0 instruments are available in 2 explosion protection types.

- Explosion proof instrument (Ex d)
  The flameproof / explosion proof enclosure provides three ¾" NPT openings, which can be used for field wiring, direct attachment of a sensor or wiring of a remote sensor.
- Instrument for increased safety (Ex e)
  The instrument is extended by an increased safety terminal box (docking station) that provides up to four 20 mm openings, which can be used for field wiring or wiring of a remote sensor. The permissible cable diameter range is 7 to 12 mm.

This manual covers explosion protection type explosion proof (Ex d).

1) Using the fieldbus interface no relays are available. The fieldbus interface is not in accordance with the BVS 13 ATEX G 001 X.

4.4 Intended use

The instruments of the Polytron® 8xx0 family are intended for continuous monitoring of the ambient air.

With the optionally integrated relay module, the instrument can be operated without a control unit (with additional local alarm signaling).

With a sealed conduit or approved cable gland, the instrument can be connected to a Dräger control unit or a Programmable Logic Controller (PLC).

If the 4 - 20 mA interface is used, the current between 0 and 3.5 mA must be monitored. Currents between 0 and 3.5 mA can indicate a special state.

The instrument is designed to be installed in permanent locations and is approved for use in hazardous, classified areas.

Polytron® 8100 EC-specific:

– Polytron® 8100 EC is a combined intrinsically safe / explosion proof instrument for continuous monitoring of toxic gases or oxygen in the ambient air.

Polytron® 8200 CAT-specific:

– Polytron® 8200 CAT with catalytic DrägerSensor DQ or LC is an explosion proof instrument for the continuous monitoring of combustible gases and vapors containing hydrocarbons and non-hydrocarbons (e.g. hydrogen or ammonia) in ambient air.

Polytron® 8310 IR-specific:

– Polytron® 8310 IR with infrared DrägerSensor IR is an explosion proof instrument for the continuous monitoring of combustible gases and vapors containing hydrocarbons in ambient air.

Polytron® 87x0 IR-specific:

– Polytron® 8700 IR with PIR 7000 is an explosion proof instrument for the continuous monitoring of combustible gases and vapors containing hydrocarbons.
– Polytron® 8720 IR with PIR 7200 is an explosion proof instrument for the continuous monitoring of carbon dioxide.

4.5 Approvals

4.5.1 ATEX, IECEx, UL, CSA

See the following sample of an approval label. There is also a printout of the approval label inside the shipping box of the instrument.

4.5.2 Marking

The marking is reproduced on a separate piece of paper shipped with the instrument.

Serial Number key: The third letter of the serial number specifies the manufacturing year: M = 2019, N = 2020, P = 2021, R = 2022, S = 2023, T = 2024, U = 2025, W = 2026, X = 2027, Y = 2028, Z = 2029, etc. (Letters G, I, O, Q are omitted)

Example: Serial Number ARMB-0001: the third letter is M, which means that the unit was manufactured in 2019.

5 Installation

5.1 Mechanical installation

The instrument can be mounted for measuring gases in ambient air or inside of a duct/pipe.

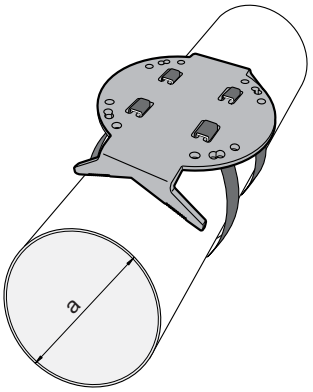
1. Use M6 (1/4’’) bolts with hex socket caps to mount the enclosure to one of the following options.

Option	Accessory
Mounting on a flat surface	Drilling template: 4544299 Additionally for Polytron® 87x0 IR: Spacer 6812617
Mounting on a pole	Pole mount kit: 4544198
Mounting on a duct/pipe	Duct mount kit: 6812725 For Polytron® 87x0 IR:: 6812300

5.1.1 Pole Mount Kit

The enclosure is mounted to the Pole Mount Kit with the included 4 screws, washers, and hexagon nuts.

The clamping rings for fastening the kit to a pole are not included.



a 50 ... 155 mm
2“ ... 6“

5.1.2 Duct Mount Kit

The enclosure is mounted to the Duct Mount Kit with the included 4 screws, washers, and hexagon nuts.

The Duct Mount Kit can be fitted lengthwise or crosswise to the duct.

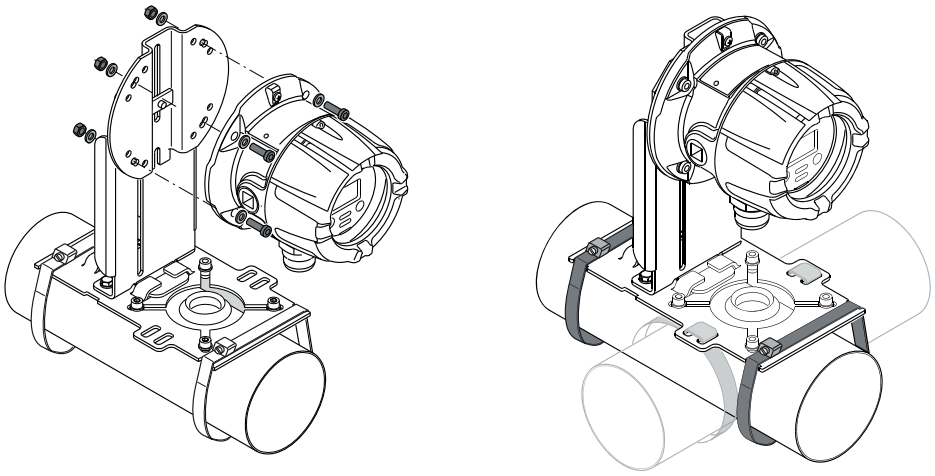
The clamping rings for fastening the Duct Mount Kit are not included.

5.1.2.1 Duct Mount Kit Polytron® 8xx0 except Polytron® 87x0 IR

For installation instructions refer to 9033235.

Dimensions of the duct

– Wall thickness ≤ 4 mm / 0.15’’
– Diameter ≥ 100 mm / 4’’

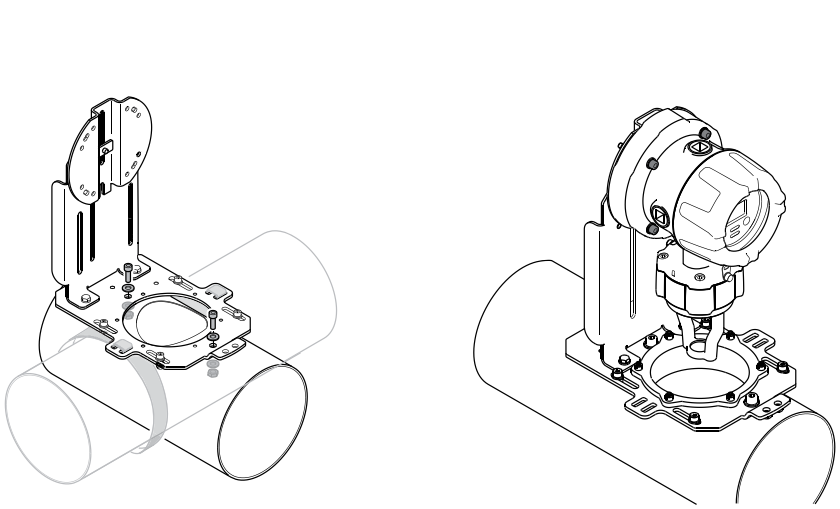


5.1.2.2 Duct Mount Kit Polytron® 87x0 IR

For installation instructions refer to 9033236.

Dimensions of the duct

– Diameter ≥ 200 mm / 8’’
– rectangular cross-section ≥ 170 x 170 mm / 6.7" x 6.7".



5.2 Electrical installation

For recommended tightening torques and admissible wire specifications see 17 Technical data.

5.2.1 Cable lengths Polytron® 8200 CAT

5.2.1.1 Cable lengths of the 4 to 20 mA signal connection

The maximum cable length between instrument and control unit depends on different factors. The following factors are key factors to determine the cable length for a certain application.

- The specifications of the sensor used
- The cable cross-section
- The ambient temperature
- The type of cable
- The operating voltage

The given cable lengths include a 10% safety margin and are valid for 20 °C (68 °F) and 50 °C (122 °F). Further values are available upon request.

Type of cable

The cable lengths are calculated for 2 standardized cables of different quality.

- Tinned copper wire, class 5/6 according to IEC 60228 / VDE 0295
  Characteristic cable resistance: 41 Ohms/km at 20 °C (134514 Ohms/feet at 68 °F)
- Bare copper wire, class 2 according to IEC 60228 / VDE 0295
  Characteristic cable resistance: 36 Ohms/km at 20 °C (118110 Ohms/feet at 68 °F).

5.2.1.2 Cable lengths for 4 to 20 mA signal connection of Polytron® 8200 CAT DQ

Tinned copper wire, class 5/6 according to IEC 60228 / VDE 0295

Values include a safety margin of 10%.

Operating voltage: 24 V

	AWG	**21**	**20**	**18**	**16**	**13**
	mm^2	**0.5**	**0.75**	**1**	**1.5**	**2.5**
122°F 50°C	**feet**	925	1391	1857	2710	4521
	m	282	424	566	826	1378
68°F 20°C	**feet**	1033	1555	2077	3028	5056
	m	315	474	633	923	1541

Bare copper wire, class 2 according to IEC 60228 / VDE 0295

Values include a safety margin of 10%.

Operating voltage: 24 V

	AWG	**21**	**20**	**18**	**16**	**13**
	mm^2	**0.5**	**0.75**	**1**	**1.5**	**2.5**
122°F 50°C	**feet**	1030	1516	2050	3068	5010
	m	314	462	625	935	1527
68°F 20°C	**feet**	1683	1693	2293	3429	5600
	m	513	516	699	1045	1707

5.2.1.3 Cable lengths for 4 to 20 mA signal connection of Polytron® 8200 CAT LC

Tinned copper wire, class 5/6 according to IEC 60228 / VDE 0295

Values include a safety margin of 10%.

Operating voltage: 24 V

	AWG	21	20	18	16	13
	mm²	0.5	0.75	1	1.5	2.5
122°F 50°C	feet	906	1361	1814	2651	4423
	m	276	415	553	808	1348
68°F 20°C	feet	1014	1519	2031	2963	4944
	m	309	463	619	903	1507

Bare copper wire, class 2 according to IEC 60228 / VDE 0295

Values include a safety margin of 10%.

Operating voltage: 24 V

	AWG	21	20	18	16	13
	mm²	0.5	0.75	1	1.5	2.5
122°F 50°C	feet	4902	3002	2008	1483	1007
	m	1494	915	612	452	307
68°F 20°C	feet	1129	1657	2244	3356	5479
	m	344	505	684	1023	1670

5.2.2 Terminal connections 4-20mA / HART® interface and relay

4-20mA / HART® interface

Pin	Mark	Function
1	PWR+	V+
2	PWR-	V-
3	PWR-	V- To be used when the instrument is not powered by the control unit (separate power supply), see wiring figures.
4	4-20mA	4 to 20 mA signal (Operation as source or sink)
5	PE	Protective earth Optional PE for relay connection. Connecting PE together with the 4-20mA analog output may cause ground loops.

5-pin connector for 4-20 mA and HART® connections

Galvanic separation of a separate power supply and analog signal output is not possible (pin 2 and 3 are connected within the 5-pin connector).

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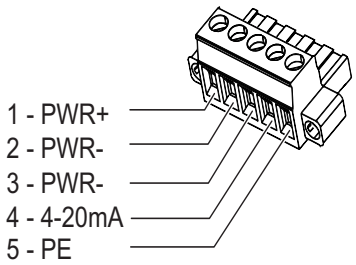
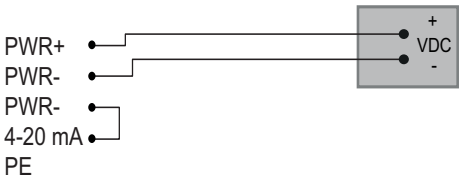
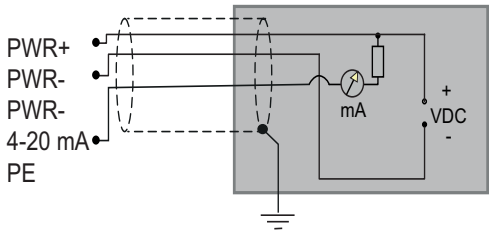


Wiring figures

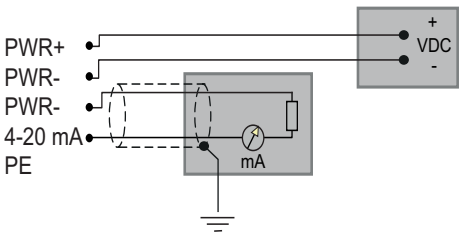
Stand-alone, relay only



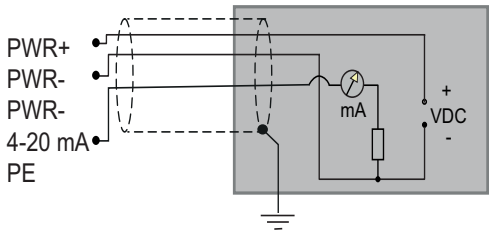
4-20 mA / HART® (Current sink)



4-20 mA / HART® (Separate power)



4-20 mA / HART® (Current source)



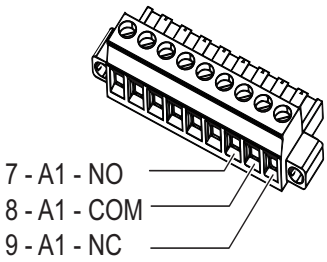
Relay connector

The relay labels (NO, COM, NC) represent the default state (normally energized) of all relays while the instrument is powered.

Pin	Mark		Relay	
1	NO	FLT	Fault	Normally Open
2	COM		Fault	Common
3	NC		Fault	Normally Closed
4	NO	A2	A2	Normally Open
5	COM		A2	Common
6	NC		A2	Normally Closed

Pin	Mark		Relay	
7	NO	A1	A1	Normally Open
8	COM		A1	Common
9	NC		A1	Normally Closed

9-pin connector for relay connections



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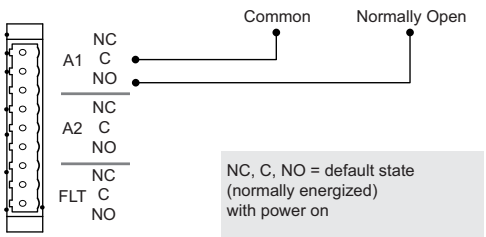
Wiring figure

Relay connector



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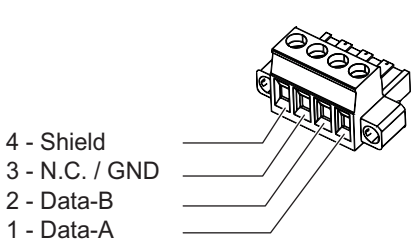
5.2.3 Terminal connections digital interface

Fieldbus interface

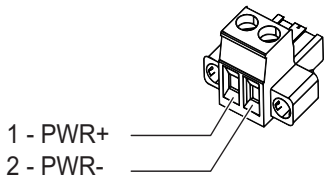
Pin	Mark	Function
1	Data-A	Signal Line A
2	Data-B	Signal Line B
3	GND	Ground
4	SHIELD	Cable Shield

Pin	Mark	Function
1	PWR+	V+
2	PWR-	V-

4-pin connector for digital interface connection

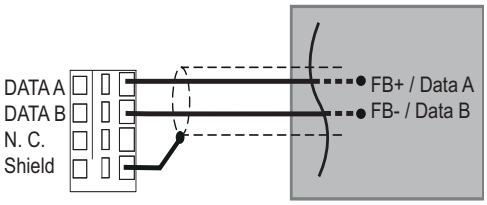


2-pin power supply connector for digital interface versions

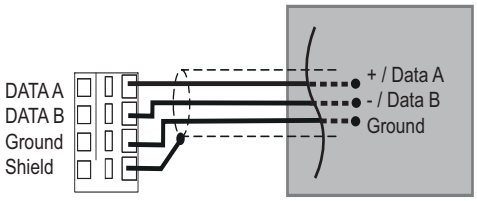


Wiring figures

Foundation™ Fieldbus / PROFIBUS® PA



Modbus RTU



Power supply

5.2.4 Preparing the electrical installation

1. Loosen set-screw (2) and unscrew lid from instrument, see product overview
2. Pull-out the PCB unit.
3. Proceed with the figure corresponding to your Polytron® model and signal output, see terminal connections.

5.2.5 Connecting the instrument as stand-alone

1. Pull off the 5-pin connector.
2. Connect the wires for power to the appropriate terminal, see wiring figures
3. Bridge pin 3 and 4 of the 5-pin connector.
4. Connect the relay wires, see The relay labels (NO, COM, NC) represent the default state (normally energized) of all relays while the instrument is powered.
5. Close the instrument, see 5.2.9 Closing the instrument.

Connecting the relay connector

The wires for alarm devices have to be connected to the 9-pin relay connector. A piece of wire insulation (heat shrink tube) and a rubber boot are included for extra protection of relay wires.

1. Pull off the 9-pin connector.
2. Cut the heat shrink tube as needed and slide over the relay wires before insertion into the 9-pin connector.
3. Position the heat shrink tube at the edge of wire insulation and use a heat gun to shrink the tubing securely onto wire insulation.
4. Slide rubber boot over the wires.
5. Connect the wires for alarm 1 (pre alarm), alarm 2 (main alarm) and fault alarm to the terminals, as indicated in the wiring table.
6. Plug connector back into socket and tighten screws.
7. Close the instrument, see 5.2.9 Closing the instrument.

5.2.6 Connecting the 4-20mA/HART® interface

For connections to a control unit (PLC), refer to the documentation corresponding to the control unit.

1. Pull off the 5-pin connector.
2. Connect the three wires for power and signal to the appropriate terminal as indicated in the wiring table and figure.
3. Plug connector back into socket and tighten screws.
4. Close the instrument, see 5.2.9 Closing the instrument.

5.2.7 Connecting the fieldbus interface

1. Pull off the 2-pin and 4-pin connector.
2. Connect the two wires for power and the four wires for signal to the appropriate terminals as indicated in the wiring table and figure.
3. Plug connector back into socket and tighten screws.
4. Close the instrument, see 5.2.9 Closing the instrument.

For further information regarding the fieldbus interface installation consult the corresponding Technical Handbook.

5.2.8 Grounding

To ground fieldbus and modbus connections refer to the corresponding technical manual.

1. Ground the enclosure of the instrument locally at the grounding lug, see the following figure.
2. Connect the shield of the wires only to the instrument earth ground of the controller (e g. chassis, ground busbar, etc.).

Unless special measures are taken (e. g. capacitive earthing), the shield must only be connected at one end.

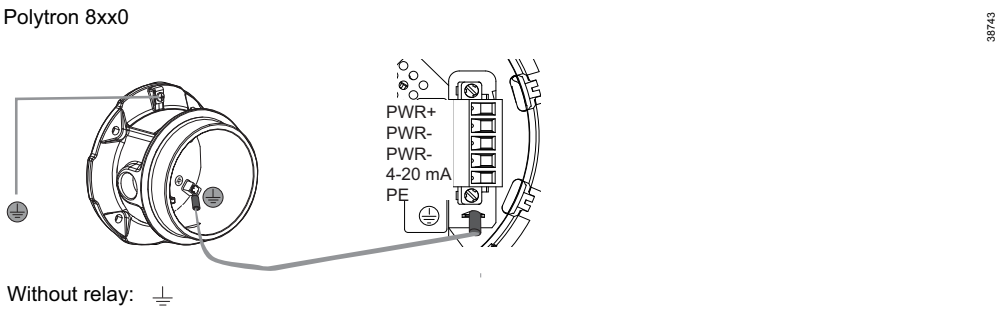


Fig. 3 Grounding the Ex d enclosure and the PCB unit

5.2.9 Closing the instrument

1. Ensure the following connections are properly made:
   a. Wiring screws are tightened to the correct torque.
   b. All cable connectors are secured with screws.
   c. The sensor connector is plugged.
   d. The grounding cable coming from the enclosure is connected to the lug on the PCB unit, Grounding the Ex d enclosure and the PCB unit
2. Place PCB unit back into the enclosure.
3. Screw the lid back on, until it is seated with correct torque, and tighten set-screw.

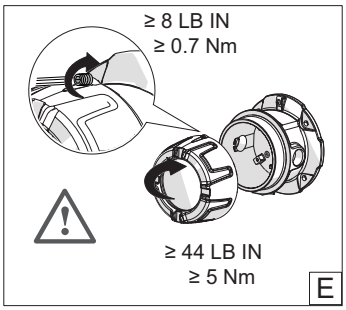


Fig. 4 Closing the Ex d enclosure with correct torques

5.3 Installing EC sensor

Observe the following figure.
This point is only valid for Polytron® 8100 EC

1. If the instrument is already in operation, activate the function to change the sensor (Sensor change function). Otherwise, a fault is displayed when the sensor is deplugged.

2. Loosen set-screw, 2mm Allen screw.
3. Unscrew bayonet ring and remove blank or old sensor.
4. Insert sensor into the opening. The Dräger logo on the sensor must point to the mark on the sensing head housing.
5. Lock sensor with bayonet ring.
6. Tighten set-screw.
   Mandatory for Zone 22 installations.

C

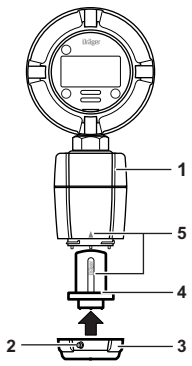


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Fig. 5 Inserting EC sensor

6 Remote sensors

Remote versions with explosion protection "explosion proof (Ex d)"

Transmitter	Sensing head IFU part numbers
Polytron® 8100 EC	EC sensing head remote (9033247)
Polytron® 8200 CAT Polytron® 8310 IR Polytron® 87x0 IR	Junction Box stainless steel or aluminum (4544286)

The cable length shall be ≤ 30 m.

Polytron® 8100 EC

Polytron® 8100 EC is shipped without EC sensor. For remote installations a remote cable is inserted in the EC sensor enclosure of the transmitter. The other end of the cable is then connected to the EC remote sensor enclosure away from the transmitter. The sensor is then installed in the this remote sensor enclosure.

Duct mounting requires additional connection kits.

ℹ Observe control drawing included in annex.

Polytron® 8200 CAT, Polytron® 8310 IR, Polytron® 87x0 IR

Instruments are shipped with installed CAT and IR sensors. For remote installations the sensor must be removed. The sensor is then installed in the Junction Box Ex d away from the transmitter.

The Junction Box Ex d is an explosion-proof sensor enclosure that makes it possible to install the sensor separately from the transmitter. The housing consists of robust stainless steel or aluminum and is suitable for indoor or outdoor applications.

The Junction Box Ex d is suitable for wall, ceiling and duct mounting.

Duct mounting requires additional connection kits.

6.1 Cable lengths Polytron® 8200 CAT

6.1.1 Cable lengths of catalytic remote sensors

The connection between transmitter and remote sensor represents a Wheatstone bridge. One leg of the bridge circuit is enclosed in the sensor enclosure, the other leg is included in the transmitter.

The maximum cable length between remote sensor and transmitter depends on different factors. The following factors are key factors to determine the cable length for a certain application.

– The specifications of the sensor used
– The cable cross-section
– The ambient temperature
– The type of cable

The given cable lengths include a 10% safety margin and are valid for 20 °C (68 °F) and 50 °C (122 °F). Further values are available upon request.

Type of cable

The cable lengths are calculated for 2 standardized cables of different quality.

– Tinned copper wire, class 5/6 according to IEC 60228 / VDE 0295
  Characteristic cable resistance: 41 Ohms/km at 20 °C (134514 Ohms/feet at 68 °F)
– Bare copper wire, class 2 according to IEC 60228 / VDE 0295
  Characteristic cable resistance: 36 Ohms/km at 20 °C (118110 Ohms/feet at 68 °F).

6.1.2 Cable lengths for remote sensor connection of Polytron® 8200 CAT DQ

Tinned copper wire, class 5/6 according to IEC 60228 / VDE 0295

Values include a safety margin of 10%.

	AWG	21	20	18	16	13
	mm^2	0.5	0.75	1	1.5	2.5
122°F	feet	121	184	243	354	590
50°C	m	37	56	74	108	180
68°F	feet	135	203	272	397	663
20°C	m	41	62	83	121	202

Bare copper wire, class 2 according to IEC 60228 / VDE 0295

Values include a safety margin of 10%.

	AWG	21	20	18	16	13
	mm^2	0.5	0.75	1	1.5	2.5
122°F	feet	135	200	269	400	656
50°C	m	41	61	82	122	200
68°F	feet	151	223	302	449	735
20°C	m	46	68	92	137	224

6.1.3 Cable lengths for remote sensor connection of Polytron® 8200 CAT LC

Tinned copper wire, class 5/6 according to IEC 60228 / VDE 0295

Values include a safety margin of 10%.

	AWG	21	20	18	16	13
	mm^2	0.5	0.75	1	1.5	2.5
122°F	feet	43	46	52	63	82
50°C	m	6	8	11	17	28
68°F	feet	43	48	55	64	88
20°C	m	6	9	13	18	31

Bare copper wire, class 2 according to IEC 60228 / VDE 0295

Values include a safety margin of 10%.

	AWG	21	20	18	16	13
	mm²	0.5	0.75	1	1.5	2.5
122°F	feet	43	48	55	66	86
50°C	m	6	9	13	19	30
68°F	feet	45	50	57	70	93
20°C	m	7	10	14	21	34

6.2 Installation of EC remote sensors

6.2.1 Installation

1. Insert the EC sensor in the remote sensor enclosure.
2. Attach the remote sensor enclosure to one of the following options.

Option	
Mounting on a flat surface	Wall Mount Bracket 4544213[1)]
Mounting to a bar or beam	Wall Mount Bracket 4544213[1)]
Mounting in a tube/duct	– Duct adapter 8317617 – Process adapter 8323404

1) Wall Mount Bracket is shipped with the EC remote enclosure.

3. Observe the preferred position of the sensor: downwards.
4. If the wall mount bracket is used, reinstall bayonet ring over the sensor, and turn clockwise until sensor is locked in place.
5. Tighten adjusting screw.

Wall Mount Bracket

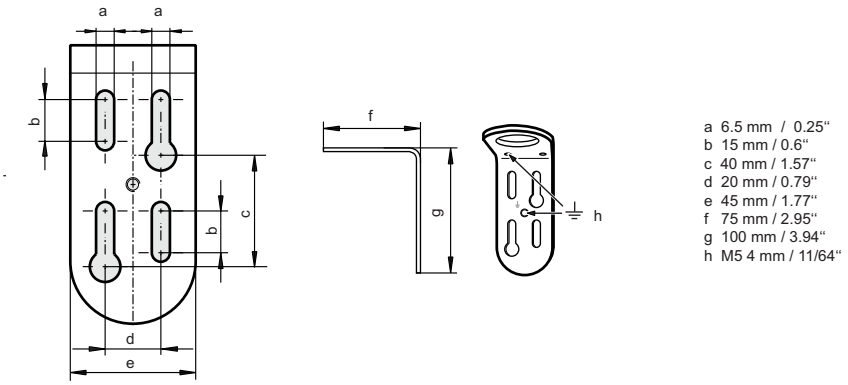


Fig. 6 Dimensions of Wall Mount Bracket

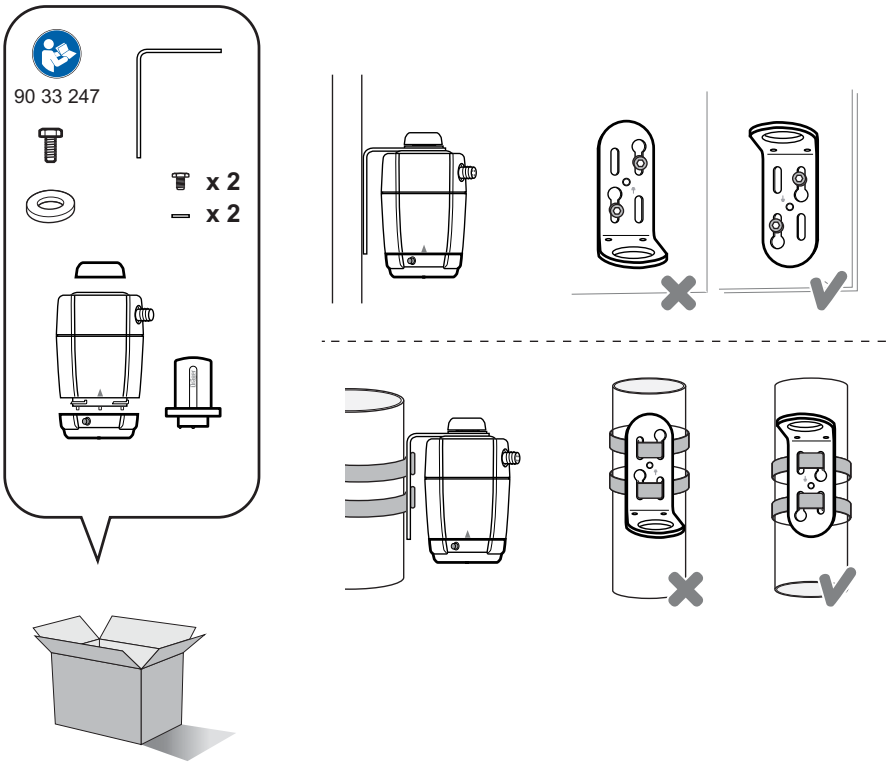


Fig. 7 Overview of Wall Mount Bracket assembly

Duct Adapter

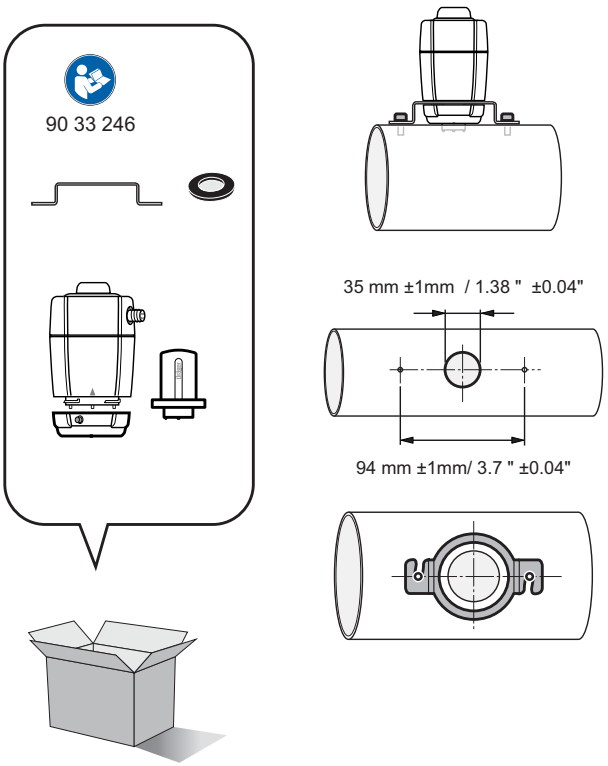
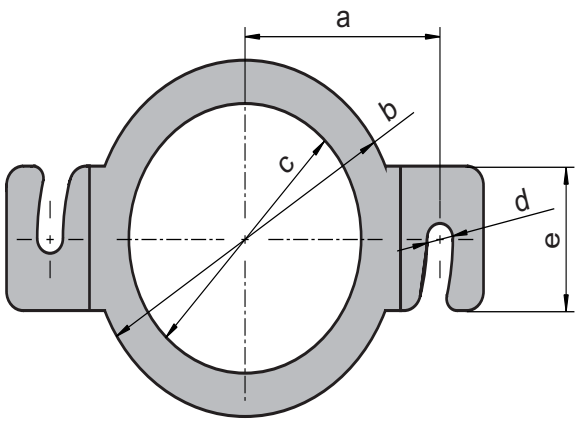


Fig. 8 Overview of Duct Adapter assembly

Bolts are not included. Use M6 (1/4”) bolts to mount the duct adapter.



a 47 mm / 1.85“
b 74 mm / 2.91“
c 56 mm / 2.2“
d 6,2 mm / 0.25“
e 30 mm / 1.18“

Fig. 9 Dimensions of the duct adapter

Process Adapter

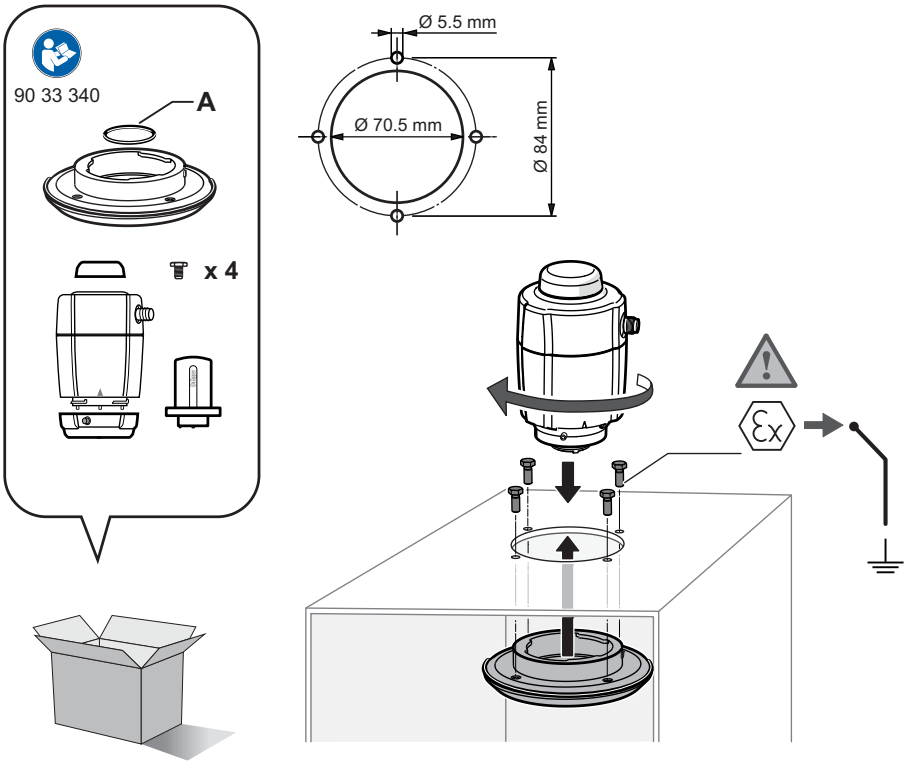


Fig. 10 Overview of Process Adapter assembly

6.2.2 Connecting the EC sensing head to the transmitter

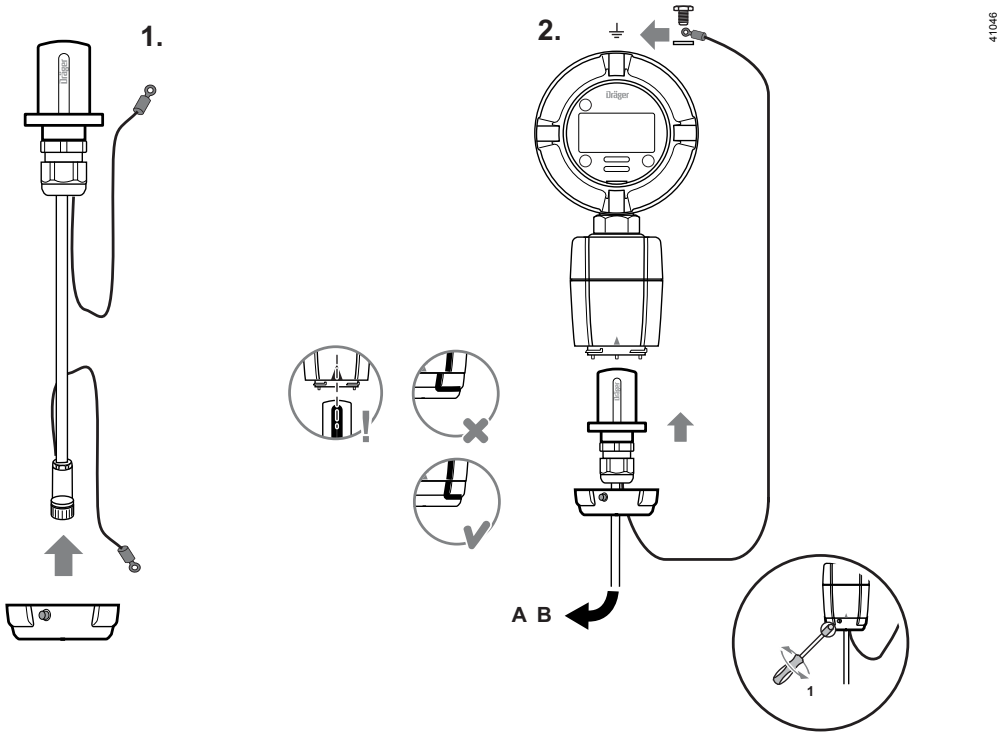


Fig. 11 Connection of EC sensing head remote cable

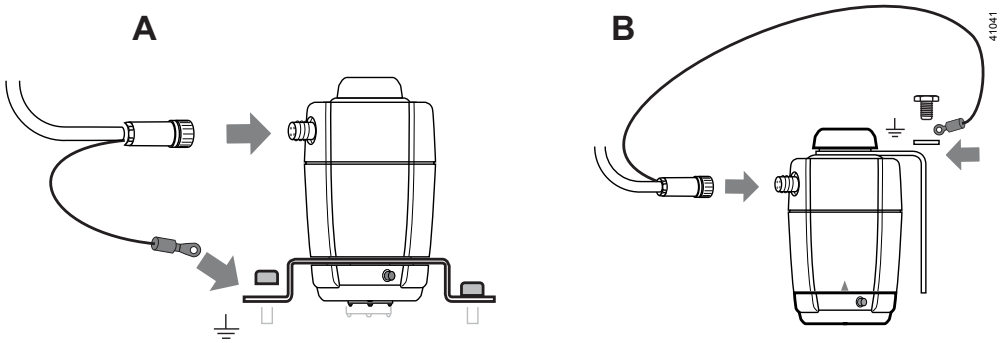


Fig. 12 Grounding of EC sensing head remote

ℹ Observe control drawing included in annex.

6.3 Installation of remote sensors (except EC sensors)

A remote wiring kit connects the Junction Box Ex d with the transmitter. The remote wiring kit contains 2 wiring harnesses. 1 harness is already installed in the Junction Box Ex d. The other kit must be installed in the transmitter.

Both harnesses have marks on the terminals (1b, 1a, 2, 3a, 3b).

- Connect the terminals to their related counterparts (e. g. 1a<->1a,...).

NOTICE
Bridges are necessary for 3-core field wiring
► Install bridges at terminals 1a/1b and 3a/3b

6.3.1 Installation

The sensor must be removed from the transmitter and inserted into the Junction Box Ex d.

NOTICE
Sensor damage
Polytron® 87x0 IR must not be operated with 3-core field wiring.
► Operate Polytron® 87x0 IR only with 5-core field wiring.

Refer to the corresponding figures
– 3-core field wiring (see "Junction Box Ex d 3-core field wiring installation", page 38)
– 5-core field wiring and PIR 7x00 installations (see "Junction Box Ex d 5-core field wiring installation", page 39)

The junction box can be mounted for measuring gases in ambient air or inside of a duct/pipe.

1. Use M6 (1/4'') bolts with hex socket caps to mount the enclosure to one of the following options.

Option	Accessory
Mounting on a flat surface	Drilling template: 4544299 Additionally for Polytron® 87x0 IR: Spacer 6812617
Mounting on a pole	Pole mount kit: 4544198
Mounting on a duct/pipe	Duct mount kit: 6812725 For Polytron® 87x0 IR:: 6812300

   For PIR 7x00 sensors:
   - Mount the housing of the Junction Box Ex d on the mounting spacer **(Fig. D)**.
2. Ground the housing using the grounding screw. (**Fig. A1**).
3. Unscrew the lid.
4. Screw in the sensor (at least 5 rotations and 266 LB IN. / 30 Nm).
5. Observe the preferred position of the sensor (**Fig. A2)**.

   For PIR 7x00 sensors (**Fig. A2a**):
   - The "Dräger" lettering on the splash guard must read horizontally. A deviation from the horizontal of ±30° maximum is permissible.
6. Connect the sensor plug to the socket of the cable harness (**Y**) (**Fig. B1**).
   - In case of DD/DQ CatEx sensors, twist the sensor cables with 7 rotations (**Fig. B2**).
7. Feed the field wiring through the cable entry and connect it to terminal (**Y**).

In case of 3-core field wiring:

- Install screw bridges between contacts 1a/1b and 3a/3b of the terminals. (**Fig. C**).

8. Attach the lid and tighten it (≥44 LB IN. / ≥5 Nm) (**Fig. E**).
9. Tighten the set screw (≥ 8 LB IN. / ≥0.7 Nm) (**Fig. E**).
10. Close unused housing openings with screw plugs.
11. Tighten all cable entries and screw plugs (at least 5 rotations and 266 LB IN. / 30 Nm).

6.3.2 Connecting the Junction Box Ex d to Polytron® transmitters

1. Screw the cable harness (**X**) into the Polytron® enclosure (**Fig. F1**).
2. Feed the field wiring through the cable entry and connect it to terminal (**X**) (**Fig. G**).

   In case of 3-wire field wiring:

   - Install screw bridges between contacts 1a/1b and 3a/3b of the terminals. (**Fig. C**).
3. Connect the cable shield to one of the two the grounding screws inside of the transmitter (**Fig. G1**).
4. Connect the plug of the cable harness to the socket of the PCB unit.
5. Attach the lid and tighten it (≥44 LB IN. / ≥5 Nm) (**Fig. E**).
6. Tighten the set screw (≥ 8 LB IN. / ≥0.7 Nm) (**Fig. E**).
7. Close unused housing openings with screw plugs.
8. Tighten all cable entries and screw plugs (at least 5 rotations and 266 LB IN. / 30 Nm).

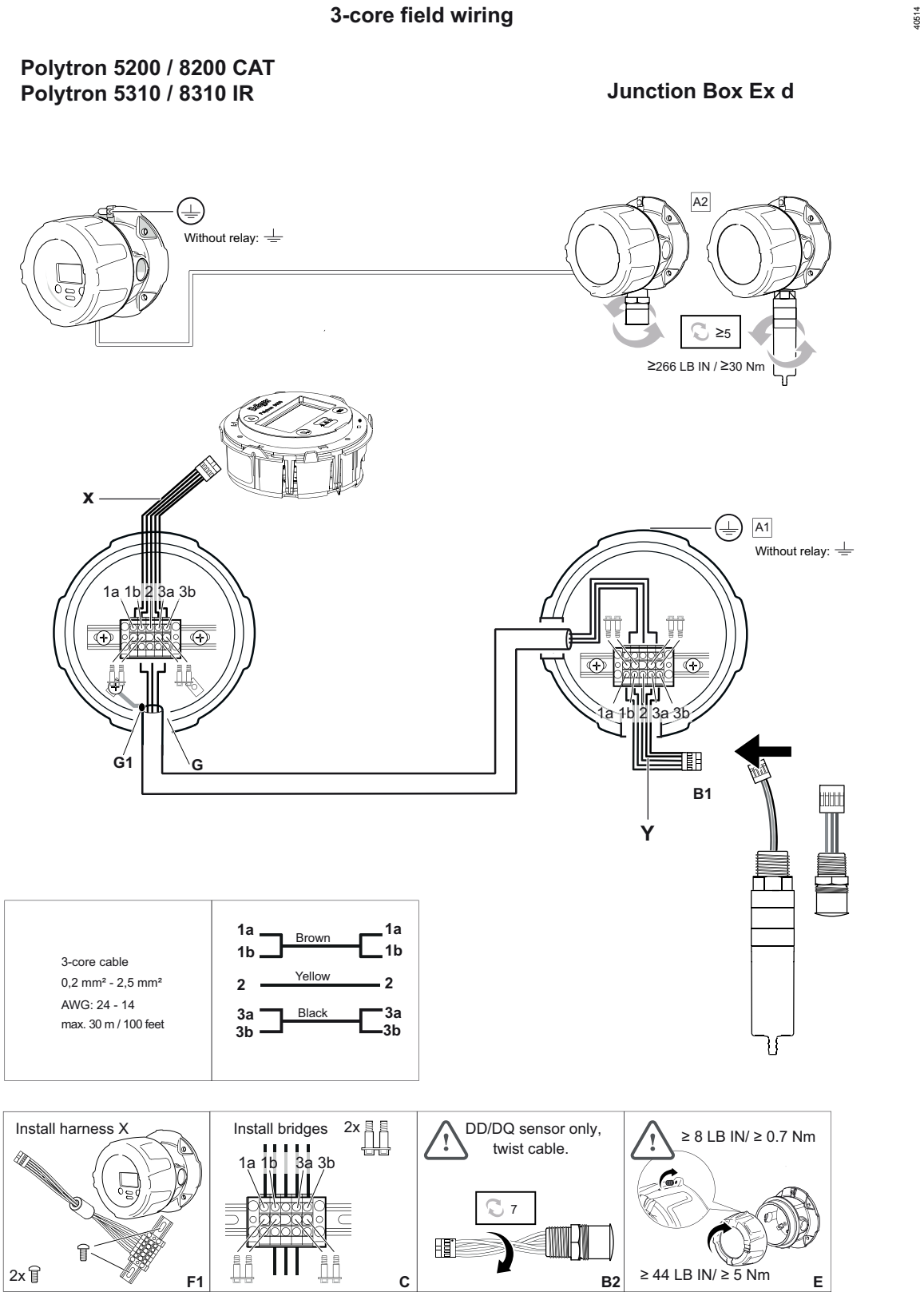


Fig. 13 Junction Box Ex d 3-core field wiring installation

5-core field wiring

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Polytron 5200 / 8200 CAT
Polytron 5310 / 8310 IR
Polytron 5700 / 8700 IR
Polytron 5720 / 8720 IR

Junction Box Ex d

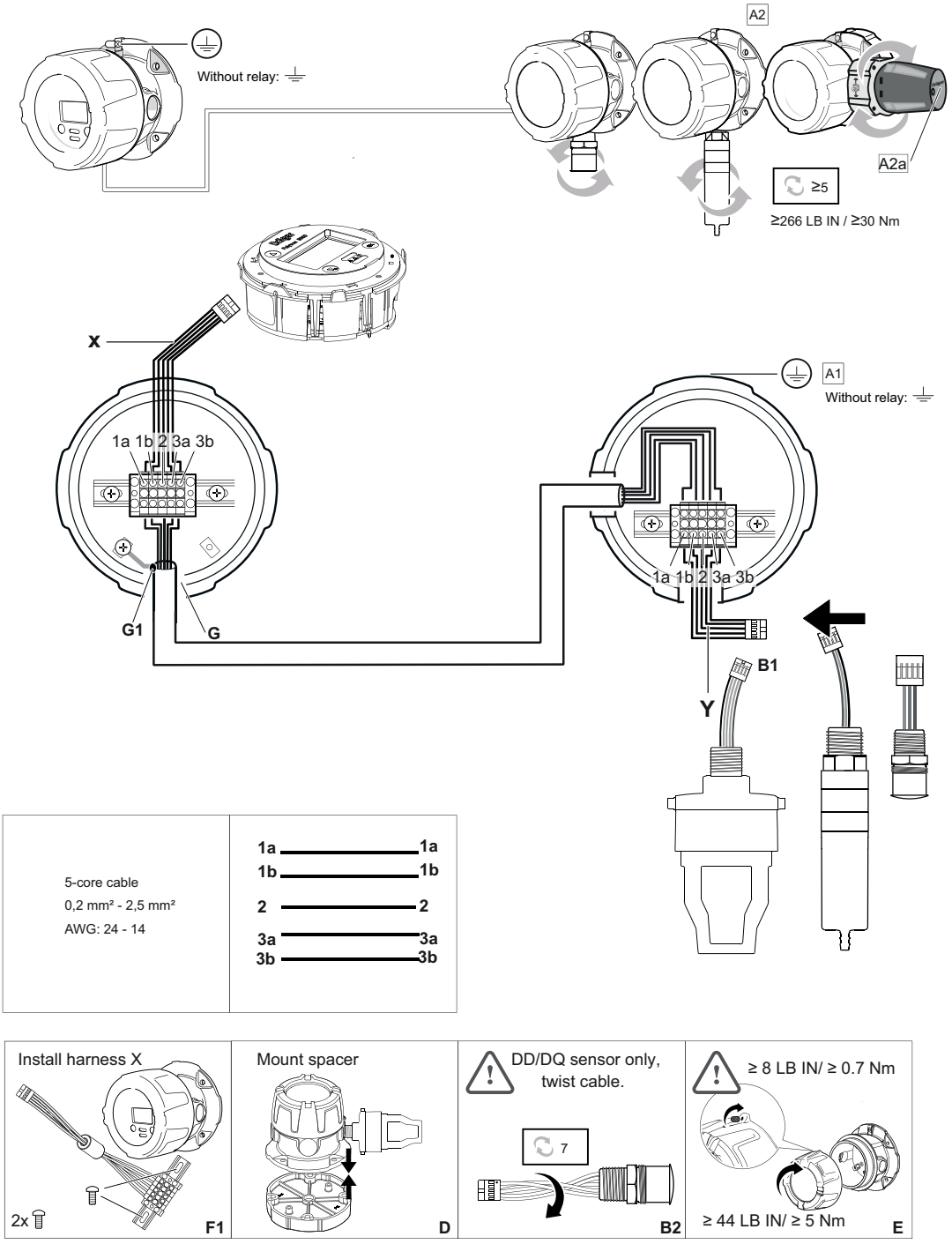


Fig. 14 Junction Box Ex d 5-core field wiring installation

7 Commissioning of the instrument

1. Switch power supply on.
   ⇒ The display shows that the sensor will be ready for measurement in hh:mm:ss (countdown) and the instrument transmits the maintenance signal.
   ⇒ The fault relay is activated.
   ⇒ The instrument will go through a start-up sequence (LCD / LED test, software version, and initialization) and start the warm-up period.
   The maintenance signal on the 4-20mA interface remains pending until the sensor is warmed-up.
   Maximum warm-up time of a new sensor: see the Instructions for Use for the sensor. For Oxygen: EN 50104 approvals.
   ⇒ After the warm-up period, the instrument goes into normal operation. The display shows the current gas concentration, the selected gas and the units of measurement. The green LED is lit.
2. Check date and time.
   Settings can be made during the warm-up period. The warm-up period depends on the sensor and environment conditions.
3. If necessary, calibrate the instrument.

Obey the safety statements mentioned in 2.5 Commissioning!

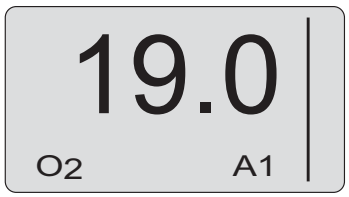
8 Operation

8.1 Display, analog interface and relay status

The following display examples show Polytron® 8100 EC.

For Polytron® 8200 CAT and Polytron® 8310 IR gas names are not predefined. Gas names must be entered via DrägerPolysoft PC software.

8.1.1 Measuring mode

Display example	Description
	In normal operation, the display shows the measured gas concentration, the selected gas and the unit of measurement.
	Exceeding the alarm thresholds. Example shows pre alarm A1.

8.1.2 Special states

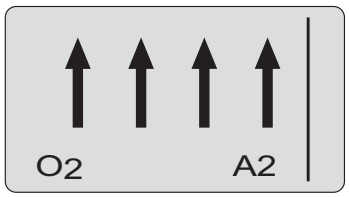
If the instrument is in a special state, a proper measurement or alarming can no longer be guaranteed.

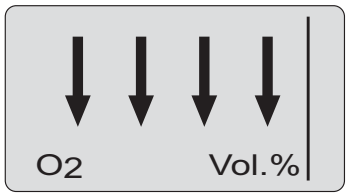
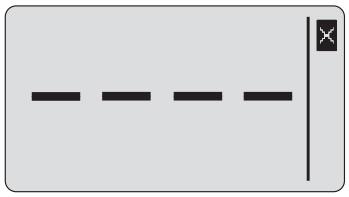
This is the case:

- When the gas concentration exceeds the measuring range.
- When a fault occurs.
- When alarms are deactivated.
  The measuring function (display output and analog/digital interface) remains active.
- During calibrations.
- During bump tests.
- During warm-up phase.
- During maintenance.

For the current of the analog interface corresponding to the analog signal, see 17.2.

For signals of digital interfaces, refer to the corresponding technical manual.

Display example	Description
	**Value is over measuring range** The gas concentration is beyond the measuring range of the sensor. **Analog interface:** Measuring range exceeded **Relays:** A2 relay switches

Display example	Description
	**Value is under measuring range** The gas concentration is beyond the measuring range of the sensor. **Analog interface:** Drift below zero **Relays:** Fault relay switches
	**Fault indication** The ⛌ symbol is displayed on the right side of the display. **Analog interface:** Fault current **Relays:** Fault relay switches
	**Maintenance indication** The 🔧 symbol is displayed on the right side of the display. This is displayed when alarms are deactivated, during calibrations, bump test and maintenance work. **Analog interface:** Maintenance current **Relays:** No change
	**Warning indication** The ⚠ symbol is displayed on the right side of the display. **Analog interface:** Warning current[1)] **Relays:** No change

1) Only when warning current is enabled. Factory default setting: disabled.

Warm-up phase 1

The ⚠ symbol is displayed on the right side of the display.

The remaining time is indicated on the left side of the display.

Analog interface: Maintenance current

Relays: Fault relay switches

For warm-up phase 1, the fault relay behavior is configurable (see "Setting fault relay warm-up 1", page 67)

Warm-up phase 2

The ⚠ symbol is displayed on the right side of the display.

The measured value is indicated on the left side of the display.

Analog interface: Measured value

Relays: Behavior as in measuring mode (Fault relay does not indicate warm-up phase 2.)

8.1.3 Ending special states

Fault / warning indication

Faults and warnings are non-latching. If the fault or warning condition clears, the message disappears.

To solve warning and fault conditions, display the error code or warning message (see "Displaying Information", page 46) and begin troubleshooting (see "Troubleshooting", page 54).

Value under/over measuring range

The display indicates that the gas concentration is beyond the measuring range of the sensor. The indication disappears as soon as the gas concentration is within the measuring range.

NOTICE
Sensor malfunction
Gas concentrations beyond the measuring range of the sensor might cause sensor malfunctions.
► Check the calibration.

Polytron® 8200 CAT with DQ sensor:

An over range has to be acknowledged with [OK] after verifying that the gas concentration is below 100 %LEL (e.g. using a portable instrument).

Latching alarms is the default setting of the instrument.

For instruments without relays, the over range can be set to non-latching. In this case, the over range indication disappears. The control unit must support this function! For further information see: "Setting DQ sensor latching", page 79.

Polytron® 8200 CAT with LC sensor:

⚠ WARNING
Ambiguous readings at over range measuring values
Latching over range alarms are not supported with LC sensors.
For a safe operation in accordance with BVS 13 ATEX G 001 X, operate the transmitter when connected to a control unit that has a latching over range indication. Do not use internal alarm relays of the transmitter.
► Make sure that over range latching is active at the control unit.

8.2 LED and symbol indications

Symbol	LED	Description
	Red	Alarm Triggered
	Yellow	Fault
	Green	Power on

LED status

– When the first alarm (pre alarm) has been triggered the red LED flashes in single mode .
– When the second alarm (main alarm) has been triggered the red LED flashes in double mode .
– When an alarm is acknowledged before the alarm condition clears, the red LED is lit continuously to indicate the present alarm condition.

8.3 Definitions of indicators in the display

Symbol	Explanation
	Error message available.
	Warning message available.
	Maintenance signal is transmitted.
	Measuring range of analog interface exceeded.
	Measurement value less than range of analog interface.
	HART® operation is active. Analog interface is set to a fixed value and is not transmitting any measurement signal.
SIL	SIL operation mode is activated.

8.3.1 Polytron® 8100 EC-specific indicators in the display

Symbol	Explanation
	"Preventive" maintenance: The sensor is ready for operation.
	"Preventive" maintenance: The sensor is ready for operation but is close to the end of its life cycle.
	"Preventive" maintenance: The sensor is still ready for operation but should be changed as soon as possible.
	The data logger is active in Roll mode.
	The data logger is active in stack mode.

8.4 User interface keys

The instrument is designed for the magnetic wand (part number 4544101: blue body, white logo) to be used with the enclosure lid in place. If the enclosure lid is not in place, the magnetic wand may activate two or more buttons at once (cross-talk).

Button	Function
▲	Upwards / Function key
▼	Downwards / Menu key

Button	Function
OK	Different functions depending on the type of menu

8.5 Info mode and function key

8.5.1 Activating info mode

The Info mode is used to show instrument relevant information. This does not interrupt the normal operation of the instrument.

- Tap and hold ▲ for 3 seconds in measuring mode.

8.5.2 Info mode navigation

Button	Function
▲	Switches to the next screen
▼	Switches to the previous screen
OK	Ends info mode

If no key is tapped within 30 seconds, the instrument will automatically return to normal operation.

8.5.3 Using function key

Using the function key, a pre-set function can be executed. By default the faults are displayed.

- Tap and hold ▲ for 1 seconds in measuring mode.

To configure the function key, see 12.4 Configuring function key.

8.6 Menu

8.6.1 Menu navigation

Button	Function
▲	Scrolls upwards. Sets values.
▼	Scrolls downwards. Sets values.
OK	Confirms entry. Selects menus and functions.

8.6.2 Passwords

Calibration PWD	Access to information (Information menu) and calibration settings (Calibration menu) Default: **_ _ _ 1**
Settings PWD	Access to all configurations and menus Default: **_ _ _ 2**

To change passwords, see 12.1.

8.6.3 Entering the menu

- To directly enter the ***Information*** menu:
  a. Tap and hold ▼ for 1 second in the measuring mode.
- To enter the ***Calibration*** menu:
  a. Tap and hold ▼ for 3 seconds in measuring mode
  b. Select ***Enter password***
  c. Enter ***Calibration PWD***.
- To enter all menus:
  a. Tap and hold ▼ for 3 seconds in measuring mode
  b. Select ***Enter password***
  c. Enter ***Settings PWD***

8.6.4 Displaying Information

Select the appropriate menu item in the ***Information*** menu:

Instrument	
Warnings	Displays warning messages in plain text and the corresponding number. If there are several warning messages available, there is an indicator (e.g. 1/3 = Screen 1 of 3).
Faults	Displays fault messages in plain text and the corresponding number If there are several faults, there is an indicator (e.g. 1/3 = Screen 1 of 3).
Device flag	This function displays warning and fault codes as a table. If all codes are 00 there are no warning or fault messages available.
Modules	Displays an overview of the installed hardware modules. To access detailed information select the appropriate module. ■ = installed modules □ = not installed modules
Sensor	
Vitality[1)]	The sensor vitality is displayed in %. Changing the sensor is recommended with a vitality < 25 % by Dräger.
Last cal. date	The calibration date, unit, gas and concentration of the last calibration are displayed.
Next cal. date	Displays the next calibration due date.
Sensor temperature[1)]	The current and the highest sensor temperature is displayed.
Data logger	
Logger status	Displays the data logger status (active or non-active)
Graph	Displays the history of the past 15 minutes on a time/concentration graph.

1) Function only available with diagnostic dongle.

9 Calibration

Obey the safety statements mentioned in 2.5 Commissioning!

A calibration checks and adjusts the measurement accuracy with a known test gas concentration. First the zero point of the sensor and then the sensor span is calibrated. Calibrations have to be performed on a regular basis. The length of calibration intervals depends on the ambient conditions in which the sensor is operated.

Ambient conditions and aging cause sensor drifts. Sensor drifts have a negative impact on the measurement accuracy. Calibrations restore this accuracy. Depending on the severity of the drift shorter calibration intervals have to be established.

To evaluate the ambient conditions of a new installations, shorter calibration intervals with documentation of the drift should be established. The plant operator should establish customized calibration intervals with the obtained data.

Under normal conditions, Dräger recommends the following calibration intervals[2]:

– Electrochemical sensors (EC): 6-12 months[3]
– Catalytic sensors (CAT): 4 months
– Infrared sensors (IR): 6-24 months[3]

9.1 Test gases

For test gas properties (e. g. humidity, concentration) refer to the corresponding sensor data sheet.

Test gas humidity is irrelevant for O_2 sensors.

Depending on the type of calibration different test gases are used.

Zero gas

Zero gas is a test gas to calibrate the zero point. If ambient air is free from interfering impurities and measured gas, it can be used as zero gas. For O_2 and CO_2 sensors, nitrogen (N_2) is used.

Calibration gas

Calibration gas is a test gas to calibrate the sensor sensitivity during span calibration. Calibration gas is a known concentration of the measured gas diluted with clean air or nitrogen. For O_2 sensors no calibration gas is needed, as oxygen from ambient air is used.

2) Observe sensor data sheet and sensor IfU
3) For applications in line with EN45544-1 the calibration interval must not exceed 6 months.

9.2 Preparation of Calibration

⚠ WARNING
Health hazard due to test gas
Inhaling test gas may risk health or lead to death.
► Do not inhale test gas.
► Observe risks and security statements related to the test gas (Refer to data sheets and instructions figuring on calibration devices).

⚠ CAUTION
Triggering alerts by test gas
Applied test gas may trigger alerts.
► Make sure that test gas is no longer applied after calibration.

Prerequisites:
– Sensor has finished the warm-up phase (7 Commissioning of the instrument).
– Date and Time are set (12.2 Setting date and time).

9.2.1 Preparing calibration set-up

For all transmitters except Polytron® 87x0 IR:

Observe the following figure.

Calibration equipment:
– Dräger pressure regulator (1), for reactive gases use stainless steel pressure regulator
– Dräger calibration adapter (2) (part number 6810536).
– Tubing (3)
– Dräger calibration gas cylinder (4)

Prepare calibration
1. Attach the pressure regulator to the calibration gas cylinder.
2. Fit calibration adapter to the sensor.
3. Connect the tubing to the barbed fitting.
4. Enter the menu, see 8.6.3 Entering the menu

For Polytron® 87x0 IR:

Observe the following figure.

Calibration equipment:
– Dräger pressure regulator (1), for reactive gases use stainless steel pressure regulator
– Dräger calibration adapter (5) (part number 6811610).
– Tubing (3)
– Dräger calibration gas cylinder (4)

Prepare calibration:
1. Attach the pressure regulator to the calibration gas cylinder.
2. Fit calibration adapter to splash guard until it snaps into place.

This does not apply for duct mount applications or if the process adapter number is used (see installation instructions for PIR 7x00 accessories).

3. Make sure that the sealing surfaces around the openings of the splash guard are clean. The insect guard does not have to be removed.
4. Connect the tubing to the barbed fitting.
5. Enter the menu, see 8.6.3 Entering the menu

9.3 Gas flow for calibrations

Gas flow varies depending on the sensor.

EC sensor	0.5 l/min ± 10%
All other sensors	0.5 l/min - 2 l/min

Gas flow should correspond to the environmental conditions during operation (e. g. duct measurement with higher flows than 2 l/min)

9.4 Calibration setup with test gas cylinder

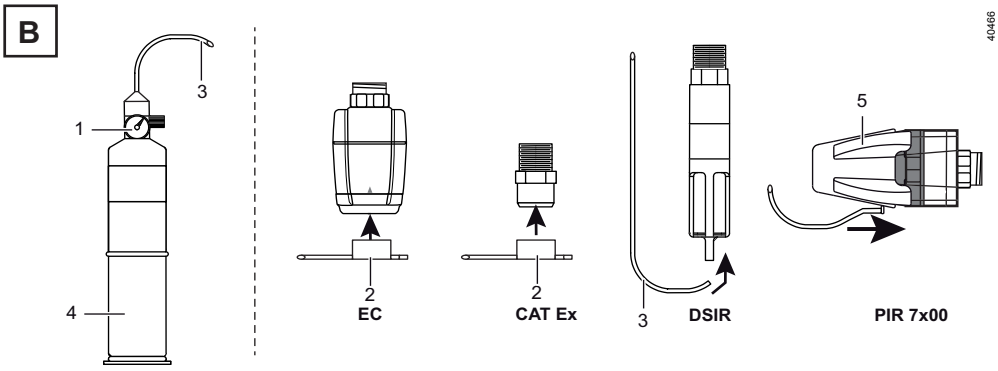


Fig. 15 Calibration setup with test gas cylinder

1	Dräger pressure regulator, for reactive gases use stainless steel pressure regulator
2	Dräger calibration adapter (part number 68 10 536)
3	Tubing
4	Dräger calibration gas cylinder
5	Dräger calibration adapter (part number 68 11 610).

9.5 Zero calibration

Ambient air can be used to zero the sensor instead of Nitrogen or Synthetic Air only if the area is known to be free of the target gas or any gas to which the sensor may be cross-sensitive (as listed on the sensor data sheet). In this case, no cylinder or calibration adapter is needed for the zero calibration.

⚠ WARNING
Calibration fault at zero calibration
Insufficient ambient air flow may cause calibration errors.
► Make sure that the ambient air flow to the sensor is sufficient.

Polytron® 8100 EC-specific:

For Oxygen (O_2) sensors a zero calibration does not change any value in the firmware or sensor. Thus, the zero calibration function can be used to check the correct zero reading when Nitrogen is applied to the sensor. The Polytron® 8100 EC will indicate a fault state if a zero check fails with a deviation of more than 0.6 Vol% O_2 from zero. In case of a fault, repeat the zero check or change the sensor if necessary. Use Nitrogen (N_2) for verification.

Polytron® 8200 CAT-specific:

Sensors must not be calibrated with pure nitrogen. Catalytic sensors need oxygen to work properly.

Polytron® 8720 IR-specific:

For Polytron® 8720 IR (with PIR 7200 to detect carbon dioxide), only Nitrogen or Synthetic Air without any CO_2 content may be used for a zero calibration.

9.5.1 Performing zero calibration

ℹ Calibration can be aborted at any time. To abort calibration select ***back***.

Prerequisites:
– Sensor has finished the warm-up phase
– Calibration is prepared.

Perform zero calibration
1. Select ***Calibration*** > ***Zero calibration*** and confirm.
   ⇒ The Maintenance signal is transmitted by the analog interface, no alarm or fault relays are switched and the symbol is displayed.
   ⇒ The message ***Apply zero gas*** is displayed.
2. Apply synthetic air or nitrogen, if ambient air cannot be used.
   a. Set gas flow corresponding to the sensor used (see "Gas flow for calibrations", page 49)
3. Select ***Next*** and confirm.
   ⇒ The current value is displayed.

   ℹ After 15 minutes without confirmation, the instrument reverts to the calibration menu without performing a calibration.

   After the test gas has been applied to the sensor for 3 minutes and the displayed value is stable perform calibration.
4. Select ***calibrate*** and confirm.
   ⇒ The message ***please wait...*** is displayed.
   ⇒ The new current value is displayed.
5. Select ***Next*** and confirm.

6. Turn off gas flow and remove the calibration adapter from the sensor or disconnect tubing.
   If the current value is not within the alarm range:
7. Select ***Next*** and confirm.
   ⇒ The instrument returns to the calibration menu.

9.6 Span calibration

Polytron® 8200 CAT / 8310 IR / 8700 IR - specific:

The span calibration has to be performed within 24 h after the last valid zero calibration.

Polytron® 8310 IR-specific:

Due to the design of the DSIR gas sensor, the output signal of the gas sensor is limited to 45 % . . . 55 % of the instrument-internal supply voltage. If the gas concentrations increase further after the maximum sensor output signal has been reached, this does not lead to an increase of the values displayed on the instrument response transmitted to the central device. In case of substances with particularly low calibration factors and/or manual configuration of a high span calibration factor at the sensor, this may already happen at concentrations below 100 %LEL. For substitute gas calibrations, correct triggering of the alarm should therefore be checked with a test gas concentration corresponding to the alarm threshold. If necessary, the measuring range which can be represented can be increased as required by a reduction of the sensor output signal (see DSIR Instructions for Use, part number 9023981) and subsequent calibration at the instrument.

9.6.1 Performing span calibration

ℹ Calibration can be aborted at any time. To abort calibration select ***back***.

Prerequisites:

– Zero-point is calibrated.
– Calibration is prepared.

Perform span calibration

1. Select ***Calibration*** > ***Span calibration*** and confirm.
   ⇒ The Maintenance signal is transmitted by the analog interface, no alarm or fault relays are switched and the symbol is displayed.
   ⇒ The parameters for the calibration gas are displayed, e. g.:[4)]
   Gas : H_2S
   Unit: ppm
   Concentr.:25
2. If the displayed parameters do not match the target gas, adjust the parameters:
   a. Select ***Gas*** and confirm.
   b. Select the calibration gas from the list and confirm.
   c. Select ***Unit*** and confirm.
   d. Select the unit of measurement from the list and confirm.

4) Not applicable for all sensors (see "Display, analog interface and relay status", page 41).

e. Select ***Conc.*** and confirm.
f. Set the concentration of the calibration gas.

3. If settings are correct:
   a. Select ***Next*** and confirm.
      ⇒ A message like ***Gas flow ON H_2S*** is displayed.
4. Apply calibration gas.
   a. Set gas flow corresponding to the sensor used (see "Enter the menu, see 8.6.3 Entering the menu", page 49)
5. Select ***Next*** and confirm.
   ⇒ The current value is displayed

   After the test gas has been applied to the sensor for 3 minutes and the displayed value is stable perform calibration[5]:
6. Select ***Next*** and confirm.
   ⇒ The message ***please wait...*** is displayed.
   ⇒ The new current value is displayed.
7. Select ***Next*** and confirm.
8. Turn off gas flow and remove the calibration adapter from the sensor or disconnect tubing.

   If the current value is not within the alarm range:
9. Select ***Next*** and confirm.
   ⇒ The instrument returns to the calibration menu.

9.7 Automatic calibration

Automatic calibration (Auto calibration) combines zero calibration with subsequent span calibration and represents an alternative to performing the zero and span calibration manually.

Not all sensors and gases support auto calibration. If the function is not available, perform the calibration manually.

9.7.1 Performing automatic calibration

ℹ Calibration can be aborted at any time. To abort calibration select ***back***.

Prerequisites:
– Automatic calibration is enabled
– Sensor has finished the warm-up phase
– Calibration is prepared.

Perform automatic calibration
1. Apply Synthetic Air or Nitrogen if ambient air cannot be used.

5) For LC sensors the test gas must be applied for at least 6 minutes.

2. Select ***Calibration*** > ***Auto calibration*** and confirm.
   ⇒ The message ***please wait...*** is displayed and the instrument automatically performs the zero calibration.
   ⇒ In case of an O_2 sensor ***Fresh air cal.*** is displayed.

   The Maintenance signal is transmitted by the analog interface, no alarm or fault relays are switched and the symbol is displayed.

3. After a successful zero calibration, the span calibration is started.
   ⇒ The parameters for the gas are displayed, e. g.:[6)]
   Gas : H_2S
   Unit: ppm
   Concentr.:25
4. If the displayed parameters do not match the target gas, adjust the parameters:[7)]
   a. Select ***Gas*** and confirm.
   b. Select the calibration gas from the list and confirm.
   c. Select ***Unit*** and confirm.
   d. Select the unit of measurement from the list and confirm.
   e. Select ***Conc.*** and confirm.
   f. Set the concentration of the calibration gas.
5. If settings are correct:
   a. Select ***Next*** and confirm.
      ⇒ A message like ***Gas flow ON H_2S*** is displayed.
6. Apply calibration gas.
   a. Set gas flow corresponding to the sensor used (see "Gas flow for calibrations", page 49)
7. Select ***Next*** and confirm.
   ⇒ The current value is displayed

   After 15 minutes without confirmation, the instrument reverts to the calibration menu without performing a calibration.

8. Once the current value is stable, the instrument automatically performs the span calibration.
9. After a successful calibration, the new current value and the message ***Value OK?*** are displayed.
   - If not, select Redo and confirm to perform the calibration again.
   - If the value corresponds the target value, proceed.
10. Turn off gas flow and remove the calibration adapter from the sensor or disconnect tubing.
11. Select ***Accept value*** and confirm to finish the calibration. The instrument returns to the calibration menu.

6) Not applicable for all sensors (see "Display, analog interface and relay status", page 41).
7) Only possible for certain sensors.

10 Troubleshooting

10.1 Faults

Fault number	Cause	Remedy
001, 003 - 005, 011 - 014, 020 - 024, 043, 060, 067	Serious instrument fault, various causes.	Have the instrument checked by DrägerService.
002, 025 - 027, 030 - 034, 041, 042, 044, 050, 052, 081, 085	Serious data error in the instrument, various causes.	Reset the instrument to factory default settings. If this fault occurs again: Have the instrument checked by DrägerService.
010	4 to 20 mA interface cable not connected.	Check the 4 to 20 mA interface connection. If operated as a stand-alone instrument without a central controller, wire pin 3 to pin 4.
045	Instrument not detecting any sensor.	Check connections.If this fault occurs again: Have the instrument checked by DrägerService.
051, 054	Faulty zero calibration.	Perform zero calibration.
055	Faulty span calibration.	Perform span calibration
076, 080 - 084	Instrument fault.	Check electrical connections.If this fault occurs again: Have the instrument checked by DrägerService.
090	Sensor lock function is activated. A sensor with a different part number has been connected.	Use a sensor with the same part number or disable the sensor lock function.
105	Instrument fault.	Have the instrument checked by DrägerService.
137, 64, 91	Instrument fault.	Cycle power.If this fault occurs again: Have the instrument checked by DrägerService.

Polytron® 87x0 IR-specific:

Fault number	Cause	Remedy
064, 071	Communication fault.	Check connection to PIR 7x00.
083	PIR 7x00 optics dirty.	Clean PIR 7x00 optics.
086	Supply voltage outside range	Check supply voltage.
087	4 to 20 mA fault at PIR 7x00 sensor.	Check 4 to 20 mA connection to PIR 7x00.

Fault number	Cause	Remedy
094, 095	Data error in the instrument.	Reset the sensor to factory default settings. If this fault occurs again: Have the instrument checked by DrägerService.
096	SIL password does not match with PIR 7x00.	Enter password again.

10.2 Warnings

Warning number	Cause	Remedy
101	Data logger in Stack mode is 100 % full and is not logging any more data.	Have the instrument checked by DrägerService.
102	Data logger in Stack mode is 90 % full.	Download the data as soon as possible and clear the data logger.
103, 106	Data error in the instrument. Some dongle functions like data logger, sensor test, etc. may no longer be available.	Reset the instrument to factory default settings. If this error occurs again: Have the instrument checked by DrägerService.
104	Date or time setting not valid.	Set date and time
105	Instrument fault.	Have the instrument checked by DrägerService.
107	Battery for data memory empty.	Have the instrument checked by DrägerService.
110, 111, 112	SW dongle has been removed without being deactivated.	Deactivate SW dongle.
113	Alarms inhibited.	Enable alarms
164, 165	Sensor warm-up phase has not ended. Increased measurement error must be expected.	Wait until the sensor has warmed up. Do not calibrate before sensor is fully warmed-up.
167, 170	Calibration interval expired.	Recalibrate the instrument.
171[1)]	Negative reading. Value below range minimum.	Recalibrate zero point.
163[1)]	Low EC sensor vitality	Replace sensor

1) Polytron® 8100 EC only

Polytron® 87x0 IR-specific:

Warning number	Cause	Remedy
163	Sensor temperature is very high.	

Warning number	Cause	Remedy
171	Zero drift too high.	Perform zero calibration
172	PIR 7x00 optics dirty.	Clean PIR 7x00 optics.
173	Zero calibration expired for span calibration	Perform zero calibration
182	Auto calibration not possible with PIR 7200.	Perform new zero and span calibration

11 Maintenance

– The maintenance intervals must be established for each individual installation. Depending on safety considerations and application specific conditions the instrument is used in, these might need to be shortened.

Every 6 months

– Inspection by trained service personnel.
– Check signal transmission to the central controller, LEDs and triggering of alarm devices.

Calibrations have to be performed on a regular basis, see 9 Calibration

11.1 Performing a bump test

A bump test checks alarm activation without setting off the alarms.

1. Select ***Settings*** > ***Instrument*** > ***Bump test*** and confirm.
   ⇒ The maintenance symbol is displayed
   ⇒ The analog output is set to the maintenance signal.
2. Apply a known concentration of gas.
3. Press OK to return to measurement.

11.1.1 Checking response time (t90)

1. Perform a bump test and check the response time.
2. Compare the response time with the t90 values that are indicated in the corresponding sensor data sheet.

⚠ CAUTION
Delayed response time at the gas detection control unit.
If the transmitter is connected to control units, the total response time could be delayed. The entire measuring path must be taken into account (e. g. latency of the control unit).
► Ensure that the required response time is kept.

11.2 Sensor replacement

⚠ WARNING
Faulty Calibration
Faulty Calibration may cause inaccurate readings.
► If the sensor is replaced, all settings and parameters must be checked for correctness.
► Check calibration to verify proper operation.

11.2.1 Polytron® 8100 EC

A sensor can be replaced in the hazardous, classified area, without interrupting the power supply.

Sensor lock function

If a sensor of the same type (same part number) was previously installed, the instrument specific configuration is retained (gas type, measuring range, test gas, calibration interval, etc.) Otherwise the factory default settings of the new sensor are uploaded and will overwrite the instrument specific configuration. This can be prohibited if the sensor lock function 77 is activated.

Sensor change function

With the menu function ***Change Sensor***, a sensor can be changed during operation without triggering a fault signal at the control unit. It also ensures that all sensor data in the microprocessor can be saved in the sensor memory (EEPROM) before disconnecting the sensor.

Replacing the sensor

Refer to figure C under Installing EC sensor

A sensor can be replaced at any time.

1. Select ***Settings*** > ***Sensor*** > ***Change Sensor*** and confirm.
   ⇒ The maintenance signal is generated on the 4-20mA interface.
   ⇒ The display shows ***Please remove the sensor***.
   ⇒ The Maintenance symbol is displayed.
2. Replace the old sensor with a new sensor:
   a. Loosen set-screw (2)
   b. Unscrew bayonet ring (3)
   c. Insert sensor (4) into the opening. The Dräger logo on the sensor must point to the mark on the sensing head housing (5).
   d. Lock sensor with bayonet ring (3)
   e. Tighten set-screw (2). Mandatory for Zone 22 installations.
      ⇒ The display shows: ***Loading data, please wait***
3. If necessary, apply the label included with the sensor to the instrument. This identifies the gas type from a distance, even if the power has failed.
4. When the sensor data are loaded, the display shows: ***Data loaded***.
5. Select ***Back to menu*** and confirm.
   ⇒ The maintenance signal on the 4-20mA interface remains pending until the sensor is warmed-up.

   Maximum warm-up time of a new sensor: see the Instructions for Use for the sensor. For Oxygen: EN 50104 approvals.
6. Check calibration. If necessary, calibrate the instrument (see "Calibration", page 47).
7. Check the installation requirements and instrument for SIL status.
   See sections "Mechanical installation" through "Remote sensors".

11.2.2 Polytron® 8200 CAT, 8310 IR, 87x0 IR

Replacing the sensor

1. If required, set the maintenance current for the analog interface.
2. Turn off power to the instrument or declassify the area according to local regulations.

3. Loosen set-screw and unscrew lid from instrument.
4. Pull out the PCB unit.
5. Turn PCB unit over and pull off the sensor connector.
6. Unscrew the sensor.
7. Insert the sensor wires through the threaded port of the enclosure.

⚠ WARNING
Explosion hazard!
The enclosure openings must be sealed to prevent ignition of hazardous atmospheres in case of an ignition inside the enclosure.
► Five threads must be engaged to ensure explosion proof status.

8. Screw the sensor into the port and tighten with the correct torque (min. 266 LB IN. / min. 30 Nm)
9. Polytron® 8200 CAT-specific:
   Twist the sensor wires together. If necessary, fit a cable tie to keep the wires tight.
10. Plug the sensor connector back into socket.
11. Place PCB unit back into the enclosure.
12. Screw the lid back on until it is sealed (min. ≥44 LB IN. / min. ≥5 Nm) and tighten set-screw.
13. Apply power to the instrument, if necessary.
    ⇒ The maintenance signal on the 4-20mA interface remains pending until the sensor is warmed-up.

    Maximum warm-up time of a new sensor: see the Instructions for Use for the sensor.
14. Check calibration. If necessary, calibrate the instrument (see "Calibration", page 47).
15. Check the installation requirements and instrument for SIL status.
    See sections "Mechanical installation" through "Remote sensors".

11.3 Performing display test

1. Select ***Settings*** > ***Instrument*** > ***Display*** > ***Displaytest*** and confirm.
2. Select ***Enable*** or ***Disable*** and confirm.
   When enabled, the display is shown inverted and all the LEDs are lit.

12 Instrument settings

12.1 Setting passwords

1. Select ***Settings*** > ***Instrument*** > ***Passwords*** the desired password and confirm.

Calibration PWD	Access to zero and span calibration
Settings PWD	Access to all configuration parameters

2. Select the line for editing the password and confirm.
3. Set the password and confirm.
4. Select ***Confirm*** and confirm with [OK].

12.2 Setting date and time

1. Select ***Settings*** > ***Instrument*** > ***Date and time*** and confirm.
2. Select the line for editing the date or time and confirm.
3. Select ***Confirm*** and confirm with [OK].

12.3 Setting language

1. Select ***Settings*** > ***Instrument*** > ***Language*** and confirm.
2. Select a language from the list and confirm

12.4 Configuring function key

1. Select ***Settings*** > ***Instrument*** > ***Function key*** and confirm.
2. Select a function and confirm.

Graph	The measurements of the past 15 minutes are displayed as a time/concentration graph.
Faults	Fault messages are displayed in plain text.
Warnings	Warning messages are displayed in plain text.
Bump test	The bump-test allows applying gas to the sensor without generating an alarm. The maintenance signal is transmitted. After 15 minutes or tapping [OK] again ends the bump test and the instrument returns to normal operation.
Sensor vitality[1)]	Shows the remaining sensor vitality.

1) Only with diagnostic dongle

12.5 Resetting to default settings

This function resets the instrument to factory default settings.

1. Select ***Settings*** > ***Instrument*** > ***Device init*** and confirm.
2. Select ***Confirm*** and confirm with [OK].

12.6 Changing the display contrast

1. Select ***Settings*** > ***Instrument*** > ***Display*** > ***Display contrast*** and confirm.
2. Change the contrast and confirm.

12.7 Changing the display mode

1. Select ***Settings*** > ***Instrument*** > ***Display*** > ***Display mode*** and confirm.
2. Select the desired mode and confirm.

Standard	Shows the standard display.
Non-display	Shows the start screen and the applicable symbols.

If an alarm is triggered, the display shows the current gas concentration and the red LED blinks regardless of the selected display mode.

12.8 Data logger settings

12.8.1 Information regarding the data-logger

The data logger can store up to 35000 values. At a sampling interval of 1 measurement per minute the data logger stores the measurement history of approximately 24 days. This time can be significantly increased if the trigger function is enabled.

The data logger can only be downloaded using the PolySoft PC software.

12.8.2 Displaying graph

The last 15 minutes as a time/concentration graph can be viewed.

1. Select ***Information*** > ***Data logger*** > ***Graph***

12.8.3 Switching data logger on or off

1. Select ***Settings*** > ***Data logger*** > ***Datalogr. on/off*** and confirm.
2. Select ***Enable*** or ***Disable*** and confirm.

12.8.4 Setting the sampling time

This function defines how often a value is stored.

1. Select ***Settings*** > ***Data logger*** > ***Datalogr. on/off*** > ***Sample time*** and confirm.
2. Select the sample time and confirm.

12.8.5 Setting peak/average

This function determines which value is stored.

1. Select ***Settings*** > ***Data logger*** > ***Data logger*** > ***Peak/Average*** and confirm.
2. Select ***Peak*** or ***Average*** and confirm.

Peak	The maximum value (if monitoring falling concentrations, the minimum value) of the measured concentrations within the selected sampling time is stored.
Average	The average value of all the measured concentrations within the selected sampling time is stored

12.8.6 Switching triggering mode on or off

This function allows storing values from a certain value on.

1. Select ***Settings*** > ***Data logger*** > ***Data logger*** > ***Trigger on/off*** and confirm.
2. Select ***On*** or ***Off*** and confirm.

On	Measurements are stored if they exceed a threshold beyond the trigger value (relative to the last stored value).
Off	Measurements within the sampling time are stored.

12.8.7 Setting trigger value

This function defines the trigger threshold to store a value.The trigger value is defined as a percentage of the full scale deflection.

Example: A trigger value of 2 % at full scale deflection of 500 ppm will only store values if they deviate by 10 ppm (relative to the previously stored value).

1. Select ***Settings*** > ***Data logger*** > ***Datalogr. on/off Trigger value*** and confirm.
2. Set the trigger value and confirm.

12.8.8 Setting stack/roll function

1. Select ***Settings*** > ***Data logger*** > ***Data logger*** > ***Stack/Roll*** and confirm.
2. Select ***Stack*** or ***Roll*** and confirm.

Roll	Once the capacity of the data logger is reached, the old data are overwritten by new values.
Stack	Once the capacity of the data logger is reached, no more data can be stored. The instrument issues a warning.

12.8.9 Clearing data logger

This function deletes the stored data.

1. Select ***Settings*** > ***Data logger*** >***Clear data logger*** and confirm.
2. To clear the data-logger, select ***Confirm*** and confirm with [OK].

12.9 Relays

The instrument ships with all relays (A1, A2, FLT) configured by default to normally energized. This provides a “fail-safe” operation.

The relay labels (NO, COM, NC) represent the default state (normally energized) of all relays while the instrument is powered

12.9.1 SPDT Relays

Single Pole Double Throw (SPDT) relays switch the terminal (COM = Common) between 2 contacts (NO = Normally Open and NC = Normally Closed).

If the relay coil is energized, the terminal connects with the Normally Open contact.

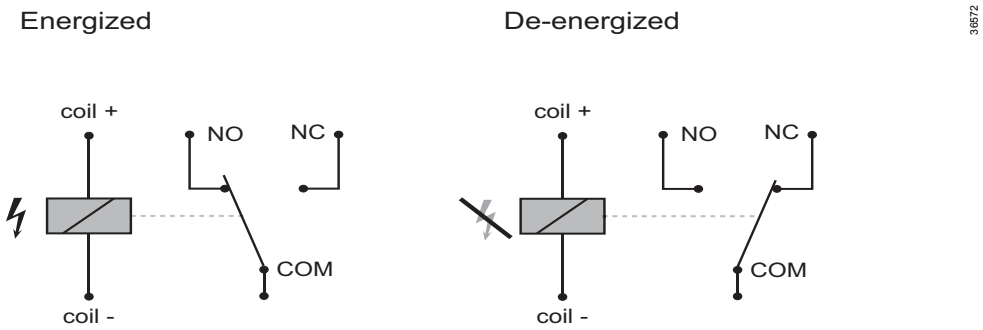


Fig. 16 Energized and de-energized status of a SPDT relay

Relay configurations determine which status the relay has during normal operation. There are 2 relay configurations: Normally Energized and Energized on alarm.

Relay configuration: Normally Energized

During normal operation the relay is energized and the Normally Open contact connects with the Common terminal.

If an alarm is triggered, the relay is de-energized and the Common terminal connects with the Normally Closed contact.

Power loss to the transmitter also de-energizes the relay, connecting the terminal to Normally Closed.

Relay configuration: Energized on alarm

During normal operation the relay is de-energized and the terminal connects with the Normally Closed contact.

If an alarm is triggered, the relay is energized and the terminal connects with the Normally Open contact.

Power loss to the transmitter has no influence on the terminal position.

12.9.2 Relay contacts and relay configuration

The following tables show the status of a connected alarm indicator and whether it indicates faults such as power loss to the transmitter.

The relay's behavior depends on the alarm configuration and the relay contact to which the alarm indicator is connected.

Relay configuration: Normally energized

Contact	Alarm indicator status and fault indication by the alarm indicator		
	Alarm triggered	Transmitter-specific fault	Field wiring fault
Normally Closed	ON	indicated	not indicated
Normally Open	OFF	indicated	indicated

Relay configuration: Energized on alarm

Contact	Alarm indicator status and fault indication by the alarm indicator		
	Alarm triggered	Transmitter-specific fault	Field wiring fault
Normally Closed	OFF	not indicated	indicated
Normally Open	ON	not indicated	not indicated

12.9.3 Examples for relay contacts and configuration

This chapter shows examples for the combination of the connected relay contact and relay configuration depending on the relay status.

The terminology for contacts, configuration and status is similar and can be confusing.

Relay contacts
Designation of relay contacts to which an alarm indicator is connected.

– Normally Open (NO)
– Normally Closed (NC)
– Common (COM)

Relay configuration
Behavior of the relay during operation.

– Normally Energized
– Energized on alarm

Relay status
Status of the relay coil during operation.

– Energized (Common terminal connects with Normally Open contact)
– De-Energized (Common terminal connects with Normally Closed contact)

Relay contact Normally Open (NO) and configuration Normally Energized

This is the Dräger standard setting for relay operation.

The alarm indicator is connected to the Normally Open relay contact. The relay is energized during operation and connects the Common terminal with the Normally Open contact. The electric circuit is closed and current flows to the alarm indicator.

If an alarm is triggered, the relay de-energizes

This setting is suitable for green status lights.

Failures such as field wiring faults, defective alarm indicators and power loss to the transmitter are indicated.

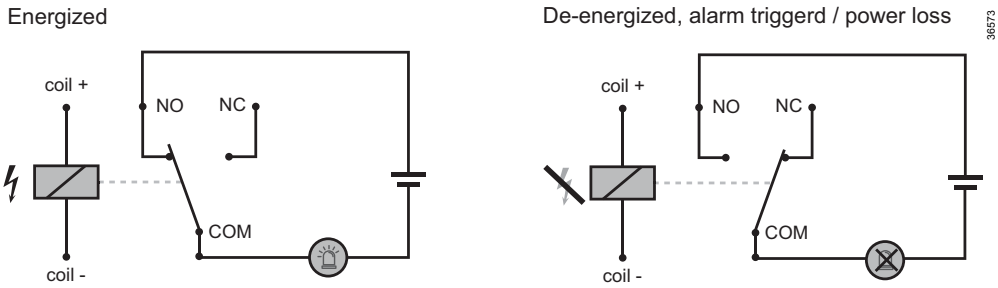


Fig. 17 Example for relay configuration Normally Energized and Normally Open relay contact.

Relay contact Normally Open (NO) and configuration Energized on alarm

The alarm indicator is connected to the Normally Open relay contact. The relay is de-energized during operation and connects the Common terminal with the Normally Closed contact. The electric circuit is open and no current flows to the alarm indicator.

If an alarm is triggered, the relay energizes and the alarm indicator is active.

This setting is suitable for horns or strobes.

Failures such as field wiring faults, defective alarm indicators or power loss to the transmitter are not indicated.

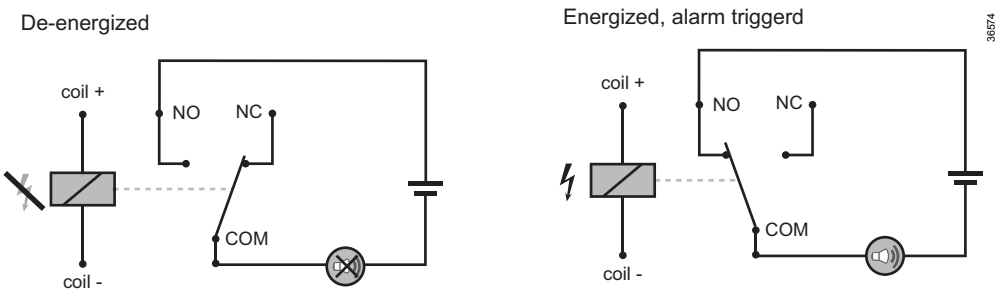


Fig. 18 Example for relay configuration Energized on alarm and Normally Open relay contact.

Relay contact Normally Closed (NC) and configuration Normally Energized

The alarm indicator is connected to the Normally Closed relay contact. The relay is energized during operation and connects the Common terminal with the Normally Open contact. The electric circuit is open and no current flows to the alarm indicator.

If an alarm is triggered, the relay de-energizes and the alarm indicator is active.

This setting is suitable for horns and strobes.

Failures such as field wiring faults and defective alarm indicators are not indicated. Power loss to the transmitter is indicated.

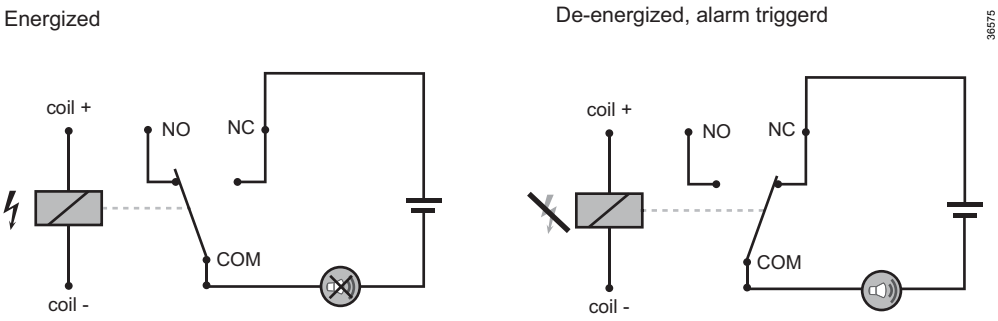


Fig. 19 Example for relay configuration Normally Energized and Normally Closed relay contact.

Relay contact Normally Closed (NC) and configuration Energized on alarm

The alarm indicator is connected to the Normally Closed relay contact. The relay is de-energized during operation and connects the Common terminal with the Normally Closed contact. The electric circuit is closed and the alarm indicator is active.

If an alarm is triggered, the relay energizes and the alarm indicator is deactivated.

This setting is suitable for green status lights.

Failures such as field wiring faults and defective alarm indicators are indicated. Power loss to the transmitter is not indicated.

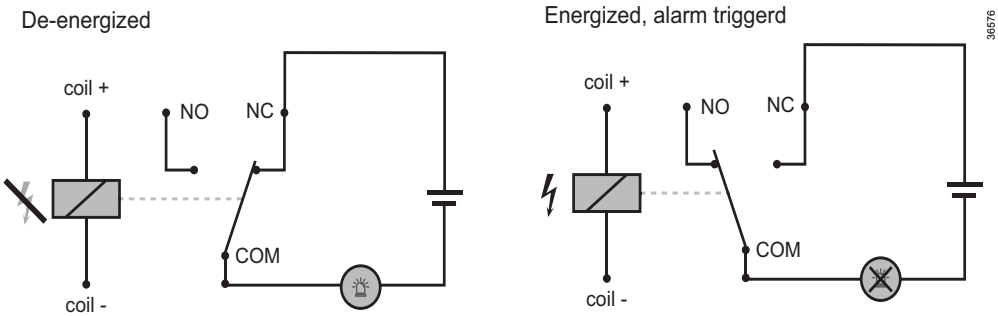


Fig. 20 Example for relay configuration Energized on alarm and Normally Closed relay contact.

Dräger standard for relay wiring is Normally Open with relay configuration normally energized. This way, power loss to the transmitter and transmitter-specific failures are indicated.

12.9.4 Setting fault relay warm-up 1

This function is used to set operation of the fault relay during warm-up 1 to indicate the warm-up 1 state on the relay output.

1. Select ***Settings*** > ***Instrument*** > ***Alarm***> ***Fault warm up*** the desired option and confirm.

static	The fault relay triggers a connected alarm indicator permanently. The orange LED is lit continuously.
dynamic	The fault relay switches state for 9 seconds. *Example:* – A horn is connected to fault relay output Normally Open. – Relays are configured as normally energized. ⇒ The horn and the orange LED of the transmitter are 1 second active and 9 seconds in-active.

12.9.5 Configuring relay A1 or A2

This function defines whether the alarm relay is energized during normal operation or energized at an alarm condition.

1. Select ***Settings*** > ***Instrument*** > ***Alarm***> ***Relay A1*** or ***Relay A2*** and confirm.
2. Select the desired option and confirm.

Normally energized	The relay contact is energized during normal operation and changes if an alarm is triggered. At a loss of power this triggers an alarm (fail-safe).
Energ. on alarm	If an alarm is triggered, the relay contact is energized.

12.9.6 Combinations of latching and alarm acknowledgment

The following examples give an overview of relay acknowledgment combinations.

	Latching (Manual relay reset)	**Non-Latching** (Automatic relay reset after alarm condition cleared)
Acknowledgeable	Relay reset possible at any time.	
Non-acknowledgeable	Relay reset not possible before alarm condition cleared.	
Pre-acknowledgeable	Alarm acknowledgment possible before the alarm condition cleared. The relay resets automatically after the alarm condition cleared.	

Latching and non-latching signals are not time-limited. Latching signals stay active until they are acknowledged. Non-latching signals stop as soon as the triggering condition clears.

12.10 Alarm configuration

12.10.1 Switching the alarms on or off

1. Select ***Settings*** > ***Instrument*** > ***Alarm*** > ***Alarm on/off***.

Enable	Alarm signaling is on.
Disable	Alarm signaling is off. LEDs, relays and interfaces do not indicate an alarm condition. The 4-20mA interface transmits the maintenance signal. The measured value and the symbol ! are displayed. The fault relay indicates a fault.

2. Select ***Enable*** or ***Disable*** and confirm.

12.10.2 Configuring alarms

1. Select ***Settings*** > ***Instrument*** > ***Alarm*** > ***Alarm A1*** or ***Alarm A2*** and confirm. The current alarm threshold is displayed.
2. Apply settings and confirm the configuration steps successively with ***Next***.
   a. Set value for alarm threshold.
   b. Set alarm direction.

Rising	The alarm direction is called rising, if the gas concentration has to exceed a certain value to activate an alarm.
Falling	The alarm direction is called falling, if the gas concentration has to fall below a certain value to activate an alarm.

   c. Set latching mode.

Latching	Once the alarm threshold is reached, the instrument will trigger the alarm. It will remain in alarm status even if the gas concentration does not meet the alarm condition any more. To clear a latching alarm it has to be acknowledged.
Non-latching	The alarm status clears if the gas concentration does not meet the alarm condition anymore.

   d. Set acknowledgement mode.

Acknowledgeable	Alarm relay and LED can be reset before alarm condition clears.
Non-acknowledgeable	Alarm relay and LED can not be reset until the alarm condition clears.
Pre-Acknowledgeable	Alarm status is acknowledgeable before the alarm condition clears. However, the alarm relay and LED stay active until the alarm condition clears.

e. Set the hysteresis mode.
The hysteresis function defines an interval where a triggered relay maintains its status until the gas concentration is outside the defined interval. Example: Alarm threshold is set to 40 ppm and hysteresis to 3 ppm The alarm stays active until the value falls below 37 ppm. This prevents relays from chattering at an alarm threshold.
⇒ A confirmation screen shows all settings.

f. Select ***Confirm*** and confirm with OK.

✓ The new settings are saved.

12.11 Testing alarms/relays

These functions change the status of a relay and LED for test purposes (e.g. to check the function of alarm devices connected to the relay) and the symbol is displayed. After exiting this function, the status of the relay and LED will automatically return to their previous status.

1. Select ***Settings*** > ***Instrument*** > ***Alarm*** the desired alarm condition and confirm.

Set Alarm A1	Simulates pre-alarm
Set alarm A2	Simulates main alarm
Set fault	Simulates fault signal

2. Select ***Enable*** or ***Disable*** and confirm.

✓ If the function is activated, the fault relay is de-energized and the 4 to 20 mA interface is set to the fault current. The yellow LED is lit, the symbol for maintenance is shown.

13 Interface settings

For further information regarding the configuration of other interfaces consult the relevant documents.

Interface	Document
PROFIBUS® PA	Technical PROFIBUS® Handbook 9033782
Foundation™ Fieldbus FF	Technical Fieldbus Handbook 9033783
Modbus RTU	Technical Modbus Handbook 9033781

13.1 4-20mA interface

The current output of the instrument during normal operation is between 4 and 20 mA and is proportional to the detected gas concentration.

Polytron® 8xx0 uses different current values to indicate various modes of operation. The factory default settings are user adjustable for application specific requirements. This follows the NAMUR recommendation NE43.

13.1.1 Full scale deflection

Polytron® 8100 EC, 87x0 IR and 8200 CAT LC only

Some sensors offer an adjustable full scale deflection to limit the measuring range for the 4-20 mA interface.

The full scale deflection (FSD) sets an endpoint within the measuring range of the sensor. If the gas concentration reaches this endpoint, the 4-20mA interface transmits 20mA.

Example: Required range 0 to 500 ppm CO (e.g. part number 6809605 default 300 ppm, range min/max = 50/1000 ppm).Select full scale deflection as 500 ppm. The analog output will be linear between 4 mA = 0 ppm and 20 mA = 500 ppm.

Full scale deflection

The full scale deflection only sets the 20 mA endpoint of the analog interface for a certain gas concentration. This has no effect on relays or on the display.

If the gas concentration exceeds the full scale deflection, the display continues to indicate the measure value with the indicator "Measuring range of the analog interface exceeded”  .

The following table shows the correlation between Display indication, relays and analog interface output depending on assumed values.

Assumed values:

LC sensor (measuring range: 5-10% LEL),

A1 = 8% LEL,

A2 = 9% LEL,

FSD = 7% LEL.

Gas Concentration	Relays	Display	Analog interface
6.5 % LEL	no change	Measured value	Linear current between 4 and 20mA
7.5 % LEL	no change	Measured value and 	20mA
8.5 % LEL	A1 switches	Measured value and 	20mA
9.5 % LEL	A1 and A2 switch	Measured value and 	20mA
10.5 % LEL	A1 and A2 switch	4 upwards-pointing arrows Value is over measuring range of the sensor.	20mA

13.1.2 Setting fault current

This function defines the current for the fault signal.

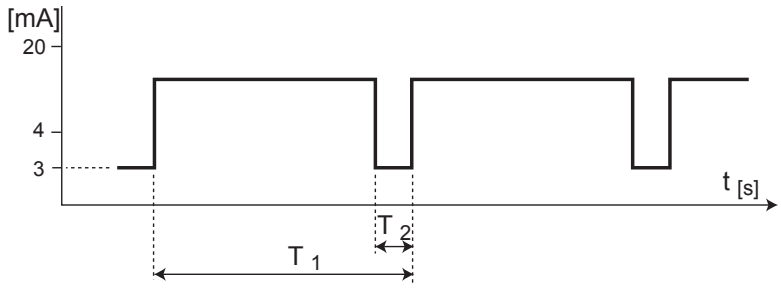
1. Select ***Settings*** > ***Communication*** > ***Analog interface*** >***Fault current*** and confirm.
2. Select the line for editing the current and confirm.
3. Set the current and confirm.
   ⇒ The setting for the ***Fault current*** is displayed.
4. Select ***Confirm*** and confirm with [OK].

13.1.3 Information regarding the warning signal

To transmit a warning signal via the analog interface, the warning signal must be switched on.
The warning signal alternates between the warning current and the measurement current.

– Warning current (interval T2)
– Measurement current (interval T1-T2)

Time intervals and the warning current are configurable.



13.1.4 Switching the warning signal on or off

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** > ***Warning*** and confirm.
2. Select ***Enable*** or ***Disable*** and confirm.

13.1.5 Setting warning interval

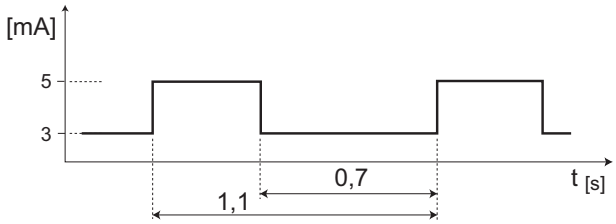
1. Select ***Settings*** > ***Communication*** > ***Analog interface*** > ***Warning interval*** and confirm.
2. Set times for warning intervals T1 and T2 and confirm.

13.1.6 Setting warning current

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** > ***Warning current*** and confirm.
2. Set the current and confirm with [OK].

13.1.7 Setting maintenance signal

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** > ***Maint. signal*** and confirm.
2. Set the signal type and confirm.

static	A constant current that can be configured.
dynamic	A square wave signal with the following characteristics: 

13.1.8 Setting static maintenance current

The maintenance current can only be set if the maintenance signal has been set to static.

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** >***Maint. current*** and confirm.
2. Set the current and confirm.

13.1.9 Setting analog offset

This function adds an offset to the analog output at 4 mA. The offset adjusts the current at 4 mA without affecting the 20 mA set point.

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** >***Analog offset*** and confirm.
2. Select the line for editing the offset (range: -0.5 to 0.5 mA, SIL: -0.1 to 0.1) and confirm.
3. Set the current and confirm.

   ⇒ The setting for the ***Analog offset*** is displayed.
4. Select ***Confirm*** and confirm with [OK].

13.1.10 Setting analog span

This function adjusts the analog output at 20 mA without affecting the 4 mA set point.

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** > ***Analog span*** and confirm.
2. Select the line for editing the offset (range: -0.5 to 0.5 mA, SIL: -0.1 to 0.1) and confirm.
3. Set the current and confirm.

   ⇒ The setting for the ***Analog span*** is displayed.
4. Select ***Confirm*** and confirm with [OK].

13.1.11 Testing the analog interface

These functions change the current of the analog interface for test purposes (e.g. to check the programming of the control unit). It might be necessary to inhibit the alarms at the control unit to avoid false alarms. After exiting these functions, the currents automatically return to the maintenance signal. During the test, the maintenance symbol is displayed.

- To set current or concentration:

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** and the desired option.

Set Current	This function sets the current to any value between 0 and 22 mA. Analog offset and analog span are not used for this function.
Set concentr.	This function sets the current corresponding to any measurement value between 0 ppmand full scale deflection.

2. Once the alarms at the control unit are inhibited, confirm the message ***Inhibit all alarms*** with ***Next***.
3. Select the line for editing and confirm with [OK].
4. Set the desired value.
5. Select ***Next*** and confirm.
6. Select the desired option:

Set concentr. out / ***set current out***	This function sets the preset measurement value or current test value. During the test, the maintenance symbol is displayed.
concentration off / ***current off***	This function aborts the transmission of the preset test value.

7. Select ***Next*** and confirm.
   ⇒ The function is aborted.
8. Once the alarms at the control unit are enabled again, confirm the message ***Enable all alarms***.

- To set a test signal:

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** and the desired test.

Set fault	Sets the current to the fault current.
Set warning	Sets the current to the warning current.
Set mainten.	Sets the current to the maintenance current.

2. Once the alarms at the control unit are inhibited, confirm the message ***Inhibit all alarms***.
3. Select ***Enable*** or ***Disable*** and confirm.

13.1.12 Beam block

This function is only available for Polytron® 87x0 IR (using the sensor PIR 7x00).

The factory default setting for the beam block function is off.

If turned On, the beam block signal will be transmitted on the analog interface if the optics of the PIR 7x00 sensor is “dirty”. The optics of the PIR 7x00 can become “dirty” if there is a build-up of deposits on the optical surfaces. However, if the gas concentration rises to a level above beam block limit, the instrument returns to normal operation.

If the build-up of deposits on the optical surfaces increases beyond the point where a measurement is possible, the instrument will go into fault.

- To set beam block signals on/off:

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** and the desired option.

Beamblock on/off	This function switches the beam block on or off
Set beamblock	This function sets the current to the beam block warning current

2. Select ***Enable*** or ***Disable*** and confirm.

- To set beam block signals:

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** and the desired option.

Beambl. current	This function defines the current for the beam block signal.

Beamblock limit.	This function defines the maximum limit if the beam block signal will be transmitted on the analog interface.

2. Select the current line for editing the current and confirm.
3. Set the current and confirm.
   ⇒ The setting for the beam block current is displayed.
4. Select ***Confirm*** and confirm with OK.

13.2 HART® interface

13.2.1 Setting Polling Adress

The polling address configures the instrument for analog operation (4 to 20 mA) or multidrop operation. Setting the polling address to 0 activates analog operation (4 to 20 mA). Setting the polling address to a value between 1 and 15 activates multidrop operation. In multidrop operation the analog interface is deactivated and set to a constant current of approximately 1 mA.To allow the central controller to request the Unique Identifier (unique HART address) with HART command #0, all the devices on a line must be configured with different polling addresses. It is advised to choose a sequence starting with 1 and continuous increments. This function corresponds to HART command #6 (Write Polling Address).

1. Select ***Settings*** > ***Communication*** > ***Hart Schnittst.*** > ***Polling Adresse***.
2. ***Set Polling Adress*** and ***Confirm***.

13.2.2 Display HART address (Unique Identifier)

This function reads the Unique Identifier (unique HART address). It has to be known for almost all HART addressing commands. However, this information is only required for systems which are not able to read back the Unique Identifier using the HART command #0 in Short-Frame Format or HART command #11. The display corresponds to the address for HART command #0 (Read Unique Identifier) or #11 (Read Unique Identifier associated with Tag).

1. Select ***Settings*** > ***Communication***> ***Hart Schnittst.*** > ***Unique Identifr***.
2. Set a unique HART address and ***Confirm***

13.2.3 Setting HART Tag

The tag can be used to identify an instrument. It can contain up to 8 alphanumeric characters. The tag can also be used as an address for reading the unique identifier using HART command #11 (Read Unique Identifier Associated with Tag), even if the polling address is unknown. This requires that a unique tag has been configured for each instrument.

1. Select ***Settings*** > ***Communication*** > ***Hart Schnittst.*** > ***Tag***.
2. Set HART tag and ***Confirm***.

13.2.4 Settings Dräger REGARD protocols

This function switches between different HART protocols.

1. Select ***Settings*** > ***Communication***> ***Hart Schnittst.*** > ***Dräger REGARD***
2. Select the software version corresponding to your REGARD controller.

14 Sensor settings Polytron® 8xx0

14.1 Switching automatic calibration on or off

1. Select ***Settings*** > ***Sensor*** > ***Auto calibration*** and confirm.
2. Select ***Enable*** or ***Disable*** confirm with [OK].

14.2 Capture range

The capture range blanks out measurement fluctuations. Measurement fluctuations are minor variations in measured values (such as signal noise, variations in concentration). Those variations do not change the transmitted or displayed value. Measured values within this range will be displayed with the capture value. Measured values outside the capture range will be displayed with the actual measured value.

Capture value (offset)

The capture value is displayed continuously, as long as the measured value ranges between the upper and lower capture value limits.

Upper capture value limit

The upper capture value limit marks the upper limit of the range in which the capture value is displayed.

Lower capture value limit

The lower capture value limit marks the lower limit of the range in which the capture value is displayed.

14.2.1 Setting capture range

1. Select ***Settings*** > ***Sensor*** > ***Display Capture*** and confirm.
2. Set offset in the first window.
3. Set the lowest value of the capture range and confirm with ***Next***.
4. Set the highest value of the capture range and confirm with ***Next***.
5. Check all the values and confirm with ***Next***.

14.2.2 Switching capture range off

1. Select ***Settings*** > ***Sensor*** > ***Display Capture*** and confirm.
2. Set offset in the first window.
3. Set the lowest value of the capture range to 0 and confirm with ***Next***.
4. Set the highest value of the capture range to 0 and confirm with ***Next***.
5. Check all the values and confirm with ***Next***.

14.3 Resetting sensor

This function resets the sensor to factory default settings.

1. Select ***Settings*** > ***Sensor*** > ***Init. channel*** and confirm.
2. Select ***Confirm*** and confirm with [OK].

14.4 Setting calibration interval

After the calibration interval expires, the instrument will issue a warning that the calibration is past due.

1. Select ***Settings*** > ***Sensor*** > ***Cal. interval*** and confirm.
2. Set the calibration interval and confirm with [OK].

14.5 Setting sensor lock

This point is only valid for Polytron® 8100 EC and Polytron® 87x0 IR.

1. Select ***Settings*** >***Sensor*** > ***Sensor lock*** and confirm.
2. Select ***On*** or ***Off***.

On	The instrument rejects any sensor whose part number does not match the part number of the previously installed sensor.
Off	The instrument accepts any suitable sensor, uploading the default settings of this sensor. However, this overwrites any customized settings with the default settings of the new sensor.

14.6 Software dongles for EC sensors

14.6.1 Installing software dongles

Polytron® 8100 EC-specific:

1. Switch off power to the instrument or declassify the area according to the local regulations.
2. Loosen set-screw and unscrew lid from instrument.
3. Insert the dongle with the Dräger logo facing upwards in the slot of the PCB unit, see figure D under product overview
4. Place the PCB unit back cover and close the instrument (see "Closing the Ex d enclosure with correct torques", page 28).

14.6.2 Deactivating dongles

Polytron® 8100 EC-specific:

This function deactivates a SW dongle to safely remove the dongle or if the dongle is faulty.

A dongle can only be reactivated by cycling the power to the instrument.

1. Select ***Settings*** > ***Instrument*** > ***SW dongle*** and the dongle to be deactivated and confirm.
2. Select ***Deactivation func.*** The selected dongle is deactivated.

14.7 Sensor settings Polytron® 8100 EC

14.7.1 Sensor test

This function is only active if the sensor test or diagnostics dongle is installed. If the sensor does not pass the self-test, a warning or fault message is issued.

Setting periodic sensor test

This function periodically initiates the sensor self-test. The instrument routinely checks the sensor for proper function.

1. Select ***Settings*** > ***Sensor*** > ***Set sensor test*** and confirm.
2. Select ***Enable*** or ***Disable*** and confirm.

Starting sensor test manually

This function starts a singular sensor test.

1. Select ***Settings*** > ***Sensor*** > ***Sensor test*** and confirm.
2. Select ***Start sensor test*** and confirm.
3. Select ***Confirm***

✓ The test result is displayed.

14.7.2 Gas settings

Setting gas settings

This function sets the gas type, measuring range and units of measurement. Only certain sensors support these settings.

1. Select ***Settings*** > ***Sensor*** > ***Gas setting*** and confirm.
   ⇒ The current measured gas is displayed.
2. Select a measured gas from the list and confirm.
   ⇒ The current unit of measurement is displayed.
3. Select the unit of measurement from the list and confirm.
   ⇒ The current full scale deflection is displayed.
4. For certain EC sensors only: Set the full scale deflection and confirm.
   ⇒ The new full scale deflection is displayed.
5. Select ***Next*** and confirm.
   ⇒ An overview of the new gas settings is displayed.
6. After review, select ***Back to menu*** or ***Confirm***.

Back to menu	Select Back to menu for leaving the function without changes and confirm with [OK].
Confirm	Select Confirm to accept the settings and confirm with [OK].

14.8 Sensor settings Polytron® 8200 CAT / 8310 IR

14.8.1 Sensor type

This function defines the sensor type installed.

1. Select ***Settings*** > ***Sensor*** > ***Sensor type*** and confirm.

2. Select the sensor type and confirm.

14.8.2 Gas settings

This function sets the unit of measurement.

For LC sensors, this function also sets the full scale deflection.

1. Select ***Settings*** > ***Sensor*** > ***Gas setting*** and confirm.
2. Select the unit of measurement from the list and confirm.
   ⇒ For DQ sensors and DSIR:
   An overview of the new gas settings is displayed. Continue with step 4.
   ⇒ For LC sensors:
   The current full scale deflection is displayed. Continue with step 3.
3. Set the full scale deflection and confirm (only for LC sensors).
   ⇒ An overview of the new gas settings is displayed.
4. After review, select ***Back to menu*** or ***Confirm***.

Back to menu	Select Back to menu for leaving the function without changes and confirm with [OK].
Confirm	Select Confirm to accept the settings and confirm with [OK].

14.8.3 Setting DQ sensor latching

This function is only available without relays installed. This function configures whether the DQ sensor must be acknowledged after a measurement at higher concentration than 100%LEL.
This setting does not apply for LC sensors.

1. Select ***Settings*** > ***Sensor*** > ***DQ Sensor latch.*** and confirm.
   ⇒ The current setting is displayed.
2. Select ***Enable*** or ***Disable*** and confirm.

⚠ WARNING
Explosion Hazard
If sensor latching is disabled and an alarm indicating an explosion hazard is acknowledged, the instrument informs the end user of such hazard by having the red LED on the display being continuously lit.
► Before acknowledging an over range, ensure that the gas concentration has fallen under 100%LEL.

⚠ WARNING
Explosion Hazard possible
Operation non-compliant with BVS type examination.
If DQ sensor latching is disabled, for safe operation in accordance with BVS 13 ATEX G 001 X, the control unit must support this function.
► Make sure that over range latching is active at the control unit.

14.9 Sensor settings Polytron® 87x0 IR

14.9.1 Gas settings

This function sets the gas type, measuring range and units of measurement. Only certain sensors support these settings.

1. Select ***Settings*** > ***Sensor*** > ***Gas setting*** and confirm.
   ⇒ The current measured gas is displayed.
2. Select a measured gas from the list and confirm.
   ⇒ The current unit of measurement is displayed.
3. Select the unit of measurement from the list and confirm.
   ⇒ If the unit of measurement is set to %LEL, %UEG, or %LIE, the category will be displayed. Continue with step 4.
   ⇒ Otherwise the current full scale deflection is displayed. Continue with step 6.
4. Select a category and confirm.
5. Set the LEL value and confirm.
6. Set the full scale deflection and confirm.
   ⇒ The new full scale deflection is displayed.
7. Select ***Next*** and confirm.
   ⇒ An overview of the new gas settings is displayed.
8. After review, select ***Back to menu*** or ***Confirm***.

Back to menu	Select Back to menu for leaving the function without changes and confirm with [OK].
Confirm	Select Confirm to accept the settings and confirm with [OK].

9. Check the alarm settings after changing the category or the LEL value.

15 Factory default settings

15.1 Fixed settings for relays, LED and alarm

	Setting
Fault relay	Energized / Normally Open
Yellow Fault LED	Lit if a fault message is available
Red Alarm LED	Single blink if A1 condition is present. Double blink if A2 condition is present. If an alarm is configured as acknowledgeable and the alarm is acknowledged, single/double blink changes into continuously lit.
Alarm Hierarchy	A2 overrides A1 on the LED. However, the A1 and A2 relays operate independently. I.e. if A1 is acknowledgeable and A2 is not, and the gas concentration is such that it triggers A1 and A2: acknowledging will cause the A1 relay to release. However, the red LED will still double blink as long as the A2 condition continues to exist.

15.2 Settings which can be changed via the menu

15.2.1 Polytron® 8xx0

Menu	Default setting	Range
Relay active on alarm / No alarm	Active on alarm	On / Off
A1 alarm: direction	Rising (falling for O_2 Sensors)	Falling / Rising
A2 alarm: direction	Rising	
A1 latch mode	Non-latching	Latching / Non-latching
A2 latch mode	Latching	
A1 acknowledgment mode	Acknowledgeable	Acknowledgeable / Not acknowledgeable / Pre-acknowledgeable
A2 acknowledgment mode	Not acknowledgeable	
Normal operation A1 relay	Energized	Energized / Not energized
Normal operation A2 relay		
Calibration password	_ _ _ 1	
Settings password	_ _ _ 2	
LCD setting	On	On / Off
SIL status	Off	On / Off
Language	EN	DE / EN / FR / ES / RU / ZH
Auto-calibration	Off	On / Off
Function key	Faults	Graph, fault, warning, vitality, bump test

Interface	Default setting	Range
Fault current	1.2 mA	0 to 3.5 mA
Warning	Off	On / Off
Warning current	3.0 mA	0 to 3.5 mA
Warning cycle interval T1	10 sec	5 to 60 sec
Warning cycle interval T2 (warning current)	1 sec	1 to (T1-1) sec
Maintenance signal	static	static / dynamic
Maintenance current	3.4 mA	0 to 3.5 mA
Analog offset	0 mA	-0.5 to 0.5 mA
Analog span	0 mA	-0.5 to 0.5 mA
HART® address	0	0 to 15
Modbus address[1)]	126	2-126
Modbus parity[1)]	even (default)	even, odd parity, no parity
Modbus baudrate[1)]	9600 bps	9600 or 19200 bps
PROFIBUS® address[1)]	126	2-126

1) Fieldbus interfaces are not in accordance with the BVS 13 ATEX G001 X. Using the fieldbus interface no relays are available.

15.3 Sensor-specific values

See sensor data sheet for further specifications.

15.3.1 Sensor range electrochemical (EC) sensors

Sensor	Part number	Range			Default value	
		Min.	Default	Max.	A1	A2
CO	6809605	50	300	1000	30	100
CO LH	6812570	50	300	300	30	100
CO LS	6809620	200	1000	5000	200	400
H_2S LC	6809610	10	50	100	10	20
H_2S	6810435	5	50	100	10	20
H_2S HC	6809710	100	500	1000	100	200
OV1	6810740	20	50	200	10	20
OV2	6810745	20	50	100	10	20
NO	6809625	30	50	200	10	20
O_2 LS	6809630	5	25	25	19	23
O_2	6809720	5	25	100	19	23
Hydride	6809635	0.3	1	20	0.1	0.2

Sensor	Part number	Range			Default value	
		Min.	Default	Max.	A1	A2
Hydride SC	6809980	0.3	1	1	0.1	0.2
HCN	6809650	10	50	50	10	20
HCN LC	6813200	5	50	50	4	8
NO_2	6809655	5	10	100	2	4
NO_2 LC	6813205	1	5	20	0.5	1
SO_2	6809660	5	10	100	2	4
CI2	6809665	1	10	50	0.5	1
H_2O_2 LC	6809705	1	5	300	1	2
H_2O_2 HC	6809675	1000	4000	7000	200	2800
H_2	6809685	500	1000	3000	200	400
COCI2	6809930	0.1	1	20	0.1	0.2
Hydrazin	6810180	0.3	1	5	0.1	0.2
HCl SC	6809640	20	30	100	5	10
AC	6810595	3	10	30	2.5	5
PH3/AsH3	6809695	0.3	1	20	0.1	0.2
NH3 HC	6809645	300	1000	1000	50	100
NH3 LC	6809680	50	100	300	12.5	25
NH3 FL	6813260	50	100	300	12.5	25
NH3 TL	6813095	50	100	300	12.5	25
NH3 TH	6800055	300	1000	10000	50	100
Ozon	6814005	0.5	1	5	0.1	0.2

15.3.2 Polytron® 8100 EC

Menu	Default setting	Range
A1 Alarm	Depending on the sensor	
A2 Alarm	Depending on the sensor	
Hysteresis for A1 alarm at direction rising	0	0 to A1
Hysteresis for A2 alarm at direction rising	0	0 to A2
Calibration interval [days]	Depending on the sensor	0 to 720
Display capture offset	20.9 Vol% (O_2)	0 to 25 Vol% (O_2 LS) 0 to 100 Vol% O_2)
Display capture low	-0.25 Vol% (O_2)	0 to -0.75 Vol%
Display capture high	0.25 Vol% (O_2)	0 to 0.75 Vol%
Full scale deflection	25 Vol% (O_2, O_2LS)	5 to 25 Vol% (O_2 LS) 5 to 100 Vol% O_2)

15.3.3 Polytron® 8200 CAT DrägerSensor® DQ

Menu	Default setting	Range
A1 Alarm	20 % LEL	1 to 100 %LEL
A2 Alarm	40 % LEL	
Hysteresis for A1 alarm at direction rising	1 % LEL	0 to A1
Hysteresis for A2 alarm at direction rising	1 % LEL	0 to A2
Calibration interval [days]	180	0 to 360
Display capture offset	0 % LEL	-5 to 4 %LEL
Display capture low	-5 % LEL	-5 to 0 %LEL
Display capture high	2 %LEL	0 to 4 %LEL
Full scale deflection	100 %LEL	Range is not adjustable

15.3.4 Polytron® 8200 CAT DrägerSensor® LC

Menu	Default setting	Range
A1 Alarm	2.0 % LEL	0.1 to 10 % LEL
A2 Alarm	4.0 % LEL	
Hysteresis for A1 alarm at direction rising	0.1 % LEL	0 to A1
Hysteresis for A2 alarm at direction rising	0.1 % LEL	0 to A2
Full scale deflection	10 % LEL	5 to 10[1)] % LEL 1 to 10 % LEL
Calibration interval [days]	180	0 to 360
Display capture offset	0 % LEL	-0.5 to 0.4 % LEL
Display capture low	-0.5 % LEL	-0.5 to 0 % LEL
Display capture high	0.2 %LEL	0 to 0.4 % LEL

1) For firmware versions < 3.0.0

15.3.5 Sensor range catalytic bead (CatEx) sensors

Default alarm values for all CatEx sensors are the same.

Sensor	Partnum-ber	Range			Default value% LEL	
		Min.	Default	Max.	A1	A2
PR DD/DQ	68 12 380	0	100	100	20	40

15.3.6 Polytron® 8310 IR

Menu	Default setting	Range
A1 Alarm	20 % LEL	1 to 100 % LEL
A2 Alarm	40 % LEL	
Hysteresis for A1 alarm at direc-tion rising	1 % LEL	0 to A1
Hysteresis for A2 alarm at direc-tion rising	1 % LEL	0 to A2
Calibration inter-val [days]	180	0 to 360
Display capture offset	0 % LEL	-3 to 4 % LEL
Display capture low	-3 % LEL	-3 to 0% LEL
Display capture high	2 %LEL	0 to 4% LEL
Full scale deflec-tion	100 %LEL	Range is not adjustable

15.3.7 Polytron® 8700 IR

Type 334

Menu	Default setting	Range
Calibration gas	Methane	
Calibration gas units	%LEL	
Calibration gas concentrations	50 %LEL	
A1 Alarm	20 %LEL	0.01 to 100 Vol% at unit %LEL = 0.3 to 100 %LEL
A2 Alarm	40 %LEL	
LEL type	NIOSH	IEC / PTB / NIOSH / configurable
Measured gas	Methane	
Measured gas units	%LEL	%LEL / Vol% / PPM / %LEL / %LIE
Full scale deflec-tion	100 % LEL	20 to 100 %LEL
Beam block	Off	On / Off
Beam block cur-rent	2 mA	0 to 3.5 mA
Beam block limit	7.5 %LEL	0 to max. 15 %LEL[1)]

Menu	Default setting	Range
Calibration interval [days]	360	0 to 720
Response	Normal	Normal / Fast
Display capture offset	0	The absolute values of the display capture must be inside these limits: -1000 to 2200 ppm (methane Type 334) -850 to 850 ppm (propane Type 334) -1200 to 1150 ppm (ethylene Type 334)
Display capture low	-750 ppm (methane) -315 ppm (propane) -405 ppm (ethylene)	
Display capture high	750 ppm (methane) 315 ppm (propane) 405 ppm (ethylene)	

1) The maximum Beam block limit depends on the type of transmitter and the selected measuring gas.

Type 340

Menu	Default setting	Range
Calibration gas	Propane	
Calibration gas units	%LEL	
Calibration gas concentrations	50 %LEL	
A1 Alarm	20 %LEL	0.01 to 100 Vol% at unit %LEL = 0.3 to 100 %LEL
A2 Alarm	40 %LEL	
LEL type	NIOSH	IEC / PTB / NIOSH / configurable
Measured gas	Propane	
Measured gas units	%LEL	%LEL / Vol% / PPM / %LEL / %LIE
Full scale deflection	100 % LEL	20 to 100 %LEL
Beam block	Off	On / Off
Beam block current	2 mA	0 to 3.5 mA
Beam block limit	2.5 %LEL	0 to max. 15 %LEL[1)]
Calibration interval [days]	360	0 to 720
Response	Normal	Normal / Fast

Menu	Default setting	Range
Display capture offset	0	The absolute values of the display capture must be inside these limits: -850 to 425 ppm (propane Type 340) -1800 to 2200 ppm (methane Type 340)
Display capture low	-750 ppm (methane) -85 ppm (propane)	
Display capture high	750 ppm (methane) 85 ppm (propane)	

1) The maximum Beam block limit depends on the type of transmitter and the selected measuring gas.

15.3.8 Polytron® 8720 IR

Menu	Default setting	Range
Calibration gas	CO_2	
Calibration gas units	Vol%	
Calibration gas concentrations	4.0 Vol%	0.2 to 100 Vol%
A1 Alarm	1 Vol%	0.01 to 100 Vol%
A2 Alarm	2 Vol%	
LEL type	-	
Measured gas	CO_2	
Measured gas units	Vol%	Vol% / PPM
Full scale deflection	10 Vol%	0.2 to 100 Vol%
Beam block	Off	On / Off
Beam block current	2 mA	0 to 3.5 mA
Beam block limit	0.1 Vol%	0 to 0.1 Vol%
Calibration interval [days]	360	0 to 720
Response	Normal	Normal / Fast
Display capture offset	340 ppm	The absolute values of the display capture must be inside these limits: -1000 to 1000 ppm (carbon dioxide)
Display capture low	-200 ppm	
Display capture high	200 ppm	

16 Disposal

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

Disposal of electrochemical sensors

⚠ WARNING
Danger of explosions and risk of chemical burns!
Sensor fluids may leak out and can cause acid burns.
► Do not dispose sensors in fire
► Do not open with force

17 Technical data

17.1 Measuring ranges

Sensor	Measuring range
Polytron® 8100 EC with DrägerSensor® EC	Depending on the sensor
Polytron® 8200 CAT with DrägerSensor® DQ	0 to 100 %LEL
Polytron® 8200 CAT with DrägerSensor®LC	0 to 10 %LEL[1)]
Polytron® 8310 IR with DrägerSensor® IR	0 to 100 %LEL
Polytron® 8700 IR with PIR 7000 infrared gas sensor	
Type 334 (IDS 01x1)	0 to 10,000 ppm[1)] 0 to 100 %LEL,[1)] 0 to 5 Vol%,[1)] For CH4 (Methane) 0 to 100 Vol%[1)]
Type 340 (IDS 01x2)	0 to 10,000 ppm[1)] 0 to 100 %LEL[1)] 0 to 5 Vol%[1)]
Polytron® 8720 IR with PIR 7200 infrared gas sensor (IDS 01x5)	0 to 100 Vol%[1)]

1) For adjustable full scale deflection, see 15.3.

17.2 Signal transmission to control unit

The measuring range and performance characteristics depend on the installed sensor (see the Instructions for Use and/or data sheet for the installed sensors).

Frequency of measurement calculation: 1 x per second (update of display, analog interface and relays).

Analog signal	
Normal operation	4 ... 20 mA
Drift below zero	3,8 ... 4 mA
Measuring range exceeded	20 ... 20,5 mA
Instrument fault	≤ 1.2 mA
Fault on analog interface	> 21 mA
Maintenance signal	3.4 mA steady signal or 1 Hz modulation between 3 and 5 mA (selectable)

Impedance of the signal loop

Operating mode	Impedance range of the signal loop	Supply voltage range
Operation without HART® communication	0 to 230 Ω	at 10 V DC
	Rising linearly with the supply voltage from: 0 to 230 Ω at 10 V to 0 to 500 Ω at 16 V	10 to 18 V DC
	0 to 500 Ω	18 to 30 V DC
Operation with HART® communication	230 to 270 Ω	at 13 V DC
	Rising linearly with the supply voltage from: 230 to 270 Ω at 11 V to 230 to 500 Ω at 16 V	11 to 16 V DC
	230 to 500 Ω	18 to 30 V DC
HART® Multidrop operation	230 to 500 Ω	10 to 30 V DC

For further information regarding the fieldbus interface installation consult the corresponding Technical Hanbook.

17.3 Cable specifications

For non-conduit installations, use shielded cables.

Analog and HART® connection with control unit and power supply	
Power supply and signals	3-core shielded cable 24 - 12 AWG / 0.2 - 2.5 mm²
Relays	20 - 12 AWG / 0.5 - 2.5 mm²

Digital connection with control unit	
Instruments with fieldbus interfaces and remote sensors must be installed with shielded cables.	
Modbus RTU	4-core, ≥ AWG 26
PROFIBUS® PA Foundation™ Fieldbus	2-core, Cable type A Wave impedance Rw:135 - 165 Ω Capacitance / unit length C‘:< 30 pF/m Loop resistance R‘:110 Ω/km Core diameter d:0.64 mm Core cross section q:> 0.34 mm² Shield coverage:> 90 %
Power supply	24 - 12 AWG / 0.2 - 2.5 mm²

17.4 Power supply and relays

Relay rating[1)] **SPDT[2)]**	
230 V ~	0.1 A - 5 A

Relay rating[1] SPDT[2]	
30 V ⎓, resistive load	0.1 A (minimum) - 5 A

1) For safety-related applications (SIL 2), the maximum contact rating is reduced (see Polytron® 8xx0 Safety Manual).
2) Single pole, double throw, (changeover electrical contacts)

Power supply Polytron® 8xx0	
Operating voltage	10[1] to 30 V ⎓ at the instrument
Inrush current	2.3 A for 2 ms at 24 V ⎓,10 Ω resistor

1) At supply voltages of < 7 V DC the instrument provides a fault signal.

Operating current (max.)	
Polytron® 8100 EC	
without relay, non-remote sensor	80 mA
with relay, remote sensor	100 mA
Polytron® 8200 CAT	
without relay, non-remote sensor	105 mA (DrägerSensor DQ) 130 mA (DrägerSensor LC)
with relay, remote sensor	145 mA (DrägerSensor DQ) 165 mA (DrägerSensor LC)
Polytron® 8310 IR	
without relay, non-remote sensor	145 mA
with relay, remote sensor	185 mA
Polytron® 87x0 IR	
without relay, non-remote sensor	330 mA
with relay, remote sensor	350 mA

17.5 General specifications

Enclosure Polytron® 8xx0	
Enclosure material	copper free aluminum or 316L stainless steel
Enclosure protection	NEMA 4X[1] IP 65/66/67
Display	Resolution 128 x 64 pixel, back-lit

1) Polytron® 8100 EC NEMA 4X enclosure protection pending.

17.6 Environmental parameters

See sensor data sheet for sensor specifications and influences.

Polytron® 8xx0	
Pressure (performance approval)	20.7 to 38.4 in. Hg (700 to 1300 hPa)
Pressure (explosion protection)	23.6 to 32.5 in. Hg (800 to 1100 hPa)
Humidity	0 to 100%RH, non-condensing
Temperature	
Polytron® 8100 EC[1)]	-40 to +149 °F (-40 to + 65 °C) -40 to + 158 °F[2)] (-40 to + 70 °C)[2)]
Polytron® 8200 CAT[3)]	-40 to +176 °F (-40 to +80 °C)
Polytron® 8310 IR	-40 to +149 °F (-40 to +65 °C)
Polytron® 87x0 IR[3)]	-40 to +170 °F (-40 to +77 °C) -40 to + 176 °F[2)] (-40 to + 80 °C)[2)]
Storage temperature	-4 to +149 °F (-20 to +65 °C)
Storage pressure	26.5 to 32.4 in. Hg (900 to 1100 hPa)
Storage humidity	0 to 100%RH, non-condensing

1) See specific EC sensor data sheet for limitations to the maximum specification.
2) Value from Ex approval. For values without this footnote, EX and performance Approval values are identical.
3) Except for relay option and UL approval-relevant installations. For relay option and UL installations: -40 to + 158°F (-40 to +70°C)

The values for accessories and spare parts are less strict than or identical to those of the transmitter. For exact values, refer to the corresponding manual.

17.7 Tightening torque

Instrument threads	
Enclosure lid	≥44 LB IN. / ≥5 Nm
Sensor	min. 266 LB IN. / min. 30 Nm
Blind plugs	min. 266 LB IN. / min. 30 Nm
Ports (for conduits or cable glands)	min. 443 LB IN. / min. 50 Nm
Docking Station blind plugs	62 lbs-in / 7 Nm
Docking Station cable glands	70 lbs-in / 8 Nm
Field wiring terminals	
Power supply, signals and relays	4.4 - 7.0 LB IN. / 0.5 - 0.8 Nm
Grounding screws	10.6 LB IN. / 1.2 Nm

18 Further product documentation

This chapter gives an overview of further documentation on the Polytron® 8xx0 family and assembly instructions of accessories. The list only indicates part numbers for documents with English content, language-neutral content or language clusters containing English content. For other languages visit www.draeger.com/ifu.

18.1 Polytron® 8xx0

Drilling Template, Declaration of Conformity, Control Drawings	4544299
Assembly instructions language cluster 1	4544288
Assembly instructions language cluster 2	4544289
Assembly instructions language cluster 3	4544290
Pole Mount Kit Polytron® 5000/8000	9033237
IR Connection Kit	9033239
Technical Manual Polytron® 8xx0 SIL	9033307
Technical Manual Modbus RTU	9033781
Technical Manual PROFIBUS® PA	9033782
Technical Manual Foundation™ Fieldbus	9033783

18.2 Polytron® 8100 EC

Duct Mount Kit Polytron® 5000/8000	9033235
Splashguard	9033238
EC Remote Duct Adapter	9033246
EC Sensing Head Remote	9033247
EC Remote Process Adapter	9033340

18.3 Polytron® 8200 CAT

Duct Mount Kit Polytron® 5000/8000	9033235
Polytron Sensing Head	9033888

18.4 Polytron® 8310 IR

Duct Mount Kit Polytron® 5000/8000	9033235
Instructions for use DrägerSensor® IR (DSIR)	9023843
Installation Instructions DrägerSensor® IR (DSIR)	9023867

18.5 Polytron® 87x0 IR

Duct Mount Kit Polytron® 57x0/87x0	9033236
Instructions for use PIR 7x00	9023885

19 Accessories and spare parts

This chapter gives an overview of the main parts that are covered by the BVS 13 ATEX G 001 X and PFG 14 G 001 X type examination. For other parts refer to the spare parts list or contact DrägerService.

19.1 Polytron® 8xx0

Description	Part Number
IRDA to PC interface	4544197
Magnetic wand with key chain	4544101
Dräger PolySoft Configuration Software	8328600 / 8328639
Exd blind plug stainless steel	4544321
Exd blind plug galvanic steel	6812269

19.2 Polytron® 8100 EC

Description	Part Number
PCB unit Polytron 8100 4-20/HART	4544781
PCB unit Polytron 8100 4-20/HART, Relay	4544782
Bayonet ring	4544366
Duct mount adapter for EC Sensing Head Remote[1)]	8317617
Pole mount kit for EC Sensing Head Remote	4544213
Sensor test dongle	8317619
Diagnostic dongle	8317860
Calibration adapter PE, Europe	6806978

1) May have an influence on measurement performance, i.e. increasing the response time. Not covered by BVS 13 ATEX G 001 X.

19.2.1 DrägerSensor AC

Description	Part number
DrägerSensor® AC	6810595
Splashguard	6809379
Calibration adapter	8324093

19.3 Polytron® 8200 CAT

Description	Part Number
PCB unit Polytron 8200 4-20/HART	4544788
PCB unit Polytron 8200 4-20/HART Relay	4544789

Description	Part Number
Calibration adapter PE, Europe	6806978
Remote Calibration Adapter DQ	6812480
Remote Calibration Adapter LC[1)]	6812482

1) Remote Calibration Adapter LC is not covered by performance approval.

19.3.1 Sensors

Description	Part number
DrägerSensor DQ NPT	6814150
DrägerSensor LC NPT	6810675
Sensing head, Polytron SE Ex PR M1 DQ	6812711
Sensing head, Polytron SE Ex PR M2 DQ	6812710
Sensing head, Polytron SE Ex HT M DQ	6812720

19.4 Polytron® 8310 IR

Description	Part Number
Splash Guard	6810796
Process Adapter	6811330
Protection Labyrinth	6811135
Calibration adapter	6810859
PCB unit Polytron 8310 4-20/HART	4544788
PCB unit Polytron 8310 4-20/HART Relay	4544789

19.4.1 Sensors

Description	Part number
DrägerSensor IR NPT	6811901
Sensing head, DrägerSensor IR complete set e	6811165
Sensing head, DrägerSensor IR complete set e2	6811265

19.5 Polytron® 87x0 IR

Description	Part Number
PCB unit Polytron 87x0 4-20/HART[1)]	4544795
PCB unit Polytron 87x0 4-20/HART Relay[1)]	4544796
Mounting Set PIR 7000	6811648

Description	Part Number
Process cuvette PIR 7000 Stainless Steel	6811415
Process adapter PIR 7000 SGR	6813219
Status Indicator PIR 7000 / 7200	6811625 / 6811920
Splash Guard PIR 7000 / 7200	6811911 / 6811912
Flow Cell PIR 7000 / 7200	6811490 / 6811910
Bump Test Adapter PIR 7000 / 7200	6811630 / 6811930
Insect Guard PIR 7000	6811609
Hydrophobic Filter PIR 7000	6811890
Calibration Adapter PIR 7000	6811610
Process adapter PIR 7000 / 7200 POM (Polyoxymethylene)	6811915

1) Check firmware compatibility of sensor and transmitter. Changing the PCB may require a firmware update. For support, contact Dräger.

19.5.1 Sensors

Check firmware compatibility of sensor and transmitter. Changing the sensor may require a firmware update. For support, contact Dräger.

Description	Part number
Dräger PIR 7000 Type 334 (NPT)	6811822
Dräger PIR 7000 Type 340 (NPT)	6811832
Dräger PIR 7000 334 (M25) complete set	6811825
Dräger PIR 7000 340 (M25) complete set	6811819
Dräger PIR 7200 (NPT)	6811572
Dräger PIR 7200 (M25) HART, complete set	6812290

20 Performance Approvals

In combination with certain sensors, Polytron® 8xx0 is performance approved by the following standards:

– EU- and Type Examination Certificates in line with EN 60079-29-1, EN 50104, EN 45544. Issued by DEKRA Testing and Certification GmbH, Handwerkstr. 15, D-70565 Stuttgart.
– FM Performance approvals in line with ANSI/ISA-92.00.01 FM6340

For further information on sensor specifications and restrictions (e. g. measuring principles, performance, cross-sensitivities), refer to the Instructions for Use and/ or data sheets for the sensors.

20.1 EU-Type Examination Certificate, BVS 13 ATEX G 001 X

Measurement of flammable gases and vapors mixed with air.

– Polytron® 8200 CAT with DrägerSensor DD or DQ
– Polytron® 8200 CAT with DrägerSensor LC
  Approved with 10 % LEL full scale deflection.
  A connection to a control unit with approved measuring function (e. g. REGARD® 7000) is necessary. Latching alarms for over range measuring values must be enabled at the control unit.
– Polytron® 8310 IR with DrägerSensor IR
– Polytron® 8700 IR with PIR 7000 type 334 and 340

Measurement of oxygen (inertisation)

– Polytron® 8100 EC with DrägerSensor O_2 (6809720) and DrägerSensor O_2 LS (6809630) within a measuring range of 0-5...25 Vol% O_2.

Approved are:

– 4-20mA interface
– Relay module
– Remote sensor (except Polytron® 8100 EC)
– Factory default full scale deflections

Not approved are fieldbus interface and data logger.

20.2 Type Examination Certificate, PFG 14 G 001 X

Measurement of oxygen (deficiency and enrichment)

– Polytron® 8100 EC with DrägerSensor O_2 (6809720) and DrägerSensor O_2 LS (6809630) within a measuring range of 0-25 Vol% O_2.

Measurement of carbon dioxide

– Polytron® 8720 IR with PIR 7200 within the following measuring ranges:
  - 1 Vol% and 10 Vol% - EN 45544-2
  - 2000 ppm, 1 Vol% and 10 Vol% - EN45544-3

Approved are:

– 4-20mA interface
– Relay module

– Remote sensor (except Polytron® 8100 EC)

Not approved are fieldbus interface and data logger.

20.3 Deviations from operating conditions with DrägerSensor O_2 and O_2LS

O_2 sensor cross sensitivities

There are no known cross sensitivities against interfering gases with a concentration up to 100 ppm. For detailed information, contact Dräger.

20.3.1 DrägerSensor O_2 (6809720)

The DrägerSensor O_2 (6809720) is an electrochemical 2-electrode sensor for measuring Oxygen (O_2) in ambient air.

Environmental parameters	
Pressure	20.7 to 38.4 in. Hg (700 to 1300 hPa)
Humidity	10 to 95%RH, non-condensing
Temperature	-5 to +40 °C short term -20 to +55 °C

Storage	
Pressure	no influence
Humidity	30 to 70%RH, non-condensing (only relevant if sensor packaging open)
Temperature	0 to +40 °C
Time	Storing of sensors is not intended. Sensors should be used upon arrival. Remaining service life = Expected Service life - Storage time

Influence of environmental parameters	**Zero point**	**Span[1)]**
Temperature[2)3)]		
-20 to 55 °C	< ± 0.2 Vol%O_2	Relative deviation from reading at 20 °C
-10 to 55 °C	-	< ± 8%
-10 to -20 °C	-	< ± 16%
Pressure	< ±0.2 Vol%O_2	Relative deviation from reading at 1013 hPa: < 10% of measurement value / 100 hPa
Humidity	No influence	Relative deviation from reading at 50 % r.H.: < 1 % of measurement value

1) Relative deviation of display reading is caused by atmospheric pressure changes.
2) At temperatures below -5 °C the measurement deviation is higher than specified in the EN 50104.

3) For operation-temperatures outside -5 °C to 40 °C a calibration at operation temperature must be performed.

Response time[1)]		
	$t_{0...20}$	$t_{0...90}$
0-5 Vol% O_2	≤ 15 seconds[2)]	≤ 33 seconds
0-25 Vol% O_2	≤ 10 seconds	≤ 26 seconds

1) At temperatures below -5 °C, the response time may increase.
2) Response time is higher than the permissible limit of EN 50104.

Stabilization time: 5 x $t_{0...90}$

Measuring range

0-5 Vol% O_2 to 0-100 Vol% O_2

Default: 25 Vol% O_2Minimum reading: -1.25 Vol% O_2

Warm-up time

Operation: <20 minutes / Calibration: ≤ 2 hours

20.3.2 DrägerSensor O_2LS (6809630)

The DrägerSensor O_2LS (6809630) is an electrochemical 3-electrode sensor for measuring Oxygen (O_2) in ambient air.

Environmental parameters	
Pressure	20.7 to 38.4 in. Hg (700 to 1300 hPa)
Humidity	5 to 95%RH, non-condensing
Temperature	-40 to +60 °C short term +65 °C

Storage	
Pressure	no influence
Humidity	30 to 70%RH, non-condensing (only relevant if sensor packaging open)
Temperature	0 to +40 °C
Time	Storing of sensors is not intended. Sensors should be used upon arrival. Remaining service life = Expected Service life - Storage time

Influence of environmental parameters		
	Zero point	Span
Temperature		
-40 to 65 °C	< ± 0.3 Vol%O_2	< ± 0.3 Vol%O_2
Pressure	< ± 0.1 Vol% O_2	Relative deviation from reading at 1013 hPa: < 2 % of measurement value / 100 hPa

Influence of environmental parameters		
	Zero point	**Span**
Humidity	No influence	Relative deviation from reading at 50 % r.H.: < 2.5 % of measurement value

NOTICE

Sensor failure

The sensor cannot be used for Oxygen measurements in the presence of Helium!

► Do not use the sensor for Oxygen measurements in the presence of Helium.

⚠ CAUTION

Sensor failure

The exposure to higher concentrations of unsaturated hydrocarbons, alcohols or hydrogen over an extended period of time (dose approx. 100,000 ppm x hours) could cause the sensor to fail.

► Ensure that the sensor is not exposed to such concentrations over an extended period of time.

Response time		
	$t_{0...20}$	$t_{0...90}$
0-5 Vol% O_2	≤ 14 seconds[1)]	≤ 45 seconds
0-25 Vol% O_2	≤ 10 seconds	≤ 27 seconds

1) Response time is higher than the permissible limit of EN 50104.

Stabilization time: 5 x $t_{0...90}$

Measuring range

0-5...25 Vol% O_2, 0-25 Vol% O_2

Default: 25 Vol% O_2

Minimum reading: -1.25 Vol% O_2

Warm-up time

Operation: ≤ 20 minutes / Calibration: ≤ 6 hours

20.4 FM Performance Approval for DrägerSensor H_2S and H_2S LC

The DrägerSensor H_2S and H_2S LC are electrochemical diffusion sensors measuring hydrogen sulfide (H_2S) in ambient air.

DrägerSensor H_2S (6810435)	
Examination Type P8100	ETR 0400, 0401, 0500, 0501
Interface[1)]	4-20mA, relay
Environmental parameters	
Humidity	5 to 95%RH, non-condensing

DrägerSensor H_2S (6810435)	
Temperature	-40/+65°C (-40/149°F)
Storage temperature	0/+40°C (32/104°F)
Enclosure protection 2)	IP 65/66/67
Range	0-100ppm
Accuracy (whichever is greater)	measurement uncertainly (of meas. value) ≤ ±3 % or minimum ≤ ±0.5ppm
Accessories	
Dust filter	6812223
Adapter kit	6810536
Standard	ANSI/ISA-92.00.01FM6340

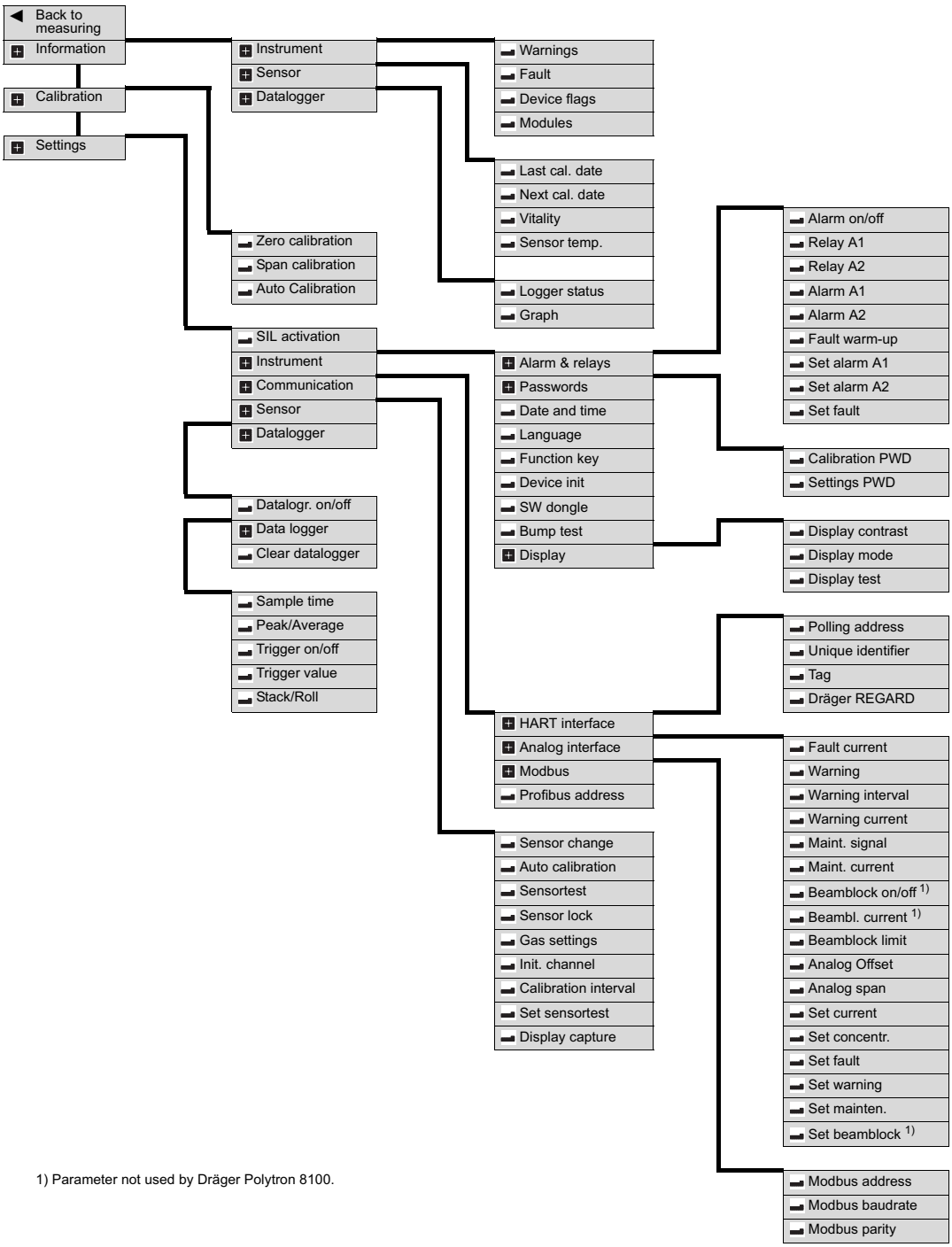
1) HART communication shall not be used for safety-relevant communication
2) After submersion and jet water the sensor shall be replaced

DrägerSensor H_2S LC (6809610)	
Examination Type P8100	ETR 0400, 0401, 0500, 0501
Interface 1)	4-20mA, relay
Environmental parameters	
Humidity	5 to 95%RH, non-condensing
Temperature	-20/+65°C (-4/149°F)
Storage temperature	0/+40°C (32/104°F)
Enclosure protection 2)	IP 65/66/67
Range	0-100ppm
Accuracy (whichever is greater)	measurement uncertainly (of meas.value) ≤ ±3 % or minimum ≤ ±0.5ppm in the range >50ppm, ±10 % or ±3ppm
Accessories	
Dust filter	6812223
Adapter kit	6810536
Standard	ANSI/ISA-92.00.01FM6340

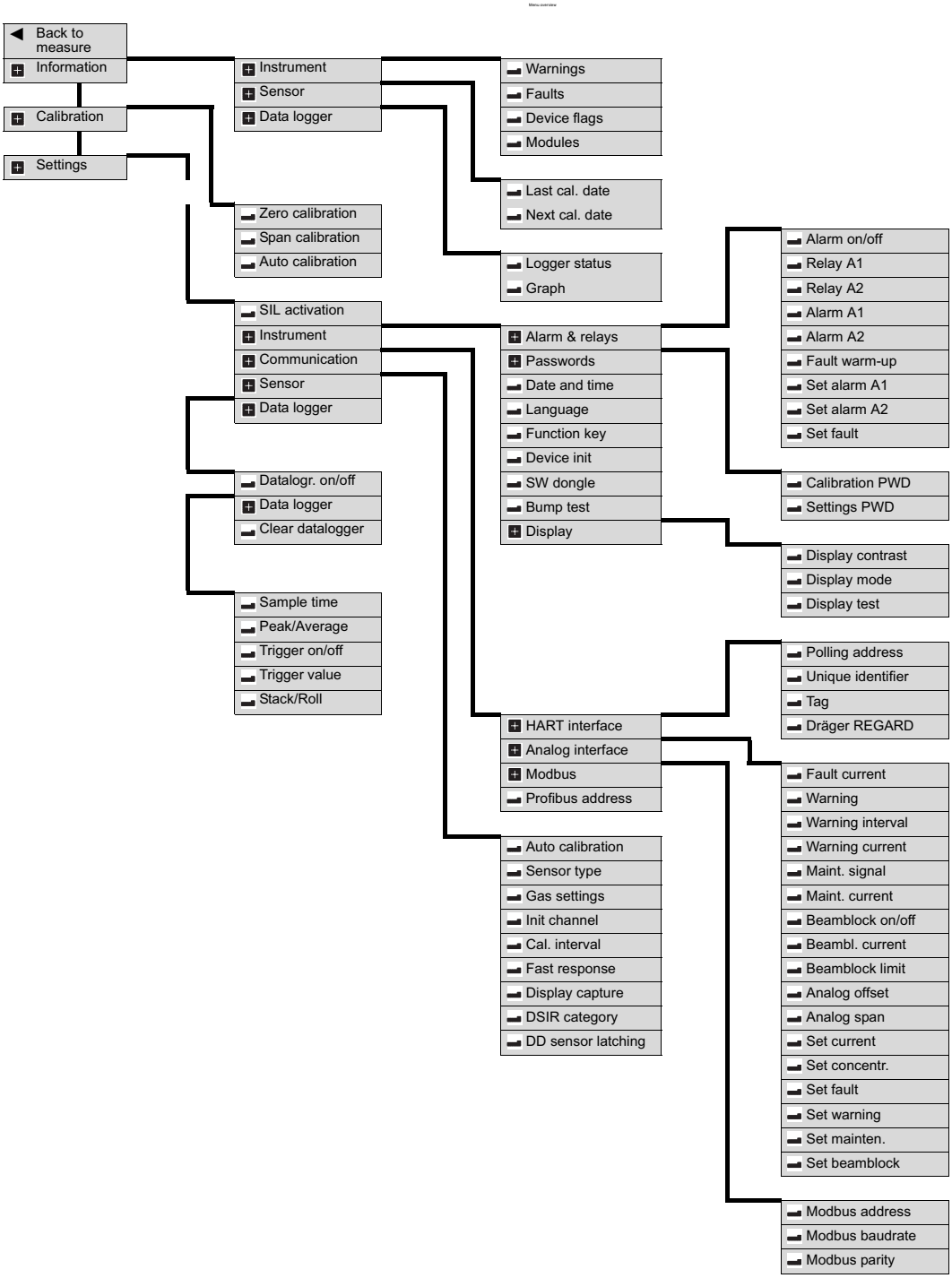
1) HART communication shall not be used for safety-relevant communication
2) After submersion and jet water the sensor shall be replaced

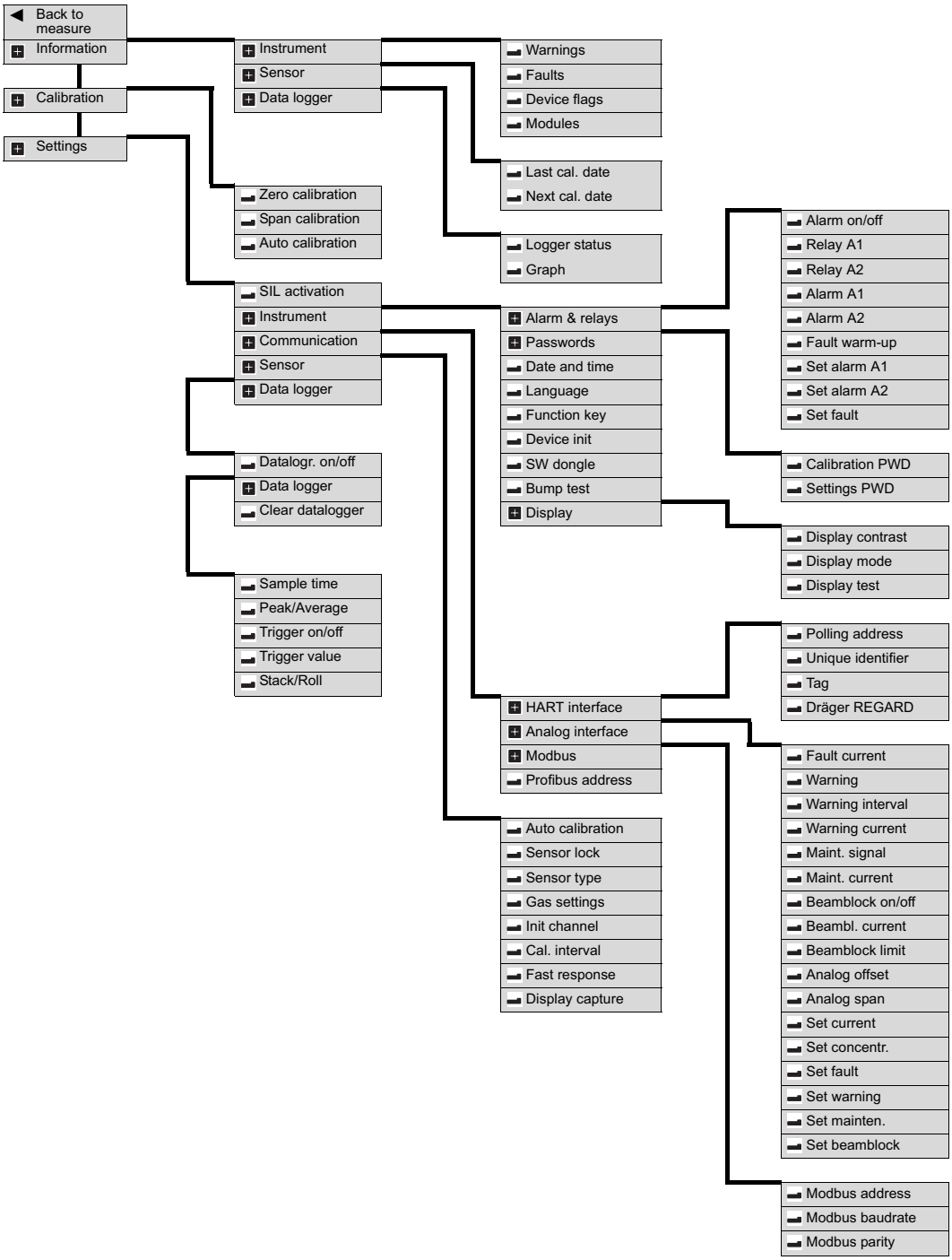
21 Menu tree

The following menu trees are English. Further languages are selectable in the transmitter. For the menu trees of those languages, contact Dräger.

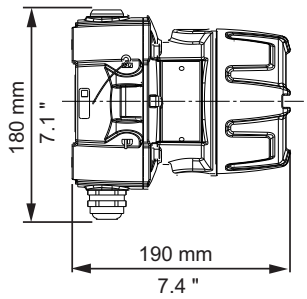


1) Parameter not used by Dräger Polytron 8100.

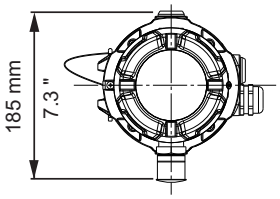

Menu overview
Back to measure
Information
Calibration
Settings
Instrument
Sensor
Data logger
Zero calibration
Span calibration
Auto calibration
SIL activation
Instrument
Communication
Sensor
Data logger
Datalogr. on/off
Data logger
Clear datalogger
Sample time
Peak/Average
Trigger on/off
Trigger value
Stack/Roll
Warnings
Faults
Device flags
Modules
Last cal. date
Next cal. date
Logger status
Graph
Alarm & relays
Passwords
Date and time
Language
Function key
Device init
SW dongle
Bump test
Display
HART interface
Analog interface
Modbus
Profibus address
Auto calibration
Sensor type
Gas settings
Init channel
Cal. interval
Fast response
Display capture
DSIR category
DD sensor latching
Alarm on/off
Relay A1
Relay A2
Alarm A1
Alarm A2
Fault warm-up
Set alarm A1
Set alarm A2
Set fault
Calibration PWD
Settings PWD
Display contrast
Display mode
Display test
Polling address
Unique identifier
Tag
Dräger REGARD
Fault current
Warning
Warning interval
Warning current
Maint. signal
Maint. current
Beamblock on/off
Beambl. current
Beamblock limit
Analog offset
Analog span
Set current
Set concentr.
Set fault
Set warning
Set mainten.
Set beamblock
Modbus address
Modbus baudrate
Modbus parity


Back to measure
Information
Calibration
Settings
Instrument
Sensor
Data logger
Warnings
Faults
Device flags
Modules
Last cal. date
Next cal. date
Logger status
Graph
Zero calibration
Span calibration
Auto calibration
SIL activation
Instrument
Communication
Sensor
Data logger
Alarm & relays
Passwords
Date and time
Language
Function key
Device init
SW dongle
Bump test
Display
Alarm on/off
Relay A1
Relay A2
Alarm A1
Alarm A2
Fault warm-up
Set alarm A1
Set alarm A2
Set fault
Calibration PWD
Settings PWD
Display contrast
Display mode
Display test
Datalogr. on/off
Data logger
Clear datalogger
Sample time
Peak/Average
Trigger on/off
Trigger value
Stack/Roll
HART interface
Analog interface
Modbus
Profibus address
Polling address
Unique identifier
Tag
Dräger REGARD
Fault current
Warning
Warning interval
Warning current
Maint. signal
Maint. current
Beamblock on/off
Beambl. current
Beamblock limit
Analog offset
Analog span
Set current
Set concentr.
Set fault
Set warning
Set mainten.
Set beamblock
Modbus address
Modbus baudrate
Modbus parity
Auto calibration
Sensor lock
Sensor type
Gas settings
Init channel
Cal. interval
Fast response
Display capture

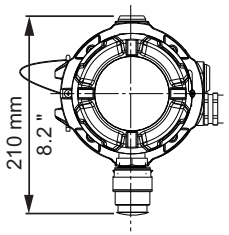
Dimensions Ex e Versions (approx.)



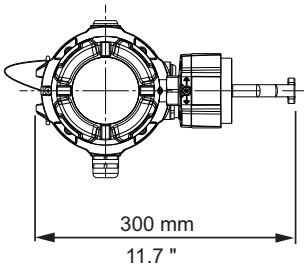
DrägerSensor DQ



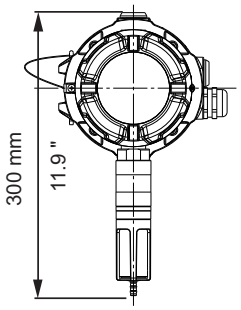
DrägerSensor LC



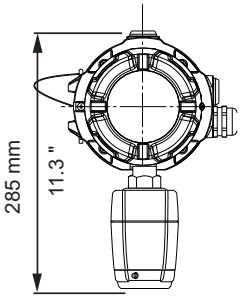
PIR 7x00



DrägerSensor IR

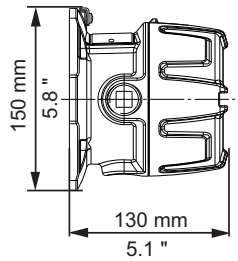


DrägerSensor EC

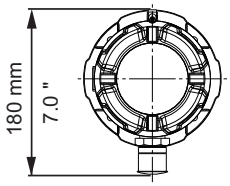


Weight Ex e versions:	Stainless Steel 316L 11.9 lbs 5.4 kg	Aluminum 7.7 lbs 3.5 kg	Stainless Steel 316L 15.6 lbs 7.1 kg	Aluminum 11.5 lbs 5.2 kg

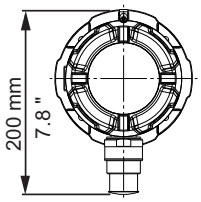
Dimensions Ex d versions (approx.)



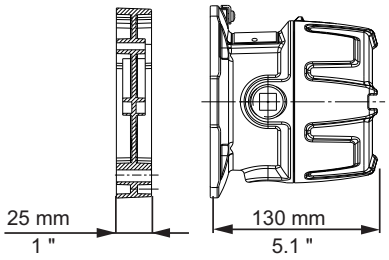
DrägerSensor DQ



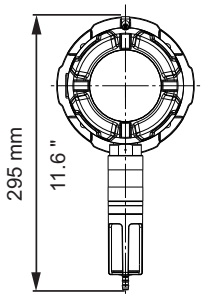
DrägerSensor LC



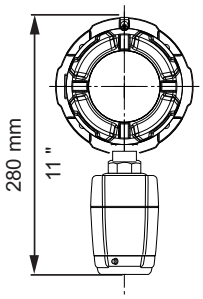
PIR 7x00

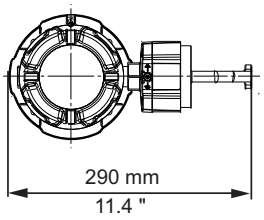


DrägerSensor IR



DrägerSensor EC / UGLD

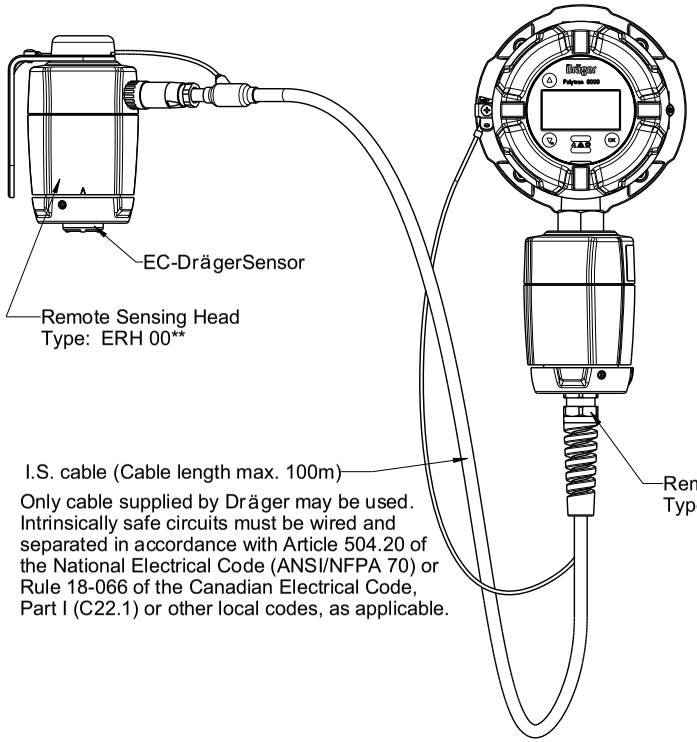




Weight Ex d versions:	Stainless Steel 316L 8.8 lbs 4.0 kg	Aluminum 4.9 lbs 2.2 kg	Stainless Steel 316L 12.6 lbs 5.7 kg	Aluminum 8.5 lbs 3.9 kg

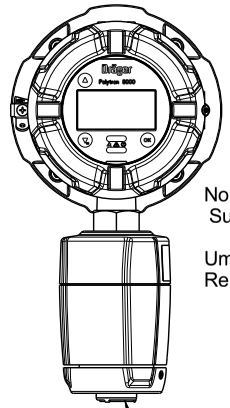
HAZARDOUS AREA: Class I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G

Gas Detection Transmitter
Type: ETR 02**, ETR 03**,
ETR 04**, ETR 05**
with Remote Sensor



Only cable supplied by Dräger may be used.
Intrinsically safe circuits must be wired and separated in accordance with Article 504.20 of the National Electrical Code (ANSI/NFPA 70) or Rule 18-066 of the Canadian Electrical Code, Part I (C22.1) or other local codes, as applicable.

Gas Detection Transmitter
Type: ETR 02**, ETR 03**,
ETR 04**, ETR 05**
with Local Sensor



Non I.S. field wiring ratings
Supply: 10...30 VDC, 0.08...0.15 A (ETR 02/3**)
10...30 VDC, 0.1...0.35 A (ETR 04/5**)
Um = 250 V (only for I.S. considerations)
Relays (optional): 5 A, 30 VDC or 230 VAC

Note: Suitability for installation in particular applications is at the discretion of the Authority Having Jurisdiction (AHJ).

PROJEKTIONSMETHODE 1 NACH DIN ISO 5456
FIRST ANGLE PROJECTION ACCORDING TO ISO 5456

Werkstoff / Material	Änderungstext / Modification Text
---	ETR 02/3** added

Allgemeintoleranzen / General Tolerance	---

=EX=	=QA=	=QB=	=QC=	Fabr.-Nr./ Serial-No.	Reg./ Registration	Begr.-Lzeit/Age Monit.	Maßstab / Scale
--	--	--	--		Nein/No		7:20

Bearbeitung / Created by	Datum / Date (dd.mm.yyyy)	Verantwortlich / Checked by	Datum / Date (dd.mm.yyyy)	Abteilung / Department	DCC Nummer / DCC Number
Vornbäumen	30.01.2014	Treptow	30.01.2014	st5430	//

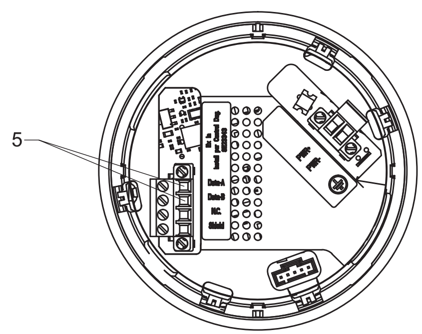
Dräger

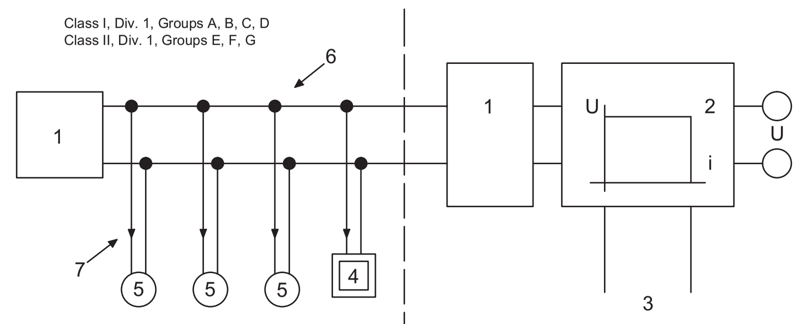
Benennung / Description	Kommt vor / Amends	Reifegrad / Status
Control Drawing ETR 02..5**	0X	Prep
	Sachnummer / Part No. - ÄZ / Rev.	
	SE23161 - 01	Y

Dokumententyp / Document Type	Seite / Page	von / of	Ersatz für/ Repl. for
Pro/E A3	1	1	SE23161-00

35814

E/I/XTR 04/05





Intrinsically Safe Apparatus		
Ui	≤ 17,5V	≥
Ii	≤ 0.380A	≥
Pi	≤ 5.32W	≥
Ci	≤ 5nF	+Cc
Li	≤ 10µH	+Lc

Associated Apparatus
Uo ≤ Ui
Io ≤ Ii
Po ≤ Pi
Co ≥ Ci + Cc
Lo ≥ Li + Lc

Key

1 Terminator
2 Power supply
3 Data
4 Hand held terminal
5 Field devices
6 Trunk
7 Spur

All intrinsically safe wiring shall be kept separate from non-intrinsically safe wiring. Refer to Article 504 of the National Electrical Code.

Notes

1. FISCO power supply must be installed as instructed by the Manufacturer´s Control Drawing.
2. Selected FISCO power supply shall be intrinsically safe outputs for Class I, Div. 1, Groups A-D, Class II, Div. 1, Groups E-G.
3. (04) The circuits are limited to overvoltage category I/II/III (non mains/mains circuits) as defined in IEC 60664-1.
4. (04) This apparatus is suitable for use in a FISCO system in accordance to IEC 60079-25.

The cable used in the system shall comply with the following parameters:

- loop resistance R_C 15 Ohms/km to 150 Ohms/km,
- loop inductance L_C 0,4 mH/km to 1 mH/km,
- capacitance C_C 45 nF/km to 200 nF/km,
- maximum length of each spur cable 60 m in IIC and IIB,
- maximum length of each trunk cable, including the length of all spurs, 1 km in IIC and 5 km in IIB

PROJEKTIONSMETHODE 1 NACH DIN ISO 5456
FIRST ANGLE PROJECTION ACCORDING TO ISO 5456

Material / Werkstoff: ---
Modification Text / Änderungstext: Text added/hinzugefügt
Amends / Kommt vor: 2X
Scale / Maßstab: -
General Tolerance / Allgemeintoleranzen: ---
=EX= -- =QS= -- =QF= -- Registration/Reg.: No/Nein
Ser.Type/Ser.art: . Docum./Erf.beleg: No/Nein Doc.Type/Dok.art: . Total SL/Ges.halt.(tA): . Min.u.time/Min.u.d(tG): .
Created by / Bearbeitung: Krusel J — Date / Datum (dd.mm.yyyy): 26.01.2016
Checked by / Verantwortlich: Schachel M — Date / Datum (dd.mm.yyyy): 26.01.2016
Department / Abteilung: st5430

Dräger

Description / Benennung: UL Control Drawing E/I/XTR 04/05
DCC Number / Nummer: 16 / st5430 / 0288
Status / Reifegrad: Prod
Part No. / Sachnummer - Rev. / AZ: SE23343 - 04
Appr. / Zul.: Y
Document Type / Dokumententyp: AutoCAD A2 — Page / Seite 01 of / von 01
Repl. for / Ersatz für: SE23343-02

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9033848 – 4683.601 enUS

Edition: 4 – 2020-01 (Edition: 1 – 2018-01)

Subject to alterations

www.draeger.com