Dräger

Dräger Polytron 5100

Instructions for Use

⚠️ **WARNING**

Strictly follow the Instructions for Use.
The user must fully understand and strictly observe the instructions. Use the product only for the purposes specified in the Intended use section of this document.

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Contents

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1 For your safety

1.1 General safety statements

- Before using this product, carefully read the Instructions for Use (IfU) of the instrument and the relevant sensor.

- Strictly follow the Instructions 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.

- Do not dispose of the Instructions for Use. Ensure that they are retained and appropriately used by the product user.

- Only fully trained and competent users are permitted to use this product.

- 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 maintain 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.

- Maintenance must be performed as described, see Section 5 on Page 20.

- Use only genuine Dräger spare parts and accessories. Otherwise the proper functioning of the product may be impaired.

- 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.

- The measuring function of the gas detection instrument for explosion protection according to Annex II, clauses 1.5.5, 1.5.6 and 1.5.7 of Directive 94/9/EC is not covered.

- Substitution of components may compromise Intrinsic Safety. This only applies to the instrument or parts of it which are classified as intrinsically safe.

- Only operate the product within the framework of a risk-based alarm signaling concept.

Safe connection of electrical devices

- Before connecting this instrument to electrical devices not mentioned in the IfU consult the manufacturer or an expert.

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.

- 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.

1.2 Definition of alert icons

The following alert icons are used in this document to provide and highlight areas of the associated text that require a greater awareness by the user. A definition of the meaning of each icon is as follows:

DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

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

CAUTION

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

NOTICE

Indicates additional information on how to use the product.

Description

2 Description

2.1 Product overview

2.1.1 Explosion proof instrument
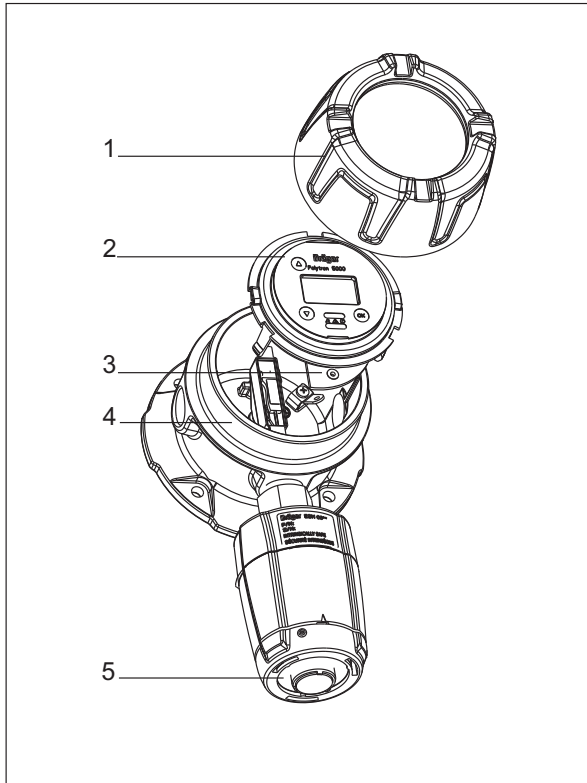
1 Enclosure lid
2 Bezel with main electronics
3 Relay board (optional)
4 Enclosure bottom
5 Sensor
6 Assembled instrument

4544911a

4544911b
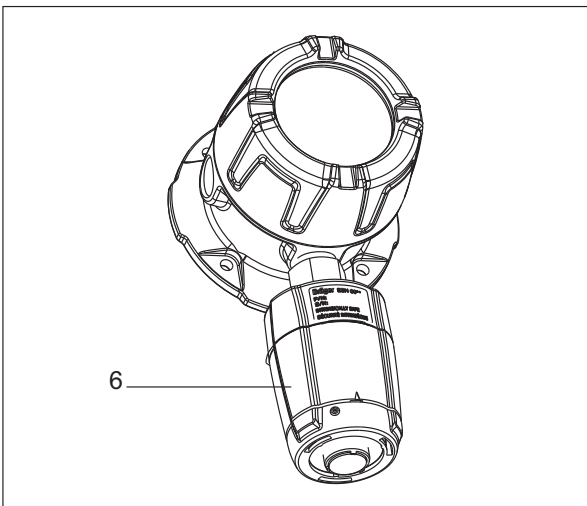
2.1.2   Explosion proof instrument with increased safety wiring compartment (Docking Station)

1   Enclosure lid
2   Bezel with main electronics
3   Relay board (optional)
4   Enclosure bottom
5   Sensor
6   Feed-through cable
7   Field wire terminals in Docking Station
8   Docking Station
9   Assembled instrument
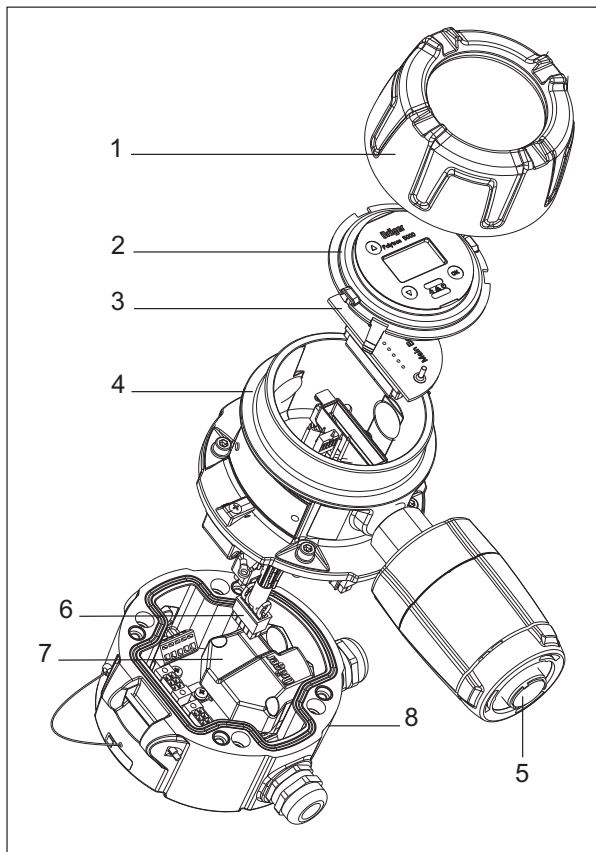
4544911c
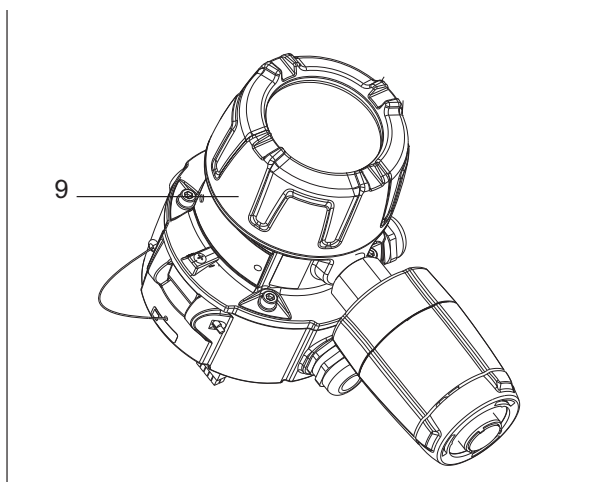
4544911d

Description

2.2 Intended use

The Dräger Polytron 5100 is an explosion proof instrument for the continuous monitoring of toxic gases and Oxygen in ambient air. The instrument is housed in a rugged stainless steel or aluminum enclosure for indoor and outdoor applications. The instrument can be connected through a sealed conduit or approved cable gland to a Dräger monitoring system or a Programmable Logic Controller (PLC). With the optional alarm relay configuration, the instrument can be operated as a stand-alone unit. The instrument is designed to be installed in permanent locations and is approved for use in hazardous, classified areas, see Section 9.1 on Page 27. With the optionally integrated relay module, the instrument can be operated without a central controller (with additional local alarm signaling).

To reduce the risk of ignition of a flammable or explosive atmosphere, strictly adhere to the following Caution and Warning statements:

⚠️ **WARNING**

Substitution of components may impair Intrinsic Safety.

⚠️ **CAUTION**

Not tested in oxygen enriched atmospheres (>21% O_2). High off-scale readings may indicate an explosive concentration.

⚠️ **WARNING**

Danger of explosions. Not to be used in Oxygen enriched atmospheres. None of the Polytron 5100 instruments are certified and approved to be operated in Oxygen enriched atmospheres.

2.3 Intended operating area and conditions

Hazardous areas classified by zones:
The device is intended to be used only in hazardous areas classified Zone 1 or Zone 2, within a temperature range as marked on the device, where gases of explosion Groups IIA, IIB or IIC and temperature class T4 or T6 (depending on the maximum ambient temperature) or dusts of Groups IIIA, IIIB or IIIC may be present.

Hazardous areas classified by divisions:
The device is intended to be used only in hazardous areas Class I or II, Div. 1 or Div. 2, within a temperature range as marked on the device, where gases or dusts of Groups A, B, C, D or E, F, G and temperature class T4 or T6 (depending on the maximum ambient temperature) may be present.

2.4 Design

The instrument is powered by 10 or 18 to 30 VDC (see Section 9.4 on Page 27). Gas concentrations, status messages, and menu choices are displayed on a back-lit 4 digit LC-display and 3 colored LEDs. The measured gas concentration is converted to a 4 to 20 mA analog output signal per NAMUR recommendation NE43. The instrument can be operated in a 2-wire or 3-wire configuration. When operated in a 2-wire configuration, certain features like back-lit display or relays are not supported.

Navigation through the menu is done by tapping a magnetic wand on the glass at the appropriate indicator.

The instrument can be configured, calibrated and maintained non-intrusively without declassifying the area.
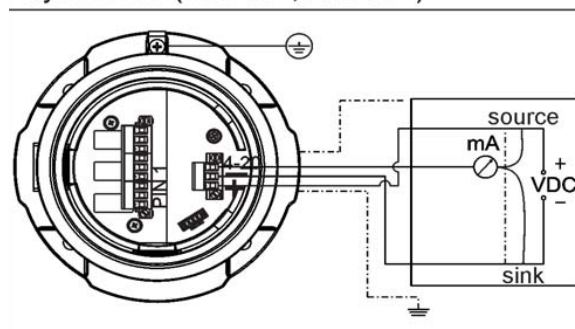
3 Installation

## 3.1 General information for installation

To ensure overall system performance and effectiveness, the selection of an installation site for the instrument is one of the most important factors. Strict compliance where possible and considerable thought must be given to every detail of installation, particularly:

● the local, state, national codes and regulations that govern the installation of gas monitoring equipment.

● the electrical codes that govern the routing and connection of electrical power and signal cables to gas monitoring equipment.

● for non-conduit installations, an approved cable gland must be used, see Section 9.1 on Page 27 (e.g. Hawke A501/ 421/A/¾" NPT or equivalent). It might be necessary to connect the shield of the cable to the cable gland and to the controller in order to improve RFI immunity.

● the full range of environmental conditions to which the instruments will be exposed to.

● the physical data of the gas or vapor to be detected.

● the specifics of the application, (e.g. possible leaks, air movement/draft, etc.).

● the degree of accessibility required for maintenance purposes.

● the types of optional and accessory equipment that will be used with the system.

● any other limiting factors or regulations that would affect system performance or installations.

● 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.

● unused openings must be closed with a plug. For correct tightening torques of conduit hubs, cable glands, plugs and sensor see Section 9.8 on Page 28.

● secondary circuit intended to be supplied from an isolating source (N/A for relay circuits).

● the optional increased safety terminal box 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.

● 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.

● strip wire insulation by 5 to 7 mm.

● connect the wires as indicated in wiring figure Section 3 on Page 9 (also showing grounding conductor terminal).

● the wiring for the optional relay module must be selected and fused according to the rated voltages, currents and environmental conditions.

● if stranded conductors are used, a ferrule must be used.

Polytron 5100 (ETR 02**, ETR 03**)

3-wire sink and source installation
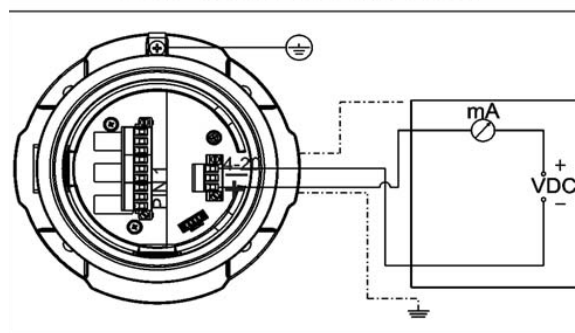
2-wire installation

3.2 Installation restrictions

The instrument must have between 10 or 18 to 30 VDC at the instrument (see Section 9.4 on Page 27). This ultimately determines the distance the instrument can be mounted from the controller or power supply. The instrument accepts wire sizes of 12 to 24 AWG (0.2 to 2.5 mm^2). Depending on the configuration, use at least a two or three-conductor, shielded cable.

The instrument must not be exposed to radiant heat that will cause the temperature to rise beyond the limits stated in see Section 9.6 on Page 28. The use of a reflecting shield is recommended.

The enclosure is weatherproof within environmental specifications and suitable for outdoor installation. The use of the optional splash guard (part number 6812510) is recommended to protect the sensor from water and dust.

Each instrument must be installed and operated in an environment that conforms to the specifications, see Section 9 on Page 27.

i **NOTICE**

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.

Installation

3.3 Mechanical installation

- Use the drilling template for mounting on a flat surface.
- The mounting surface should be even.
- Dräger recommends using M6, 1/4" bolts with hex socket caps.
- The instrument must be accessible for maintenance (e.g. calibration).
- 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.

## 3.4 Electrical installation without Docking Station

⚠️ **CAUTION**

Ensure wiring for relays and connections for sensor are made before applying power.

Ensure that the correct setting for 2 or 3-wire operation is selected and matches the installed wiring of the instrument. Otherwise, false signals may be displayed if the menu does not match the menu configuration.

3.4.1 Power and signal wiring

- Loosen set-screw and unscrew lid from instrument.
1. Pull out the bezel by grasping the notches on either side of the display with your fingers and carefully pull it out from the enclosure.
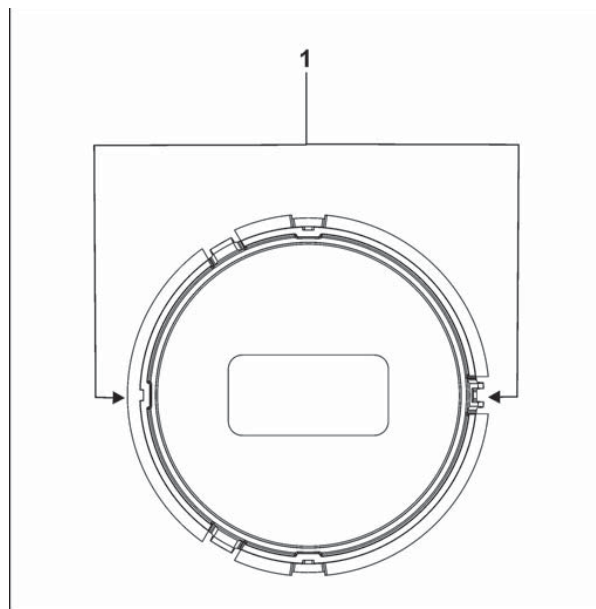
- Turn bezel over and pull off the 3-pin connector.

- Connect the wires for power and signal to the appropriate terminal as indicated in the following wiring table and figure. Fasten terminal screws with the correct torque according to the table tightening torque and wire size for field wiring terminal, see Section 9.9 on Page 28.
- If operated as a stand-alone instrument (3-wire only), wire pin 1 to pin 3.
- Plug connector back into socket and tighten screws.
- The cable shielding should only be connected at the controller.
- Place bezel back into the enclosure.
- Screw the lid back on, until it is seated (see Section 9.8 on Page 28), and tighten set-screw.

3 Pin Connector (Power and Signal)			
Pin	1	2	3
Mark	+	-	4-20
Function (3 wire)	V +	V -	4-20 mA signal
Function (2 wire)	V +	-	4-20 mA signal
Open: no connection			

3.4.2 Relay option

⚠️ **WARNING**

At voltages >30 V AC or >42.2 V DC, the relay cables must be enclosed in protective tubing, or double-insulated cables must be used.

If the relay option has been installed (3-wire configuration only), the wires for the alarm devices will be connected to the 9-pin connector. A piece of wire insulation (heat shrink tube) and rubber boot are supplied for extra protection for relay wires.

- Turn bezel over and pull off the 9-pin connector.
- Cut the heat shrink tube as needed and slide over the relay wires before insertion into the 9-pin connector.
- Position the heat shrink tube at the edge of wire insulation and use a heat gun to shrink the tubing securely onto wire insulation.
- Slide rubber boot over the wires.
- Connect the wires for alarm 1, alarm 2 and fault to the terminals, as indicated in the following wiring table. Fasten terminal screws with the correct torque according to the table tightening torque and wire size for field wiring terminals, see Section 9.9 on Page 28.
- With factory default settings and during normal operation, the relays are energized. This provides "fail-safe" operation. The terminal designators indicated in the following wiring table are shown as factory default and normal operation mode, see Section 6 on Page 25.
- Plug connector back into socket and tighten screws.
- Put rubber boot over connector.

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3.6 Installing sensor

NOTICE

ℹ️

To ensure that a fault is recognized - without having to look at the instrument - an alarm device must be connected to the fault relay.

1 Connector for EC sensing head

- Loosen set-screw (2), 2mm Allen screw on black sensor housing.
- Unscrew bayonet ring (3) and remove blank.
- Remove sensor from packaging.
- Insert sensor (4) 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.
- Tighten set-screw (2). Mandatory for Zone 22 installations.
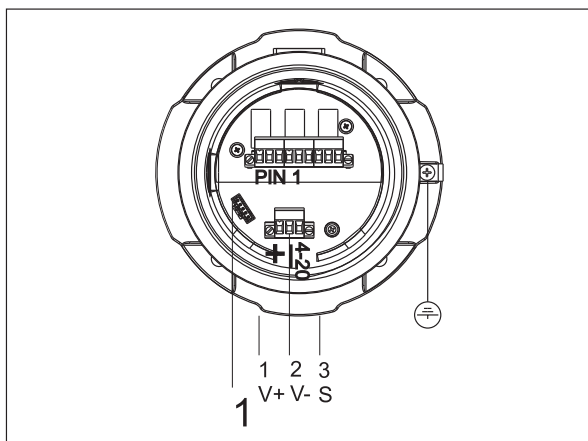
9 Pin Connector (Relays)								
	Fault Relay			A2 Relay			A1 Relay		
Pin	1	2	3	4	5	6	7	8	9
Mark	NO	C	NC	NO	C	NC	NO	C	NC

NO = Normally open, NC = Normally closed, C = Common

3.5 Electrical installation with Docking Station

Installing this configuration is a two-step process.

First, the Docking Station is mounted and connected to the field wires. Second, the main instrument enclosure with the electronics and sensor is attached to the Docking Station.

The Docking Station can be pre-mounted, wired and sealed with the supplied cover. Once the site is ready for commissioning, the instrument is then hooked up to the Docking Station and placed into operation; this helps prevent damage to the instrument during the construction phase.

The connection between the Docking Station and the main instrument is realized via a 'feed-through'. Depending on the instrument selected, there are 2 types of feed-through.

- 3 wire for power (part number 4544182)
- 9 wire for power and relay (part number 4544169)

3.5.1 Field wiring

For field wiring of Docking Station refer to Instructions for Use 9033242.

Installation

3.7 Installation of EC sensing head remote

3.7.1 Wall or pipe mounting kit

⚠️ **CAUTION**

Observe the general installation information, see Section 3 on Page 9.

Multiple EC sensing heads remote must not be daisy-chained.

ℹ️ **NOTICE**

The EC sensor wall or pipe mount kit (part number, 4544213) is required to mount the EC sensor on a wall or pipe.

The sensing head should be mounted at a low-vibration location at even temperature near a potential leakage point (avoid direct sunlight).
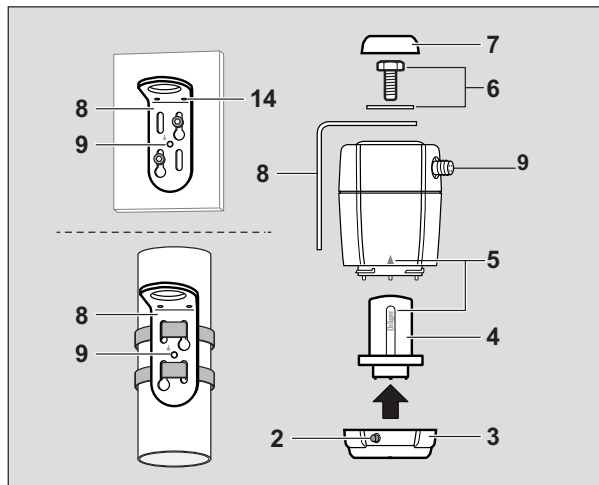
00233298.eps

● Install wall or pipe mount kit (8) as specified in the assembly instructions.
● Screw the EC sensing head to the wall or pipe mount bracket (8) using screw and washer (6).

ℹ️ **NOTICE**

Pay attention to the orientation of the cable connector (9)!

● Select the appropriate protection cap (7) and place it on the screw.

3.7.2 Installing sensor

● Loosen set-screw (2), 2mm Allen screw.
● Unscrew bayonet ring (3) and remove blank.
● Remove sensor from packaging.
● Insert sensor (4) 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.
● Tighten set-screw (2). Mandatory for Zone 22 installations.

3.8 Connecting the EC sensing head remote to Polytron 5100
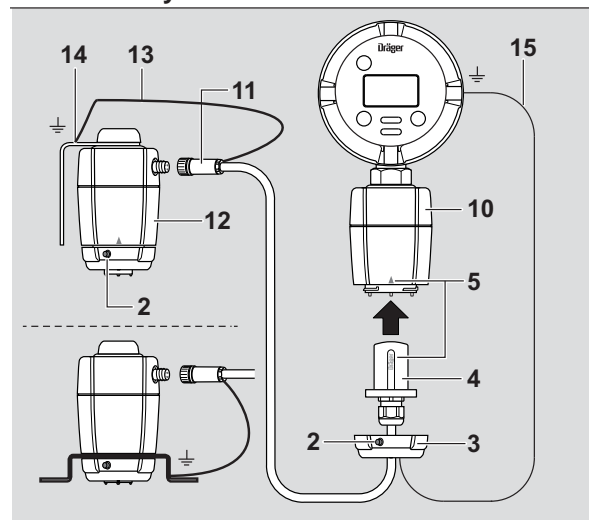
4544911k

● Connect remote cable plug (11), see Section 10.3 on Page 29, to the EC sensing head remote (12) and lock.
● Attach the shield wire (13) to the grounding point (14) of the bracket (M5 thread).
● Loosen set-screw (2), 2 mm Allen screw.
● Unscrew bayonet ring (3) and remove blank. Either bayonet ring can be used: black or silver.
● Insert the remote adapter (4) in the opening. The Dräger logo on the sensor adapter must point to the mark on the sensing head housing (5).
● Lock sensor adapter with bayonet ring.
● Attach the shield wire (15) to the ground lug of the enclosure.
● Tighten set-screw (2). Mandatory for Zone 22 installations.

ℹ️ **NOTICE**

The EC sensing head remote is automatically recognized by the instrument.

3.9 Connecting the instrument to a controller from Dräger

i NOTICE

For hook-up information, please refer to the Instructions for Use which was included with the Dräger controller (e.g. Regard, QuadGard).

Electrical connections at the controller
Connect the shield of the wires to the instrument earth ground of the controller (e.g. chassis, ground busbar, etc.)

3.10 Connecting the instrument to a PC

The separately available IR interface connection kit (part number 4544197) is intended for use with the Polytron 5100 and enables communication between the Polytron 5100 and a PC using the PolySoft software.

3.11 PolySoft PC software (optional)

The PolySoft PC software is used to display instrument information and edit configuration settings.

⚠ CAUTION

After modifying parameters with the PolySoft PC software or another software, verify all parameters by downloading or by checking them on the Polytron 5100.

4 Operation

4.1 Normal operation

⚠ WARNING

Before leaving the instrument for normal operation, check the configuration and calibration for the proper settings.

● Switch power supply on.

The instrument will go through a start-up sequence (LCD / LED test, software version, and initialization) and start the warm-up period. The remaining warm-up time is displayed in minutes. E.g. [tO 16] means that the instrument will be ready for calibration in 16 minutes and the instrument transmits the maintenance signal on the analog output, see Section 5.3 on Page 22. After the warm-up period, the instrument goes into normal operation. The display shows the current gas concentration and the units of measurement. The green LED is lit.

All configurations must be checked, and the instrument must be calibrated.

4.1.1 Analog signals

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

Polytron 5100 uses different current values to indicate various modes of operation, see Section 9.3 on Page 27. This follows the NAMUR recommendation NE43.

4.1.2 The display and LEDs

In normal operation, the display shows the measured gas concentration and unit of measurement. The green LED is lit.

The following special symbols may also be displayed:

● when the measuring range of the sensor has been exceeded

● when a fault has been detected the display toggles between 'Err' and a number and the yellow LED is lit, see Section 5.3 on Page 22.

If the optional relay board is installed:
● when the first alarm has been triggered the red LED blinks in single mode. The A1 relay is asserted.
● when the second alarm has been triggered the red LED blinks in double mode. The A2 relay is asserted.

If the A2 is configured as acknowlegeable, and the A1 is configured as non-acknowledgeable, then, when an A2 alarm occurs, the red LED will blink the double blink A2 mode. After the alarm is acknowledged, the red LED will blink in single blink mode to indicate A1 is still active.

4.1.3 Segments of the display and LED symbols.

i NOTICE

The alarm triggering function is only available when the optionally integrated relay module is used (3-wire configuration only).

Symbol	LED	Description
⌣ ⌐	Red	Alarm Triggered
	Yellow	Fault
	Green	Power ON Normal Operation

Operation

4.2 Menu navigation

Tapping the magnetic wand (part number 4544101, blue body, white logo) over [UP] / [DOWN] arrows scrolls through the menu selections.

● Tapping [OK] confirms a selection.

When the last menu item is reached, the menu will bottom-out, and [UP] has to be used to scroll back up through the menu.

The active menu item as well as its current value or status will flash on the display as it scrolls.
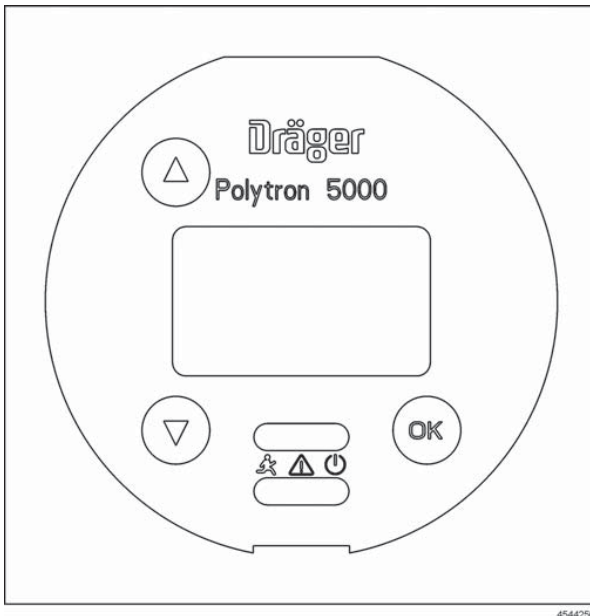
4544256

NOTICE

The instrument is designed for the magnetic wand 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).

NOTICE

After 15 minutes of inactivity within the menu, the instrument times-out and returns to normal operation without accepting any changes.

4.2.1 Password

The use of a password is optional. A password consists of a 4-digit number from 0000 to 9999. A value of 0000 disables the password protection and allows anyone to access the menu.

● If the password is enabled, from normal operation, tap [DOWN].
● The 4-digit LCD will then show '0000', with the first zero on the left blinking.
● Tap [UP] / [DOWN] to increment or decrement this digit, then tap [OK].
● The second digit will blink; set the correct value by tapping [UP] / [DOWN], then tap [OK].
● Repeat the process for the other two digits.
● Tap [OK] when the full password is displayed.

If the displayed value matches the set password, access will be given to the rest of the menu. If an incorrect password is entered, the instrument will return to normal operation, see Section 4.3.18 on Page 18.

4.2.2 Changing parameter values / status

Select the menu item to be accessed tapping [UP] / [DOWN].
● When the desired menu item is displayed, tap [OK]. The current value or status will flash to indicate a change to data entry mode.
● [UP] / [DOWN] allow adjusting the value of a numerical parameter or scrolling through preset choices.
● Once the display shows the intended value or choice, tap [OK] to validate the new parameter and return to the main menu.

4.2.3 Exiting the menu

To get back into the measurement mode, tap [UP] until the menu is exited.

4.3 Menu overview
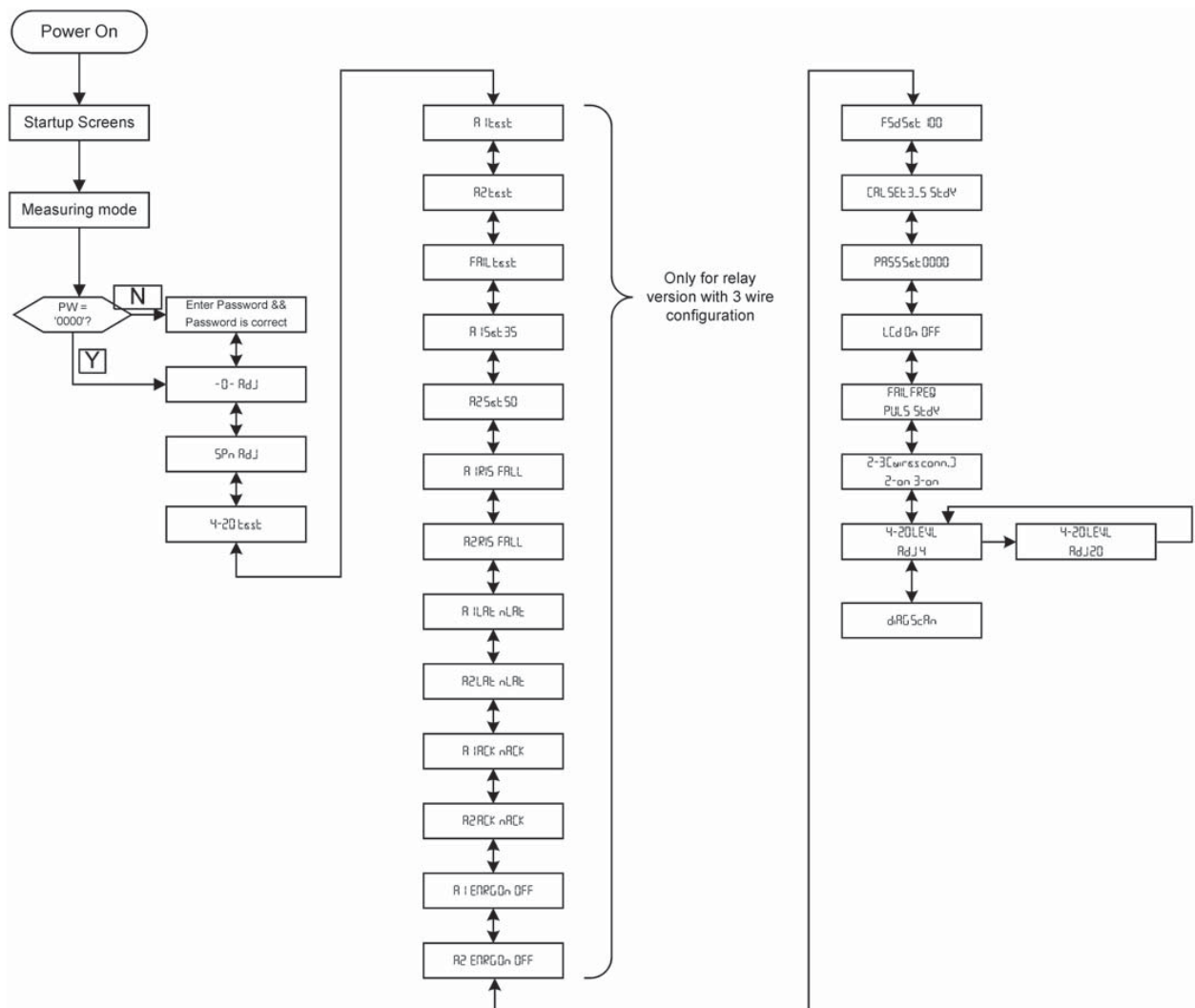
Operation

4.3.1 -0- adj

Allows adjusting the zero reference point of the sensor, see Section 5.2.1 on Page 21.

4.3.2 SPn adj

Allows adjusting the sensitivity to match the known concentration of an applied calibration gas, see Section 5.2.2 on Page 21.

4.3.3 4-20 test

This function changes the current of the analog interface for test purposes (e.g. to check the programming of the central controller). It might be necessary to inhibit the alarms at the central controller to avoid false alarms. After exiting this function, the current, if changed, will automatically return to the maintenance signal.

⚠️ **CAUTION**

Sections 4.3.4 to 4.3.15 are only available if the relay module is installed. All other users continue with section 4.3.16.

4.3.4 Relay test

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). After exiting this function, the status of the relay and LED will automatically return to their previous status.

i NOTICE

When the relays are activated, alarm devices will be switched on.
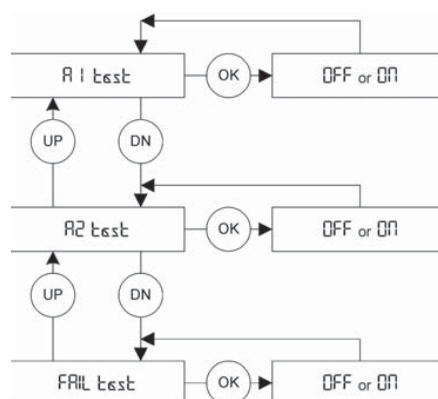
4.3.5 A1 set

Configuring the A1 alarm level set point.

Holding the magnet on an arrow will begin automatically changing the value without requiring additional taps.

The lowest alarm threshold is one display unit of gas depending on the configured sensor type.

4.3.6   A2 set

Configuring the A2 alarm level set point.

Holding the magnet on an arrow will begin automatically changing the value without requiring additional taps.

The lowest alarm threshold is one display unit of gas depending on the configured sensor type.

Alarm hierarchy:
A2 overrides A1 on the LED and display. However, the A1 and A2 relays operate independently. I.e. if A1 is acknowledgeable, 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 exists.

Alarm hysteresis:
In order to avoid chatter at an alarm threshold, a threshold of 6% of FSD or Full Scale Deflection must be programmed. Any alarm threshold setting less than 6% FSD is not supported and will violate the hysteresis window preventing the instrument from exiting the alarm state. A fixed hysteresis of 5% of full scale is programmed.

4.3.7   A1 rising / falling

Configuring whether the alarm should be triggered by a rising or falling gas concentration.

4.3.8   A2 rising / falling

Configuring whether the alarm should be triggered by a rising or falling gas concentration.

4.3.9   A1 latching

Configuring the A1 alarm level to status latching or non-latching.

Latching means that once the alarm level is reached, the instrument will trigger the alarm. It will remain in alarm status even if the gas concentration subsequently does not meet the alarm condition any more. To clear a latching alarm it has to be acknowledged with [OK].

In non-latching mode, the alarm status clears if the gas concentration does not meet the alarm condition anymore.

4.3.10 A2 latching

Configuring the high level A2 alarm status to latching or non-latching.

4.3.11 A1 acknowledgeable

Configuring the A1 alarm as acknowledgeable or non-acknowledgeable.

Acknowledgeable means that the alarm relay can be reset before alarm condition clears.

Non-acknowledgeable means that the alarm relay can not be reset until the alarm condition clears.

4.3.12 A2 acknowledgeable

Configuring the A2 alarm as acknowledgeable or non-acknowledgeable.

Operation

4.3.13 Explanation of combining latching and acknowledgment of alarms

Since the concepts of latching and acknowledgment can be confusing, the following four combinations are offered for clarification:

Latching and Acknowledgeable	Relay must be reset manually and can be reset before the alarm condition clears.
Latching and Non-Acknowledgeable	Relay must be reset manually. Relay cannot be reset before the alarm condition clears.
Non-Latching and Acknowledgeable	Relay will reset automatically when the alarm condition clears or can be reset manually.
Non-Latching and Non-Acknowledgeable	Relay will reset automatically when the alarm condition clears. Relay cannot be reset manually before the alarm condition clears.

4.3.14 A1 energized

Configuring the A1 alarm relay as energized.

Energized ON means that the alarm relay is energized if not in alarm condition.

4.3.15 A2 energized

Configuring the A2 alarm relay as energized.

The fault relay is always energized ON (fail safe).

4.3.16 FSD set

Configuring the Full Scale Deflection, or range, of the instrument. These are pre-configured, discrete values, corresponding to the 20 mA output. E.g., if the FSD is set to 50 ppm, then 0 ppm of the target gas applied will produce a 4 mA output, while 50 ppm will produce a 20 mA output. Depending on the selected target gas, only a subset of discrete FSD values might be selectable.

4.3.17 Cal set 3-5 or stdy

Configuring the maintenance signal.

The maintenance signal is transmitted on the analog output anytime the menu is accessed. It is user-selectable between:
- o a steady 3.4 mA output signal
- o an oscillating 3 to 5 mA signal with a frequency of 1 Hz

4.3.18 Pass set

Configuring the password.

Only numbers 0 to 9 are allowed for the password.

The use of a password is optional on the Polytron 5100.

A password consists of a 4-digit number from 0000 to 9999. A value of 0000 disables password protection and allows anyone to access the menu.

To set/change the password, enter the function

- The 4-digit LCD will show '0000' or the current password, with the first digit on the left blinking.
- Tap [UP] / [DOWN] to increment or decrement this digit, then tap [OK].
- The second digit will blink; set the correct value tapping [UP] / [DOWN], then tap [OK].
- Repeat the process for the other two digits.
- Tap [OK] when the full password is displayed.
- Once a password is set, it has to be entered to gain access to the menu.

4.3.19 LCD on/off

This feature allows turning the LCD off in normal operation, effectively turning the Polytron 5100 into a non-display instrument.

The functionality of the instrument remains active, independent of the LCD state.

When in normal operation and the LCD is set to OFF, tapping [DOWN] will switch on the LCD display and will give complete access to the menu. In case of an alarm when the LCD display is off, the red LED will blink and the LCD display will automatically switch on and show the current gas concentration. In case of fault, the yellow LED and the LCD display will switch on and the display will toggle between 'Err' and a specific number.

4.3.20 Fault relay blinking / steady

This function is only available if the relay module is installed.

This feature controls the fault relay during warm-up.

If set to pulse mode, the fault relay is energized for 9 seconds and de-energized for one second. The yellow LED blinks in the same fashion.

If set to steady mode, the fault relay is de-energized throughout the entire warm-up period. The yellow LED is lit continuously.

The default setting is pulsing.

4.3.21 2-wire or 3-wire configuration

Polytron 5100 can be operated in a 2-wire and 3-wire configuration.

This function changes the operation mode disabling options which are too power consuming.

---

i **NOTICE**

In 2-wire mode, the instrument does not offer the options:
  o current source
  o back-lit display
  o remote sensor (unless operated at 24V or higher)
  o relays
  o LEDs

⚠ CAUTION

It must be ensured that the setting of this function matches the wiring for power and signal.
After changing the configuration and returning to normal operation, the power to the instrument must be cycled.

4.3.22 4 mA offset

This function adds an offset to the 4 mA analog output.

This function is essential for an installation where the analog current at the instruments differ from the current at the central controller.

4.3.23 20 mA offset

This function adds an offset to the 20 mA analog output.

This function is essential for an installation where the analog current at the instruments differ from the current at the central controller.

4.3.24 Diag scan

Diagnostic scan to display the error codes.

During normal operation (no faults or warnings), all error codes will be shown as 00.

The error codes consist of a locater and a pair of numbers separated by a dot (e.g. 01.02 = 'P5100 ram crc fault'). Tap [DOWN] to get all subsequent error codes. After the last error code has been displayed 'OK' will display. This enables Dräger Service to determine the cause for a message in more detail and define a remedy.

The diagnostic scan can be entered from normal operation by tapping and holding [UP] for more than 3 seconds. No password is needed.

Maintenance

5 Maintenance

5.1 Maintenance intervals

5.1.1 During commissioning

- Check calibration.
- Check signal transmission to the central controller, LEDs and triggering of alarm devices.

5.1.2 Every 6 months

- Inspection by trained service personnel.
- Check signal transmission to the central controller, LEDs and triggering of alarm devices.
- 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.
- Contact Dräger Service for periodic and scheduled contract calibration and maintenance services.

5.1.3 Change sensor on demand

- To change the sensor, see Section 5.4 on Page 24.

5.2 Calibration

Calibration of the instrument must be performed at regular intervals as detailed in the sensor data sheet.

⚠️ **WARNING**

Calibration gas must not be inhaled! See appropriate Material Safety Data Sheets. Calibration gas should be vented into a fume hood or to the outside of the building.
For proper operation, never adjust the span before completing zero adjustment. Performing these operations out of order will cause the calibration to be faulty.

Dräger recommends calibrating instruments with target gas. This method of target gas calibration 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.
The sensor should be fully warmed-up (see sensor data sheet).

General procedure

- Attach the pressure regulator to the calibration gas cylinder.
- Fit calibration adapter to the sensor.
- The gas flow should be approximately 0.5 L/min.
- If the intended operation is at higher altitudes, the factory calibration will result in a reading 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.
- Connect the tubing to the barbed fitting.
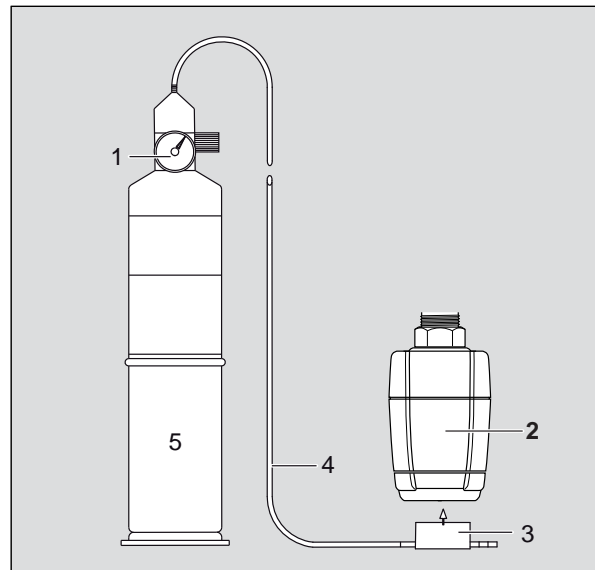
00533298.eps

1 Pressure regulator
2 EC sensing head
3 Calibration adapter
4 Tubing
5 Calibration gas cylinder

5.2.1 Zero calibration

⚠️ **WARNING**

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.

For Oxygen (O2) sensors the zero cannot be calibrated. For test purposes only Nitrogen (N2) must be used.

- Enter the menu and select -0- Adj.
- Tap [OK].
- Apply Synthetic Air or Nitrogen.
- The display will show the current value blinking (e.g. '2').
- Wait for the value to stabilize.
- Use [UP] / [DOWN] to adjust the value to 0.
- Acknowledge with [OK]; the instrument will return to the main menu.
- Turn off gas flow and remove the calibration adapter from the sensor or disconnect tubing.

5.2.2 Span calibration

- Enter menu and select SPn Adj.
- Tap [OK].
- Apply span gas (e.g. 50 ppm CO).
- The display will show the current value blinking (e.g. '48').
- Wait for the value to stabilize.
- Use [UP] / [DOWN] to adjust the value to 50 (or cal gas cylinder concentration).
- Acknowledge with [OK]; the instrument will return to the main menu.
- Turn off gas flow and remove the calibration adapter from the sensor, or disconnect tubing.

Maintenance

5.3 Troubleshooting

Messages in the 100 range are faults; messages in the 300 range are warnings which can easily be cleared.

Display Sequence	Fault	Cause	Remedy
PLS CONN SNR		Please connect sensor	Remove power; attach sensor; reapply power
⌐t___		Time in minutes until warm-up complete or Time in minutes until calibration is allowed	Wait
		Reading is above full scale	Display remains as long as reading is above full scale
InFo 305	X	FSD setting changed	Check all settings, especially Alarm Threshold
Errors			
E100 or Err 100	X	Instrument self test error	Call Dräger Service
E101	X	Firmware CRC error	Call Dräger Service
E102 or Err 102	X	RAM error	Tap [OK] to reset. If error persists, call Dräger Service.
Err 103	X	Flash memory error	Call Dräger Service
Err 104	X	Event logger error	Call Dräger Service
Err 105	X	Analog signal converter error	Call Dräger Service
E106	X	Incorrect software installed	Call Dräger Service
E107	X	Supply voltage is out of range	Ensure supply voltage is correct. Instrument will reset continuously until voltage is in range.
Err 108	X	4-20 output error	Remove power; check the field wiring from the Polytron 5100 to the control system; Reapply power.
Err 109	X	Sensor failure	Replace sensor
Err 110	X	SIOS failure	Check connection of EC sensing head
Err 112	X	Zero calibration failed	Calibrate sensor
Err 113	X	Span calibration failed	Calibrate sensor
Err 115	X	Gas value is under range	Calibrate the sensor zero point Check environment for possible gases with negative cross-sensitivity to the measured gas
Err 117	X	Magnetic key is stuck "on" for more than 1 minute	Call Dräger Service
Err 122	X	Sensor data error	Replace sensor
Err 198	X	Memory error	Call Dräger Service
E198	X	Boot-load CRC error	Call Dräger Service
Err 199	X	Factory calibration required	Call Dräger Service

Calibration Messages

Display Sequence	Fault	Cause	Remedy
	Over range	Zero Cal: Exceeding the lower zero calibration limit	Zero Cal: Press the down key
		Span Cal: Exceeding the lower span calibration limit	Span Cal: Press the down key
	Under range	Zero Cal: Exceeding the upper zero calibration limit	Zero Cal: Press the up key
		Span Cal: Exceeding the upper span calibration limit	Span Cal: Press the up key
HI GAS	High calibration gas concentration	Gas concentration exceeds sensor range during span calibration	Use lower cal gas concentration or press down key
LO GAS	Low calibration gas concentration	Gas concentration too low to perform proper span calibration	Use higher cal gas concentration or press up key

Maintenance

5.4 Replacing the sensor

⚠️ **CAUTION**

Always test a newly-installed sensor with target gas to verify proper operation.

If the sensor is replaced, all settings and parameters must be checked for correctness.

ℹ️ **NOTICE**

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

ℹ️ **NOTICE**

If a different sensor part number has been installed, the display will toggle between 'SNR' and 'Lock' indicating that if accepted, factory defaults will be loaded from the sensor.
To accept the new sensor, tap and hold [OK]. A countdown will start from 5 to ensure that the sensor will not be accepted by accident.
If the sensor is changed, all settings must be checked for correctness.

To replace the sensor:

- Loosen set-screw (2), 2 mm Allen screw.
- Unscrew bayonet ring (3) and remove old sensor.
- Remove new sensor from packaging.
- Insert sensor (4) 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.
- Tighten set-screw (2). Mandatory for Zone 22 installations.
- 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.
- Calibrate instrument, if necessary, see Section 5.2 on Page 20.
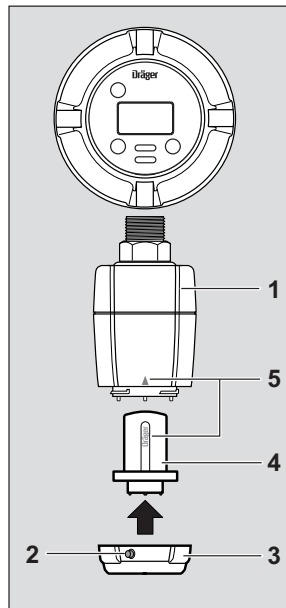
4544911h

5.5 Replacing the main electronics

⚠️ **CAUTION**

Always test a newly-installed main electronics with target gas to verify proper operation.

If the main electronics is replaced, all settings and parameters must be checked for correctness.

To replace the main electronics:

Turn off power to the instrument or declassify the area according to local regulations.

- Loosen set-screw and unscrew lid from instrument.
- Remove the bezel, by grasping the notches on either side of the display with your fingers and carefully pull it out from the enclosure.
- Turn bezel over and pull off the power, relay and sensor connectors.
- Replace the main electronics.
- Plug the power, relay and sensor connectors back into the appropriate sockets and tighten screws.
- Place bezel back into the enclosure.
- Screw the lid back on until it is seated (see Section 9.8 on Page 28) and tighten set-screw.
- Apply power to the instrument.
- Check all settings and parameters.
- Calibrate instrument, if necessary, (see Section 5.2 on Page 20).

5.6 Cleaning the instrument

Clean the instrument with a soft cloth using water and a mild detergent. Rinse with water.

6 Factory default settings

6.1 Settings which can be changed via the menu

Menu	Factory Default Setting
A1 Set	depending on the sensor
A2 Set	depending on the sensor
A1 RIS / FALL	rising (except O2 falling)
A2 RIS / FALL	rising
A1 Lat / nLat	nLat
A2 Lat / nLat	Lat
A1 Ack / nAck	Ack
A2 Ack / nAck	nAck
A1 ENRG ON / OFF wired in Docking Station	energized / NO (normally open)
A2 ENRG ON / OFF wired in Docking Station	energized / NO (normally open)
Cal Set	steady
Pass Set	0000
LCD Set ON / OFF	on
FAIL FREQ PULS / STDY	PULS (pulsing)

6.2 Fixed settings

Fault	Meaning
Fault Relay (cannot be changed) / wired in Docking Station	energized / NO (normally open)
Yellow Fault LED	Lit if a Fault message is available, see Section 5.3 on Page 22.
Red Alarm LED	Single blink if A1 condition is present. Double blink if A2 condition is present. If an alarm is configured acknowledge-able and the alarm is acknowledged, single/double blink changes into continuous lit.
Alarm Hierarchy	A2 overrides A1 on the LED. However, the A1 and A2 relays operate independently. I.e. if A1 is acknow-ledgeable, 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.

7   Sensor principle

Dräger electrochemical sensors are measuring the partial pressure of gases under atmospheric conditions. The monitored ambient air diffuses through a membrane into the liquid electrolyte in the sensor. The electrolyte contains a measuring electrode, a counter-electrode and a reference electrode. An electronic potentiostat circuit ensure a constant electrical voltage between measuring electrode and reference electrode. Voltage, electrolyte and electrode material are selected to suit the gas being monitored so that it is transformed electrochemically on the measuring electrode and a current flows through the sensor. This current is proportional to the gas concentration. At the same time, Oxygen from the ambient air reacts at the counter-electrode electrochemically. The current flowing through the sensor is amplified electronically, digitized and corrected for several parameters (e.g. the ambient temperature).

8   Disposing of the instrument

Disposing of electrical and electronic equipment:

EC-wide regulations governing the disposal of electrical and electronic appliances which have been defined in the EC Directive 2002/96/EC and in national laws have been effective since August 2005 and apply to this device.
Common household appliances can be disposed of using special collecting and recycling facilities. However, this device has not been registered for household usage. Therefore it must not be disposed of through these channels. The device can be returned to your national Dräger Sales Organization for disposal. Please do not hesitate to contact Dräger if you have any further questions on this issue.

Disposing of electrochemical sensors:

To be disposed in accordance with the material safety data sheet of the corresponding sensor.

WARNING

Danger of explosions! Do not dispose sensors in fire, risk of chemical burns!

Do not open with force.

Observe the applicable local waste disposal regulations. For information, consult your local environmental agency, local government offices or appropriate waste disposal companies.

9 Technical data

⚠️ **CAUTION**

Specifications and restrictions in the Instructions for Use and/or data sheets for the sensors used must be observed.
The measuring range and performance characteristics are dependent on the installed sensor (see Instructions for Use and/or data sheet for the installed sensor).

9.1 Approvals

ATEX, IECEx, UL

See printout of approval label inside the shipping box of the instrument.

9.2 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: A = 2009, B = 2010, C = 2011, D = 2012, E = 2013, F = 2014, H = 2015, J = 2016, K = 2017, etc.

Example: Serial Number ARFB-0066: the third letter is F, which means that the unit was manufactured in 2014.

9.3 Signal transmission to central controller

Analog signal

Description	Analog output
Normal operation	4 to 20 mA
Drift below zero	3.8 to 4 mA
Measuring range exceeded	20 to 20.5 mA
Instrument fault (3-wire)	≤ 1.2 mA
Instrument fault (2-wire)	≤ 3 mA
Fault on analog interface	> 21 mA
Maintenance signal	3.4 mA steady signal or 1 Hz modulation between 3 and 5 mA (selectable)

9.4 Power supply and relays

Operating Voltage (3-wire)	10 to 30 V at the instrument, powered by a Class 2 power supply
Operating Voltage (2-wire)	18 to 30 V at the instrument, powered by a Class 2 power supply
Cable specification	2-core or 3-core shielded cable, depending on configuration; a minimum of 18 AWG (0.75 mm^2) at 230 V~ is required for field wiring
Operating Current (max.)	80 mA at 24 V without relay, non-remote sensor 100 mA at 24 V with relay, remote sensor
Relay Rating (option)	SPDT, 0.1 A to 5 A at 230 V~, 50-60 Hz, 0.1 A to 5 A at 30 V , resistive load; to be secured with a 5 A fuse

Technical data

9.5 Physical specifications

Enclosure material	copper free aluminum or 316 stainless steel
Enclosure protection	NEMA 4X and IP 65/66/67
Display	4 digit, 9 segment, back-lit

Size (LxWxD,approx.)		
	Without Docking Station	
	11.3" x 5.8" x 5.1"	(285 x 150 x 130 mm)
	With Docking Station	
	11.5" x 7.1" x 7.4"	(295 x 180 x 190 mm)

Weight (approx.)		
	Without Docking Station	
	aluminum	4.9 lbs. (2.2 kg)
	stainless steel 316	8.8 lbs. (3.6 kg)
	With Docking Station	
	aluminum	7.7 lbs. (3.5 kg)
	stainless steel 316	11.9 lbs (5.4 kg)

9.6 Environmental parameters

Pressure	20.7 to 38.4 in. of Hg (700 to 1300 hPa)
Humidity	0% to 100% RH, non-condensing
Temperature	-40 to +149 °F (-40 to +65 °C)
Storage temperature	-4 to +149 °F (-20 to +65 °C)
See sensor data sheet for sensor specifications	

9.7 Environmental influences

For influences on the measurement performance and restrictions of a particular sensor see sensor data sheet.

9.8 Tightening torque for instrument threads

The values are valid for aluminum and stainless steel 316 versions.

Part	TQ Lb. In.	TQ Nm
Enclosure lid	min. 44.3	min. 5
Sensor	min. 266	min. 30
Blind plug	min. 266	min. 30
Feed-through Conduit hub	min. 443	min. 50
Instrument to Docking Station (4 screws)	71	8
Grounding screws	10.6	1.2

9.9 Tightening torque and size for field wiring terminals

Terminal	TQ Lb. In.	Wire Size AWG	Wire Size mm^2
Power supply and signal	4.4 – 7.0 (0.5 – 0.8 Nm)	24 – 12	0.2 – 2.5
Relays	4.4 – 7.0 (0.5 – 0.8 Nm)	20 – 12	0.5 – 2.5

10   Order list

10.1   Dräger Polytron 5100

Description	Part Number
Polytron 5100 DS d A	45 44 860
Polytron 5100 DS d A Relay	45 44 121
Polytron 5100 DS d S	45 44 862
Polytron 5100 DS d S Relay	45 44 123
Polytron 5100 DS e A	45 44 124
Polytron 5100 DS e A Relay	45 44 125
Polytron 5100 DS e S	45 44 126
Polytron 5100 DS e S Relay	45 44 127

10.2   Docking Station

NOTICE

The Docking Station is not included with the e-version of the instrument.

Description	Part Number
Docking Station Power Only Version	68 12 420
Docking Station Power and Relay Version (includes 2 cable glands)	68 12 275
Cable Gland Docking Station	68 12 868

10.3   Accessories

Description	Part Number
Splash Guard	68 12 510
Calibration Adapter PE	45 09 314
Calibration Adapter PE, Europe	68 06 978
Calibration Adapter Viton	68 10 536
Pipe Mount Kit	45 44 198
Duct Mount Kit	68 12 725
EC Sensing Head Remote with Wall/Pipe Mount Kit, requires remote cable	68 12 684
Remote Cable with Plug, 5 m (16 ft)	83 23 305
Remote Cable with Plug, 15 m (49 ft)	83 23 315
Remote Cable with Plug, 30 m (98 ft)	83 23 330
Duct Mount Adapter for EC Sensing Head Remote	83 17 617
IRDA Interface to Connect to PC	45 44 197
PolySoft	83 23 405
PolySoft Premium	83 23 411
Magnetic Wand with Key Chain	45 44 101

10.4   Spare parts

Description	Part Number
Bezel	45 44 183
PCB Main with Bezel	45 44 186
Relay PCB	45 44 297
PCB Docking Station	68 12 839
Feed-through 3 Wires	45 44 182
Feed-through 9 Wires	45 44 169
Hardware Kit Enclosure	45 44 167
Hardware Kit Docking Station	68 12 838
Cable Gland Docking Station	68 12 868
Galvanic Isolator	45 44 367
Sensor Circuit Board (EC Sensing Head Local)	45 44 368
Sensor Circuit Board (EC Sensing Head Remote)	45 44 369
Bayonet Ring	45 44 366

Declaration of Conformity

11 Declaration of Conformity

EG-Konformitätserklärung
EC-Declaration of Conformity

Dräger

Dokument Nr. / *Document No.*   SE20967-01

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

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

Gasmess- Transmitter Typ E/I/XTR 02/3** (Polytron 5**0)
Gas Detection Instrument type E/I/XTR 02/3** (Polytron 5**0)

mit den EG-Baumusterprüfbescheinigungen   **PTB 11 ATEX 1005 X**
is in conformity with the EC-Type Examination Certificates

ausgestellt von den   PTB
benannten Stellen   **Bundesallee 100**
issued by the Notified Bodys   **D-38116 Braunschweig**

Kenn-Nr. der benannten   0102
Stellen
Identification Number of Notified Bodys

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

Bestimmungen der Richtlinie *provisions of directive*	**Nummer sowie Ausgabedatum der Norm** *Number and date of issue of standard*
94/9/EG: **ATEX-Richtlinie** *94/9/EC:* *ATEX Directive*	EN 60079-0:2012, EN 60079-1:2007, EN 60079-7:2007, EN 60079-11:2012 [1], EN 60079-31:2009
2004/108/EG: **EMV-Richtlinie** *2004/108/EC:* *EMC Directive*	EN 50270:2006 (type 2), EN 61000-6-3:2007+A1 :2011+AC:2012
2006/95/EG: **Niederspannungs-Richtlinie** *2006/95/EC:* *Low Voltage Directive*	EN 61010-1:2010

[1] nur für ETR 0*** / only applicable for ETR 0***

Überwachung der Qualitätssicherung   **DEKRA EXAM GmbH**
Produktion durch   **Dinnendahlstraße 9**
Surveillance of Quality Assurance Production by   **D-44809 Bochum**

Kenn-Nr. der benannten Stellen
Identification Number of Notified Bodys   0158

Lübeck, 2014-07-10

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

Axel Lamprecht   *Axel Lamprecht*
Leiter   *President*
Globale   *Global*
Forschung & Entwicklung   *Research & Development*