8030441/AE00/V2-5/2025-04



# Operating Instructions
# **PGK Ex**

## Gas Cell for Use in Potentially Explosive Atmospheres

Endress+Hauser
People for Process Automation

**Described product**
Product name: PGK Ex

**Manufacturer**
Endress+Hauser SICK GmbH+Co. KG
Bergener Ring 27
01458 Ottendorf-Okrilla
Germany

**Production location**
Endress+Hauser SICK GmbH+Co. KG
Rengoldshauser Str. 17a
88662 Überlingen
Germany

**Legal information**


**Original document**
This document is an original document of Endress+Hauser SICK GmbH+Co. KG.

# 1 Important information

## 1.1 Symbols and document conventions

### 1.1.1 Warning symbols

| Symbol | Significance |
|---|---|
|  | Hazard (general) |
|  | Hazard by voltage |
|  | Hazard in potentially explosive atmospheres |
|  | Hazard by explosive substances/mixtures |
|  | Hazard by noxious substances |
|  | Hazard by high temperature or hot surfaces |

### 1.1.2 Warning levels and signal words

| |
|---|
| **DANGER:**<br>Risk or hazardous situation which *will* result in severe personal injury or death. |
| **WARNING:**<br>Risk or hazardous situation which *could* result in severe personal injury or death. |
| **CAUTION:**<br>Hazard or unsafe practice which *could* result in less severe or minor injuries. |
| **NOTE:**<br>Hazard which *could* result in property damage. |

### 1.1.3 Information symbols

| Symbol | Significance |
|---|---|
|  | Information on product condition with regard to explosion protection |
|  | Important technical information for this product |
|  | Important information on electrical or electronic functions |

## 1.2 Main hazards

**CAUTION:** Noxious and irritating sample gases
When the sample gas contains noxious or irritant substances:
▶ Operate the PGK Ex in a safe manner (see “Safety information on commissioning”, page 18)

**WARNING:** Risk of explosions by severe mechanical stress
The cell can become leaky when the mechanical stress is too severe.
▶ Do not subject the PGK Ex to severe mechanical stress (e.g.: dropping, jolts).

## 1.3 Intended use

### 1.3.1 Purpose of the cell

The cell is part of a measuring system for analyzing gas mixtures.

### 1.3.2 Limitations

- When used in potentially explosive atmospheres: The PGK Ex may only be used on an MCS300P Ex.

▶ Check whether the cell is suitable for the sample gas composition planned.
  – List with materials used in the cell: Refer to the Data Sheet delivered with the cell.
  – In case of doubt, contact your local Endress+Hauser Sales Office.

## 1.4 Potentially explosive atmospheres and sample gases

- The PGK Ex corresponds to the ATEX category (according to ATEX Directive 2014/34/EU): Ⓔx II 2G Ex eb IIC Gb
- The PGK Ex corresponds to the IECEx category:
  Ex eb IIC Gb
- The PGK Ex is suitable for measuring combustible and occasionally explosive gases (in accordance with Zone 1) (see “Important information on using combustible sample gases”, page 9).

## 1.5 Responsibility of user

**Designated user**

The cell may only be operated by skilled technicians who, based on their technical training and knowledge as well as knowledge of the relevant regulations, can assess the tasks given and recognize the hazards involved.

**Correct use**

▶ Use the cell only as described in these Operating Instructions.
  The manufacturer bears no responsibility for any other use.
▶ Have the prescribed maintenance work performed.
▶ Do not remove, add or modify any components in or on the cell. Otherwise:
  – The cell can become dangerous.
  – Any warranty by the manufacturer becomes void.

**Special local conditions**

▶ In addition to these Operating Instructions, observe all local laws, technical regulations and company-internal operating directives applicable at the installation location of the device.

### Further documents

- Operating Instructions of MCS300P Ex (for mounting the cell on an MCS300PEx).

### Keeping documents

These Operating Instructions:

- ▶ Must be available for reference.
- ▶ Must be passed on to new owners.

# 2 Product description

## 2.1 Product identification

| | |
|---|---|
| Manufacturer: | Endress+Hauser SICK GmbH+Co. KG<br>Bergener Ring 27 · 01458 Ottendorf-Okrilla · Germany |
| Production location: | Endress+Hauser SICK GmbH+Co. KG<br>Rengoldshauser Str. 17a · D-88662 Überlingen · Germany |

| Cell | Material | Part No. |
|---|---|---|
| PGK10-Ex (10 cm)[1] | Stainless steel | 2041807 |
| PGK20-Ex (20 cm) | Stainless steel | 2041808 |
| PGK50-Ex (50 cm) | Stainless steel | 2041809 |
| PGK75-Ex (75 cm) | Stainless steel | 2041810 |
| PGK10-Ex (10 cm) | Stainless steel DSC | 2147413 |
| PGK20-Ex (20 cm) | Stainless steel DSC | 2147414 |
| PGK50-Ex (50 cm) | Stainless steel DSC | 2147415 |
| PGK75-Ex (75 cm) | Stainless steel DSC | 2147416 |
| PGK10-Ex (10 cm) | Hastelloy | 2070997 |
| PGK20-Ex (20 cm) | Hastelloy | 2070998 |
| PGK50-Ex (50 cm) | Hastelloy | 2070999 |
| PGK75-Ex (75 cm) | Hastelloy | 2071000 |

[1] Optical path length

The type plate is located on the connection unit (see “Connections”, page 10).

## 2.2 Important information on usage in Ex zones

EX

- The PGK Ex corresponds to the ATEX category (according to ATEX Directive 2014/34/EU): Ⓔx II 2G Ex eb IIC Gb
- The PGK Ex corresponds to the IECEx category:
  Ex eb IIC Gb
- The Ex marking is on the type plate:
  Endress+Hauser
  PGK10 Ex
  II 2G Ex eb IIC Gb
  BVS 10 ATEX ... (= number of ATEX Type Examination Certificate)
  BVS 17 ATEX ... (= number of IEC Type Examination Certificate)

- ▶ Only use the PGK Ex on an MCS300P Ex.
- ▶ Only use the PGK Ex with a fault current or isolation monitoring system.
- ▶ Do not remove, add or modify and components on or in the PGK Ex. Otherwise the approval for use in potentially explosive atmospheres becomes void.
- ▶ Adhere to the prescribed maintenance intervals (see “Maintenance plan”, page 21).
- ▶ Maximum surface temperature is 150 °C (300 °F)
  Cell temperature must not be set higher than 150 °C (300 °F) (external temperature limiter).

## 2.3 Important information on using combustible sample gases

The PGK Ex cell is suitable for measuring combustible and occasionally explosive gases (in accordance with Zone 1).

There is no ignition source present in the part of the cell with sample gas contact.

▶ An inert purge gas must be used when feeding combustible or occasionally explosive sample gas (in accordance with Zone 1) (see “Connecting purge gas”, page 15).

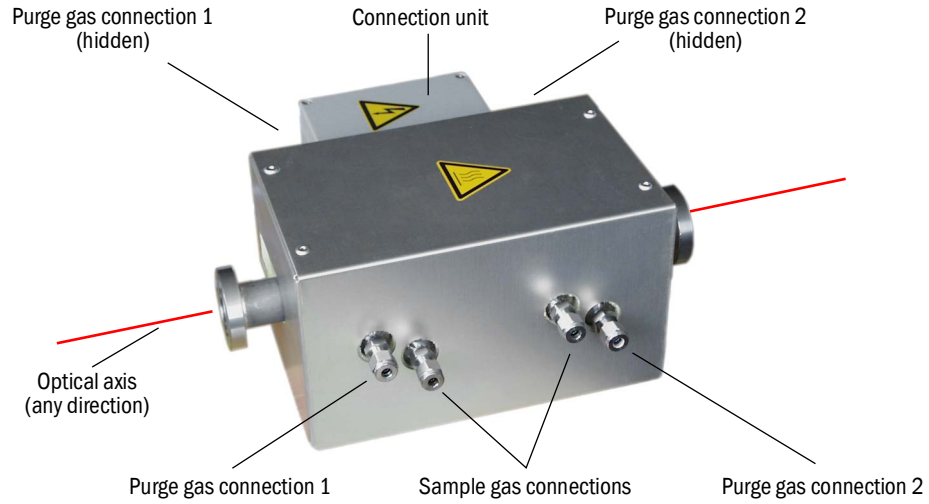
## 2.4 Layout and function

The sample gas is channeled through a sample compartment limited by windows on the side.

The measuring beam of a connected analyzer travels lengthwise through the cell and through the sample compartment. The measuring beam is attenuated by the sample gas, depending on the sample gas in a gas-specific manner and the analyzer evaluates this attenuation.

Protective windows between the sample compartment windows and the flanges to the analyzer form a purge gas compartment. This can be purged via purge gas connections. This allows, for example, flushing out gas from leaks in the cell window and detecting such leaks.

*Fig. 1: Connections*




### 2.4.1 Materials used

Different materials are used for the windows and seals depending on the spectral range and application conditions.

- The cell can be used for reactive and corrosive gases depending on the materials used.
- The maximum operating pressure depends on the materials used.

▶ Refer to the Data Sheet delivered with the cell for the materials used.

### 2.4.2 Thermostatic control

The cell has integrated heating cartridges.

Two independent Pt100 sensors are fitted for cell temperature control.

- The temperature is controlled with one of the Pt100 sensors using an external temperature controller for Pt100 sensors.
- An external temperature limiter connected to the second Pt100 sensor is required for monitoring the temperature controller. This limiter must switch the heating off definitely at a preset temperature (max. 150 °C (300 °F)). The heating must be not able to restart automatically.

The temperature controllers are available as an option.

# 3 Mounting and electrical installation

## 3.1 Information on Ex zones and combustible gases

For PGK Ex used in potentially explosive atmospheres or used with combustible or occasionally explosive sample gases (in accordance with Zone 1):

- ▶ Check the Ex identification is on the cell type plate (see “Important information on usage in Ex zones”, page 8).
- ▶ Installation, commissioning, maintenance and testing may be performed only by experienced persons who have knowledge of the rules and regulations for potentially explosive atmospheres, particularly:
  - Ignition protection types
  - Installation regulations
  - Zone classification
- ▶ Only use the PGK Ex with a fault current or isolation monitoring system.
- ▶ Applicable standards (examples):
  - IEC 60079-14, Annex F: Knowledge, skills and competencies of responsible persons, operatives and designers.
  - IEC 60079-17: Electrical installations inspection and maintenance
  - IEC 60079-19: Equipment repair, overhaul and reclamation

**WARNING:** Risk of explosions when the sample gas throughput is too high

When using combustible or occasionally explosive sample gas (in accordance with Zone 1):

- ▶ Operator to limit sample gas throughput to 100 l/h

Maximum surface temperature is 150 °C (300 °F).

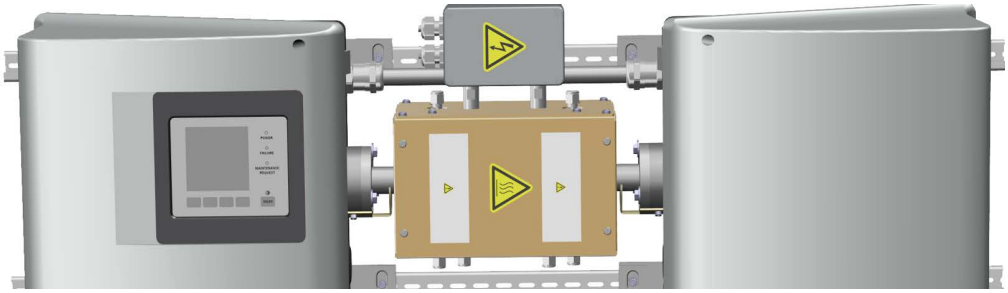
- ▶ Cell temperature must not be set higher than 140 °C (285 °F) (external temperature limiter).

## 3.2 Mounting

The PGK Ex is usually installed on the Endress+Hauser MCS300P Ex analyzer.

The positions of the measuring beam inlet and outlet are arbitrary.

*Fig. 2: PGK Ex cell on MCS300P Ex*



If you have to install the cell yourself: → Operating Instructions of the MCS300P Ex.

**Final mounting steps:**

1 Connect sample gas, see “Connecting sample gas”, page 12.
2 Connect purge gas (option), see “Connecting purge gas”, page 15.
3 Electrical installation, see “Electrical installation”, page 16.

### 3.2.1 Connecting sample gas

Gas connections may only be performed by skilled persons who, based on their technical training and knowledge:

- Are familiar with handling pipes and pipe connections.
- Are capable of performing suitable leak tests.

**NOTE:** Damage through condensate

Condensate can form on the sample gas outlet when using wet and hot sample gas.

- ▶ Keep the line opening free from any blockages.
- ▶ Always lay the line so that it runs downwards and no condensate can occur.
- ▶ Protect the sample gas outlet from frost.
- ▶ If necessary, provide a suitable condensate collecting device and adequate ventilation.
  Check and empty the condensate collection container regularly.

**NOTE:** Damage resulting from overpressure.

Blocked pipes can falsify measured values and possibly damage the cell.

- ▶ The sample gas outlet may not increase the working pressure.
- ▶ Only use pipes and pipe screw fittings that are adequate for the required pressure.
- ▶ Do not bend or crimp the pipes.

#### 3.2.1.1 *Preparation work*

**WARNING:** Danger to life/health risk by noxious gases

If noxious gases are applied to the cell, emerging gas can damage health.

- ▶ Lay the cell outlets into the open or into a suitable collecting channel.
- ▶ Pay attention to the information from the equipment operator.

A leak in the gas path can create acute danger for persons.

- ▶ Take suitable safety measures.

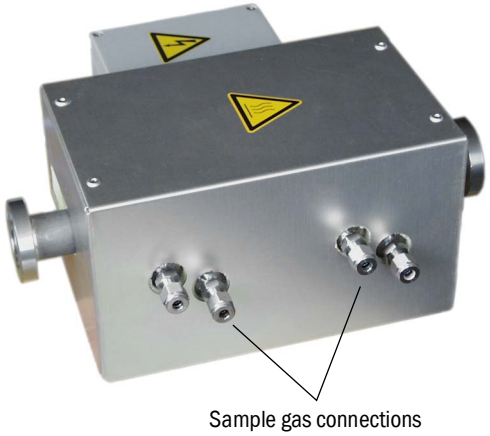
**NOTE:** Possibly provide initial thermal stabilization for cold sample gas

When cold sample gas is fed to a heated cell, it is possible that the measurement signal becomes unstable due to thermal turbulence.

- ▶ Plan suitable initial thermal stabilization when necessary.

### 3.2.1.2 *Connecting the sample gas*

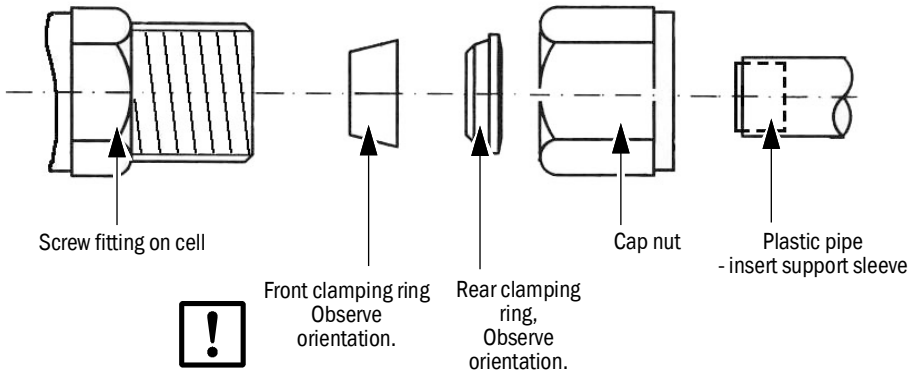
*Fig. 3: Sample gas connections*




▶ Connect sample gas pipes gas-tight.
  – *Vertical mounting*: Sample gas inlet below, sample gas outlet above (recommended).
  – *Horizontal mounting*: Sample gas inlet and sample gas outlet arbitrary.

*Information:* Only use suitable pipes for the sample gas, e.g. PTFE pipes.
*Information on plastic pipes:* Use support sleeves.

*Fig. 4: Clamping ring screw connection*




4 Carry out leak test.

**NOTE:** Damage due to torsion

Torsion loads damage the inner coating of the stainless steel gas cell with DSC.

▶ When connecting the sample gas connections, care must be taken to ensure that the screw connection on the cell is locked against any torsional stress.

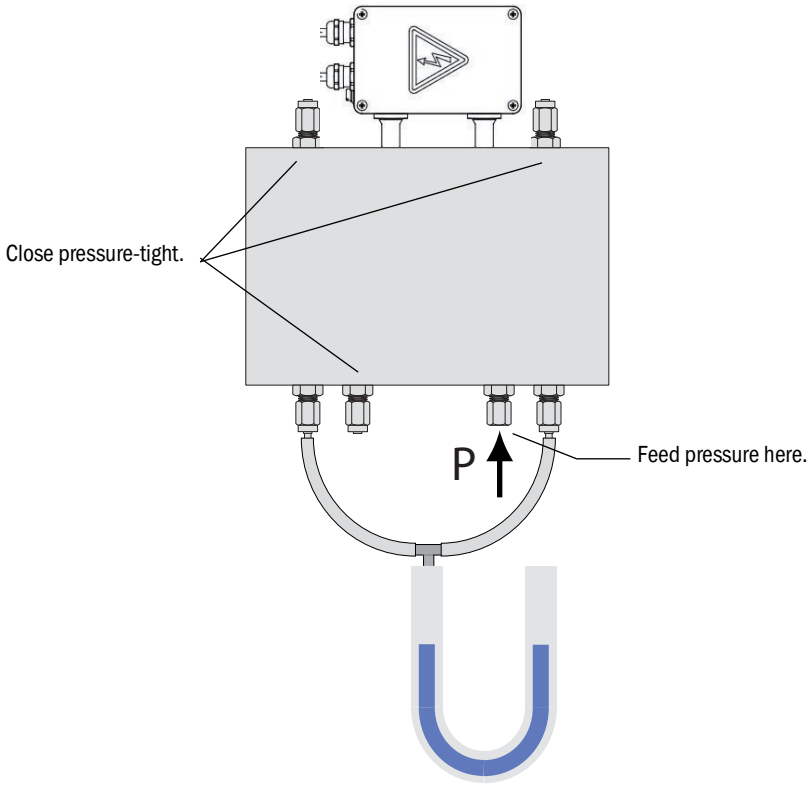
### 3.2.1.3 *Carrying out the leak test*

**NOTE:** Damage through condensate

Condensate can form on the sample gas outlet when using wet and hot sample gas.

- ▶ Keep the line opening free from any blockages.
- ▶ Always lay the line so that it runs downwards and no condensate can occur.
- ▶ Protect the sample gas outlet from frost.
- ▶ If necessary, provide a suitable condensate collecting device and adequate ventilation.
  Check and empty the condensate collection container regularly.

*Fig. 5: Leak test arrangement*




**WARNING:** Risk of bursting with high pressure

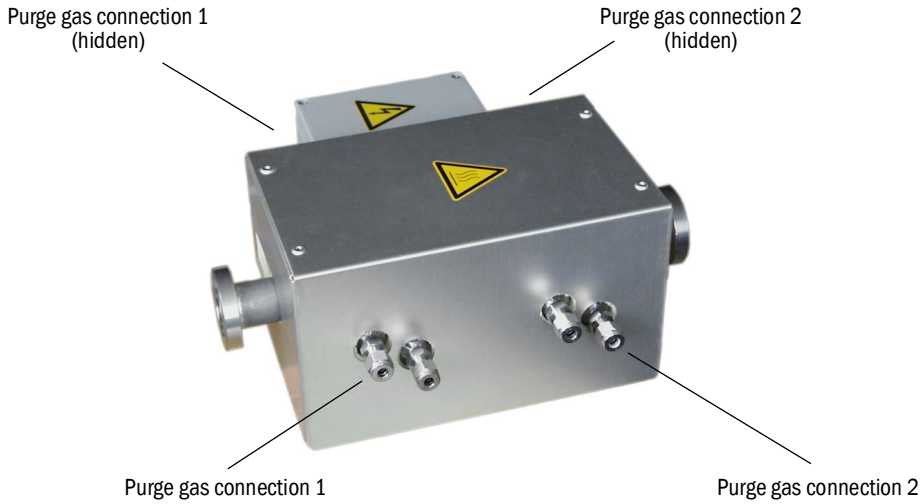
Glass splinters can escape from the pipes should a window break.

- ▶ Bring the cell to a safe place and cover the pipes.

1 Bring the cell up to operating temperature.
2 Slowly apply 1.5 times the operating pressure to the cell sample gas compartment.
3 Use a transparent plastic hose with 400 mm water column to monitor leak tightness.
  1 mm water column corresponds to 0.1 mbar.
  The water column must not change for 1 minute after the pressure has been increased.

### 3.2.2 Connecting purge gas

*Fig. 6: Purge gas connections*




- An inert purge gas (e.g. nitrogen) must be used when measuring combustible or explosive sample gas (in accordance with Zone 1).
- Feeding into the purge compartments must run via a return valve (provided by operator).
- Purge gas disposal must be made against atmospheric pressure and using lines with a larger cross-section than those for the purge gas pipes to the cell.
- The operator must ensure purge gas pressure and purge gas flow.
- Measuring medium may only be fed into the cell when purge gas flow is available.
- The operator must ensure safe disposal of the purge gas as well as any sample gas escaping after a malfunction.
- Purge gas conditions:
  - Flow rate: 2 ... 100 l/h (0.1 ... 35 cu.foot/h)
  - Primary pressure: Max. 3 bar (300 kPa)

**Procedure**

▶ Connect purge gas lines.

## 3.3 Electrical installation

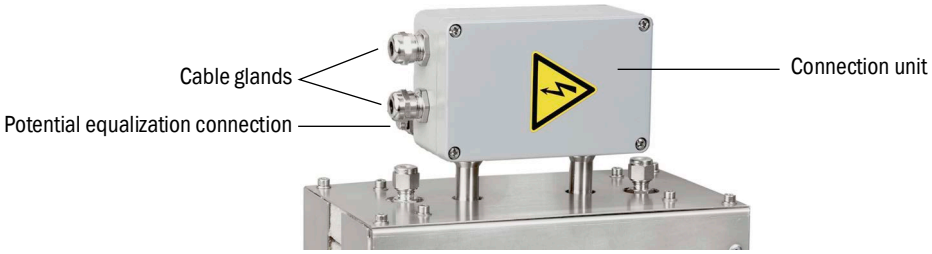
When used in potentially explosive atmospheres:
▶ Observe information see “Information on Ex zones and combustible gases”, page 11.

### 3.3.1 Preparation work

- Install a suitable power disconnecting device to be able to disconnect from the voltage supply and make all poles potential-free.
- Install a suitable power fuse for the cell heater.
  – 4 A for PGK10/PGK20/PGK50 (with 115 V and 230 V)
  – 8 A for PGK75 (with 115 V and 230 V)
- Install a temperature controller and limiter for Pt100 sensors.

### 3.3.2 Electrical connection

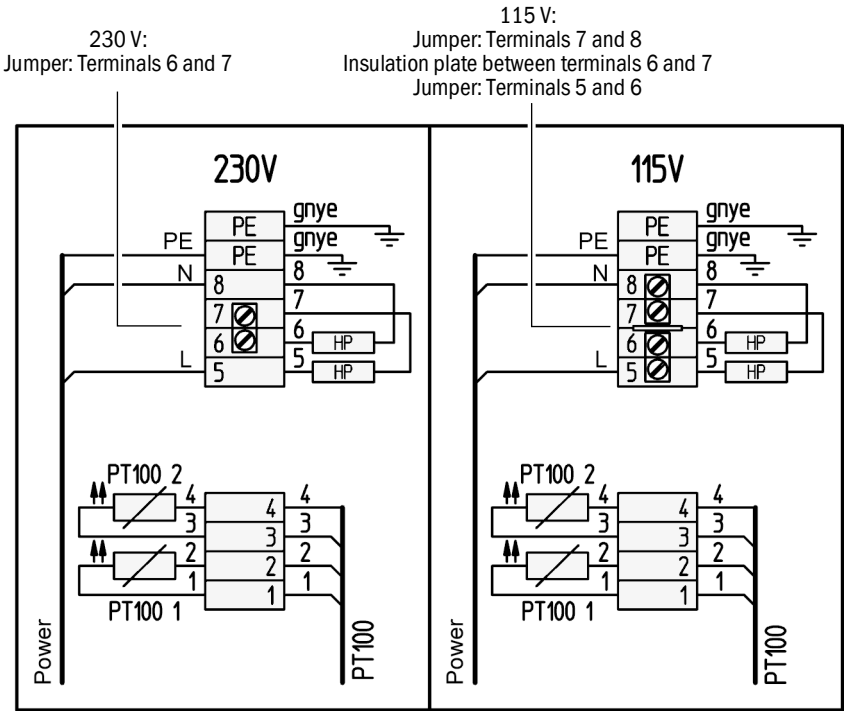
*Fig. 7: Connection unit*




1 Loosen screws (4) on the connection unit cover.
2 Take the cover off.

A wiring diagram is in the connection unit cover.

*Fig. 8: Connection diagram*




3 Check voltage setting on jumpers

**NOTE:** Pay attention to jumpers
- Jumpers and insulation plate depend on the input voltage available. These are preconfigured.
- Changes to the input voltage setting (jumpers) may only be carried out by a qualified skilled person with knowledge of electrical circuits in Ex areas.

4 Lead the connection cables for input voltage and Pt100 (specification see “Technical data”) through cable glands and connect them in the connection unit.
Pay attention to the clamping range of the cable glands (specification see “Technical data”).
5 Tighten the cable glands.
6 Fit and tighten the connection unit cover.

**WARNING:** Risk of explosions. Check seal
- Make sure the cover seal is in perfect condition.
- Do not use the connection unit anymore when the seal shows signs of damage. Please contact Endress+Hauser Service.

7 Connect the potential equalization to the terminal for potential equalization (cable: 2.5 mm²).
8 Connect the cell to the external temperature control.

**WARNING:** Hazard when the temperature is too high
The cell heating must be switched off definitely should the temperature limiter trigger (the cell must not restart automatically).

# 4 Commissioning / operation

## 4.1 Commissioning

### 4.1.1 Safety information on commissioning

**WARNING:** Risk of explosions by severe mechanical stress
The cell can become leaky when the mechanical stress is too severe.
- ▶ Check the PGK Ex visually for perfect condition.
- ▶ In case of doubt, carry out a leak test (see “Carrying out the leak test”, page 14).

**WARNING:** Mortal/health danger as a result of gas path leakage
When noxious gases are fed to the cell:
A leak in the gas path can create an acute danger for persons.
- ▶ When required, carry out a leak test (see “Carrying out the leak test”, page 14).

### 4.1.2 Start-up procedure

1 Check sample gas feed for:
- Damage
- Leak tightness
- Continuity
- Functional capability of sample gas filter
- Correct sample gas pressure setting
- When heated: Functional capability of heater

2 Let the cell heat up.

There is a risk of condensation in the cell when gas is fed to a cold cell.
- ▶ Let the cell heat up.
- ▶ Then feed sample gas.

a) When used under ambient temperature without heating:
- Allow the cell to adapt to the gas temperature for approx. 5 h.

b) When using the cell heating:
- Check the setting of the temperature controller.

- ▶ Check the temperature controller and limiter are not set higher than the allowable temperatures (→ Data Sheet) and observe the maximum temperature of 150 °C (300 °F).

Heating up time:
- From room temperature to approx. 50 °C (120 °F): Approx. 1 h
- From room temperature to approx. 150 °C (300 °F): Approx. 4 h

3 Set the purge gas flow rate.
Flow rate: 2 … 100 l/h (0.1 … 35 cu.foot/h)

4 Feed sample gas.
- Max. sample gas temperature: 150 °C (300 °F).

When the cell is operated with pressure: Apply pressure slowly.
- Max. pressure: → Data Sheet

Set the sample gas flow rate:
- Recommended flow rate: 30 … 1000 l/h

When measuring combustible or occasionally explosive gases (in accordance with Zone 1): Limit sample gas flow rate to max. 100 l/h.

## 4.2 Operation

**WARNING:** Risk of burns on hot surface
Cell and gas connections can be very hot.
▶ Do not touch the surface.

The cell operates automatically.

In regular intervals:

▶ Check the cell and connected pipes for:
- Damage
- Leak tightness
- Continuity

▶ If a condensate container is fitted: Check fill level regularly.

# 5 Decommissioning

## 5.1 Decommissioning

**WARNING:** Hazard resulting from substances remaining in the cell
Depending on the sample gas composition, toxic or corrosive gases can remain in the cell and connected pipes when the gas supply is switched off. If necessary:
- ▶ Purge the cell and connected pipes for at least 1 h with inert gas (e.g.: $N_2$).
- ▶ Take suitable protective measures (e.g. work under a vent, wear suitable protective clothes).
- ▶ Decontaminate the cell.

1 Switch off the sample gas feed and ensure that no more gas can flow into the cell.
2 Depending on the sample gas composition, purge the cell and connected pipes for at least 1 h with inert gas.
3 Ensure there is no pressure.
4 Switch purge gas off when used.
5 If heating is connected: Switch the heating off and disconnect where necessary.
6 If the cell is to be put out of operation for a longer period: Close the gas inlets airtight.

**WARNING:** Risk of burns on hot surface
Cell and gas connections can be very hot.
- ▶ Allow the cell and gas connections to cool down before touching them.

**WARNING:** Danger when storing or dispatching
If the cell can contain deposits dangerous to health and the cell is to be stored or sent somewhere:
- ▶ Mark the cell *clearly*:
  - Which gases were in the cell.
  - Which hazards exist (e.g. when disassembling the cell).
  - How the cell was cleaned.

## 5.2 Disposal

- ▶ Observe local regulations.
- ▶ Dispose of electronic components (heating cartridges) as electronic waste.
- ▶ Dispose of metal parts as scrap metal.
- ▶ Dispose of windows and seals as residual waste.
- ▶ If the cell was used with toxic substances or substances harmful to the environment and there is a risk that deposits of these substances still cling to parts with media contact: Dispose of parts with media contact as hazardous waste.

# 6 Maintenance

## 6.1 Information on working on the cell


For cells used in potentially explosive atmospheres:
- Use original Endress+Hauser spare parts only.
- Maintenance and inspection should only be carried out by experienced personnel with knowledge of the rules and regulations for potentially explosive atmospheres, especially:
  - Ignition protection types
  - Installation regulations
  - Zone classification
- Applicable standards (examples):
  - IEC 60079-14, Annex F: Knowledge, skills and competencies of responsible persons, operatives and designers.
  - IEC 60079-17: Electrical installations inspection and maintenance.
  - IEC 60079-19: Equipment repair, overhaul and reclamation.

## 6.2 Maintenance plan

| Maintenance interval | Maintenance work |
|---|---|
| 1 year | ▶ Disassemble and clean the cell.<br>*Recommendation:*<br>▶ Renew O-rings with media contact.<br>▶ Renew the cell windows (could be severely damaged during disassembly). |
| 2 years | ▶ Additionally: Renew O-rings and protective window in purge gas flange. |

**NOTE:** Malfunction hazard
Maintenance work on the cell may only be carried out by skilled persons trained on the cell.

## 6.3 Recommended spare parts for 2 years operation

**NOTE:** Malfunction hazard
- ▶ Use original Endress+Hauser spare parts only.

**WARNING:** Risk of leaks and bursting when incorrect seal or window materials are used
The maximum operating pressure and therefore cell leak tightness depend on the windows and seal materials used.
- ▶ Observe the maximum operating pressure: see “Technical data”, page 31 or Data Sheet.
- ▶ Only use window and seal materials specified in the Data Sheet.

| Assembly kits[1] | Quantity[2] | Y[3] | 2Y[4] | Part No. |
|---|---|---|---|---|
| Cell-side windows and seals - Isolast | | | | |
| 1 set quartz windows 32 x 5<br>with Isolast O-ring, washer and thrust ring | 2 | ● | | 2024087 |
| 1 set CaF2 windows 32 x 5<br>with Isolast O-ring, washer and thrust ring | 2 | ● | | 2024089 |
| 1 set BaF2 windows 32 x 5<br>with Isolast O-ring, washer and thrust ring | 2 | ● | | 2024088 |
| Cell-side windows and seals - Kalrez | | | | |
| 1 set quartz windows 32 x 5<br>with Kalrez O-ring, washer and thrust ring | 2 | ● | | 2055958 |
| 1 set CaF2 windows 32 x 5<br>with Kalrez O-ring, washer and thrust ring | 2 | ● | | 2055960 |
| 1 set BaF2 windows 32 x 5<br>with Kalrez O-ring, washer and thrust ring | 2 | ● | | 2055959 |
| Protective window and seals, purge flange | | | | |
| 1 set quartz protective windows 32 x 5<br>with Viton O-ring, washer and thrust ring | 2 | | ● | 2023647 |
| 1 set CaF2 protective windows 32 x 5<br>with Viton O-ring, washer and thrust ring | 2 | | ● | 2023649 |
| 1 set BaF2 protective windows 32 x 5<br>with Viton O-ring, washer and thrust ring | 2 | | ● | 2023648 |

[1] see “Exploded view of the cell body”, page 25
[2] Number of sets per maintenance
[3] Recommendation: Renew yearly
[4] Recommendation: Renew every 2 years

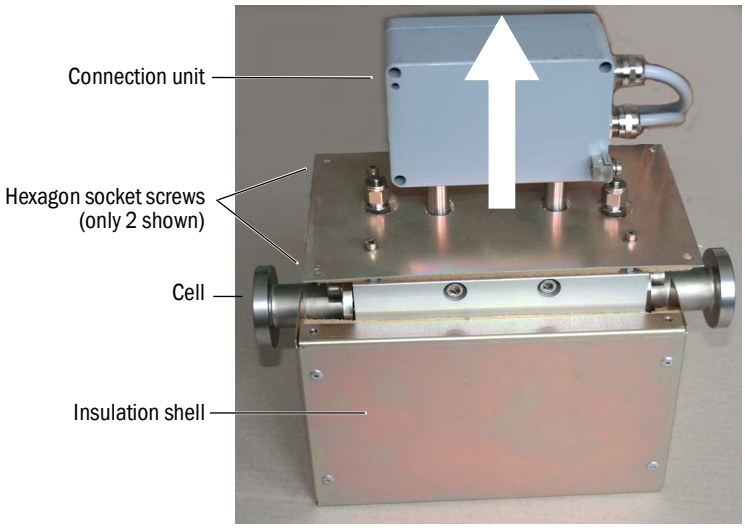
## 6.4 Removing the cell from the MCS300P Ex

Removing the cell from the MCS300P Ex → Operating Instructions of the MCS300P Ex

## 6.5 Working on the cell

### 6.5.1 Removing the cell from the insulating housing

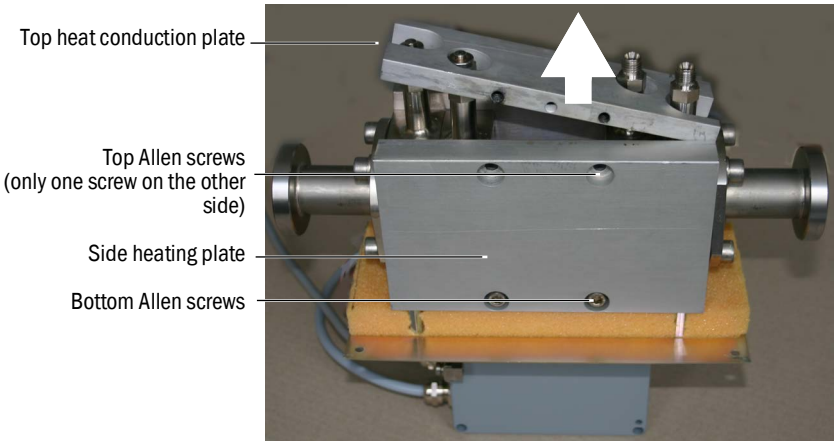
*Fig. 9: Removing the cell from the insulating housing*




1 Insert the cell so that the connection unit points upwards.
2 Unscrew 4 hexagon socket screws on the top side of the enclosure.
3 Lift the cell with connection unit out of the insulation shell.

### 6.5.2 Removing the cell from the cell heating

*Fig. 10: Take off the top heat conduction plate*

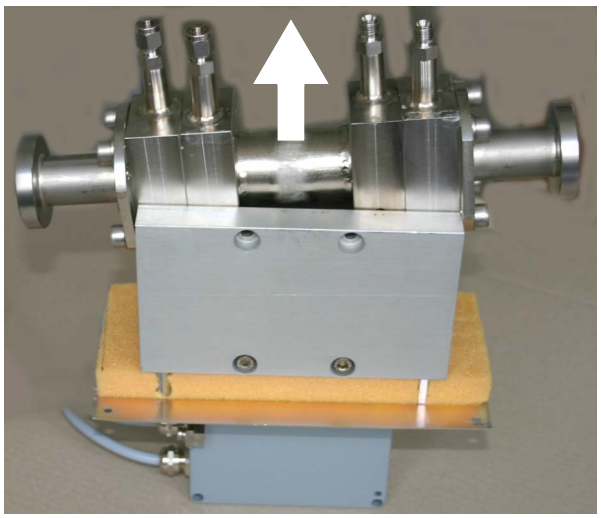



**NOTE:**
Do not damage connection cables for heating cartridges.

Mark position of the plates to be unscrewed (e.g. with a pencil line).

1 Place the cell on the connection unit.
2 On the side heating plates:
   – Loosen the *bottom* 6 mm Allen screws slightly (1/2 turn at the most).
   – Unscrew the *top* 6 mm Allen screws from the cell.
3 Pull the top heat conduction plate out upwards.
4 Mark position of the cell (e.g. with a pencil line).
5 Pull the cell out.

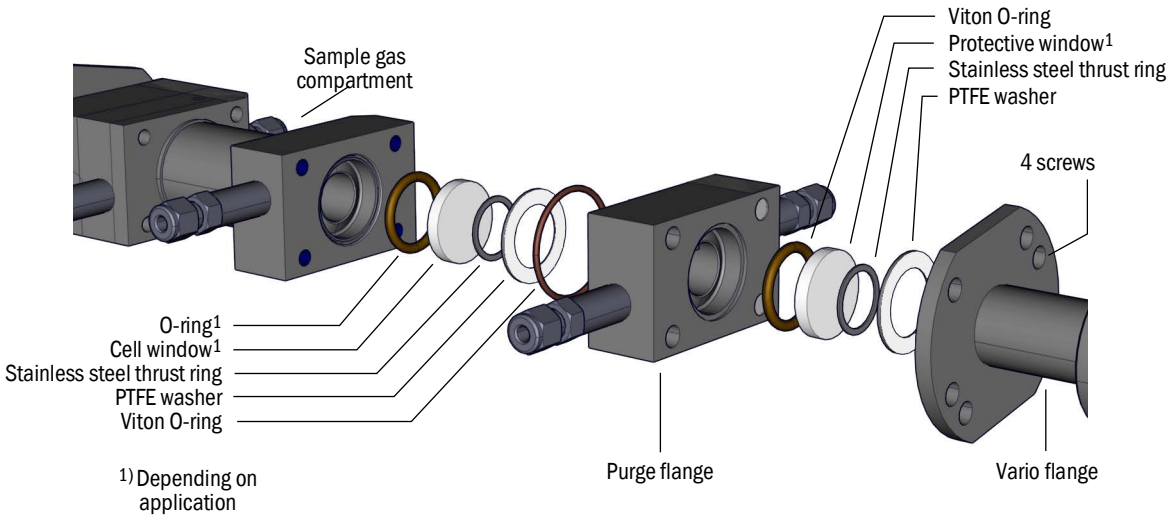
*Fig. 11: Removing the cell from the heating plates*



### 6.5.3 Working on the cell body

**WARNING:** Toxic and acidic deposits
Toxic, acidic or corrosive gases or deposits can be present in parts of the cell depending on the sample gas.
- ▶ Ensure adequate ventilation.
- ▶ As necessary, take suitable protective measures (e.g. work under a vent, wear breathing protection, protective goggles or safety mask, protective gloves and acid-proof protective clothes).

*Fig. 12: Exploded view of the cell body*




Technical drawing, see “Technical drawing (example, 75 cm cell)”, page 36

#### 6.5.3.1 *Removing the flanges*

**NOTE:**
- ▶ Make sure the cell window does not fall out during removal.
- ▶ Protect windows from contamination and damage.

1 Position the cell so that the flange to be disassembled points upwards.
2 Unscrew 4 screws (Allen screw M8) on the cell face side.
3 Remove the vario flange (sealing rings may stick).
The protective window is now accessible
(exchanging the window → both following Sections).
4 Remove the purge flange (sealing rings may stick).
The cell window is now accessible
(exchanging the window → both following Sections).

### 6.5.3.2 *Removing the protective and cell windows and seals*

Removal of the protective and cell windows is identical.

1 Take off the PTFE seal.
2 Take off the stainless steel thrust ring.

**NOTE:**
▶ Do not touch cell window with your fingers (wear gloves, if required) and do not contaminate the window.

**NOTE:** Sensitive surface of stainless steel gas cell with DSC
The invisible, sensitive coating must be protected against any mechanical stress.
▶ Do not use rough cleaning cloths.
▶ Dissolve and rinse out incrustations.

3 Remove the window (e.g. using a suction cap).
Place the window in a clean and secure place.
4 Take out the O-ring (cell window-side, two O-rings).

### 6.5.3.3 *Fitting the protective and cell windows and seals*

Fitting the protective and cell windows is identical. Consider the additional O-ring for the cell window (see Fig. 12).

1 Carefully clean the sealing surfaces.
– If necessary, use cotton swabs or wooden sticks for cleaning, and possibly acetone.
– Use new O-rings.
Make sure O-rings are made of the correct material.
Do not mix up the O-rings.
2 Insert O-rings carefully.

**WARNING:** Risk of bursting with scratched windows and high pressure
Windows can burst when scratched and with high operating pressure.
▶ Only use windows in perfect condition.

**NOTE:** Make sure the cell is clean
Sample gas and purge gas compartments must be clean before assembly.
Cleaning agent residues could affect measurement.
The windows must be clean.
▶ Do not touch the windows with your fingers.

3 If necessary, clean the window carefully with a soft cloth.
Suitable cleaning agent (depending on the sample gas):
– Demineralized water
– Isopropanol
– Acetone
Do not use any other cleaning agents and no scouring cloths.
Carefully dry the window after cleaning (no marks should remain).
4 Check window for perfect condition and insert.
5 Lay PTFE sealing ring centered to opening.
6 Lay the stainless steel thrust ring in the PTFE sealing ring.

#### 6.5.3.4 *Installing the flanges*

**NOTE:**
During flange assembly, make sure the windows do not fall out and get dirty.

1 Carefully clean the sealing surfaces.
2 Insert the cell window (see “Fitting the protective and cell windows and seals”, page 26).
3 Position the purge flange (according to markings made).
4 Insert the protective window (see “Fitting the protective and cell windows and seals”, page 26).
5 Position the Vario flange (according to markings made) on the purge flange (the flange is seated slightly tilted).
6 Tighten 4 screws slowly and evenly, then screw tight.
7 Perform a suitable leak test (see “Carrying out the leak test”, page 14).

### 6.5.4 Inserting the cell in the cell heating

Use the markings made during assembly.

**WARNING:** Hazard through leaky cell
▶ Check the cell with a suitable leak test before assembling (see “Carrying out the leak test”, page 14).

1 Push the cell with 2 gas connections down between the side heating plates (see Fig. 11).
2 Insert the top heat conduction plate.
3 Screw all screws of the side plates tight again.

### 6.5.5 Installing the cell in the insulating housing.

1 Fit the cell in the insulating housing (see Fig. 10).
2 Screw the screws of the insulating housing tight.

## 6.6 Fitting the cell on the MCS300P Ex

The cell is normally operated on an MCS300P Ex.

The positions of the measuring beam inlet and outlet are arbitrary.

*Recommendation*: Fit the cell in the same direction as beforehand.

Fitting the cell on an MCS300P Ex: → Operating Instructions of the MCS300P Ex.

# 7 Clearing malfunctions

## 7.1 Clearing malfunctions

| Malfunction | Possible cause | Information |
|---|---|---|
| Gas flow rate inadequate. | Sample gas path blocked. | Clean. |
| Leak. | Sample gas path leaky. | Seal. |
| | Cell window leaky. | Clean or renew window (see “Working on the cell”, page 23). |
| Temperature limiter has triggered. | Temperature on temperature controller set too high. | Set temperature. |
| | Pt100 defective. | Please contact Endress+Hauser Service. |
| Temperature varies considerably. | Power connection incorrect. | Provide power connection. |
| | Temperature controller defective. | Have the temperature controller repaired or replaced. |
| Heating does not work. | No voltage supply. | Provide power connection. |
| | Heating defective. | Please contact Endress+Hauser Service. |
| Condensate in the cell. | Temperature below dew point. | Check cell and clean as necessary.<br>Check thermostatic control. Heat sample gas feed.<br>Dry sample gas (e.g. sample gas cooler). |
| Not enough energy at the analyzer detector. | Cell window or mirror soiled. | Clean cell (see “Working on the cell”, page 23). |
| Unstable measurement signal. | Temperature difference between cell and sample gas very high. | Adjust temperature. |
| | Cell window or mirror soiled. | Check cell temperature.<br>Clean cell (see “Working on the cell”, page 23). |
| | Temperature controller hysteresis too large. | Reduce hysteresis. |
| Measured values incorrect. | For heated cell: Sample or purge gas flow rate too high so that cell cools down. | Adjust gas flow rate or preheat gas. |
| | After cleaning: Cleaner in sample gas or purge gas compartment. | Clean cell thoroughly. |

# 8 Technical specification

## 8.1 Compliance

The technical design of this device complies with the following EU directives and EN standards:

- EU Directive: EMC (Electromagnetic Compatibility)

Applied EN standards:

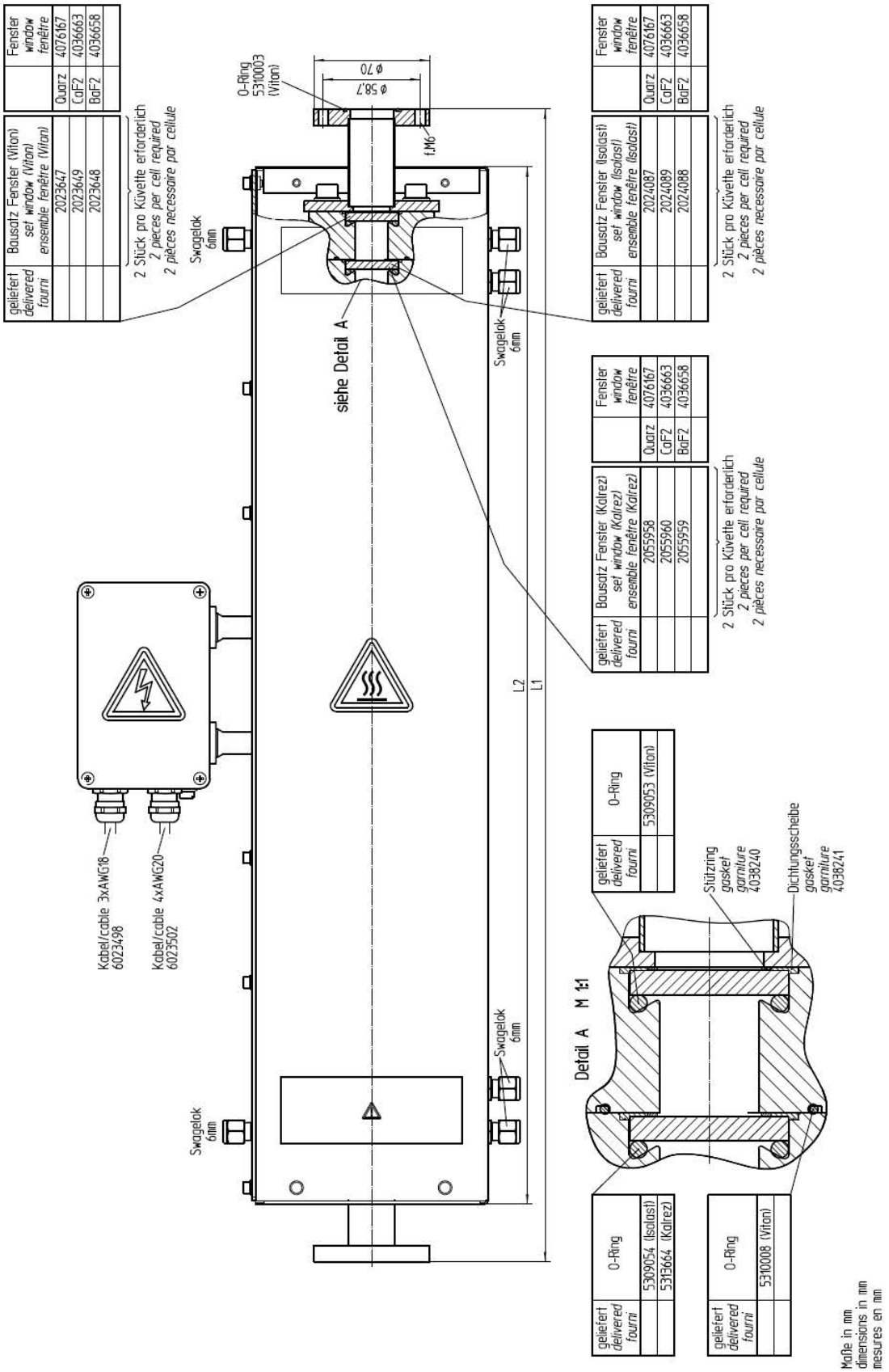
- EN 60079-0: Explosive atmospheres - Equipment - General requirements
- EN 60079-7: Explosive atmospheres - Equipment protection by increased safety “e”
- EN 61326, Electrical equipment for measurement technology, control technology and laboratory use - EMC requirements

## 8.2 Approval for potentially explosive atmospheres

EX

- The PGK Ex corresponds to the ATEX category (according to ATEX Directive 2014/34/EU): Ex II 2G Ex eb IIC Gb
- The PGK Ex corresponds to the IECEx category: Ex eb IIC Gb
- EU Type Examination Certificate: BVS 10 ATEX E 087 U

## 8.3 Technical drawing (example, 75 cm cell)



## 8.4 Technical data

Refer to the Data Sheet delivered with the cell for the materials used.

| Cell characteristics | |
|---|---|
| Optical path length | PGK10: 10 cm ( 3.94 in.)<br>PGK20: 20 cm (7.87 in.)<br>PGK50: 50 cm (19.7 in.)<br>PGK75: 75 cm (29.5 in.) |
| Materials with media contact:<br>– Cell body<br><br>– Window<br>– O-rings | <br>Stainless steel 1.4571 (SS316Ti)<br>Hastelloy 2.4819 (Alloy C-276)<br>Quartz, CaF2, BaF2<br>Isolast, Option: Viton, Kalrez |
| Weight | PGK10: Approx. 8 kg<br>PGK20: Approx. 10 kg<br>PGK50: Approx. 15 kg<br>PGK75: Approx. 20 kg |
| Sample gas volume | PGK10: Approx. 80 $cm^3$ (4.9 cu.in.)<br>PGK20: Approx. 150 $cm^3$ (9.2 cu.in.)<br>PGK50: Approx. 360 $cm^3$ (22 cu.in.)<br>PGK75: Approx. 540 $cm^3$ (33 cu.in.) |

| Operating conditions | |
|---|---|
| Ambient temperature | +5 ... +40 °C (+40 ... +100 °F) |
| Storage temperature | –20 ... +70 °C (0 .... +160 °F) |
| Relative humidity | Max. 80% |
| Degree of protection | IP54 |
| Heating temperature<br>Max. surface temperature<br>Temperature controller (external) | Adjustable to max. 140 °C (285 °F)<br>Due to material 150 °C (300 °F)<br>Temperature controller for Pt100 |
| Temperature sensor | 2 * Pt100 |
| Heating up time | From room temperature to approx. +50 °C (+120 °F): Approx. 1 h<br>From room temperature to approx. +150 °C (+300 °F): Approx. 4 h |
| Operating pressure, sample gas compartment | – Quartz, $CaF_2$: Max. 20 bar (2000 kPa) absolute<br>– $BaF_2$: Max. 10 bar (1000 kPa) absolute<br>(For T = +5 °C .. ... +150 °C (+40 ... +300 °F) |
| Operating pressure, purge gas compartment | Max. 3 bar (300 kPa) |
| Helium leak rate | $10^{-8}$ mbar*L*$sec^{-1}$; 5 minutes at max. 90 °C (He leak test) |

| Mechanical installation | |
|---|---|
| Fitting position | Any |
| Pipes:<br>– Sample gas inlet and outlet<br>– Purge gas inlet and outlet | Pipe screw fitting for pipe outer diameter:<br>6 mm<br>6 mm |

| Sample gas (requirements) | |
|---|---|
| Temperature | Thermostatically controlled to cell temperature |
| Flow rate | 30 ... 1000 l/h (1 ... 35 cu.foot./h)<br>For combustible and occasionally explosive sample gas (according to Zone 1): Max. 100 l/h (3.5 cu.foot/h) |
| Cleanness | Free from dust and condensed components |

| Purge gas (expendable item) | |
|---|---|
| Consumption | 2 ... 100 l/h (0.1 ... 35 cu.foot/h) |
| Primary pressure | Max. 3 bar (300 kPa) |

| Electrical installation | |
|---|---|
| Input voltage | 115 or 230 V +10% / -15%; 50...60 Hz |
| Power input | PGK10/PGK20/PGK50: Max. 275 VA<br>PGK75: Max. 550 VA |
| Power fuse (external):<br>- PGK10/PGK20/PGK50<br>- PGK75 | Via temperature controller or external<br>4 A (for 115 V and 230 V)<br>8 A (for 115 V and 230 V) |
| Electrical connection cables:<br>- Input voltage<br>- Pt100 | <br>3 * AWG 18<br>4 * AWG 20 |

| Explosion protection | |
|---|---|
| Ex category (2014/34/EU) | ⟨Ex⟩ II 2G Ex eb IIC Gb |
| Ex category (IEC 60079) | Ex eb IIC Gb |

### 8.4.1 Cable glands

| Connection | Type | Size | Clamping range mm | Tightening torque Nm |
|---|---|---|---|---|
| Heater | Ex | M16 | 4 ... 8 | 6 |
| Pt100 | | | | |

### 8.4.2 Connection terminals

*Table 1: Input voltage, Pt100*

| Conductor | Cross-section in mm² | Cross-section in AWG | Tightening torque Nm |
|---|---|---|---|
| Rigid | 0.2...4.0 | 24...12 | 0.6...0.8 |
| Flexible with ferrules | 0.25...2.5 | 24...14 | |
| Flexible with ferrules with insulating collar | 0.25...1.5 | 24...16 | |

*Table 2: Potential equalization*

| Conductor | Cross-section in mm² | Cross-section in AWG | Tightening torque Nm |
|---|---|---|---|
| Rigid | 4.0 | 11 | 2 |
| Flexible with ferrules | | | |
| Flexible with ferrules with insulating collar | | | |

### 8.4.3 Torques

Tighten all screw connections, for which no tightening torque or no pretension force is specified in drawings or Mounting Instructions, according to VDI 2230.

All connections with screws which are not classic screw connections are excluded from this rule.. This means strap retainers, cable glands, screw fittings, gas connections, screws for circuit boards etc. Here, the screw fittings have to be tightened as evenly as possible with a significantly lower tightening torque (strap retainers 1 Nm, other screw fittings according to manufacturer specification).

Select the next lowest torque valid for the screw for mixed materials and special screws such as relieved screws.

The basic friction coefficient is (screw fittings without lubrication) μk=μG=0.14. The calculated values are valid for room temperature (T=20 °C).

*Table 3: Torques*

| **Dimension M** | **Pitch P** | **Tightening torque Ma (Nm)** | | | | | |
|---|---|---|---|---|---|---|---|
| | | **3.6** | **4.6** | **5.6** | **8.8, A2 a. A4-80** | **10.9** | **12.9** |
| 1.6 | 0.4 | 0.05 | | 0.05 | 0.17 | | 0.28 |
| 2 | 0.45 | 0.1 | | 0.11 | 0.35 | | 0.6 |
| 2.5 | 0.45 | 0.21 | | 0.23 | 0.73 | | 1.23 |
| 3 | 0.5 | | 0.54 | 1 | 1.3 | 1.7 | 2 |
| 3.5 | 0.6 | | 0.85 | 1.3 | 1.9 | 2.6 | 3.2 |
| 4 | 0.7 | | 1.02 | 2 | 2.5 | 4.4 | 5.1 |
| 5 | 0.8 | | 2 | 2.7 | 5 | 8.7 | 10 |
| 6 | 1 | | 3.5 | 4.6 | 10 | 15 | 18 |
| 8 | 1.25 | | 8.4 | 11 | 25 | 36 | 43 |
| 10 | 1.5 | | 17 | 22 | 49 | 72 | 84 |
| 12 | 1.75 | | 29 | 39 | 85 | 125 | 145 |
| 14 | 2 | | 46 | 62 | 135 | 200 | 235 |
| 16 | 2 | | 71 | 95 | 210 | 310 | 365 |
| 18 | 2.5 | | 97 | 130 | 300 | 430 | 500 |
| 20 | 2.5 | | 138 | 184 | 425 | 610 | 710 |
| 22 | 2.5 | | 186 | 250 | 580 | 830 | 970 |
| 24 | 3 | | 235 | 315 | 730 | 1050 | 1220 |
| 27 | 3 | | 350 | 470 | 1100 | 1550 | 1800 |
| 30 | 3.5 | | 475 | 635 | 1450 | 2100 | 2450 |
| 33 | 3.5 | | 645 | 865 | 2000 | 2800 | 3400 |
| 36 | 4 | | 1080 | 1440 | 2600 | 3700 | 4300 |
| 39 | 4 | | 1330 | 1780 | 3400 | 4800 | 5600 |

8030441/AE00/V2-5/2025-04

www.addresses.endress.com

Endress+Hauser

People for Process Automation