8030445/AE00/V2-2/2025-04

Operating Instructions
PGK

Gas Cell

Endress+Hauser
People for Process Automation

Described product
Product name: PGK

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

Legal information

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

CE

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: Risk or hazardous situation which *will* result in severe personal injury or death.
WARNING: Risk or hazardous situation which *could* result in severe personal injury or death.
CAUTION: Hazard or unsafe practice which *could* result in less severe or minor injuries.
NOTE: 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 in a safe manner (see “Safety information on commissioning”, page 16)

WARNING: Risk of explosions in potentially explosive atmospheres
▶ Do not use the PGK in potentially explosive atmospheres.

WARNING: Hazards by ignitable or combustible gases
▶ Do not use the PGK to measure ignitable or combustible gases.

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

▶ 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 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 (for mounting the cell on an MCS300P).

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 Bergener Ring 27 · 01458 Ottendorf-Okrilla · Germany

Cell	Material	Part No.
PGK10 (10 cm)[1]	Stainless steel	2023312
PGK20 (20 cm)	Stainless steel	2023313
PGK50 (50 cm)	Stainless steel	2023314
PGK75 (75 cm)	Stainless steel	2030789
PGK10 (10 cm)	Stainless steel DSC	2147409
PGK20 (20 cm)	Stainless steel DSC	2147410
PGK50 (50 cm)	Stainless steel DSC	2147411
PGK75 (75 cm)	Stainless steel DSC	2147412

[1] Optical path length

The type plate is located on the connection unit (see “Connections”, page 8).

2.2 Combustible sample gases

The cell is conditionally suitable for measuring combustible gases.

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

Conditions for feeding combustible sample gas

WARNING: Risk of explosions in potentially explosive atmospheres
▶ Do not use the PGK in potentially explosive atmospheres.

- Flow rate of sample gas: Max. 100 l/h (3.5 cu.foot/h)
- Purge gas:
  - Use inert purge gas (e. g. nitrogen) (see “Connecting purge gas”, page 13).
  - Feed via a suitable non-return valve.
  - Purge gas disposal against atmospheric pressure.
  - The purge gas disposal lines must have a larger diameter than all upstream purge gas lines.
  - Sample gas may only be fed into the cell when purge gas flow is available.
  - Monitor the purge gas pressure and flow (specification see “Technical data”).
  - Ensure purge gas disposal - even in the event of escaping sample gas.
- If necessary, carry out an accident assessment depending on the operating conditions.

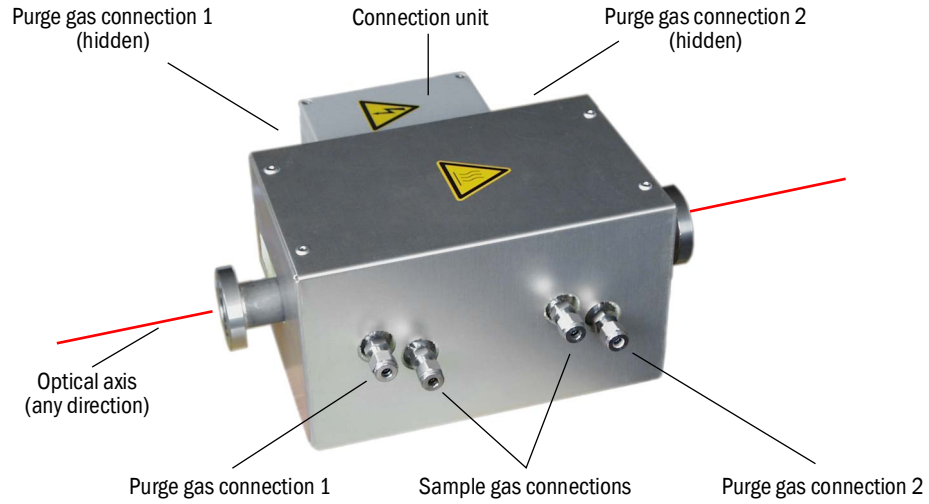
2.3 Layout and function

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



2.3.1 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.

2.3.2 Thermostatic control

The cell has integrated heating cartridges.

A Pt100 sensor (option: 2 Pt100 sensors) is installed for temperature measurement.

The temperature is controlled via an external “temperature controller for Pt100 sensor” (not part of the cell).

A self-resetting temperature switch (see “Safety temperature switch has triggered.”, page 27 and see “Technical data”) is integrated for thermal protection of the cell.

3 Mounting and electrical installation

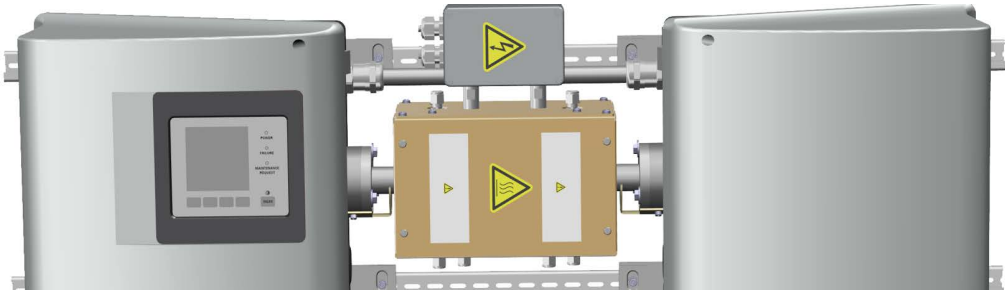
3.1 Mounting

WARNING: Risk of explosions
▶ Do not use the PGK in potentially explosive atmospheres and do not use for measuring combustible gases.

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

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

Fig. 2: Cell on MCS300P



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

Final mounting steps:

1 Connect sample gas, see “Connecting sample gas”, page 10.
2 Connect purge gas (option), see “Connecting purge gas”, page 13.
3 Electrical installation, see “Electrical installation”, page 14.

3.1.1 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.

3.1.1.1 *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.

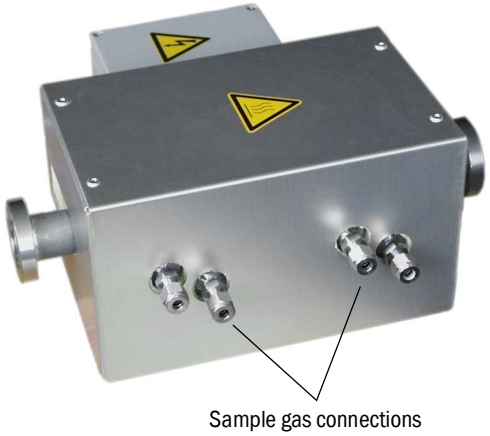
NOTE: Possibly provide initial thermal stabilization for cold sample gas

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.

3.1.1.2 *Connecting the sample gas*

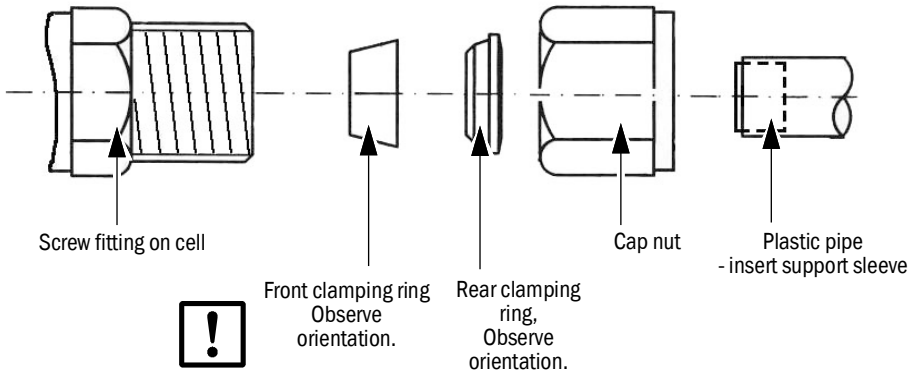
Fig. 3: Sample gas connections



▶ 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.

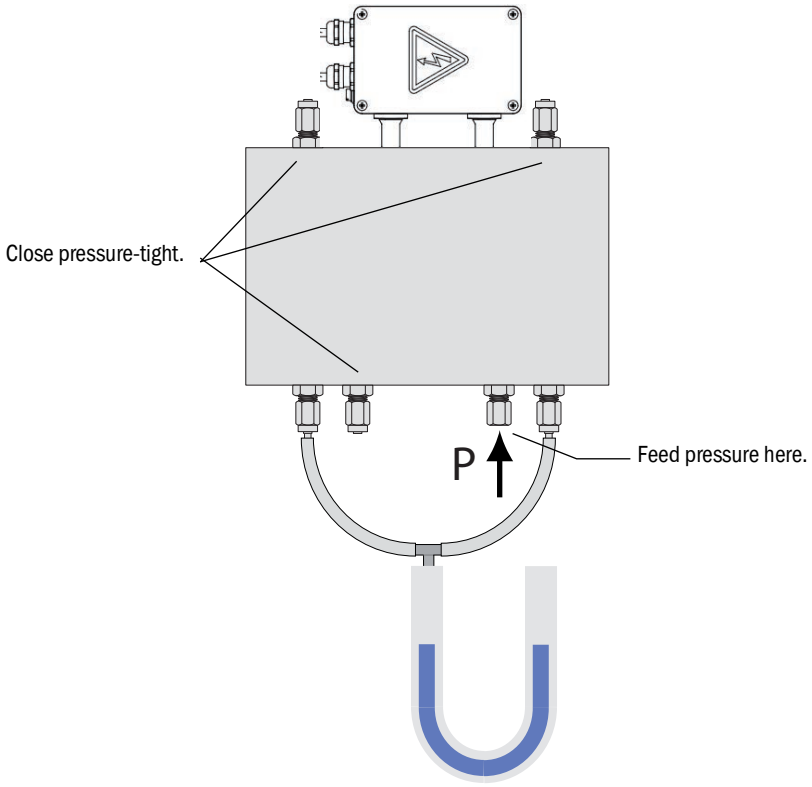
3.1.1.3 *Carrying out the leak test*

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

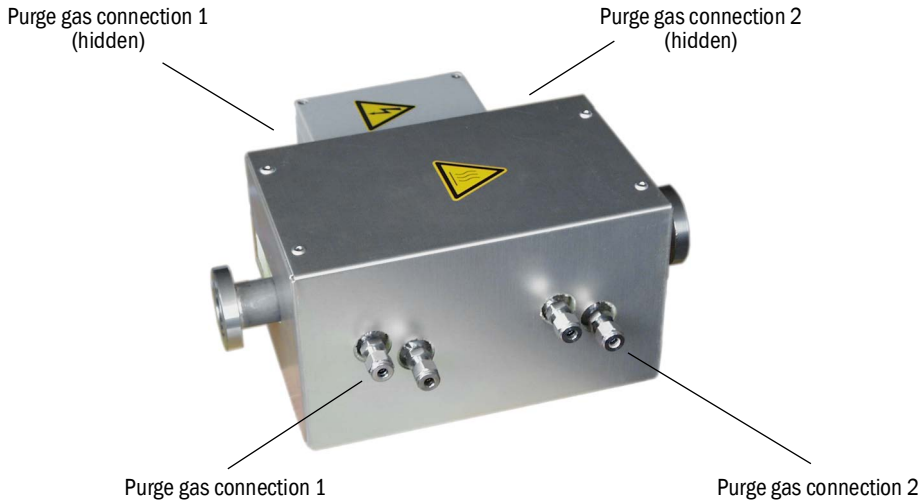
Glass splinters can escape from the pipes should a window break.

- 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.

3.1.2 Connecting purge gas

Fig. 6: Purge gas connections



- 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.

3.2 Electrical installation

An electrical installation is only necessary if the cell is to be heated.

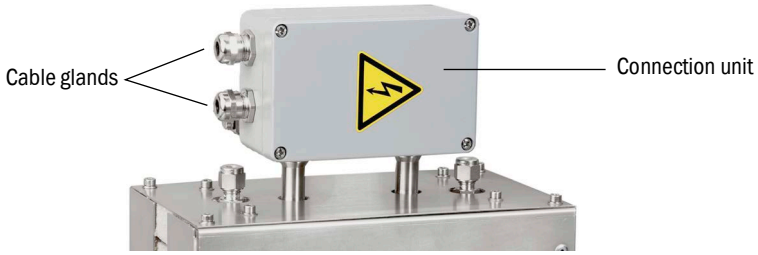
WARNING: Hazard by voltage
The electrical connection of the PGK may only be made by skilled technicians who, based on their technical training and knowledge as well as knowledge of the relevant regulations, can assess the tasks given and recognize the hazards involved.

3.2.1 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, if necessary, temperature limiter, for Pt100 sensors.

3.2.2 Electrical connection

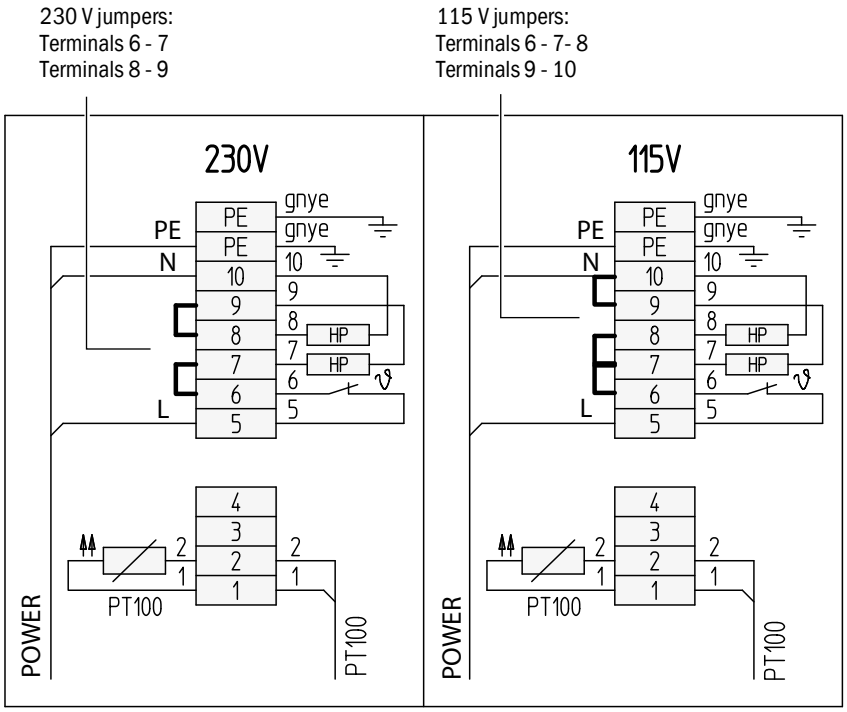
Fig. 7: Connection unit



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 depend on the line voltage.

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.
7 Connect the cell to the external temperature control.

4 Commissioning / operation

4.1 Commissioning

4.1.1 Safety information on commissioning

WARNING: Hazards by explosive or combustible gases
▶ Do not use the PGK for measuring combustible or ignitable gases.

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 12).

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.

Heating up time:
- From room temperature to approx. 50 °C (120 °F): Approx. 1 h
- From room temperature to approx. 180 °C (360 °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: 200 °C (400 °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

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 Maintenance plan

Maintenance interval	Maintenance work
1 year	▶ Disassemble and clean the cell. *Recommendation:* ▶ Renew O-rings with media contact. ▶ 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.

6.2 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 30 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 with Isolast O-ring, washer and thrust ring	2	●		2024087
1 set CaF2 windows 32 x 5 with Isolast O-ring, washer and thrust ring	2	●		2024089
1 set BaF2 windows 32 x 5 with Isolast O-ring, washer and thrust ring	2	●		2024088
1 set IG2 windows 32 x 5 with Isolast O-ring, washer and thrust ring	2	●		2024090
Cell-side windows and seals - Kalrez				
1 set quartz windows 32 x 5 with Kalrez O-ring, washer and thrust ring	2	●		2055958
1 set CaF2 windows 32 x 5 with Kalrez O-ring, washer and thrust ring	2	●		2055960
1 set BaF2 windows 32 x 5 with Kalrez O-ring, washer and thrust ring	2	●		2055959
1 set IG2 windows 32 x 5 with Kalrez O-ring, washer and thrust ring	2	●		2055961
Protective window and seals, purge flange				
1 set quartz protective windows 32 x 5 with Viton O-ring, washer and thrust ring	2		●	2023647
1 set CaF2 protective windows 32 x 5 with Viton O-ring, washer and thrust ring	2		●	2023649
1 set BaF2 protective windows 32 x 5 with Viton O-ring, washer and thrust ring	2		●	2023648
1 set IG2 protective windows 32 x 5 with Viton O-ring, washer and thrust ring	2		●	2023650

[1] see “Exploded view of the cell body”, page 23
[2] Number of sets per maintenance
[3] Recommendation: Renew yearly
[4] Recommendation: Renew every 2 years

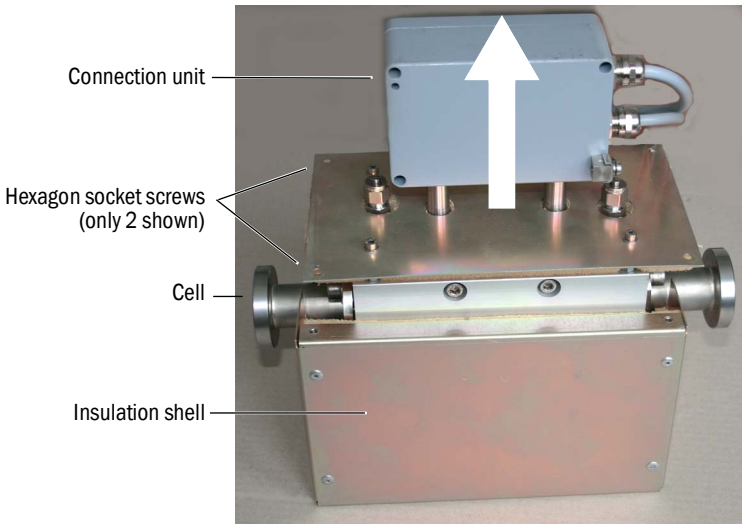
6.3 Removing the cell from the MCS300P

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

6.4 Working on the cell

6.4.1 Removing the cell from the insulating housing

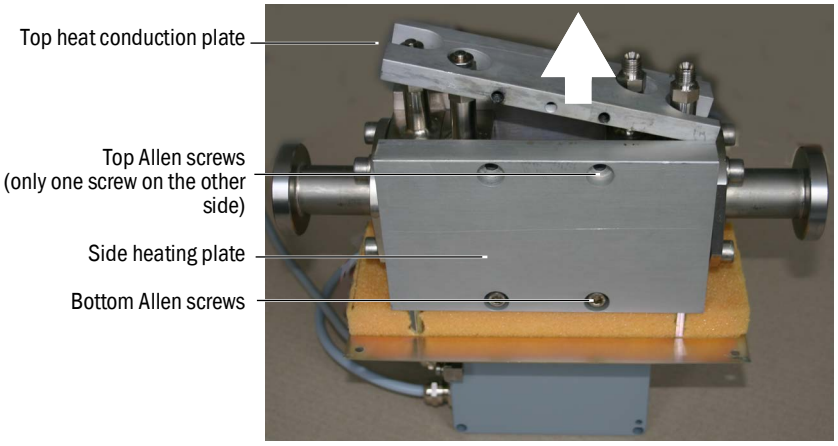
Fig. 9: Removing the cell from the insulating housing



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.

6.4.2 Removing the cell from the cell heating

Fig. 10: Take off the top heat conduction plate

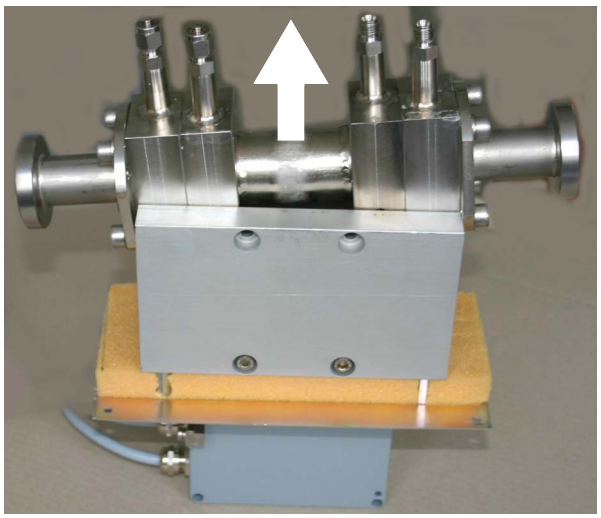


NOTE:
Do not damage connection cables for heating cartridges.

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.

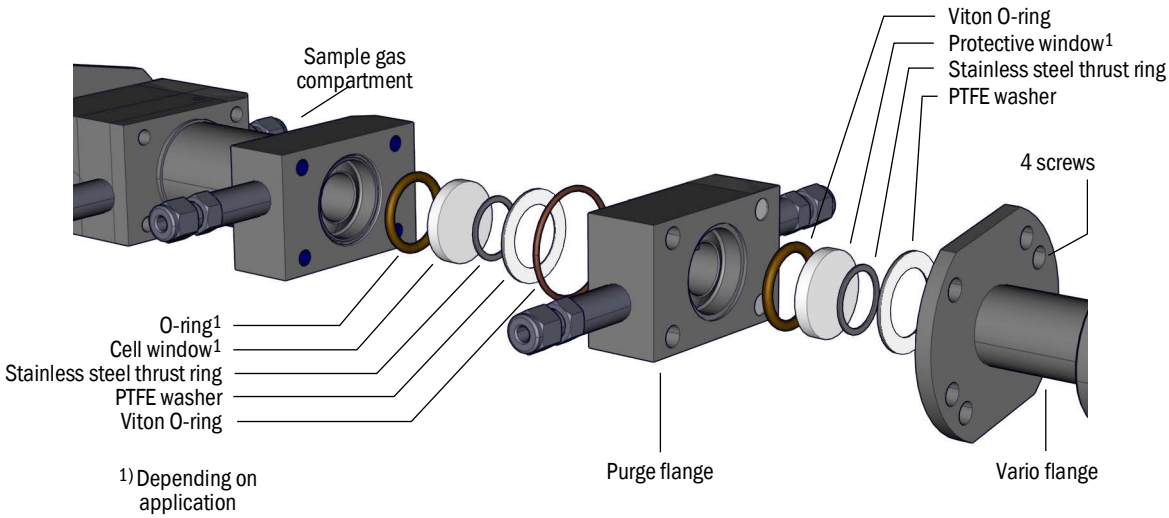
Fig. 11: Removing the cell from the heating plates



6.4.3 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 29

6.4.3.1 *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).

6.4.3.2 *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).

6.4.3.3 *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):
– Demineral7ed 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.

6.4.3.4 *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 24).
3 Position the purge flange (according to markings made).
4 Insert the protective window (see “Fitting the protective and cell windows and seals”, page 24).
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 12).

6.4.4 Replace heating cartridges, Pt100, safety temperature switch

6.4.4.1 *Replacing the safety temperature switch*

The safety temperature switch is located on the plate with the connection unit.

1 Remove the blade terminal.
2 Unscrew the safety temperature switch.
3 Screw on a new safety temperature switch.
4 Connect the blade terminal.

6.4.4.2 *Removal for replacing the heating cartridges and the Pt100*

Mark the positions of the unscrewed plates.

NOTE:
Do not damage electrical cables.

1 Disconnect the wires of the heating cartridges or the Pt100 in the connection unit.
2 Loosen the cable clamps.
3 Unscrew the heating plates completely at the bottom 2 screws (see Fig. 10) and take them apart.

Replacing the heating cartridges

- PGK10/PGK20/PGK50: 2 heating cartridges on 1 heating plate
- PGK75: 4 heating cartridges on 2 heating plates

1 Pull out the heating cartridges.
2 Wires of the new heating cartridges:
  – Cut to the length of the old wires.
  – Strip the cables.
  – Remove the marking rings from the connecting cables of the old heating cartridges and attach them to the corresponding connecting cables of the new heating cartridges.
  – Crimp on ferrules.
3 Insert new heating cartridges into the heating plate as far as they will go.

Replacing the Pt100

One (1) Pt100 (optionally 2 Pt100) is mounted in a heating plate.

1 Pull out Pt100.
2 Wires of the new Pt100:
  – Cut to the length of the old wires.
  – Strip the cables.
  – Attach the marking rings according to the old marking.
  – Crimp on ferrules.
3 Insert the new Pt100 into the heating plate as far as it will go.

6.4.4.3 *Fitting after replacement of the heating cartridges and the Pt100*

1 Lay the connecting cables in the connection unit in the same way as originally.
2 Secure the connecting cables with cable clamps.
3 Loosely screw the heating plates back together with the bottom screws.
4 Reconnect the wires according to the numbering.

6.4.5 Inserting the cell in the cell heating

Use the markings made during assembly.

NOTE:
▶ Do not damage connection lines for heating cartridges.

WARNING: Hazard through leaky cell
▶ Check the cell with a suitable leak test before assembling (see “Carrying out the leak test”, page 12).

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.

6.4.6 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.

6.5 Fitting the cell on the MCS300P

The cell is normally operated on an MCS300P.

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: → Operating Instructions of MCS300P.

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 21).
Safety temperature switch has triggered.	Temperature on temperature controller set too high.	Cell seals can be damaged (see “Working on the cell”, page 21).
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.
	Safety temperature switch defective	Safety temperature switch, renew (see “Working on the cell”, page 21).
	Pt100 defective	Renew Pt100 (see “Working on the cell”, page 21).
	Heating cartridge defective	Renew heating cartridge (see “Working on the cell”, page 21).
Condensate in the cell.	Temperature below dew point.	Check cell and clean as necessary. Check thermostatic control. Heat sample gas feed. 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 21).
Unstable measurement signal.	Temperature difference between cell and sample gas very high.	Adjust temperature.
	Cell window or mirror soiled.	Check cell temperature. Clean cell (see “Working on the cell”, page 21).
	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.

7.2 Safety temperature switch has triggered.

Switch-off temperature: Approx. 235 °C

The internal safety temperature switch automatically switches back on when the temperature falls below the reset temperature (approx. 205 °C).

If the internal safety temperature switch has switched off the cell, the seals of the cell may have been damaged.

▶ Carry out a leak test (see “Carrying out the leak test”, page 12).

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)
- EU Directive: LVD (Low Voltage Directive)

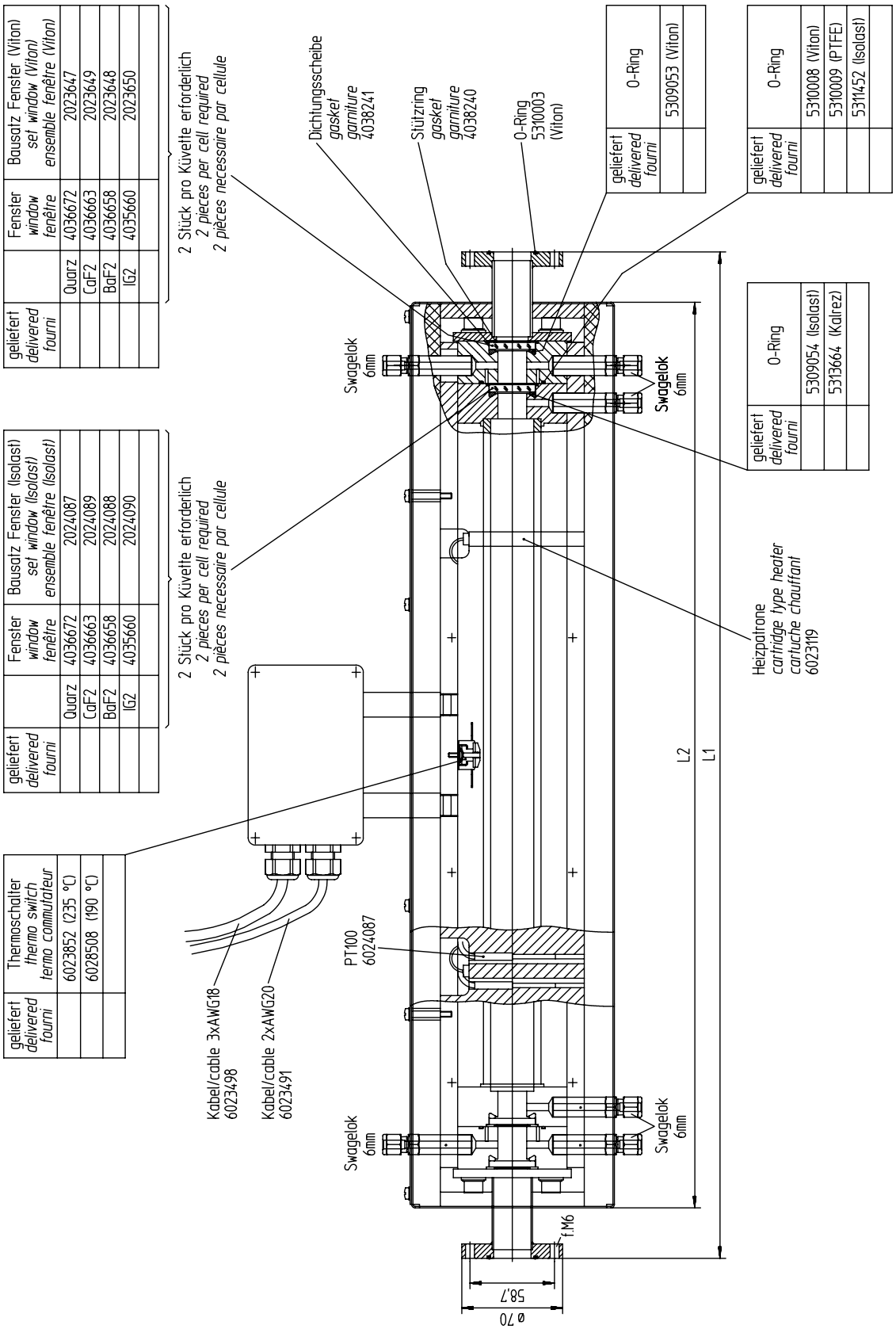
Applied EN standards:

- EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use
- EN 61326, Electrical equipment for measurement technology, control technology and laboratory use - EMC requirements

8.1.1 Electrical protection

- Insulation: Protection class 1 in accordance with EN 61010-1.
- Pollution: The device operates safely in an environment up to pollution degree 2 in accordance with EN 61010-1 (normal, non-conductive pollution and temporary conductivity due to occasional condensation).

8.2 Technical drawing (example, 75 cm cell)



8.3 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.) PGK20: 20 cm (7.87 in.) PGK50: 50 cm (19.7 in.) PGK75: 75 cm (29.5 in.)
Materials with media contact: – Cell body – Window – O-rings	 Stainless steel 1.4571 (SS316Ti) Quartz, CaF2, BaF2 Isolast, Option: Viton, Kalrez
Weight	PGK10: Approx. 8 kg PGK20: Approx. 10 kg PGK50: Approx. 15 kg PGK75: Approx. 20 kg
Sample gas volume	PGK10: Approx. 80 cm^3 (4.9 cu.in.) PGK20: Approx. 150 cm^3 (9.2 cu.in.) PGK50: Approx. 360 cm^3 (22 cu.in.) 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	IP20
Heating temperature Temperature controller (external)	Adjustable to max. 200 °C (390 °F) Max. temperature for Isolast O-rings: 220 °C (428 °F) Temperature controller for Pt100
Temperature sensor	1 * Pt100, optional 2 * Pt100
Safety temperature switch (internal)	Switch-off temperature 235 °C, independent reset at approx. 205 °C. Other temperatures optional (refer to the Data Sheet delivered with cell).
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
Operating pressure, sample gas compartment	– Quartz, CaF_2: Max. 20 bar (2000 kPa) absolute – BaF_2: Max. 10 bar (1000 kPa) absolute (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: – Sample gas inlet and outlet – Purge gas inlet and outlet	Pipe screw fitting for pipe outer diameter: 6 mm 6 mm

Sample gas (requirements)	
Temperature	Thermostatically controlled to cell temperature Max. temperature: 200 °C (400 °F)
Flow rate	30 ... 1000 L/h (1 ... 35 cu.foot./h) With combustible sample gas: 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 PGK75: Max. 550 VA
Power fuse (external): - PGK10/PGK20/PGK50 - PGK75	Via temperature controller or external 4 A (for 115 V and 230 V) 8 A (for 115 V and 230 V)
Electrical connection cables: - Power supply - Pt100	 3 * AWG 18 2 or 4 * AWG 20
Ex category (IEC 60079)	

8.3.1 Cable glands

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

8.3.2 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 1: 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

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