OPERATING INSTRUCTIONS

EN

Translation of the Original

GSD 350 OMNISTAR | THERMOSTAR

Gas analysis system

PFEIFFER VACUUM

Dear Customer,

Thank you for choosing a Pfeiffer Vacuum product. Your new gas analysis system is designed to support you in your individual application with full performance and without malfunctions. The name Pfeiffer Vacuum stands for high-quality vacuum technology, a comprehensive and complete range of top-quality products and first-class service. From this extensive, practical experience we have gained a large volume of information that can contribute to efficient deployment and to your personal safety.

In the knowledge that our product must avoid consuming work output, we trust that our product can offer you a solution that supports you in the effective and trouble-free implementation of your individual application.

Please read these operating instructions before putting your product into operation for the first time. If you have any questions or suggestions, please feel free to contact info@pfeiffer-vacuum.de.

Further operating instructions from Pfeiffer Vacuum can be found in the Download Center on our website.

Disclaimer of liability

These operating instructions describe all models and variants of your product. Note that your product may not be equipped with all features described in this document. Pfeiffer Vacuum constantly adapts its products to the latest state of the art without prior notice. Please take into account that online operating instructions can deviate from the printed operating instructions supplied with your product.

Furthermore, Pfeiffer Vacuum assumes no responsibility or liability for damage resulting from the use of the product that contradicts its proper use or is explicitly defined as foreseeable misuse.

Copyright

Table of contents

List of tables

List of figures

1 About this manual

IMPORTANT
Read carefully before use.
Keep the manual for future consultation.

1.1 Validity

This document describes the function of the products listed in the following and provides the most important information for safe use. The description is written in accordance with the valid directives. The information in this document refers to the current development status of the products. The document retains its validity assuming that the customer does not make any changes to the product.

1.1.1 Applicable documents

Designation	Document
"GSD 350 OmniStar/ThermoStar" operating instructions Operation via web interface and PV MassSpec	DA 0106
"Quadrupole mass spectrometer" operating instructions QMG 250 PrismaPro	BG 6001
"Quadrupole mass spectrometer" quick start guide QMG 250 PrismaPro	BG 6003
"Diaphragm pump" operating instructions MVP 010-3 DC	PU 0071
"Turbopump" operating instructions HiPace 80	PT 0208
"Turbopump" supplementary information SplitFlow 80	PT 0635
“Electronic drive unit” operating instructions TC 110	PT 0204
"Total pressure gauge" operating instructions DigiLine Pirani/ Cold cathode gauge MPT 200 AR	PG 0025
"Analog Relay" supplementary information DigiLine Gauge	PG 0029
"Mini angle valve" operating instructions [1)] EVI 005 M	BP 5120
“Venting valve” operating instructions	PT 0228
"Sealing gas valve" operating instructions [2)]	PT 0229
Software documentation PV MassSpec	(Part of the software)
Safety data sheet [3)] Perfluorotributylamine (PFTBA)	-
"Pressure monitoring" operating instructions [4)]	-
Declaration of conformity	(Component of these instructions)

Tbl. 1: Applicable documents

You can find these documents in the Pfeiffer Vacuum Download Center.

1) only for version with calibration unit
2) only for corrosive gas version
3) only for version with calibration unit
4) only for corrosive gas version

1.1.2 Variants

This document applies to products with the following part numbers:

Variant	Version	Analyzer with filament	Gas inlet	Mass range	Display
PT Q8 = OmniStar	**0** = Standard GSD 350 O **1** = Corrosive gas GSD 350 O C	**1** = Ir-Y_2O_3 (calibration unit) **2** = Ir-Y_2O_3 **5** = W (calibration unit) **6** = W	**161** = Stainless steel / without capillary tube	**1** = 100 u **2** = 200 u **3** = 300 u	**0** = yes **1** = no
			171 = Stainless steel / 1 m / heating 200 °C		
			172 = Stainless steel / 2 m / heating 200 °C		
			173 = Stainless steel / 1 m / heating 350 °C		
PT Q9 = ThermoStar	**0** = Standard GSD 350 T **1** = Corrosive gas GSD 350 T C	**1** = Ir-Y_2O_3 (calibration unit) **2** = Ir-Y_2O_3 **5** = W (calibration unit) **6** = W	**101** = Quartz / without capillary tube	**1** = 100 u **2** = 200 u **3** = 300 u	**0** = yes **1** = no
			111 = Quartz / 1 m / heating 200 °C		
			112 = Quartz / 2 m / heating 200 °C		
			113 = Quartz / 1 m / heating 350 °C		

Tbl. 2: Variants

Breakdown based on the example of part number PT Q80 217 110

- OmniStar version
- Standard version
- Analyzer with filament made of Ir-Y_2O_3, without calibration unit
- Gas inlet with 1 m stainless steel capillary and heating up to 200 °C
- Mass range up to 100 u
- Version with display

Feature	OmniStar	ThermoStar
Capillary	Stainless steel (OD = 1/16", ID = 0.15 mm)	Quartz (OD 0.23 mm, ID = 0.15 mm)
Gas inlet orifice	Platinum/Iridium	Platinum/Iridium
Gas inlet	Controlled by 2 valves	Continuously open
Options	• Heating to 200 °C or 350 °C • Corrosive gas version with sealing gas connection • Calibration unit for calibrating the mass scale (Calibration medium for mass calibration: PFTBA)	

Tbl. 3: Features of variants

You can find the part number on the rating plate of the product.

Pfeiffer Vacuum reserves the right to make technical changes without prior notification.

The figures in this document are not to scale.

Dimensions are in mm unless stated otherwise.

1.2 Target group

These operating instructions are aimed at all persons performing the following activities on the product:

- Transportation
- Setup (Installation)
- Usage and operation
- Decommissioning
- Maintenance and cleaning
- Storage or disposal

The work described in this document is only permitted to be performed by persons with the appropriate technical qualifications (expert personnel) or who have received the relevant training from Pfeiffer Vacuum.

1.3 Conventions

1.3.1 Instructions in the text

Usage instructions in the document follow a general structure that is complete in itself. The required action is indicated by an individual step or multi-part action steps.

Individual action step

A horizontal, solid triangle indicates the only step in an action.

► This is an individual action step.

Sequence of multi-part action steps

The numerical list indicates an action with multiple necessary steps.

1. Step 1
2. Step 2
3. ...

1.3.2 Pictographs

The pictographs used in the document indicate useful information.

Note

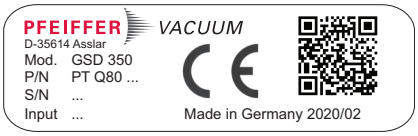
Tip

Wear laboratory gloves

Perform a visual inspection

1.3.3 Stickers on the product

This section describes all the stickers on the product along with their meaning.

	**Rating plate (example)** Rating plate of the unit.
	**Warning hot surface** This sticker warns of injuries caused by high temperatures in case of touching without protection during operation.

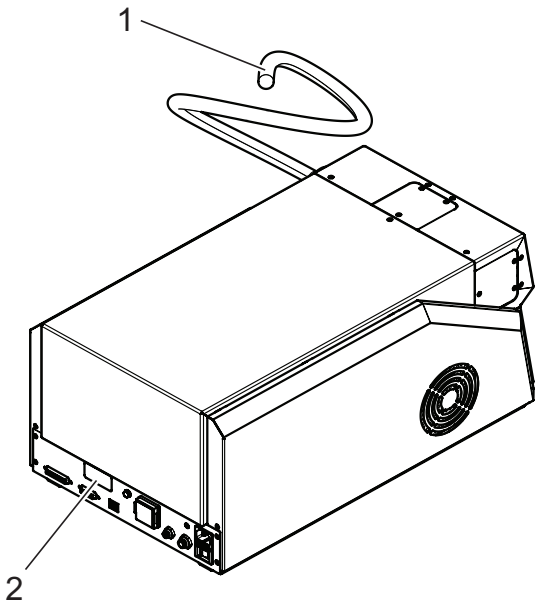


Fig. 1: Position of the stickers on the product

1 "Warning hot surface" sticker 2 Rating plate

1.3.4 Abbreviations

Abbreviation	Explanation
AD	External diameter
AI	Analog input
AO	Analog output
ATEX	Areas with a risk of explosive atmosphere (atmosphères explosibles)
C/B	Cross beam (ion source type)
DCU	Display and Control Unit
DHCP	Communication protocol for assigning the network configuration (Dynamic Host Communication Protocol)
DI	Digital input
DO	Digital output
EM	Electron multiplier
EPDM	Ethylenepropylene diene-monomer rubber, M group
FIL	Filament
FKM	Fluorinated rubber
ID	Internal diameter
IP	Intenet Protocol
IQS	Standard for plug-and-socket connections in vacuum technology
Ir-Y_2O_3	Yttrium oxide (Y_2O_3) coated iridium (Ir)
NBR	Nitrile butadiene rubber
MSL	Mean sea level
PA	Polyamide
PE	Polyethylene
PID	Proportional-integral derivative
PV	Pfeiffer Vacuum
PVC	Polyvinyl chloride (PVC)
PFTBA	Colorless liquid for mass calibration (perfluortributylamine)
PoE	Power over Ethernet

Abbreviation	Explanation
PWM	Type of modulation (pulse width modulation) in which one technical variable, e.g. the electrical voltage, changes between 2 values.
PTFE	Polymer of fluorine and carbon (polytetrafluorethylene)
RJ-45	Standardized plug-and-socket connection for telecommunication cabling (registered jack)
sccm	Standard cubic centimeters per minute as a unit of a defined gas volume flow per unit of time under standard conditions
slpm	Standard liters per minute as a unit of a defined gas volume flow per unit of time under standard conditions
VLAN	Virtual local area network
W	Tungsten

Tbl. 4: Abbreviations used

1.4 Trademark proof

- Windows® and Internet Explorer® are trademarks of Microsoft Corporation.
- OmniStar®, ThermoStar® and PrismaPro® are trademarks of Pfeiffer Vacuum GmbH.
- Swagelok® is a registered trade name of Swagelok Company.

2 Safety

2.1 General safety information

The following 4 risk levels and 1 information level are taken into account in this document.

⚠ DANGER

Immediately pending danger

Indicates an immediately pending danger that will result in death or serious injury if not observed.

► Instructions to avoid the danger situation

⚠ WARNING

Potential pending danger

Indicates a pending danger that could result in death or serious injury if not observed.

► Instructions to avoid the danger situation

⚠ CAUTION

Potential pending danger

Indicates a pending danger that could result in minor injuries if not observed.

► Instructions to avoid the danger situation

NOTICE

Danger of damage to property

Is used to highlight actions that are not associated with personal injury.

► Instructions to avoid damage to property

Notes, tips or examples indicate important information about the product or about this document.

2.2 Safety instructions

Safety instructions according to product's life stages

All safety instructions in this document are based on the results of a risk assessment. Pfeiffer Vacuum has taken into account all the relevant life stages of the product.

Risks during transport

⚠ WARNING

Danger of serious injury due to falling objects

Due to falling objects there is a risk of injuries to limbs through to broken bones.

► Take particular care and pay special attention when transporting products manually.
► Do not stack the products.
► Wear protective equipment, e.g. safety shoes.

⚠ WARNING

Danger of injury due to lifting heavy loads

The product is heavy; it weighs up to 26 kg depending on the version. If one person lifts the product incorrectly without help, this will lead to injuries.

- ► Always use 2 persons to lift the product with two hands.
- ► Take all necessary safety precautions (e.g. wear work gloves).
- ► Observe local regulations.
- ► Comply with the instructions for safe transport.

Risks during installation

⚠ DANGER

Danger to life from electric shock

Inadequate or incorrect grounding of the unit leads to contact-sensitive voltage on the housing. When making contact, increased leakage currents will cause a life-threatening electric shock.

- ► Before the installation, check that the connection leads are voltage-free.
- ► Conduct the electrical connection in accordance with locally applicable regulations.
- ► Make sure that the local mains voltage and frequency match rating plate specifications.
- ► Make sure that the mains cable and extension cable meet the requirements for double isolation between input voltage and output voltage, in accordance with IEC 61010 and IEC 60950.
- ► Use only a 3-pin mains cable and extension cable with properly connected protective earthing (earthed conductor).
- ► Plug the mains plug into a socket with earthing contact only.
- ► Always connect the mains cable prior to all other cables, to ensure continuous protective earthing.

⚠ DANGER

Electric shock due to missing internal earthed conductor

The internal earthed conductor is fastened to the housing. A unit without an internal earthed conductor attached can be life-threatening in the event of a malfunction.

- ► Do not rotate or release the internal earthed conductor.

Risks during operation

⚠ DANGER

Electric shocks due to moisture penetrating into the device

Moisture that has penetrated into the device results in personal injury through electric shocks.

- ► Only operate the device in a dry environment.
- ► Operate the device away from fluids and humidity sources.
- ► Do not switch on the device if fluid has penetrated into it, instead contact Pfeiffer Vacuum Service.
- ► Always disconnect the current supply before cleaning the device.

⚠ WARNING

Danger of burns on hot surfaces

During operation high temperatures (> 50 °C) occur on touchable surfaces of the heating components and the gas inlet. There is a risk of burning.

- ► Secure hot parts against inadvertent touching.
- ► Display warning signs.
- ► Make sure that the product has cooled down before performing work.
- ► Wear protective gloves (in accordance with EN 420).

⚠ WARNING

Danger of poisoning due to toxic process media escaping from the exhaust pipe

During operation with no exhaust line, the vacuum pump allows exhaust gases and vapors to escape freely into the air. There is a risk of injury and fatality due to poisoning in processes with toxic process media.

- ► Observe the pertinent regulations for handling toxic process media.
- ► Safely purge toxic process media via an exhaust line.
- ► Use appropriate filter equipment to separate toxic process media.

⚠ CAUTION

Health risks and environmental damage due to the process gases used

Gases used (process gases) represent a health risk and damage to the environment.

- ► Check the leak tightness of the connections before introducing the process gas.
- ► Make sure that the exhaust gas system is suitable for the gases supplied.
- ► Consider potential interactions between the materials and process gases.
- ► When handling the gases used, observe the applicable guidelines.
- ► Observe the protective measures.

Risks during maintenance

⚠ DANGER

Danger to life due to electric voltage

High voltages are present inside the device. When touching parts that are live, there is a risk of death. If there is visible damage, there is a risk of death when commissioning the device.

- ► Work on the open device must only be carried out by trained specialist personnel.
- ► Before carrying out any installation and maintenance work, switch the device off and disconnect it from the current supply.
- ► Never open the device with the current supply connected.
- ► Secure the current supply against unauthorized or unintentional reactivation.
- ► Never operate an open or defective device.
- ► Secure a defective device against accidental operation.
- ► Protect the device against moisture.

⚠ WARNING

Danger of burns on hot surfaces

During operation high temperatures (> 50 °C) occur on touchable surfaces of the heating components and the gas inlet. There is a risk of burning.

- ► Secure hot parts against inadvertent touching.
- ► Display warning signs.
- ► Make sure that the product has cooled down before performing work.
- ► Wear protective gloves (in accordance with EN 420).

⚠ WARNING

Health hazards due to cleaning agent

The cleaning agent being used causes health hazards which could include, for example, poisoning, allergies, skin irritations, chemical burns or damage to the airways.

- ► When handling cleaning agents, observe the applicable regulations.
- ► Adhere to safety measures regarding handling and disposal of cleaning agents.
- ► Be aware of potential reactions with product materials.

⚠ WARNING

Health hazard through poisoning from toxic contaminated components or devices

Toxic process media result in contamination of devices or parts of them. During maintenance work, there is a risk to health from contact with these poisonous substances. Illegal disposal of toxic substances causes environmental damage.

- ► Take suitable safety precautions and prevent health hazards or environmental pollution by toxic process media.
- ► Decontaminate affected parts before carrying out maintenance work.
- ► Wear protective equipment.

⚠ CAUTION

Risk of injury due to splintering of the quartz capillary

Quartz capillaries splinter in case of unintended use. There is a risk of eye injuries due to splinters being projected.

- ► Do not apply force when notching the quartz capillary.
- ► Wear safety goggles.

Risks when shipping

⚠ WARNING

Risk of poisoning from contaminated products

Where products that contain harmful substances are shipped for maintenance or repair purposes, the health and safety of service personnel is at risk.

- ► Comply with the instructions for safe distribution.

Risks during disposal

⚠ WARNING

Health hazard through poisoning from toxic contaminated components or devices

Toxic process media result in contamination of devices or parts of them. During maintenance work, there is a risk to health from contact with these poisonous substances. Illegal disposal of toxic substances causes environmental damage.

- ► Take suitable safety precautions and prevent health hazards or environmental pollution by toxic process media.
- ► Decontaminate affected parts before carrying out maintenance work.
- ► Wear protective equipment.

2.3 Safety precautions

The product is designed according to the latest technology and recognized safety engineering rules. Nevertheless, improper use can result in danger to operator all third party life and limb, and product damage and additional property damage.

Duty to provide information on potential dangers

The product holder or user is obliged to make all operating personnel aware of dangers posed by this product.

Every person who is involved in the installation, operation or maintenance of the product must read, understand and adhere to the safety-related parts of this document.

Infringement of conformity due to modifications to the product

The Declaration of Conformity from the manufacturer is no longer valid if the operator changes the original product or installs additional equipment.

- Following the installation into a system, the operator is required to check and re-evaluate the conformity of the overall system in the context of the relevant European Directives, before commissioning that system.

General safety precautions when handling the product

- ► Observe all applicable safety and accident prevention regulations.
- ► Check that all safety measures are observed at regular intervals.
- ► Pass on safety instructions to all other users.
- ► Do not expose body parts to the vacuum.
- ► Always ensure a secure connection to the earthed conductor (PE).
- ► Never disconnect plug connections during operation.
- ► Observe the above shutdown procedures.
- ► Keep lines and cables away from hot surfaces (> 70 °C).
- ► Do not carry out your own conversions or modifications on the device.
- ► Observe the unit protection degree prior to installation or operation in other environments.
- ► Provide suitable touch protection, if the surface temperature exceeds 70 °C.
- ► Inform yourself about any contamination before starting work.

2.4 Limits of use of the product

Installation location	weatherproof (internal space)
Installation altitude	max. 2000 m
Rel. air humidity	max. 80%, at T <31°C, up to max. 50% at T <40°C
Protection class	I
Excess voltage category	II
Permissible protection degree	IP30
Pollution degree	2
Ambient temperature	10 °C to 40 °C

Tbl. 5: Permissible ambient conditions

2.5 Proper use

The gas analysis system is used for manually controlled or automatic analysis for non-corrosive and non-flammable gases. The corrosive gas version of the gas analysis system is suitable for specific corrosive gas applications.

- ► Install, operate and maintain the product only in accordance with these operating instructions.
- ► Comply with the application limits.
- ► Observe the technical data.
- ► Contact Pfeiffer Vacuum for advice on corrosive or flammable gases.

2.6 Foreseeable misuse

Improper use of the product invalidates all warranty and liability claims. Any use that is counter to the purpose of the product, whether intentional or unintentional, is regarded as misuse, in particular:

- Use outside the mechanical and electrical application limits
- Operation with corrosive, inflammable or explosive media, if this is not explicitly permitted
- Operation in potentially explosive areas [5)]
- Operation in environments where explosive gas mixes can occur.
- Operation outdoors
- Use after technical changes (inside or outside on the product)
- Use of accessories or spare parts that are not listed in these instructions

5) The gas analysis system is not explosion proof in the sense of ATEX.

2.7 Personnel qualification

The work described in this document may only be carried out by persons who have appropriate professional qualifications and the necessary experience or who have completed the necessary training as provided by Pfeiffer Vacuum.

Training people

1. Train the technical personnel on the product.
2. Only let personnel to be trained work with and on the product when under the supervision of trained personnel.
3. Only allow trained technical personnel to work with the product.
4. Before starting work, make sure that the commissioned personnel have read and understood these operating instructions and all applicable documents, in particular the safety, maintenance and repair information.

2.7.1 Ensuring personnel qualification

Specialist for mechanical work

Only a trained specialist may carry out mechanical work. Within the meaning of this document, specialists are people responsible for construction, mechanical installation, troubleshooting and maintenance of the product, and who have the following qualifications:

- Qualification in the mechanical field in accordance with nationally applicable regulations
- Knowledge of this documentation

Specialist for electrotechnical work

Only a trained electrician may carry out electrical engineering work. Within the meaning of this document, electricians are people responsible for electrical installation, commissioning, troubleshooting, and maintenance of the product, and who have the following qualifications:

- Qualification in the electrical engineering field in accordance with nationally applicable regulations
- Knowledge of this documentation

In addition, these individuals must be familiar with applicable safety regulations and laws, as well as the other standards, guidelines, and laws referred to in this documentation. The above individuals must have an explicitly granted operational authorization to commission, program, configure, mark, and earth devices, systems, and circuits in accordance with safety technology standards.

Trained individuals

Only adequately trained individuals may carry out all works in other transport, storage, operation and disposal fields. Such training must ensure that individuals are capable of carrying out the required activities and work steps safely and properly.

2.7.2 Personnel qualification for maintenance and repair

Advanced training courses

Pfeiffer Vacuum offers advanced training courses to maintenance levels 2 and 3.

Adequately trained individuals are:

- **Maintenance level 1**
  - Customer (trained specialist)
- **Maintenance level 2**
  - Customer with technical education
  - Pfeiffer Vacuum service technician
- **Maintenance level 3**
  - Customer with Pfeiffer Vacuum service training
  - Pfeiffer Vacuum service technician

2.7.3 Advanced training with Pfeiffer Vacuum

For optimal and trouble-free use of this product, Pfeiffer Vacuum offers a comprehensive range of courses and technical trainings.

For more information, please contact Pfeiffer Vacuum technical training.

3 Product description

3.1 Functional description

The GSD 350 can analyze multiple gas components simultaneously. The gas to be analyzed passes through a pressure reduction stage to the PrismaPro, which operates in a vacuum. The PrismaPro ionizes a portion of the gas and separates and detects the different gas components based on their different mass/charge ratio.

Two versions of the GSD 350 are available with different gas inlet systems (OmniStar and ThermoStar). The gas inlet system reduces the pressure of the gas to be analyzed from 1000 hPa to the working pressure of the PrismaPro. The gas analysis unit and the high-vacuum and gas transport system are the same in both versions.

3.1.1 OmniStar

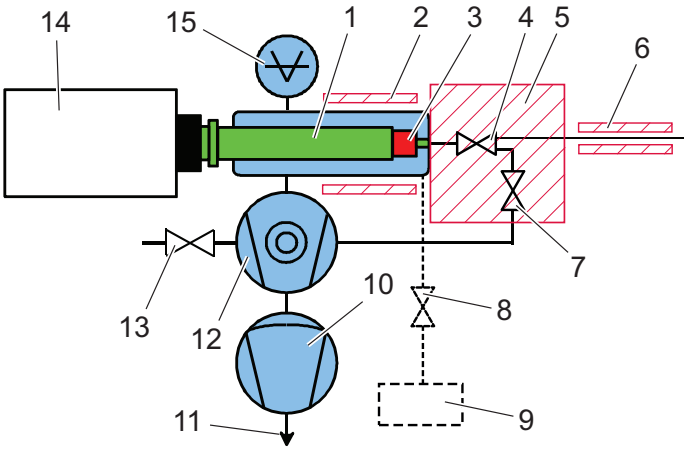


Fig. 2: Vacuum diagram of the OmniStar

1 Analyzer QMA 250 M
2 Vacuum chamber heating
3 Ion source
4 Gas inlet valve (V1) to ion source
5 Gas inlet heating
6 Stainless steel capillary with heating
7 Pump valve (V2)
8 Shut-off valve EVI 005 M on calibration unit
9 Calibration unit (optional)
10 Diaphragm Pump
11 Exhaust gas connection
12 Turbopump
13 Venting valve
14 Electronic unit QME 250
15 Total pressure gauge

3.1.2 ThermoStar

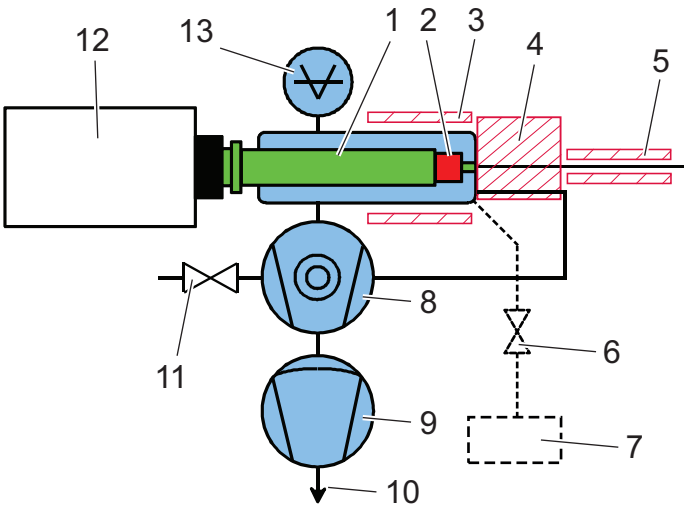


Fig. 3: Vacuum diagram of ThermoStar

1 Analyzer QMA 250 M
2 Ion source
3 Vacuum chamber heating
4 Gas inlet heating
5 Quartz capillary with heating
6 Shut-off valve EVI 005 M on calibration unit
7 Calibration unit (optional)
8 Turbopump
9 Diaphragm Pump
10 Exhaust gas connection
11 Venting valve
12 Electronic unit QME 250
13 Total pressure gauge

3.1.3 Corrosive gas version

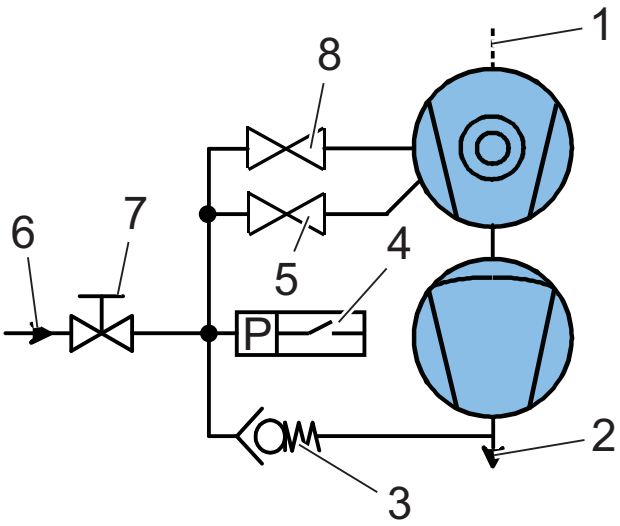


Fig. 4: Additionally sealing gas supply in corrosive gas version

1 Connection to the vacuum chamber
2 Exhaust gas connection
3 Non-return valve
4 Digital pressure switch with pressure gauge
5 Sealing gas valve
6 Sealing gas connection
7 Manual pressure regulator
8 Venting valve

3.2 Controls and indicators

3.2.1 Version with display

The 7" touch display is located on the front side of the unit and can be removed from the housing via the 2 recesses at the side. The operator field and operator keys are context-sensitive and change to reflect the display. Unavailable functions are grayed.

Warning messages or fault messages

In the event of a warning message or fault message, a warning triangle is displayed at the top right on the screen, and the "Messages" key is activated. The warning triangle appears on all menu screens. A description of the error is displayed when the warning triangle is pressed.

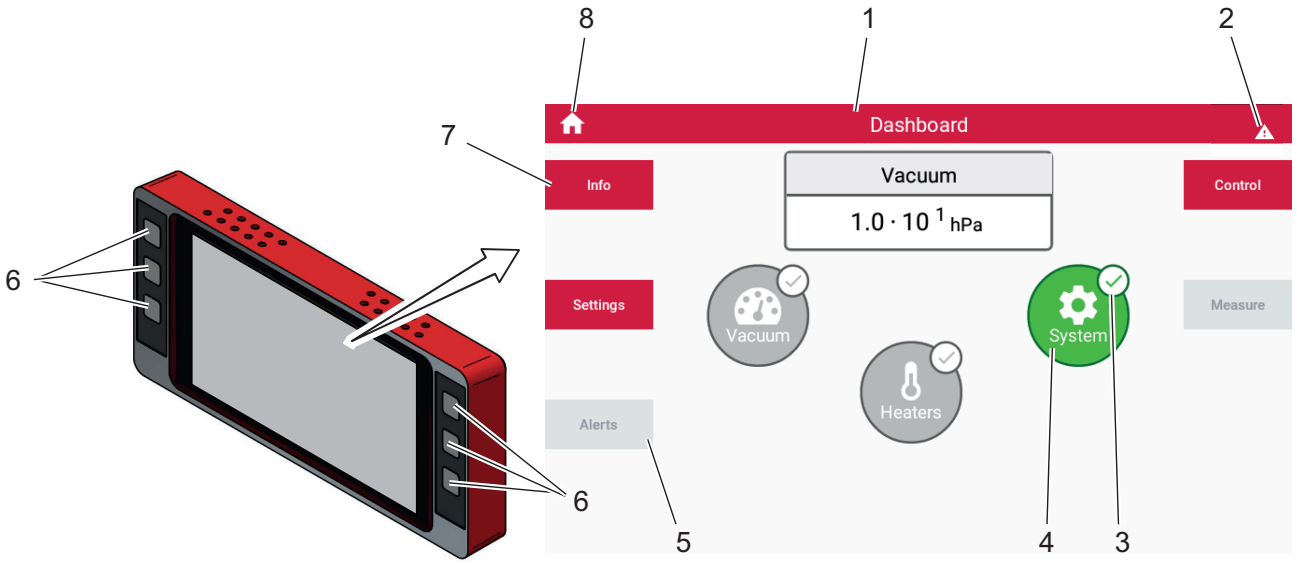


Fig. 5: Display with operator keys

1 Title bar with menu name
2 Warning triangle for warning or malfunction messages
3 Status icon
4 Components icon
5 Inactive operator field in display (grayed)
6 Controls
7 Active operator field in display
8 Link to start page

Symbol		Meaning
Color	light green	activated, operating status reached
	dark green	activated, operating status not yet reached
	light gray	not activated
	dark gray	switched off, switched off status not yet reached
Checkmark on status icon		stable state, final status on or off reached
Revolving arc in status icon		Function started or stopped, final status not yet reached

Tbl. 6: Symbols and colors of the status and components icons

3.2.2 Version without display

Various LEDs indicate the status of the individual systems for the variant without a display. Control is exclusively via the web interface.

LED	Function	Description
0	Power	The LED shows the status of the voltage supply. It is lit if the required voltage is present at the unit.
1	Vacuum + Ready	The LED flashes while the vacuum pumps are running up; it is lit once the vacuum pump is evacuated and the system is ready to measure.
2	Error	General error message
3	Heater	The LED is lit when the heating units are switched on.

LED	Function	Description
4	Filament	The LED is lit when there is a flow at the filament.
5	Purge	The LED is lit if the sealing gas is connected; it flashes if sealing gas monitoring is overridden (for service work only).

Tbl. 7: Status LEDs and their meanings

3.3 Layout of the unit

3.3.1 Basic unit

The basic unit consists of a chassis and removable covers.

For ventilation, the GSD 350 features:

- 2 ventilation openings with fans at the sides
- Ventilation openings on the top and bottom side of the removable displays
- An integrated fan in the power supply pack

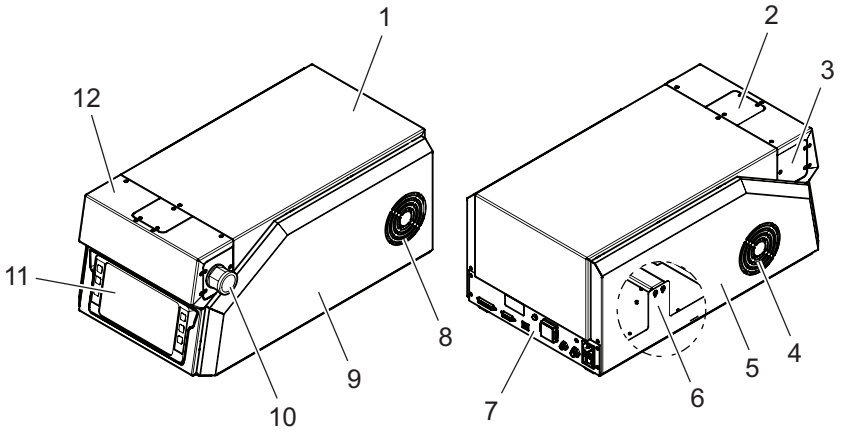


Fig. 6: Housing parts

1 Housing cover
2, 3 Optional connection panel for the heated capillary tube
4 Ventilation opening (outlet)
5 Side cover (left)
6 Frame, chassis
7 Connection panel
8 Ventilation opening (inlet)
9 Side cover (right)
10 Connection panel for heated capillary tube (as-delivered position)
11 7" touch display (alternatively: LED display without monitor)
12 Gas inlet cover

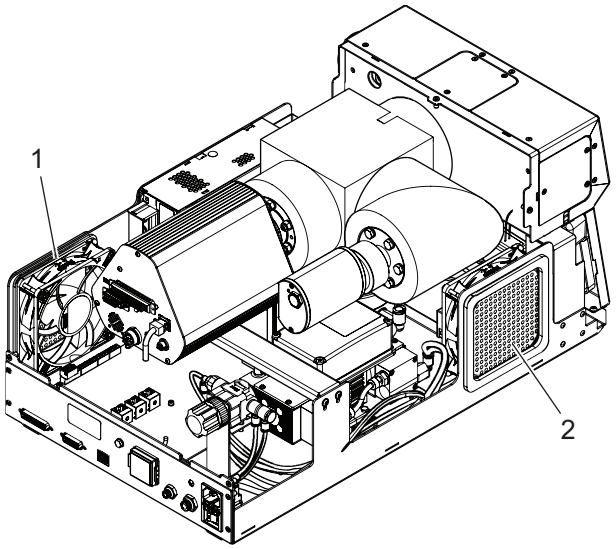


Fig. 7: Ventilation openings on the sides of the unit

1 Inlet with fan 2 Outlet with fan

3.3.2 Connection panel

The connection panel contains all of the unit's interfaces and connections.

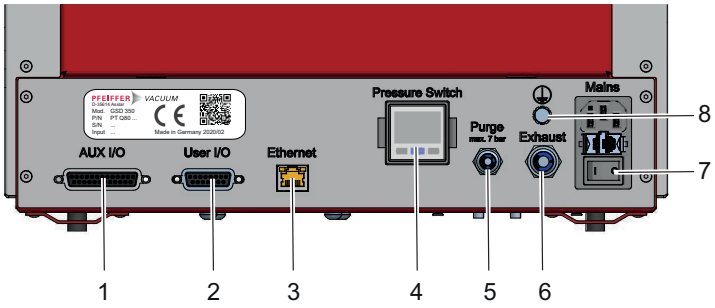


Fig. 8: Connection panel with interfaces and connections

1 "AUX IO" connection
2 "USER IO" connection
3 Ethernet connection (RJ-45)
4 Digital pressure switch for sealing gas [7)]
5 Sealing gas connection [6)]
6 Exhaust gas connection
7 Mains connection with power switch
8 Grounding connection (functional earth)

3.3.3 Gas inlet system

The gas guide to the ion source is screwed into the gas inlet system. The gas guide holds the orifice and routes the gas flow to the formation chamber of the ion source. The ceramic sleeve acts as an electrical insulator. A compression spring presses the ceramic sleeve against the formation chamber of the ion source.

6) only for corrosive gas version
7) only for corrosive gas version

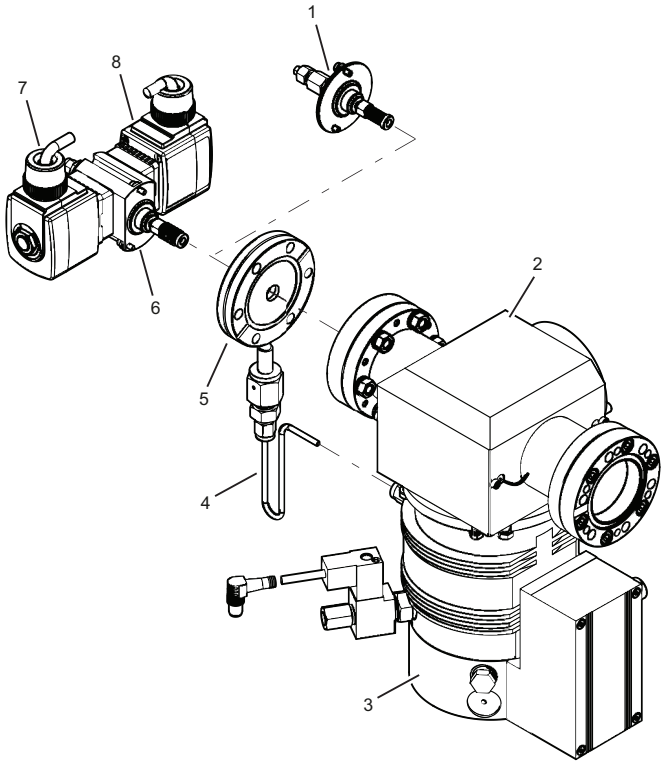


Fig. 9: Gas inlet systems

1 Gas inlet ThermoStar
2 Vacuum chamber
3 Turbopump
4 Interstage pumping of the turbopump
5 Connection flange
6 Gas inlet OmniStar
7 Gas inlet valve
8 Pump valve

Gas inlet system (OmniStar)
When the gas inlet is open, 1 to 2 sccm of the gas to be analyzed streams through the stainless steel capillary to the valve unit. The gas reaches the orifice without demixing via the integrated pressure reduction stage. The stainless steel capillary is located in a capillary tube that is heatable to 200 °C or optionally to 350 °C. The activated capillary heating heats the valve block. The effects of condensation can be avoided due to the increased temperature of the gases being analyzed. The gas inlet valve allows the sample gas flow into the vacuum chamber to be interrupted. A built-in orifice allows a small portion of the gas flow to flow into the vacuum chamber. The remaining gas flow reaches the interstage pumping of the turbopump. The gas inlet separates the PrismaPro from the gas flow, allowing the individual amount of gas being analyzed to be determined and adjusted. To do this, the gas analysis system shuts off the gas inlet valve and the pump valve in order to interrupt the gas flow into the vacuum chambers and into the turbopump interstage pumping. The mass spectrometer background can be determined and subtracted. The non-linearity of the PrismaPro can be detrimental in high-precision measurements. Admission of an extremely pure gas (zero gas) into the PrismaPro is therefore beneficial to ensure precise determination of the mass spectrometer background. The Zero Gas must be supplied under the same pressure conditions as the gas to be analyzed.

Gas inlet system (ThermoStar)
1 to 2 sccm of the gas to be analyzed flow through the quartz capillary and reach the orifice without demixing via the integrated pressure reduction stage. The quartz capillary is located in a capillary tube that is heatable to 200 °C or optionally to 350 °C. The activated capillary heating heats the inlet flange with orifice. The effects of condensation can be avoided due to the increased temperature of the gases being analyzed. The quartz capillary ends 1 to 2 mm in front of the orifice. This means that part of the gas exiting the quartz capillary reaches the PrismaPro without impacting on the walls in the pressure reduction stage. This is important to identify low concentrations of reactive gases, as reactive gases will not have any contact with stainless steel. The gas flow is not separated from the PrismaPro when using this gas inlet variant. The individual amount of the gas being analyzed can therefore not be determined and adjusted. Should this be necessary, admission of an extremely pure gas (zero gas) into the PrismaPro is beneficial to ensure precise determination of the mass spectrometer background. The Zero Gas must be supplied under the same pressure conditions as the gas to be analyzed.

3.3.4 Calibration unit

The optional calibration unit allows the mass scale, sensitivity and resolution of the PrismaPro to be calibrated in the high mass range (> 200 u). A glass storage vessel with perfluortributylamine (PFTBA) serves as a calibration medium and is inserted into the vacuum chamber via an orifice and shut-off valve. The connection to the vacuum chamber is lateral via a DN 40 CF flange on the front side. The shut-off valve on the calibration unit can be opened and closed by the GSD 350 control.

Perfluorotributylamine (PFTBA) in the background signal

PFTBA has the disadvantage that it can be traced in the unit's background signal for a very long time after shutting off the calibration valve. If this interferes with the intended gas analysis, Pfeiffer Vacuum recommends baking out the vacuum chamber after calibration with PFTBA.

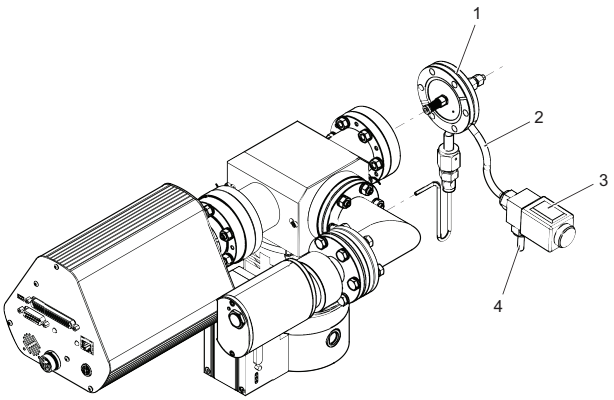


Fig. 10: Calibration unit at the gas inlet

1 Gas inlet
2 1/8" stainless steel line
3 Shut-off valve EVI 005 M
4 Glass storage vessel for PFTBA calibration medium

3.3.5 High vacuum side system

The turbopump functions according to the SplitFlow principle and maintains an operating pressure of $< 5 \times 10^{-5}$ hPa in the vacuum chamber with the gas inlet open. The turbopump assumes the majority of the gas flowing in through the capillary by way of interstage pumping.

3.3.6 Fore-vacuum system

The diaphragm pump creates the fore-vacuum required for operating the turbopump. The connection to the fore-vacuum connection (G 1/4") on the turbopump consists of a connection hose. For defined disposal of the pumped gas, the diaphragm pump has an exhaust line that can you can connect to a local gas disposal line or route out of the laboratory.

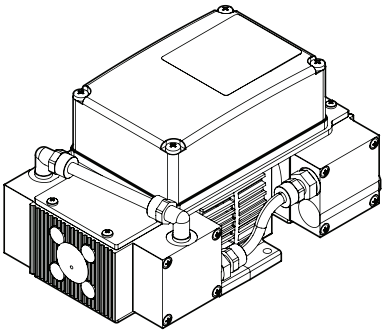


Fig. 11: Diaphragm Pump

3.3.7 Sealing gas system

Concentrations of the admitted gases

To calculate the toxicity of the sealing gas, it can be assumed that the sealing gas dilutes the concentrations of the inlet gases by a factor > 100.

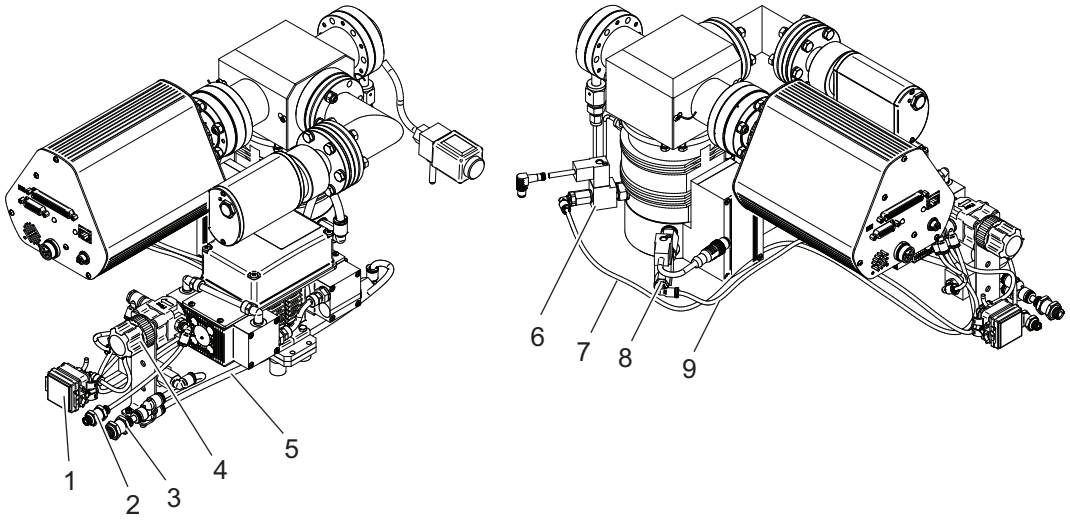


Fig. 12: Sealing gas system

1 Digital pressure switch with pressure gauge
2 Sealing gas connection
3 Exhaust gas connection
4 Manual pressure regulator
5 Hose to exhaust gas connection
6 Venting valve
7 Hose to venting valve
8 Sealing gas valve
9 Hose to sealing gas valve

In the corrosive gas version, the sealing gas protects the turbopump's bearings and ensures that the corrosive gas is fed to the diaphragm pump in a diluted form. This improves the service life of the diaphragm pump and prevents vapors condensing in the diaphragm pump. The corrosive gas version has a factory set internal pressure regulator that uses a flow meter to ensure an adequate nitrogen sealing gas flow. A small portion of the sealing gas reaches the sealing gas and venting valve on the turbopump via a flow divider. The major portion of the sealing gas, approx. 300 sccm, flows directly to the exhaust gas connection. If an exhaust duct or scrubber is connected, overpressure must not occur at the exhaust gas connection.

Purpose of the digital pressure switch:

- to provide a visual indicator of the internal sealing gas pressure downstream of the pressure regulator
- to deliver a signal that triggers the shutdown procedure if the sealing gas pressure exceeds or drops below the permissible range

3.3.8 Gas analysis unit

PrismaPro functional principle

The functional principle of the PrismaPro is described in the matching operating instructions.

The PrismaPro analyzes the small part of the gas to be analyzed that penetrates into the vacuum chamber through the orifice. To determine the pressure in the vacuum chamber, the gas analysis unit has a total pressure gauge on the vacuum chamber that enables continuous vacuum measurement in the pressure range from 1000 to 5×10^{-9} hPa. The total pressure measured can be read off the display and in the PV MassSpec software.

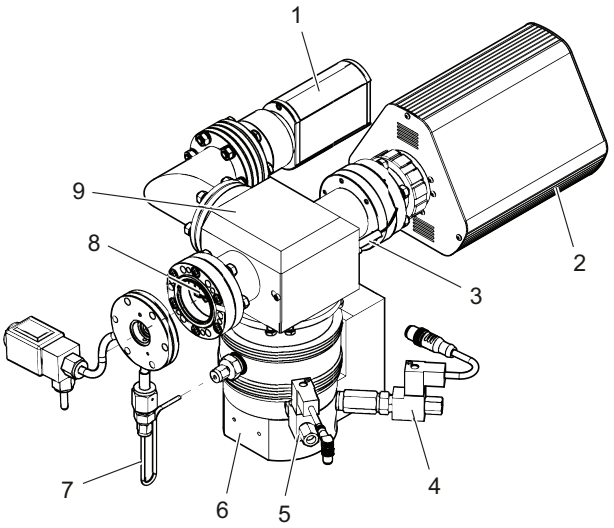


Fig. 13: Gas analysis unit components

1 Total pressure gauge
2 electronic unit QME 250
3 Heating cartridge in the vacuum chamber
4 Sealing gas valve of corrosive gas version
5 Venting valve
6 Turbopump
7 Interstage pumping of the turbopump
8 Ion source for analyzer QMA 250 M
9 Vacuum chamber

3.3.9 Heating and insulation

⚠ WARNING

Danger of burns on hot surfaces

During operation high temperatures (> 50 °C) occur on touchable surfaces of the heating components and the gas inlet. There is a risk of burning.

- ► Secure hot parts against inadvertent touching.
- ► Display warning signs.
- ► Make sure that the product has cooled down before performing work.
- ► Wear protective gloves (in accordance with EN 420).

The units heating units can be fully controlled via the unit's control.

Type	Temperature (max.)	Temperature (adjustable)
Capillary heating (200 °C)	200 °C	80 to 200 °C
Capillary heating (350 °C)	350 °C	80 to 350 °C
Gas inlet heating	100 °C	adjusted automatically
Vacuum chamber heating	130 °C	100 to 130 °C

Tbl. 8: Heating units on the unit

Vacuum chamber heating (baking out)

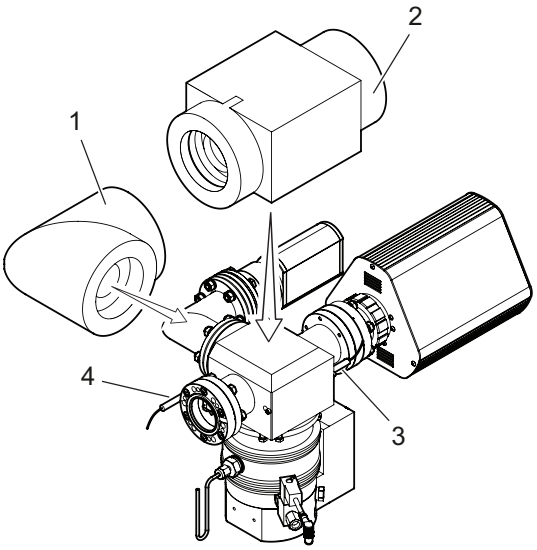


Fig. 14: Vacuum chamber heating and insulation

1 Insulation (angle)
2 Insulation of the vacuum chamber
3 + 4 Vacuum chamber heating cartridges

Baking out reduces the condensed gases which adhere to the surface of the vacuum chamber. This leads to a lower total pressure in the vacuum chamber, and to a lower background signal during measurements. As a result, the amount of water is reduced in the vacuum system.

Other characteristics of the vacuum chamber heating

- The vacuum chamber has 2 heating cartridges.
- You can remove the insulation of the vacuum chamber and elbow fitting.
- You can select a duration of 1 to 24 hours for baking out. The standard value for baking out is 6 hours.
- You can terminate the baking out process at any time via the control on the unit.
- You can select a temperature between 100 and 130 °C. The standard value for the temperature is 120 °C.

Gas inlet heating

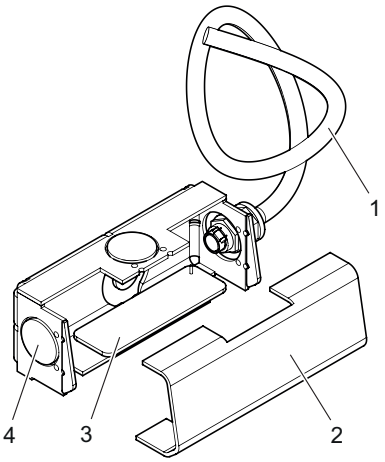


Fig. 15: Gas inlet heating

1 Capillary heating in the capillary tube
2 Silicone foam insulation in the gas inlet cover
3 Heating pad
4 Silicone foam insulation in the dummy cap

Characteristics of the gas inlet heating

- The gas inlet has a heating pad and silicone foam housing insulation.
- The gas inlet heating is always switched on and off parallel to the capillary heating.
- The GSD 350 automatically adapts the temperature of the heating pad. You cannot adjust the heating pad temperature.

Capillary heating

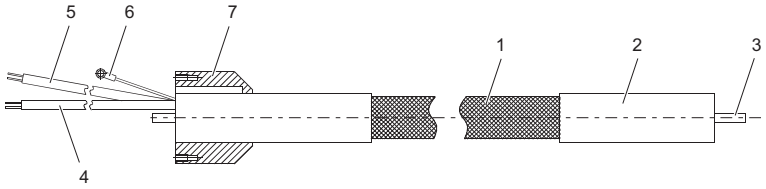


Fig. 16: Capillary heating

1 Heating coil
2 Insulation
3 Capillary guide
for 200 °C variant: PTFE hose
for 350 °C variant: Stainless steel pipe
4 Temperature sensor PT100
5+6 Electrical connection for heating
7 Fastener on unit

The capillary is located in a capillary tube with resistor heating. You can heat the capillary to 200 °C or 350 °C. Depending on the temperature setting and capillary tube variant, temperatures of > 70 °C are possible on the surface of the capillary tube. You can set additional temperature ranges of between 80 °C and maximum. The standard value for the temperature of the capillary heating is 120 °C.

3.3.10 Electronic components

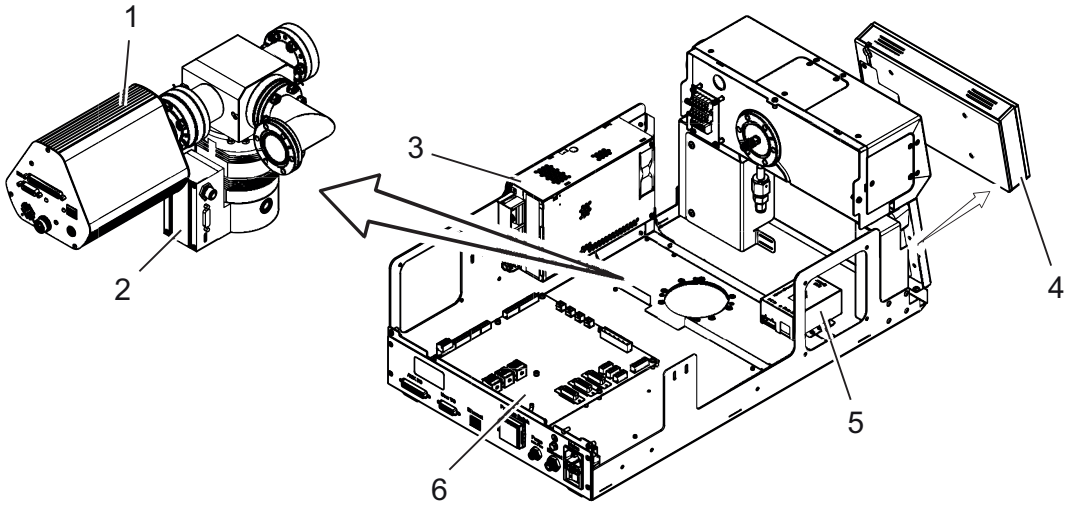


Fig. 17: Electronic components

1 Electronic unit QME 250
2 Electronic drive unit TC 110
3 Power supply pack
4 Display
5 PoE injector
6 Mainboard

Electronic unit QME 250
The QME 250 electronic unit is mounted on the analyzer QMA 250 M and contains the PrismaPro interfaces.

Electronic drive unit TC 110
The TC 110 electronic drive unit is a permanent component of the turbopump. The purpose of the electronic drive unit is to drive, monitor and control the entire turbopump.

Power supply pack
The wide area power supply pack supplies voltage to all GSD 350 components.

Display
Control the GSD 350 and call up functions via the display.

PoE injector
The PoE injector supplies current to the display.

Mainboard
The mainboard is located on the chassis' baseplate and fulfills the following functions:

- VLAN server for communication between the PrismaPro and display
- Pump control for the turbopump and diaphragm pump
- Open and closed loop heating control
- Fan control for housing temperature
- External interfaces

3.4 Identifying the product

You will need all the data from the rating plate to safely identify the product when communicating with Pfeiffer Vacuum.

1. Read the data on the product rating plate.
2. Record this data.
3. Always have all rating plate specifications to hand.

3.5 Scope of delivery

The scope of delivery includes the following parts:

- GSD 350 OmniStar/ThermoStar
- installation hardware and small parts
  - Allen key, WAF 2, WAF 2.5 and WAF 3
  - Metric open-end wrench, WAF 8, WAF 10 (2x) and WAF 14
  - Imperial open-end wrench, WAF 5/16", WAF 3/8" and WAF 9/16"
  - Two-sided socket key for the ion source
  - Special tool for the orifice of the gas inlet system
  - 2 O-rings made of FKM, 9.25 × 1.78 mm and 18.77 × 1.78 mm
  - 2 slow fuses, 10 A
  - for OmniStar with stainless steel capillary only
    - Hexagon socket wrench, TX20
    - Clamp collar set for 1/16" tube (5 pieces)
  - for ThermoStar or GSD 350 with quartz capillary only
    - Sealing set for capillary 250 µm (ferrule) (5 pieces)
- Transport protection for analyzer QMA 250 M
- Assembly aid for analyzer QMA 250
- Ethernet cable, 3 m length, red
- Mains Cable
- Operating instructions
  - GSD 350 OmniStar/ThermoStar
  - Components (see chapter “Applicable documents”, page 10)

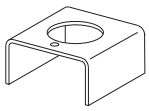


Fig. 18: Assembly aid for analyzer QMA 250

Fig. 19: Special tool for the orifice of the gas inlet system

Unpacking the product and checking completeness of the shipment

1. Unpack the product.
2. Remove the transport fasteners, transport protection etc.
3. Store the transport fasteners, transport protection etc. in a safe place.

4. Check that the shipment is complete.
5. Ensure that no parts are damaged.

4 Transport and storage

⚠ WARNING

Danger of injury due to lifting heavy loads

The product is heavy; it weighs up to 26 kg depending on the version. If one person lifts the product incorrectly without help, this will lead to injuries.

- ► Always use 2 persons to lift the product with two hands.
- ► Take all necessary safety precautions (e.g. wear work gloves).
- ► Observe local regulations.
- ► Comply with the instructions for safe transport.

⚠ WARNING

Danger of serious injury due to falling objects

Due to falling objects there is a risk of injuries to limbs through to broken bones.

- ► Take particular care and pay special attention when transporting products manually.
- ► Do not stack the products.
- ► Wear protective equipment, e.g. safety shoes.

4.1 Transporting the product

NOTICE

Damage caused by incorrect transportation

Transportation in unsuitable packaging, or failure to install all transport locks, can damage the product.

- ► Comply with the instructions for safe transportation.

Packing

We recommend keeping the transport packaging and original protective cover.

General information regarding safe transport

1. Observe the weight of the product.
2. Where possible, always transport or ship the product in the original packaging.
3. Always use dense and impact-proof packaging for the product.
4. Always install all transport protection before transport.
5. Only remove the present protective cover immediately prior to installation.

4.2 Storing the product

NOTICE

Damage caused by improper storage

Improper storage will lead to damage to the product.

- ► Comply with the instructions for safe storage.

Packing

We recommend storing the product in its original packaging.

General information for safe storage

- ► Store the product in a cool, dry, dust-free place, where it is protected against impacts and mechanical vibration.
- ► Always use dense and impact-proof packaging for the product.
- ► Where possible, store the product in its original packaging.
- ► Store electronic components in antistatic packaging.

- ► Maintain the permissible storage temperature.
- ► Avoid extreme fluctuations of the ambient temperature.
- ► Avoid high air humidity.
- ► Seal connections with the original protective caps.
- ► Protect the product with the original transport protection (where available).

5 Installation

5.1 Ensuring venting of the unit

NOTICE

Damage caused by overheating

The ambient temperature must not exceed the permissible operating temperature of the device.

- ► Make sure there is unobstructed circulation of air when installing the device.
- ► Periodically check and clean the installed air filter, if necessary.

Procedure

1. Always keep an area of > 25 mm clear around the unit.
2. If you install the unit in a cabinet:
   - Make sure that the cabinet is big enough.
   - Make sure that the cabinet ensures sufficient ventilation by the fan built into the unit.

5.2 Establishing the Ethernet connection

You need a corresponding Ethernet connection to operate the GSD 350 via the web interface or PV MassSpec software using a PC (host computer) or over a network.

Connecting the Ethernet cable

- ► Connect the supplied Ethernet cable to the GSD 350 and the PC.

The two LEDs in the RJ-45 socket show the interface status (see chapter “"Ethernet" (LAN) connection”, page 47).

5.3 Connecting the exhaust duct

⚠ WARNING

Danger of poisoning due to toxic process media escaping from the exhaust pipe

During operation with no exhaust line, the vacuum pump allows exhaust gases and vapors to escape freely into the air. There is a risk of injury and fatality due to poisoning in processes with toxic process media.

- ► Observe the pertinent regulations for handling toxic process media.
- ► Safely purge toxic process media via an exhaust line.
- ► Use appropriate filter equipment to separate toxic process media.

5.3.1 Trimming the exhaust gas hose

Required tool

- Hose cutter

Required material

- PE hose (exterior Ø = 6 mm)

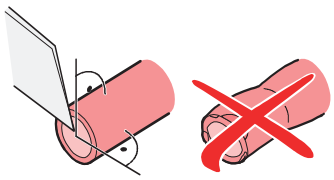


Fig. 20: Trimming the exhaust gas hose

Procedure

1. You must take the utmost care when cutting the exhaust gas hose.
   – The exhaust gas hose should not be deformed or have any scratches or gouges.
2. Cut the exhaust gas hose cleanly without any burring:
   - to the required length
   - at right angles

5.3.2 Connecting exhaust gas hose

Prerequisite

- Exhaust duct unpressurised

Required material

- PE exhaust hose (exterior Ø = 6 mm)
- optional: additional IQS or Schott plug-and-socket connections

IQS plug-and-socket connections

IQS plug-and-socket connections have 2 pressure points: Holding claw and seal.

The hose is properly connected when both pressure points are passed.

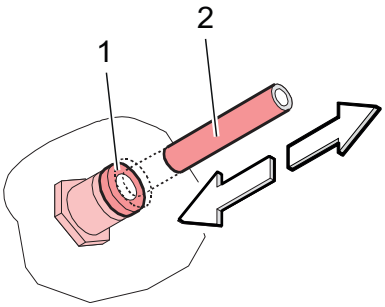


Fig. 21: Connecting exhaust gas hose

1 Release ring 2 Hose

Connecting exhaust gas hose

1. Connect the exhaust gas hose to the exhaust gas connection on the unit.
2. Connect an exhaust duct to the unit if you are operating the unit with corrosive substances.
3. Observe the local regulations for handling process gases.

5.4 Connecting the sealing gas line

5.4.1 Trimming the sealing gas hose

Required tool

- Hose cutter

Required material

- PE hose (exterior Ø = 4 mm)

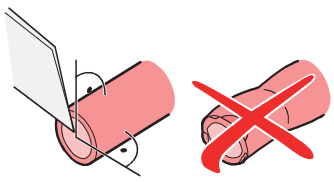


Fig. 22: Trimming the sealing gas hose

Procedure

1. You must take the utmost care when cutting the sealing gas hose.
   – The sealing gas hose should not be deformed or have any scratches or gouges.
2. Cut the sealing gas hose cleanly without any burring:
   - to the required length
   - at right angles

5.4.2 Connecting the sealing gas line

Prerequisite

- Sealing gas line and exhaust duct unpressurised

Required material

- PE sealing gas hose (exterior Ø = 4 mm)
- optional: additional IQS or Schott plug-and-socket connections

IQS plug-and-socket connections

IQS plug-and-socket connections have 2 pressure points: Holding claw and seal.

The hose is properly connected when both pressure points are passed.

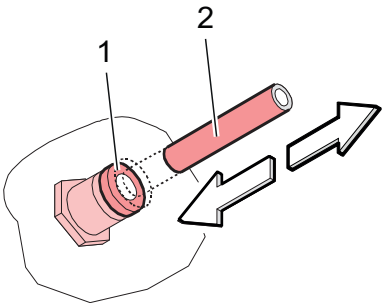


Fig. 23: Connecting the sealing gas line

1 Release ring 2 Hose

Connecting the sealing gas hose

1. Install a suitable pressure reduction system if you expect to exceed the permissible sealing gas pressure range.
   – The unit does not have its own sealing gas shut-off valve.
2. Connect the sealing gas hose to the sealing gas connection on the unit.
3. Observe the local regulations for handling process gases.

5.5 Connecting the capillary

NOTICE

Damage to the sampling system

Incorrect handling of the capillary will cause damage to the unit's sampling system.

- ► Observe the bending radius.
  - 200 °C capillary hose: **≥ 50 mm**
  - 350 °C capillary hose: **≥ 200 mm**
- ► Do not additionally insulate the capillary heating.
- ► Do not additionally cover the capillary heating.
- ► Do not expose the capillary to additional heat, e.g. from a heated flange.

NOTICE

Impairment from contamination and damage

Touching the devices or components with bare hands increases the desorption rate and leads to incorrect measurements. Dirt (e.g. dust, fingerprints, etc.) and damage impair the function.

- ► When working on high or ultra high vacuum systems, always wear clean, lint-free and powder-free laboratory gloves.
- ► Only use clean tools.
- ► Make sure that the connection flanges are free of grease.
- ► Remove protective caps and protective covers from flanges and connections only when necessary.
- ► Carry out all work in a well lit area.

Capillary hose adapter as accessory

A capillary hose adapter is available as an accessory for reliably connecting the capillary hose.

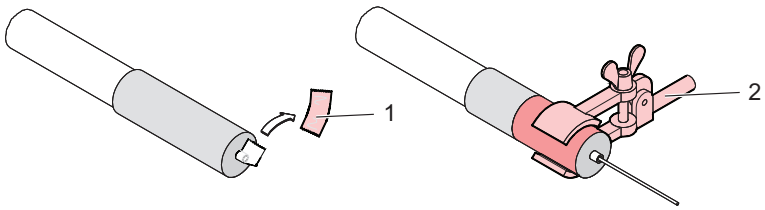


Fig. 24: Connecting the capillary

1 Adhesive tape 2 Example of how to secure a capillary hose

5.5.1 Connecting the OmniStar stainless steel capillary

Procedure

1. Remove the adhesive tape from the stainless steel capillary.
2. Attach the stainless steel capillary at the measurement point.
3. Use the stainless capillary tube adapter cable from the Pfeiffer Vacuum accessories range.
4. Fix the capillary tube in place.
5. Only clamp the capillary tube in the solid, inflexible area at the front.

5.5.2 Connecting the ThermoStar quartz capillary

Procedure

1. Remove the adhesive tape from the quartz capillary.
2. If needed, pull out the quartz capillary, or feed the quartz capillary in, to reach the measurement point.
   – Remove the gas inlet cover to do so (see chapter “Removing/attaching the gas inlet cover”, page 68).
3. Attach the quartz capillary at the measurement point.
4. Use the stainless capillary tube adapter cable from the Pfeiffer Vacuum accessories range.
5. Fix the capillary tube in place.
6. Only clamp the capillary tube in the solid, inflexible area at the front.

5.6 Adapting the position of the capillary hose

⚠ WARNING

Danger of burns on hot surfaces

During operation high temperatures (> 50 °C) occur on touchable surfaces of the heating components and the gas inlet. There is a risk of burning.

- ► Secure hot parts against inadvertent touching.
- ► Display warning signs.
- ► Make sure that the product has cooled down before performing work.
- ► Wear protective gloves (in accordance with EN 420).

To optimize the orientation of the capillary tube for specific applications, the capillary tube can be placed in 3 different positions. Pfeiffer Vacuum always delivers the GSD 350 with the capillary hose on the right-hand side. Dummy caps are installed as seals on the two positions that are not used.

Prerequisite

- Gas inlet cover removed

Required tool

- Allen key, **WAF 2**

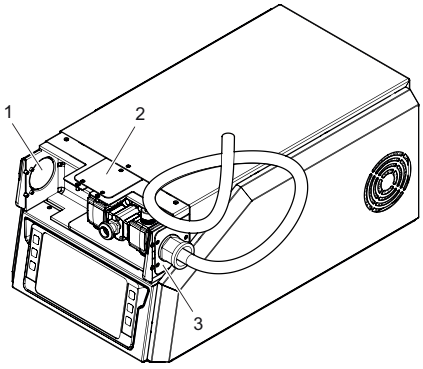


Fig. 25: Position of the capillary hose upon delivery

1 Dummy cap, left
2 Dummy cap, top
3 Capillary hose with dummy cap, right

Procedure

1. Unscrew the 3 countersunk screws and the dummy cap from the new capillary tube position.
2. Unscrew the 3 countersunk screws and the cover cap with the capillary tube.
3. Carefully pull out the cap with the capillary tube so that you can guide the capillary and the cable through the slot in the housing.
   – The capillary can remain mounted on the inlet.
4. Fasten the cap with the capillary hose at the new capillary hose position with the 3 countersunk screws.
5. Seal the previous capillary tube position with the dummy cap and the 3 countersunk screws.

5.7 Establishing a network connection

A corresponding network connection is required to operate the GSD 350 via the web interface or PV MassSpec software using a PC (host computer) or over a network.

- **IP addresses**

  A network uses IP addresses as a means of identifying individual units. IP addresses are unique within a network, but are not universal. This means that only one unit in a network can have a certain IP address, but 2 units in separate networks can have the same IP address.

The following sections provide information on some general network variables that can influence connection of the GSD 350 (see chapter “Setting the network parameters”, page 59).

Procedure

- ► Set the IP address of the GSD 350.
- ► Set the IP address of the PC (host computer) you are using.
- ► Set up a subnetwork.

5.7.1 IP addresses

NOTICE

IP address conflicts when connecting several units

Pfeiffer Vacuum supplies each GSD 350 with the same default IP address. If you want to connect several GSD 350 units, their IP addresses are initially not unique. Simultaneous connection of multiple GSD 350 units with identical standard IP address leads to IP address conflicts in the network.

- ► Change the IP address of the units that you want to connect in the network.
- ► Where possible, use static IP addresses.
- ► Then connect the units to a network.

Using IP addresses

Pfeiffer Vacuum recommends that **static IP addresses** are used for the GSD 350.

Reserve a block of IP addresses for static use and ensure that these reserved IP addresses are prohibited on the DHCP server (host). This will prevent any conflicts with double IP addresses.

If you connect the GSD 350 to an existing local network, you need a static IP address for each GSD 350 installed. Consult your network administrator for assigning the IP addresses.

Static IP addresses protect against the loss of data

The PV MassSpec software and the web interface use the IP address of the GSD 350 in order to identify each connected GSD 350. The IP address of the GSD 350 must not be changed during operation

With DHCP, the host can generate a new IP address each time the GSD 350 goes offline and back online again. DHCP can also automatically change the IP address if there is an IP address conflict in the network. If the GSD 350's IP address is changed accidentally during data acquisition, the web interface and the PV MassSpec are not automatically reconnected with the GSD 350, as the PV MassSpec does not recognize the newly assigned IP address. This leads to the loss of communication and the loss of data.

Static IP addresses only change when the IP address is changed manually, and help to protect the GSD 350 against loss of communication and data.

Standard IP address for the GSD 350

- Network prefix: 192.168.1.xxx
- IP address: 192.168.1.100

The GSD 350 use IPv4 IP addresses. IPv4 IP addresses consist of 32 bits in dotted decimal notation. They consist of four decimal numbers which are each separated from 0 to 255 by full stops, for example: 192.168.1.100. Each part represents an octet. Normally, IP addresses comprise one network prefix and one host protocol.

Setting IP addresses

- ► **Recommendation**: Use static IP addresses.
  - – You can set and change static IP addresses manually.
- ► Do **not** use dynamic IP addresses.
  - – A host (DHCP) sets these IP addresses automatically.
- ► An alternative to changing the IP address is to change the IP address of the host computer, thus enabling communication between the host computer and the unit.

5.7.2 Sub-networks

Standard subnet mask for GSD 350

- Subnet mask: 255.255.255.0

A sub-network is a logical visual sub-division of an IP network. Dividing an IP network into several sub-networks is known as sub-netting. Sub-netting sets the region of the IP address that is used as a network prefix for all IP addresses within a sub-network. This is carried out via the subnet mask.

	Example 1	Example 2	Example 3
IP address	192.168.1.104	192.168.1.105	192.168.1.150
Subnet mask	255.255.255.0	255.255.0.0	255,255,255,192
Network prefix	192.168.1.0	192.168.0.0	192.168.1.128
Host protocol	0.0.0.104	0.0.1.105	0.0.0.22

Tbl. 9: Examples for sub-networks

The subnet masks define which octets of the IP address are used as a network prefix. In order that 2 network units are allowed to communicate, the network units must be located in the same sub-network. This means that they do not only have to be connected in the same internet network, but must also have the same network prefix.

5.7.3 Changing the IP address for the GSD 350

Operating instructions for the web interface and PV MassSpec

Information on operating the GSD 350 via the web interface and PV MassSpec is available in the separate operating instructions as document number **DA 0106**.

Procedure

► Using the display to change the unit's IP address (see chapter “Setting the network parameters”, page 59).

► Using the web interface to change the unit's IP address.

5.7.4 Changing the host computer IP address

Administrator rights

The following steps apply to the Windows 10 operating system. Changing the host computer IP address requires administrator rights. Contact your system administrator if necessary.

Ex factory IP address 192.168.1.100

The unit is assigned the IP address 192.168.1.100 at the factory. You cannot use it here.

Changing the IP address back to the default

Perform these steps from the beginning again and replace the IPv4 properties again with the standard values in order to change the IP address back to standard.

Procedure

1. Press the **Start** button in the taskbar.
2. Press **Settings**.
   – The Settings window opens.
3. Click on **Network & Internet**.
4. Click on **Wireless**.
5. Select **Manage known networks**.
6. Select the network for which you will be editing the settings.
7. Select **Properties**.
8. Below **IP Assignment**, select the **Edit** option.
9. Below **Edit IP settings**, select the **Manual** option
10. Enable **IPv4**.

11. Enter the **IP address**, **subnet prefix length** and the **settings for the IP address**.
    – Do not change the **Gateway**.
    – GSD 350 with default IP address: Use **192.168.1.xxx** as the IP address:, and **255.255.255.0** as the subnet prefix length.
    – "xxx" must not be 100 in the IP address.
12. Select **Save**.
    – This sets the IP address of your computer to the selected manual IP address.
13. Close all open settings windows.

5.8 Connecting the functional earth

⚠ DANGER

Danger to life from electric shock

Inadequate or incorrect grounding of the unit leads to contact-sensitive voltage on the housing. When making contact, increased leakage currents will cause a life-threatening electric shock.

- ► Before the installation, check that the connection leads are voltage-free.
- ► Conduct the electrical connection in accordance with locally applicable regulations.
- ► Make sure that the local mains voltage and frequency match rating plate specifications.
- ► Make sure that the mains cable and extension cable meet the requirements for double isolation between input voltage and output voltage, in accordance with IEC 61010 and IEC 60950.
- ► Use only a 3-pin mains cable and extension cable with properly connected protective earthing (earthed conductor).
- ► Plug the mains plug into a socket with earthing contact only.
- ► Always connect the mains cable prior to all other cables, to ensure continuous protective earthing.

⚠ DANGER

Electric shock due to missing internal earthed conductor

The internal earthed conductor is fastened to the housing. A unit without an internal earthed conductor attached can be life-threatening in the event of a malfunction.

- ► Do not rotate or release the internal earthed conductor.

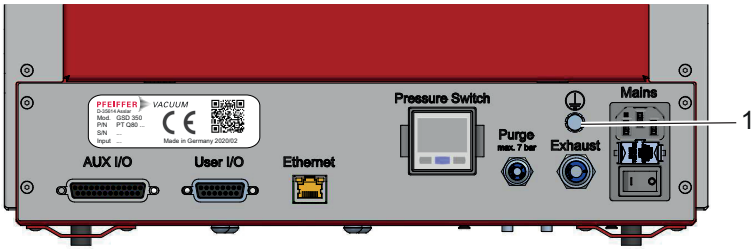


Fig. 26: Connection for functional earth

1 Connection for functional earth (M5 screw)

Procedure

- ► If necessary, use the M5 screw to connect the unit via an earthed conductor, for example, to the reference ground of a system.

5.9 Establishing mains connection

⚠ DANGER

Danger to life from electric shock

Inadequate or incorrect grounding of the unit leads to contact-sensitive voltage on the housing. When making contact, increased leakage currents will cause a life-threatening electric shock.

- ► Before the installation, check that the connection leads are voltage-free.
- ► Conduct the electrical connection in accordance with locally applicable regulations.
- ► Make sure that the local mains voltage and frequency match rating plate specifications.
- ► Make sure that the mains cable and extension cable meet the requirements for double isolation between input voltage and output voltage, in accordance with IEC 61010 and IEC 60950.
- ► Use only a 3-pin mains cable and extension cable with properly connected protective earthing (earthed conductor).
- ► Plug the mains plug into a socket with earthing contact only.
- ► Always connect the mains cable prior to all other cables, to ensure continuous protective earthing.

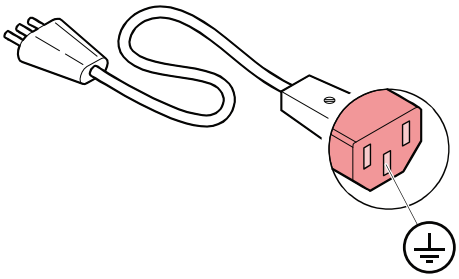


Fig. 27: Mains connection with IEC 320 C13 socket

Connecting the power supply cable

1. Connect the mains cable to the mains connection socket of the unit.
2. Connect the plug on the mains cable into a suitable socket.

5.10 Installing the PV MassSpec software

Demanding analytical measurement tasks, and applications in which measured values are to be stored, require direct operation of the PrismaPro integrated in the GSD 350 using the PV MassSpec software. The PV MassSpec software is used to parameterize the PrismaPro and to create, call and start measurement recipes. All other GSD 350 unit parameters and functions can still be controlled via the display or the web interface.

Operating instructions for the web interface and PV MassSpec

Information on operating the GSD 350 via the web interface and PV MassSpec is available in the separate operating instructions as document number **DA 0106**.

6 Interfaces and connections

The GSD 350 has an Ethernet interface for communication, as well as 2 input/output (I/O) connections, User I/O and AUX I/O, which allow the GSD 350 to exchange information with the customer's peripheral devices.

6.1 Mains connection

The mains connection socket with the main switch and fuse is located in the unit's connection panel. The required mains cable is included in the scope of delivery.

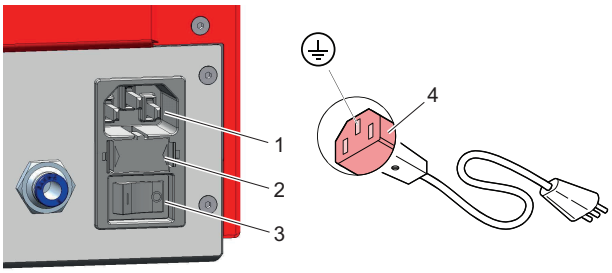


Fig. 28: Mains connection with main switch and fuse

1 Mains connection socket (IEC 320 C14)
2 Fuse
3 Main switch
4 Mains cable with cold-device plug C13

6.2 Ground terminal

⚠ DANGER

Electric shock due to missing internal earthed conductor

The internal earthed conductor is fastened to the housing. A unit without an internal earthed conductor attached can be life-threatening in the event of a malfunction.

► Do not rotate or release the internal earthed conductor.

The unit has 2 earthed conductor connections:

- The internal earthed conductor is located below the power supply pack.
- The connection to the functional earth is located in the unit's connection panel.

6.3 "User I/O" connection

NOTICE

Impairment of electrical connections caused by external disruptive influences

External disruptive influences due to electromagnetic emissions cause malfunctions in the unit and lead to property damage.

Pfeiffer Vacuum urgently recommends wiring the analog inputs (+) and (-) with twisted pair cables.

► A screened cable should be used due to the electromagnetic compatibility (EMC).
► Avoid external disruptive influences.
► Connect the screening to the connection housing.
► Leave the other end open, or ground it to suppress ground loop currents.

The "USER I/O" connection provides an interface for digital and analog inputs and outputs.

Digital Input

The digital input is high active. A pull-up resistor configures input internally to high. You can set the input to low via a contact or a transistor to ground. If used with the PV MassSpec software, you can view the states of this input or use them for recipe or sequential control.

- Total number of channels: 1
- "USER IO" connection: DI1

Relay output
You can set the relay output (24 V AC/DC, 1 A) via digital output DO8. The normally-open contact is on pin 3 and the reference contact on pin 4.

- Total number of channels: 1
- "USER IO" connection: DO8

Analog inputs
The analog inputs are differential inputs for the range -10 to +10 V. The PV MassSpec software records analog input signals or controls program sequences.

- Total number of channels: 2
- "USER IO" connection: AI1 – AI2
- Input impedance: 50 kΩ
- Sampling rate: 14 bit

Analog output
The analog outputs allow the outputting of voltages within the range of 0 to 10 V. The PV MassSpec software records analog input signals and controls program sequences.

- Total number of channels: 2
- "USER IO" connection: AO0 – AO1
- Output impedance: 100 Ω
- Sampling rate: 16 bit

Relay for pumping system status
The "USER I/O" connection includes a relay which indicates the speed status of the turbopump. When the turbopump speed reaches > 90 % (> 1350 Hz) of the nominal rotation speed, then the normally-open contact shuts. This shows that the unit is ready to measure.

- "USER IO" connection: Pin 13 (relay change-over contact, COM)
- "USER IO" connection: Pin 14 (relay normally open contact, NO)
- "USER IO" connection: Pin 15 (relay normally closed contact, NC)

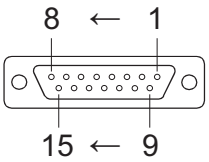


Fig. 29: "USER IO" connection

1	Ground (GND)
2	Digital input DI1
3	Relay normally open contact DO8
4	Relay change-over contact DO8
5	Analog input AI2 (-)
6	Analog input AI2 (+)
7	Analog input AI1 (-)
8	Analog input AI1 (+)
9	Analog ground (PrismaPro EXT I/O)
10	Ground (GND)
11	Analog output AO1
12	Analog output AO0
13	Relay change-over contact (pumping system)
14	Relay normally open contact (pumping system)
15	Relay normally closed contact (pumping system)

6.4 "AUX IO" connection

NOTICE

Impairment of electrical connections caused by external disruptive influences

External disruptive influences due to electromagnetic emissions cause malfunctions in the unit and lead to property damage.

Pfeiffer Vacuum urgently recommends wiring the analog inputs (+) and (-) with twisted pair cables.

- ► A screened cable should be used due to the electromagnetic compatibility (EMC).
- ► Avoid external disruptive influences.
- ► Connect the screening to the connection housing.
- ► Leave the other end open, or ground it to suppress ground loop currents.

The "AUX I/O" connection provides and additional interface for digital and analog inputs and outputs.

Digital inputs
The digital inputs are highly active. The PV MassSpec software allows you to set the actions activated by digital inputs to low active. A pull-up resistor configures these inputs internally to +24 V. The inputs can be set to low via a contact or a transistor to ground. If used with the PV MassSpec software, the states of the digital inputs can be viewed or they can be used for sequential control.

- Total number of channels: 3
- "AUX IO" connection: DI13 – DI15

Digital outputs
The digital outputs are open collectors and can each handle a max. load of 200 mA. If used with the PV MassSpec software, you can set the digital outputs permanently or relative to currents, unit state and sequence state. When you activate the output, the output switches from high voltage (> 20 V) to 0 V.

- Total number of channels: 6
- "AUX IO" connection: DO2 – DO7

Analog inputs
The analog inputs are differential inputs for the range -10 to +10 V. If used with the PV MassSpec software, you can record analog input signals simultaneously or control program sequences.

- Total number of channels: 3
- "AUX IO" connection: AI3 – AI5
- Input impedance: 50 kΩ
- Sampling rate: 16 bit

Analog output
The analog outputs allow the outputting of voltages within the range of 0 to 10 V. If used with the PV MassSpec software, the ion currents of the individual masses can be converted to corresponding output voltages using a configurator, and then be output.

- Total number of channels: 2
- "AUX IO" connection: AO2 – AO3
- Output impedance: 100 Ω
- Sampling rate: 16 bit

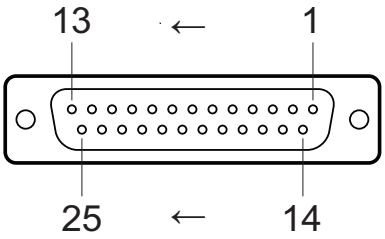


Fig. 30: "AUX IO" connection

1	Analog output AO2	14	Analog output AO3
2	Analog ground	15	Digital ground
3	Analog input AI3 (-)	16	Analog input AI3 (+)
4	Analog input AI4 (-)	17	Analog input AI4 (+)
5	Analog input AI5 (-)	18	Analog input AI5 (+)
6	Analog ground	19	Digital ground
7	Digital input DI13	20	Digital input DI14
8	Digital input DI15	21	Digital ground
9	24 V	22	Digital output DO2
10	Digital output DO3	23	Digital output DO4
11	Digital output DO5	24	Digital output DO6
12	Digital output DO7	25	unassigned
13	Digital ground		

6.5 "Ethernet" (LAN) connection

The "Ethernet" connection enables direct communication with the device via a computer.

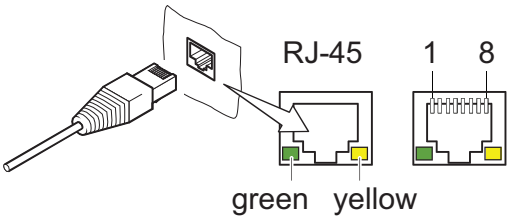


Fig. 31: "Ethernet" (LAN) connection

1	Transmission data (TD+)	6	Reception data (RD-)
2	Transmission data (TD-)	4, 5, 7, 8	Not used
3	Reception data (RD+)		

LED	Status	Meaning
Green (link)	lights up	Hardware connection exists
	dark	No hardware connection
Yellow (activity)	lit up (flickering)	Data transmission runs
	dark	no data transmission / no connection

Tbl. 10: Status of the Ethernet connection

7 Commissioning

NOTICE

Severe vibration will damage the turbopump

Severe vibration and vibrations during operation and after switching off will damage the turbopump.

- ► Avoid knocks and vibration during operation, for example, as caused by driving over cables and door sills.
- ► Avoid vibrations up to 5 minutes after switching off the system.

7.1 Switch on the unit

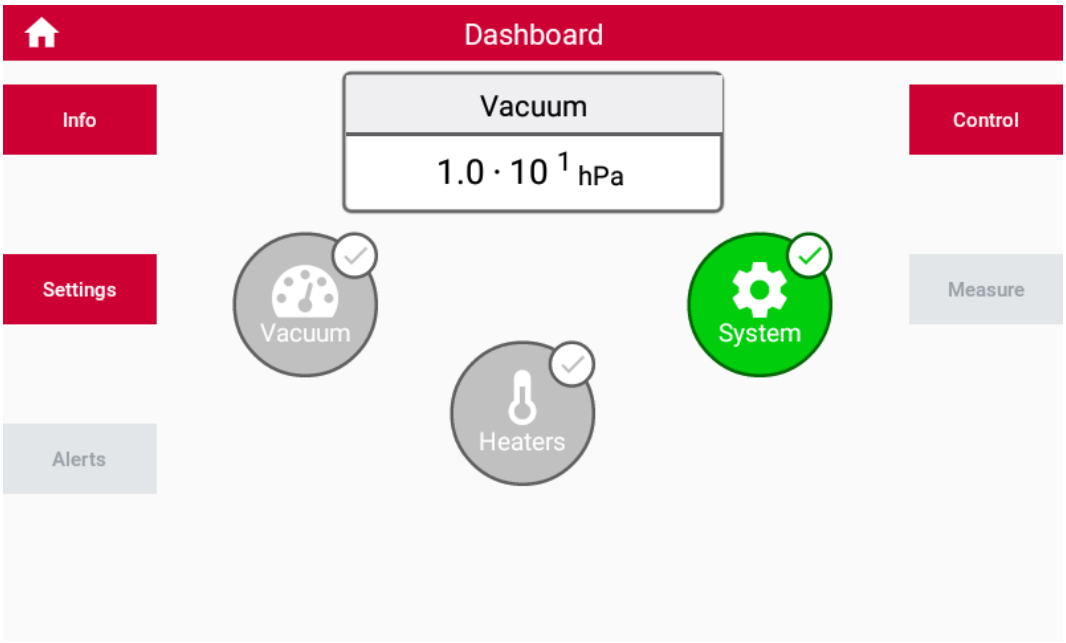


Fig. 32: "Dashboard" screen after starting the program

Procedure

1. Switch on the master switch.
   – The unit starts up. Once the electronics and the internal VLAN switch have booted, the system is ready for operation, and can be controlled using the display or the web interface.
2. Configure the language, if needed (see chapter “Setting the language”, page 58).
3. Start the pumping system.

7.2 Starting the pumping system

Prerequisite for measurements with mass spectrometer

- Pressure < 5 × 10^{-5} hPa

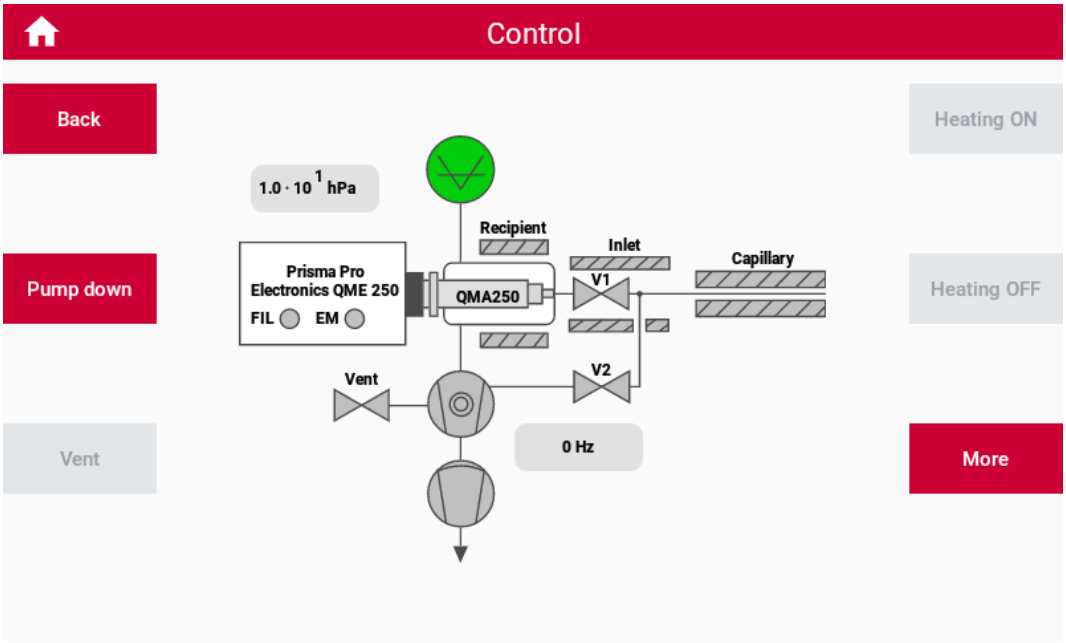


Fig. 33: "Control" screen

Pumping down the vacuum system

1. Switch to the “Control” screen.
2. Press the "Pump down" button (see chapter “Pumping down the vacuum system”, page 61).

The unit is ready for measuring.

8 Operation via the display

Operating instructions for the web interface and PV MassSpec

Information on operating the GSD 350 via the web interface and PV MassSpec is available in the separate operating instructions as document number **DA 0106**.

The GSD 350 can be operated via the display or alternatively via the web interface. For variants without a display, the web interface is used exclusively for operation.

Conducting mass spectrometer measurements

Three different types of mass spectrometer measurements are supported.

- ► Conduct mass spectrometer measurements in one of the 3 following ways.
- ► Use the PV MassSpec software.
  - – The measured data from the measurements can only be saved if you are using the PV MassSpec software.
- ► Use the display.
  - – You cannot save the measured data of measurements via the display.
- ► Use the web interface.
  - – You cannot save the measured data of measurements via the web interface.

Performing complex analytical measuring tasks

- ► Use the PV MassSpec software.

Navigating between screens and menus

The unit's functions are assigned to different screens and menus.

- ► Press the appropriate buttons on the display to navigate between screens and functions.
  - – Unavailable buttons are grayed.
- ► Press the "Next" button to go to the next page of the menu with more functions.
- ► Press the "Back" button to go back one level in the menu tree.

8.1 "Dashboard" screen

The first screen that appears after the program starts is the "Dashboard". All unit functions and information can be called up from here directly or indirectly. For more information about the controls and displays, see: (see chapter “Controls and indicators”, page 22)

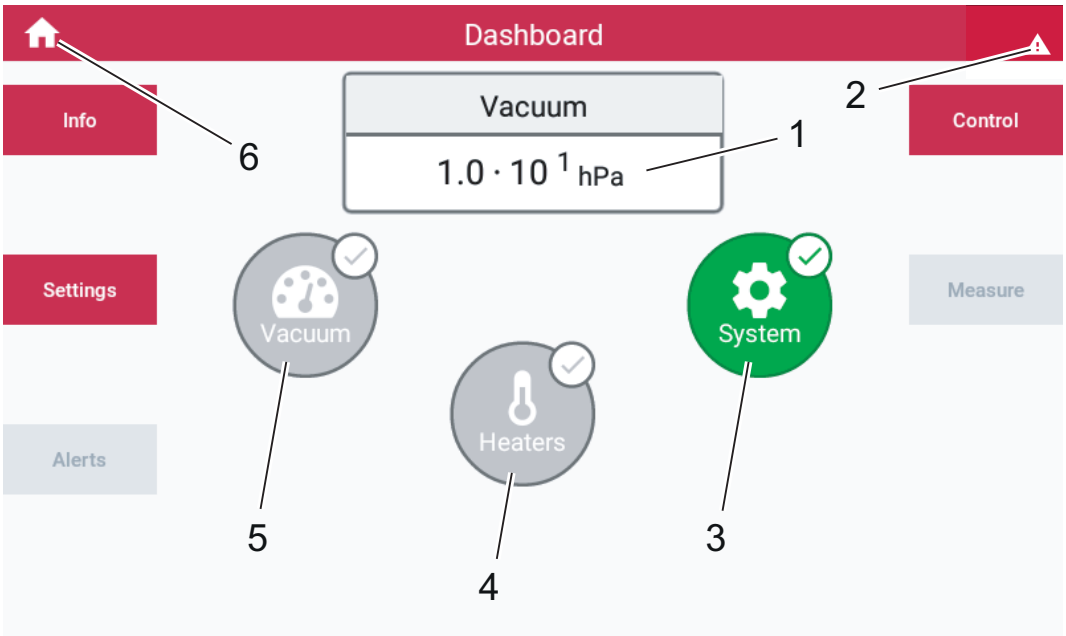


Fig. 34: "Dashboard" screen

1 Current pressure value in the vacuum chamber
2 Warning triangle
3 System status
4 Heating status
5 Vacuum system status
6 Link to start page

8.1.1 Menu structure with functions

Menu	Subprograms, functions and information	
	1. Level	2. Level
Info (see page 53)	Vacuum pumps	Diaphragm Pump
		Turbopump
	Sensors	Mass spectrometer
		Total pressure gauge
		Sealing gas sensor
	Valves	Inlet valve (V1)
		Inlet valve (V2)
		Calibration valve
	Heating units	Capillary heating
		Gas inlet heating
		Vacuum chamber heating
	GSD	Operating hours, firmware versions, etc.
	Network	IP address
		Subnet mask
		Gateway
	Fan	Fan 1 (outlet)
		Fan 2 (inlet)
Settings (see page 53)	Recipes	Creating a new recipe
		Default recipes for air
	Heating units	Capillary heating
		Gas inlet heating
		Vacuum chamber heating
	Sensors	Mass spectrometer
		Total pressure gauge
		Sealing gas sensor
	Language	German
		English
	Autostart	Vacuum
		Heating
		Gas inlet
	Network	IP address
		Subnet mask
		Gateway
	GSD system settings	Pressure
		Temperature
		Date/time
	Factory settings	Reset to as-delivered condition
	Service [8)]	Vacuum pumps
		Sensors
		Valves
		Heating units
		GSD
		Fan
Messages (see page 60)	-	-

8) Only available for service personnel after logging in

Menu	Subprograms, functions and information	
	1. Level	2. Level
Control (see page 60)	Pump down (to)	-
	Vent	-
	Heating on/off	-
	Gas inlet valves open/close [9]	-
	Bake out on/off	-
	Emission on/off	-
	Electron multiplier on/off	-
	Calibration valve open/close [10]	-
Measurement (see page 64)	Recipe selection	-

Tbl. 11: Menu structure with functions

8.2 "Info" menu

The "Info" menu shows the current status and parameter settings of the system components. Settings cannot be changed in the "Info" menu.

- Vacuum pumps
- Sensors
- Valves
- Heating units
- GSD system
- Network
- Fan

8.3 "Settings" menu

NOTICE

Property damage due to unintended changes in the Service menu

Improper changes in the Service menu impair unit functions and cause damage to the unit and its components.

The Service menu is reserved for use by Pfeiffer Vacuum Service and is only accessible after logging in.

► Contact Pfeiffer Vacuum Service.

The "Settings" menu contains the following functions and submenus:

- **"Recipes" submenu**
  - Creating, editing and deleting measurement recipes
- **"Heating" submenu**
  - Specify the setpoint temperatures for heating and set the heating mode for vacuum chamber heating
- **"Sensors" submenu**
  - Adjusting the sensors
- **"Language" submenu**
  - Setting the language
- **"Autostart" submenu**
  - Setting autostart functions
- **"Network" submenu**
  - Making the network settings

9) Only for OmniStar

10) only with optional calibration unit

- **"GSD" submenu**
  - Making the system settings on the unit (units, date and time)
- **"Factory settings" submenu**
  - Resetting the parameters to the factory settings
- **"Service" submenu**
  - Service functions [11)]

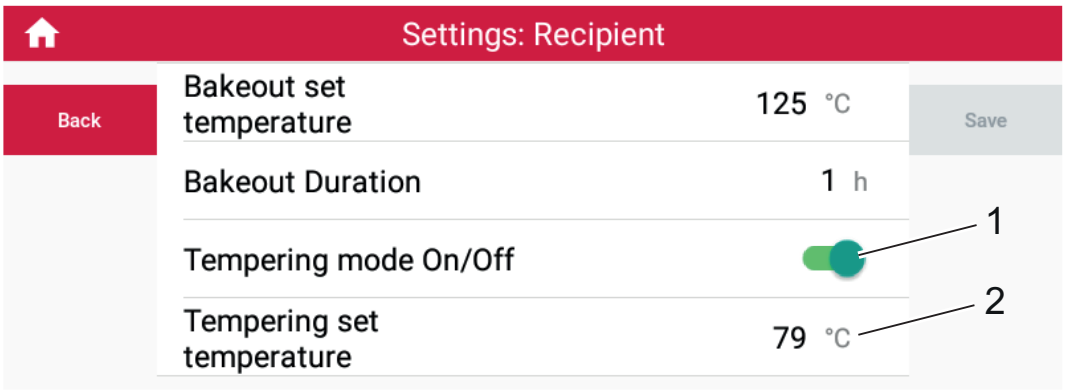


Fig. 35: Example of parameter setting

1 Switch symbol (on) 2 Editable numeric value

Using a switch to change over parameters

1. Scroll to the desired parameter.
2. Press the switch symbol to toggle the switch.
3. Press the "Save" button to save the changes.

   or

   Press the "Back" button to discard the changes.
4. Complete other changes, if needed.

Entering parameter values

1. Scroll to the desired parameter.
2. Press the parameter field.
   - A numerical entry field appears.
3. Enter the desired value.
   - For values outside the permissible value range, the GSD 350 automatically assumes the highest or lowest permissible value.
4. Press the "Save" button to save the changes.

   or

   Press the "Back" button to discard the changes.
5. Complete other changes, if needed.

8.3.1 Creating and editing measurement recipes

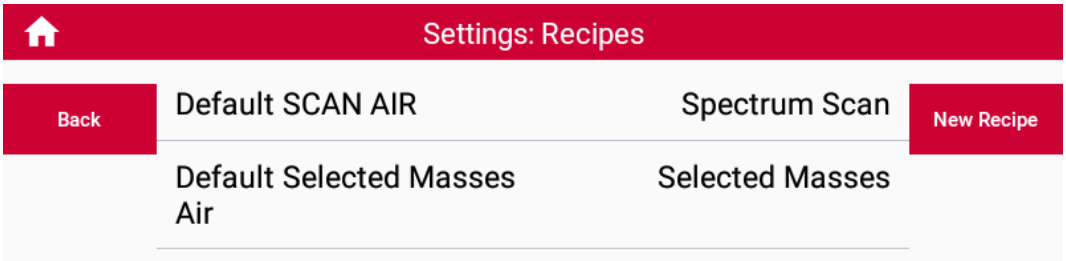


Fig. 36: "Recipes" submenu

You can select, change or delete existing measurement recipes in the "Recipes" submenu. You can create up to 8 measurement recipes.

11) Only available for service personnel after logging in

The following measurement recipes are preset:

- Measurement recipe for a scan (default SCAN AIR)
- Measurement recipe for measuring various masses over time (default Selected Masses Air)

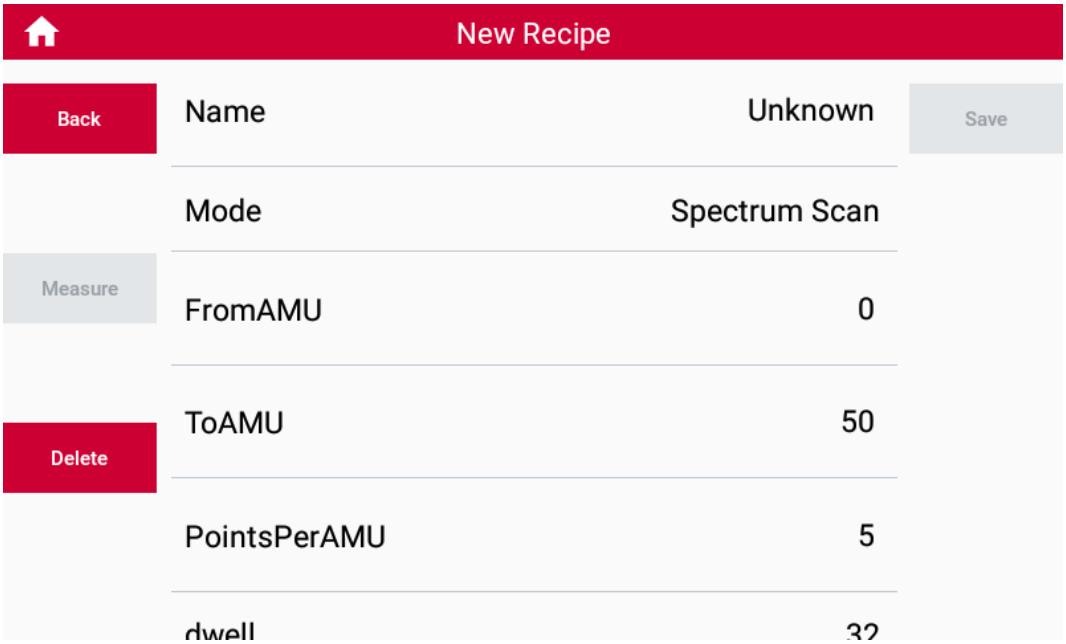


Fig. 37: Measurement recipe for "Spectrum Scan" measuring mode

Editing the measurement recipe for "Spectrum Scan" measuring mode

1. Press the "New recipe" button.
2. Enter a name for the measurement recipe.
3. Select "Spectrum Scan" measuring mode.
4. Define the mass range by entering the start and end mass (FromAMU and ToAMU).
5. Define the number of measuring points per mass (PointsPerAMU).
6. Define the measuring time for a mass point (dwell).
7. Press "Save" to save the measurement recipe under the name you entered.

   or

   Press "Back" to discard the current input.

   or

   Press "Delete" to delete the current measurement recipe.

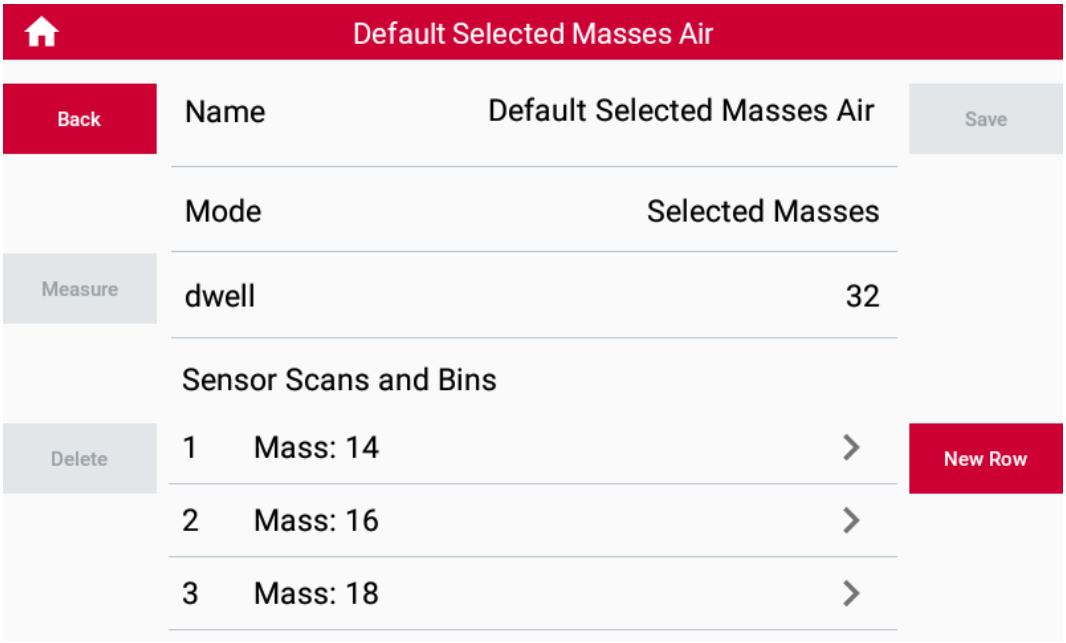


Fig. 38: Measurement recipe for " Selected Masses" measuring mode

Editing the measurement recipe for " Selected Masses" measuring mode

1. Press the "New recipe" button.
2. Enter a name for the measurement recipe.
3. Select "Selected Masses" measuring mode.
4. Define the measuring time for a mass (dwell).
5. Define the individual mass numbers (Mass: nn) that you want the GSD 350 to record and display over time.
6. Press the "New line" button to add further mass numbers.
7. Press the "Delete" button to delete individual mass numbers.
8. Press "Save" to save the measurement recipe under the name you entered.

   or

   Press "Back" to discard the current input.

   or

   Press "Delete" to delete the current measurement recipe.

8.3.2 Adjusting the heating units

Overheating protection of heating units

All heating units are protected against overheating. The GSD 350 switches off due to this safety monitoring, possibly when setting a new, **lower** set temperature.

Recommendation: Switch the heating unit in question off first, and let it cool down until it reaches a lower temperature. After cooling down , switch the heating back on to let it adjust to the new, desired temperature value.

The set heating parameters (set temperatures) are shown in the "Heating" submenu.

Heating units

- Gas inlet heating
- Capillary heating
- Vacuum chamber heating

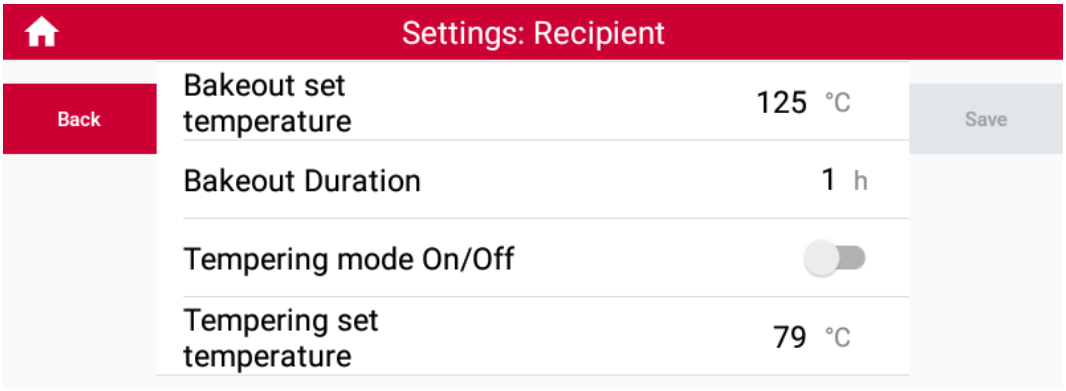


Fig. 39: Tempering mode of the vacuum chamber

In normal cases, the GSD 350 does not heat the vacuum chamber during a measurement. For certain analytical measurements, you can activate the "Tempering mode" function in the "Vacuum chamber" submenu. If tempering mode is enabled, the GSD 350 always heats the vacuum chamber to the configured set temperature when the GSD 350 switches on the capillary heating.

Switching on tempering mode of the vacuum chamber

1. Use tempering mode for certain analytical measurements.
2. In the "Heating" submenu, press the "Vacuum chamber" button.
3. Adjust the set temperature for "Tempering set temperature".
4. Switch tempering mode on.

8.3.3 Adjusting the sensors

The current sensor parameters of the sensors appear in the "Sensors" submenu.

Sensors

- **Mass spectrometer**

  Select the filament
- **Total pressure gauge**

  Ignore sensor on/off and sensor errors
- **Sealing gas sensor (only for corrosive gas version)**

  Ignore sensor errors

Recommendations for total pressure gauges

- ► If possible, leave the total pressure gauges switched on at all times to protect filaments and vacuum pumps of the GSD 350.
- ► Switch the total pressure gauge off temporarily with the "Sensor On/Off" function if this is beneficial for specific analysis tasks.
- ► Disable the switch-off function of the GSD 350 for the total pressure gauge with the "Ignore sensor error" function so that you can continue on-going measurements if the total pressure gauge is defective.
- ► Do not use the disabling function for longer than needed.
- ► Immediately replace the total pressure gauge in case of a defect.

Recommendations for the sealing gas sensor

- ► If possible, leave the sealing gas sensor switched on at all times to protect the vacuum pumps of the GSD 350.
- ► Use the "Ignore sensor error" function to temporarily switch off sealing gas monitoring in order to reduce the consumption of sealing gas for measuring tasks where the GSD 350 is not exposed to corrosive gases or condensable gas mixtures.
- ► Do not use the disabling function for longer than needed.

8.3.4 Setting the language

Fig. 40: "Language" submenu

The following languages are available in the "Language" submenu:

- English (standard)
- German

8.3.5 Setting autostart functions

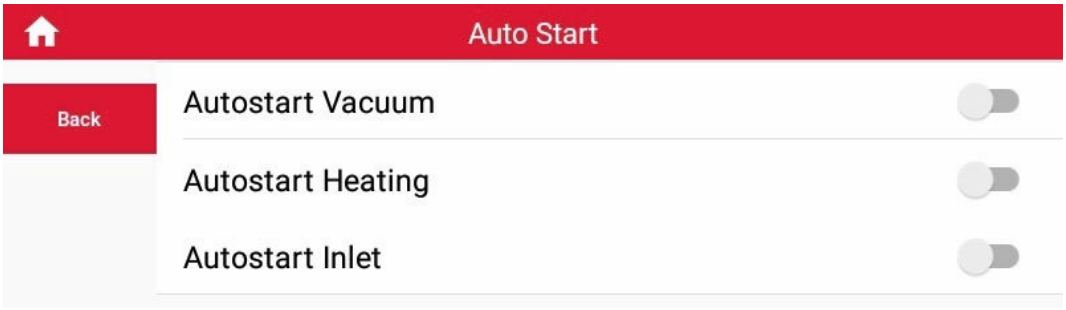


Fig. 41: "Autostart" submenu

In the "Autostart" submenu, you can define which functions of the GSD 350 start automatically after switching on.

Autostart functions

- **Vacuum**

  Starts the vacuum pump
- **Heating**

  Heats the capillary heating to the setpoint
- **Inlet**

  Open inlet valve (V1) (for OmniStar only)

Required vacuum in the vacuum chamber

The "Heating" and "Inlet" autostart functions are only available in combination with the "Vacuum" autostart function, as the required vacuum must have been built up in the vacuum chamber for these autostart functions.

8.3.6 Setting the network parameters

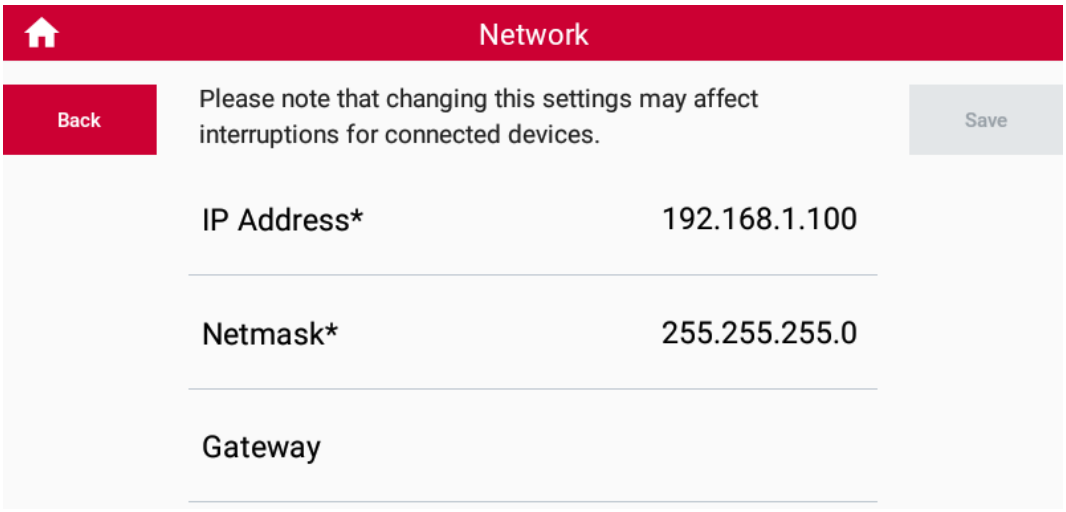


Fig. 42: "Network" submenu

You can set the network parameters for the GSD 350 in the "Network" submenu. The GSD 350 must be restarted in order to activate the new network parameter.

Network parameters

- IP address
- Subnet mask
- Gateway

Setting up the IP address for the GSD 350

1. Enter the new static IP address.
   – Setting to DHCP is not possible.
2. Enter the new subnet mask, if needed.
3. Press the "Save" button.
4. Wait until you are prompted to switch off the GSD 350.
5. Turn off the device.
6. Switch the unit back on after > 20 seconds.

You will find the GSD 350 below the new settings.

8.3.7 Adjusting the GSD system parameters

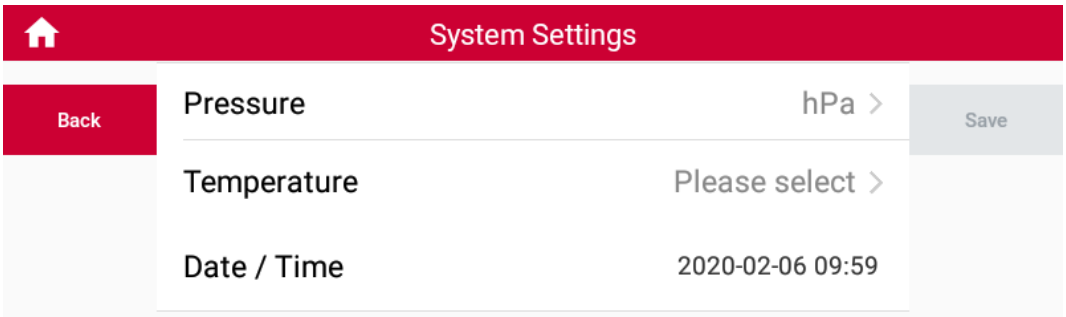


Fig. 43: "GSD" submenu

You can toggle the units for the physical variables pressure and temperature in the menu guide in the "GSD" submenu. You can also set the date and the time.

As-delivered condition

- Pressure: hPa
- Temperature: °C

Setting the time and date

1. Tap the date and time on the display.
2. Set the date.

3. Set the time.
4. Select "Save" to confirm the settings.

8.3.8 Resetting the unit to the factory settings

Modified settings are lost

Resetting to the factory settings overwrites all modified settings, or these settings are lost. You cannot undo this function.

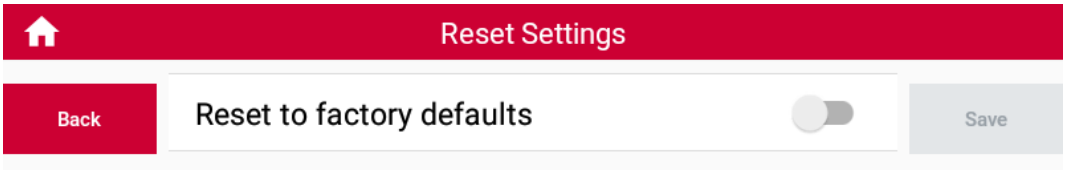


Fig. 44: "Factory settings" submenu

You can reset all of the GSD 350's parameters to the factory settings in the "Factory settings" submenu.

Procedure

1. Activate the "Reset to as-delivered condition" switch.
2. Confirm the safety prompt by pressing the "Save" button.

   or

   Press the "Back" button to keep the current parameter values.

8.3.9 Service

NOTICE

Property damage due to unintended changes in the Service menu

Improper changes in the Service menu impair unit functions and cause damage to the unit and its components.

The Service menu is reserved for use by Pfeiffer Vacuum Service and is only accessible after logging in.

► Contact Pfeiffer Vacuum Service.

- Vacuum pumps
- Sensors
- Valves
- Heating units
- GSD
- Fan

8.4 "Messages" menu

The "Messages" menu shows current warning and malfunction messages of the unit.

Accessing warnings and malfunction messages

► Switch to the "Messages" menu or press the warning triangle.
  – The warnings and malfunction messages appear.

8.5 "Control" menu

The "Control" menu shows the vacuum diagram of the system and its important parameters.

Depending on the operating status of the unit, and the type of unit, the menu offers the following functions:

- Pump down/Vent vacuum system
- Switch capillary and inlet heating on/off
- Switch vacuum chamber heating on/off (bake out)

- Open/shut off gas inlet (OmniStar)
- Switch emission (filament) on/off
- Switch electron multiplier on/off

Explanations of the vacuum diagram are available here: (see chapter “Functional description”, page 21)

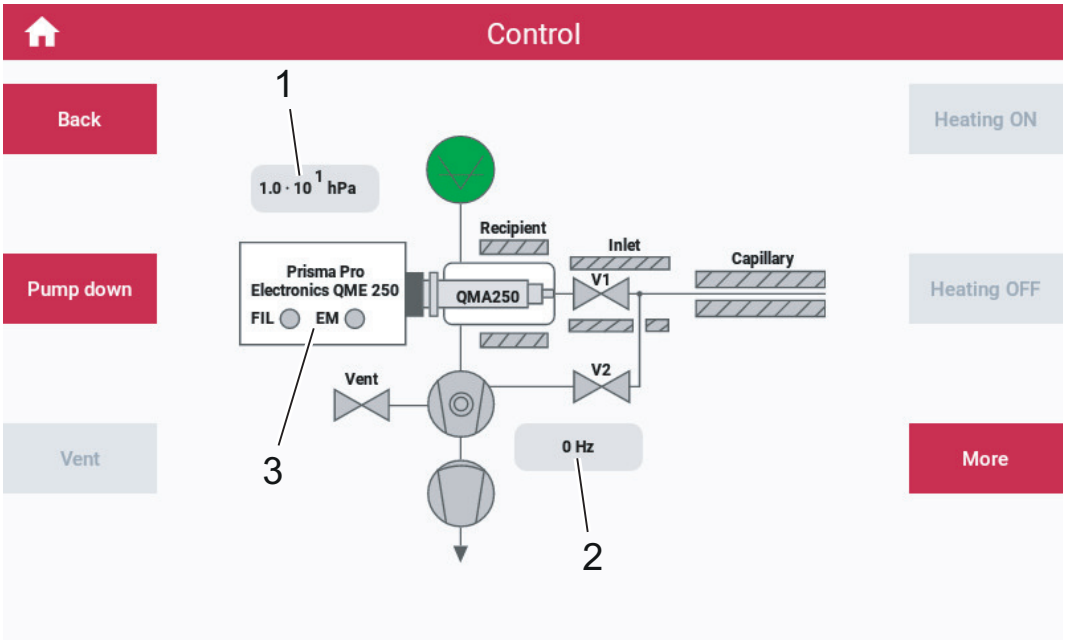


Fig. 45: "Control" menu

1 Pressure in the vacuum chamber (total pressure gauge)
2 Turbopump rotation speed
3 Status of PrismaPro filament and electron multiplier

8.5.1 Pumping down the vacuum system

Prerequisite

- Unit ready for operation

Procedure

1. Switch to the “Control” menu.
2. Press the "Pump down" button.

Sequence

- The GSD 350 transitions from "Vented" state to "Pump down" state.
- The venting valve shuts.
- The diaphragm pump starts up and evacuates the vacuum system.
- After reaching the threshold value (10 hPa), the turbopump accelerates to the final rotation speed of 1500 Hz.
- After a few minutes, the vacuum system reaches a pressure of < 5 × 10^{-5} hPa.

8.5.2 Venting the vacuum system

Prerequisites

- Ongoing measurements completed (see chapter “"Measurement" menu”, page 64)
- Filament an electron multiplier switched off (see chapter “"Control" menu”, page 60).

Procedure

1. Switch to the “Control” menu.
2. Press the "Vent" button.

Sequence

- The GSD 350 transitions from "Vacuum" state to "Vented" state.
- After confirming the safety prompt, the emission and electron multiplier are switched off.

- Once the emission is switched off, an internal timer starts. The timer allows the filament to cool down before venting the vacuum chamber. The timer time is 15 minutes; this is the duration after switching off the emission. If the emission was still switched on when starting "Venting", the timer starts at 15 minutes. The remaining timer time is shown top right on the display.
- After the timer time has expired, the turbopump runs down.
  - Below the venting rotation speed (750 Hz), the venting valve vents the turbopump and the vacuum chamber.
  - The venting valve remains open.
- The diaphragm pump stops.

8.5.3 Switching the heating units on and off

Prerequisite

- The turbopump is running at the set rotation speed

Switching the heating on

1. Switch to the “Control” menu.
2. Press the "Heating on" button.

Sequence for switching on

- The GSD 350 switches the capillary heating and the gas inlet heating on.
- A PID control regulates each heating circuit with the matching control parameters to achieve the required set temperature.

Switching the heating off

1. Switch to the “Control” menu.
2. Press the "Heating off" button.

Switch off sequence

- The GSD 350 switches the capillary heating and the gas inlet heating off.
- As of a threshold value of ≤ 40 °C, the "Heating off" state is reached.

8.5.4 Opening and closing the gas inlet (OmniStar)

Prerequisite

- The turbopump is running at the set rotation speed

Opening the gas inlet

1. Switch to the “Control” menu.
2. Press the "Open inlet valve" button.

Opening sequence

- Pump valve V2 opens and closes multiple times briefly in a defined interval in order to avoid impermissible pressure surges.
- Pump valve V2 remains open after the last interval.
- Gas inlet valve V1 opens after a delay about 7 seconds later.
- A PWM control then keeps both valves open to keep the coil current low for thermal reasons.

Shutting the gas inlet

1. Switch to the “Control” menu.
2. Press the "Shut inlet valve" button.

Closing sequence

- Gas inlet valve V1 closes.
- Pump valve V2 closes.

8.5.5 Baking out the vacuum chamber

After the timer preset, bake out is automatically disabled, or the user can select the "Bake out off" function.

Prerequisite

- The turbopump is running at the set rotation speed

Baking out the vacuum chamber

1. Switch to the “Control” menu.
2. Press the "Bake out on" button.

Bake out sequence

- The GSD 350 transitions from "Bake out off" state to " Bake out on" state.
  - The electron multiplier on the PrismaPro switches off.
  - Filament emission starts.
- The GSD 350 switches the vacuum chamber heating cartridges on.
  - A PID control regulates the heating circuit with the matching control parameters to achieve the required set temperature (default = 120 °C, adjustable between 100 °C and 130 °C)
  - The GSD 350 turns the heating down, if there is a risk of excess temperature in the unit.

    Information to this effect appears in the display.
- The timer starts.
  - After the timer preset (between 1 and 24 hours), bake out is automatically disabled.

Ending vacuum chamber bake out

1. Switch to the “Control” menu.
2. Press the "Bake out off" button.

Sequence on terminating

- The GSD 350 transitions from "Bake out on" state to " Bake out off" state.
- The GSD 350 switches the vacuum chamber heating cartridges off.
  - As of a threshold value of ≤ 40 °C, the "Back out off" state is reached.

8.5.6 Switching emission on and off

Malfunctions or impermissible conditions lead to emission being automatically shut off.

Prerequisites

- The turbopump is running at the set rotation speed
- The total pressure in the vacuum chamber is < 1×10^{-4} hPa

Switching on emission

1. Switch to the “Control” menu.
2. Press the "Emission on" button.

Sequence for switching on

- The GSD 350 switches the emission of the filament on.
- The GSD 350 keeps the emission current of the switched on filament constant and monitors this continuously.

  If the pressure in the vacuum chamber is too high, the filament current is too high, or the emission fluctuations are too pronounced, emission is automatically switched off.

Switching emission off

1. Switch to the “Control” menu.
2. Press the "Emission off" button.

Switch off sequence

- The GSD 350 switches the emission of the filament off.

8.5.7 Switching the electron multiplier on and off

Malfunctions or impermissible conditions lead to the electron multiplier being automatically switched off.

If filament emission is switched off manually or automatically, the electron multiplier is also automatically switched off.

Prerequisites

- The turbopump is running at the set rotation speed
- The total pressure in the vacuum chamber is < 5×10^{-5} hPa
- Emission on

Switching on the electron multiplier

1. Switch to the “Control” menu.
2. Press the "EM on" button.

Sequence for switching on

- The GSD 350 switches the electron multiplier on.

Switch off the electron multiplier

1. Switch to the “Control” menu.
2. Press the "EM off" button.

Switch off sequence

- The GSD 350 switches the electron multiplier off.

8.5.8 Opening and closing the calibration valve

The calibration valve only exists on variants of the GSD 350 with a calibration unit.

Prerequisite

- The turbopump is running at the set rotation speed

Opening the calibration valve

1. Switch to the “Control” menu.
2. Press the "Open calibration valve" button.
3. Calibrate the mass scale of the PrismaPro.

Opening sequence

- The calibration valve opens in a cycle.
- The calibration medium flows into the vacuum chamber with the PrismaPro.

Shutting the calibration valve

1. Switch to the “Control” menu.
2. Press the "Shut calibration valve" button.

Closing sequence

- The calibration valve shuts off.

8.6 "Measurement" menu

Depending on the operating status of the unit, the menu offers the following functions:

- calling and starting existing measurement recipes
- In as-delivered condition: mass scan (default SCAN AIR / Spectrum Scan) or measurement of individual masses (Default Selected Masses Air / Selected Masses)

Starting the measurement

1. In the "Control" menu, switch on the filament and if applicable, also the electron multiplier.
2. In the "Measurement" menu, press the "Start" button.
3. If necessary, toggle the display between linear and logarithmic.

Stopping the measurement

1. In the "Measurement" menu, press the "Stop" button.
2. In the "Control" menu, switch off the filament and if applicable, also the electron multiplier.

9 Decommissioning

NOTICE

Severe vibration will damage the turbopump

Severe vibration and vibrations during operation and after switching off will damage the turbopump.

- ► Avoid knocks and vibration during operation, for example, as caused by driving over cables and door sills.
- ► Avoid vibrations up to 5 minutes after switching off the system.

NOTICE

Property damage as a result of interrupting the supply voltage during operation

Unplugging the mains plug or turning off the main switch during operation severely stresses the filament and shortens the filament's service life if the unit is under vacuum and emission is switched on. There is a risk of total ruination of the filament.

- ► Always shut down the unit correctly.
- ► Switch off the unit before you disconnect the mains plug.

Protecting the filament

To protect the filament, the turbopump switches off 15 minutes after switching off the filament at the earliest. The actual venting action, venting the system, starts when the turbopump reaches a rotation speed of 750 Hz.

Recommendations for corrosive gases and condensable gas mixtures

1. Allow dry air or inert gas to flow in through the capillary.
2. Allow the GSD 350 to run for another approx. 30 minutes to flush residues of corrosive gases and condensable gases out of the system.

Switch off the device

1. Switch the emission of the PrismaPro off (see chapter “Switching emission on and off”, page 63).
2. Switch the electron multiplier of the PrismaPro off (see chapter “Switching the electron multiplier on and off”, page 63).
3. Vent the vacuum system to switch it off (see chapter “Venting the vacuum system”, page 61).
4. Wait until the GSD 350 vents the system and has switched off the vacuum pumps.
5. Switch off the main switch of the unit.
6. Disconnect the mains cable from the power supply.

Disconnecting the exhaust gas hose

1. Press the release ring on the exhaust gas connection part firmly down on both sides in order to open the holding claws uniformly and avoid scratches on the exhaust gas hose.
2. Pull the exhaust gas hose vertically out of the exhaust gas connection part of the unit.

Disconnecting the sealing gas hose

1. Press the release ring on the connection part firmly down on both sides in order to open the holding claws uniformly and avoid scratches on the sealing gas hose.
2. Pull the sealing gas hose vertically out of the connection part of the unit.

10 Maintenance

⚠ WARNING

Health hazard through poisoning from toxic contaminated components or devices

Toxic process media result in contamination of devices or parts of them. During maintenance work, there is a risk to health from contact with these poisonous substances. Illegal disposal of toxic substances causes environmental damage.

- ► Take suitable safety precautions and prevent health hazards or environmental pollution by toxic process media.
- ► Decontaminate affected parts before carrying out maintenance work.
- ► Wear protective equipment.

Maintenance in the Pfeiffer Vacuum Service Center

Pfeiffer Vacuum offers a complete maintenance service for all products.

Pfeiffer Vacuum recommends: Contact your Pfeiffer Vacuum Service Center to arrange the maintenance of defective products and components.

Cleaning in the Pfeiffer Vacuum Service Center

Pfeiffer Vacuum recommends: Contact your nearest Pfeiffer Vacuum Service Center to arrange the cleaning of heavily-soiled products and components.

Loss of warranty claims

The following will result in the loss of the warranty:

- Damage to or removal of a closure seal
- Opening the device during the warranty period

Contact the Pfeiffer Vacuum Service Center in the event of process-related shorter maintenance intervals.

First read through the sections completely

Read the section with the work instructions through completely first before you commence with work.

10.1 Maintenance work and intervals

Notes on maintenance intervals

The times for the maintenance intervals depend to a great extent on the process conditions; they apply for working with clean and inert gases. The use of corrosive process gases can substantially curtail the maintenance intervals.

- Agree shorter maintenance intervals for extreme loads or for specific processes with the Pfeiffer Vacuum Service.

You can carry out maintenance work at **maintenance level 1** yourself.

We recommend Pfeiffer Vacuum Service for carrying out maintenance work at **maintenance level 2** and **maintenance level 3** (overhaul). If the required intervals listed below are exceeded, or if maintenance work is carried out improperly, no warranty or liability claims are accepted on the part of Pfeiffer Vacuum. This also applies if do not use original spare parts.

Group of components, module and action	Interval	Maintenance level	Spare part/spare part set	Description
Basic unit				
Cleaning housing parts	If required	1	-	(see page 70)

Group of components, module and action	Interval	Maintenance level	Spare part/spare part set	Description
Cleaning the protection screens on the fan	Monthly	1	-	(see page 71)
High vacuum side system				
Replace copper gasket on DN 40 CF flange connection	Always when the CF flange connection is opened	2	490DFL040-S-S5	-
Replace operating fluid reservoir on turbopump	4 years	2	PM 143 740 -T	(see page 72) Also see turbopump operating instructions
Replace turbopump bearings	4 years	3	-	See turbopump operating instructions
Fore-vacuum system				
Remove/install diaphragm pump	If required	2	-	(see page 73)
Replacing the diaphragm pump	If required	3	PK T05 072	
Replace diaphragm pump diaphragm	after 15,000 operating hours	2	PU E22 030 -T	(see page 74) Also see diaphragm pump operating instructions
Gas analysis unit				
Install/remove analyzer QMA 250 M	If required	2	-	(see page 75) Also see PrismaPro operating instructions
Replace filament (tungsten)	If required	2	PT 163 331	
Replace filament (Ir-Y_2O_3)	After the first of the 2 filaments fails	2	PT 163 332	
Replace ion source (tungsten filaments)	If soiled	2	PT 163 291	
Replace ion source (Ir-Y_2O_3 filaments)	If soiled	2	PT 163 292	
Replace sensor on total pressure gauge	If soiled	2	PT 120 212 -T	(see page 77) Also see total pressure measurement operating instructions
Replace total pressure gauge	in case of a defect	2	PT R40 351 -A	(see page 77)
Gas inlet system				
Install/remove gas inlet (OmniStar)	If required	2	-	(see page 78) (see page 80)
Replace gas inlet (OmniStar)	If required	2	PT 167 016 -T	
Install/remove gas inlet (ThermoStar)	If required	2	-	(see page 82) (see page 83)
Replace gas inlet (ThermoStar)	If required	2	PT 167 013 -T	
Replace orifice (OmniStar)	If plugged	2	BK212576	(see page 79)
Replace orifice (ThermoStar)	If plugged	2		(see page 83)
Replace orifice and internal gas guide (OmniStar)	If required	2	PT 167 014 -T	(see page 80)
Replace orifice and internal gas guide (ThermoStar)	If required	2		(see page 83)
Capillary				
Shorten stainless steel capillaries	If plugged	2	-	(see page 84)
Replace stainless steel capillaries	If plugged	2	PT 167 060 PT 167 017 -T	(see page 85)
Trimming quartz capillaries	If plugged	2	-	(see page 86)

Group of components, module and action	Interval	Maintenance level	Spare part/spare part set	Description
Replace quartz capillaries	If plugged	2	B1975082EC PT 167 015 -T	(see page 87)
Electronic components				
Replace display	in case of a defect	2	PT 167 025	(see page 89)
Calibration unit (option)				
Refill calibration medium (PFTBA)	If required	2	PT 167 031	(see page 90)

Tbl. 12: Maintenance work and intervals

10.2 Maintaining the basic unit

⚠ DANGER

Danger to life due to electric voltage

High voltages are present inside the device. When touching parts that are live, there is a risk of death. If there is visible damage, there is a risk of death when commissioning the device.

- ► Work on the open device must only be carried out by trained specialist personnel.
- ► Before carrying out any installation and maintenance work, switch the device off and disconnect it from the current supply.
- ► Never open the device with the current supply connected.
- ► Secure the current supply against unauthorized or unintentional reactivation.
- ► Never operate an open or defective device.
- ► Secure a defective device against accidental operation.
- ► Protect the device against moisture.

⚠ WARNING

Danger of burns on hot surfaces

During operation high temperatures (> 50 °C) occur on touchable surfaces of the heating components and the gas inlet. There is a risk of burning.

- ► Secure hot parts against inadvertent touching.
- ► Display warning signs.
- ► Make sure that the product has cooled down before performing work.
- ► Wear protective gloves (in accordance with EN 420).

10.2.1 Removing/attaching the gas inlet cover

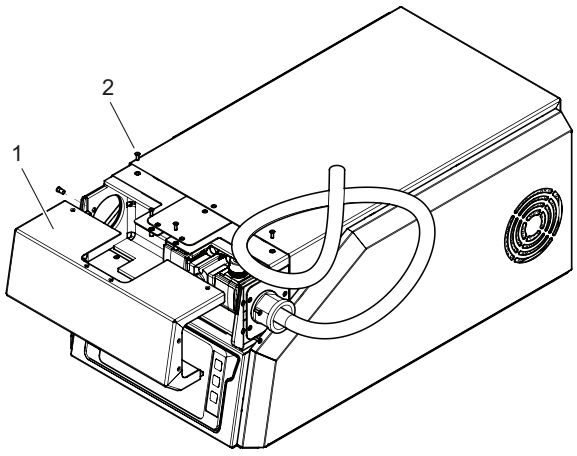


Fig. 46: Removing/attaching the gas inlet cover

1 Gas inlet cover 2 Interior hexagon socket screw (8×M3)

Prerequisites

- GSD 350 switched off
- Power cable disconnected

Required tool

- Allen key, **WAF 2**

Removing the gas inlet cover

1. Loosen the interior hexagon socket screws on the gas inlet cover from the chassis.
2. Carefully remove the gas inlet cover to the front.
   – Pay attention to the insulation.

Attaching the gas inlet cover

1. Deposit the gas inlet cover on the chassis.
   – Pay attention to the insulation.
2. Fasten the gas inlet cover to the chassis with the interior hexagon socket screws.

10.2.2 Removing/attaching the side covers

Do not remove the gas inlet cover

There is no need to remove the gas inlet cover to remove the side covers.

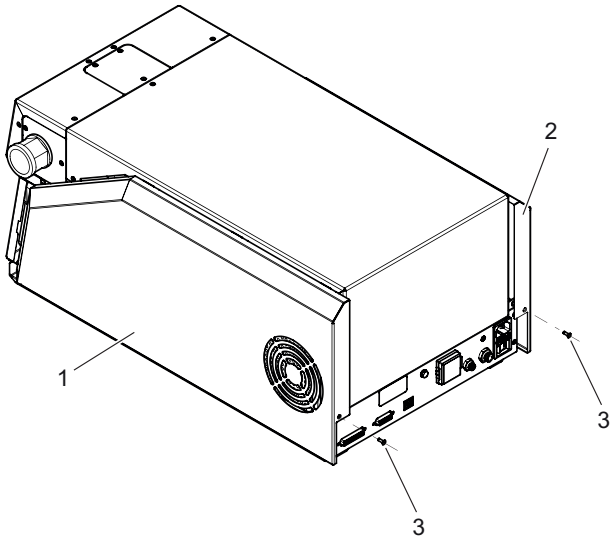


Fig. 47: Removing/attaching the side covers

1 Side cover, right
2 Side cover, left
3 Interior hexagon socket screw (2×M3)

Prerequisites

- GSD 350 switched off
- Power cable disconnected

Required tool

- Allen key, **WAF 2**

Removing the side covers

1. Loosen and remove the interior hexagon socket screws on the side cover from the chassis.
2. Carefully remove the side cover towards the rear.
   – Pay attention to the mounting straps on the side cover.
3. Loosen the plug-and-socket connection of the grounding cable on the side cover.

Attaching the side covers

1. Attach the plug-and-socket connection of the grounding cable on the side cover.
2. Carefully fit the side cover from the rear.
   – Pay attention to the mounting straps on the side cover.
3. Tighten the interior hexagon socket screws of the side cover on the chassis.

10.2.3 Removing/attaching the housing cover

Prerequisites

- GSD 350 switched off
- Power cable disconnected
- Side covers removed

Required tool

- Allen key, **WAF 2**

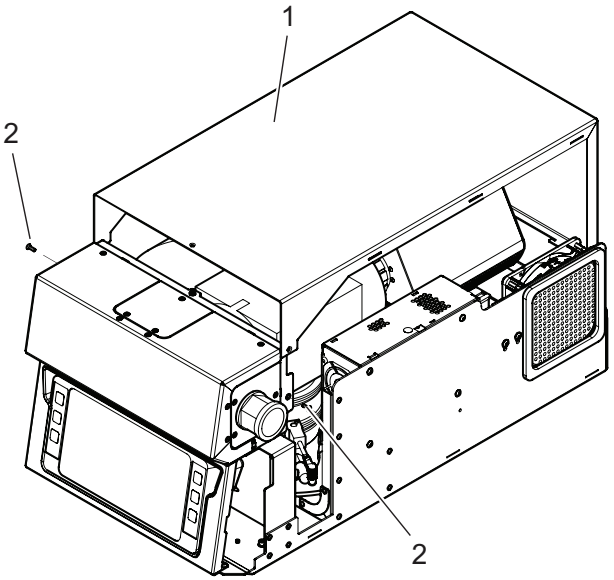


Fig. 48: Removing/attaching the housing cover

1 Housing cover 2 Interior hexagon socket screw (2×M3)

Removing the housing cover

1. Loosen the interior hexagon socket screws on the housing cover from the chassis.
2. Carefully remove the housing cover in upwards direction.
3. Loosen the plug-and-socket connection of the grounding cable on the housing cover.

Attaching the housing cover

1. Attach the plug-and-socket connection of the grounding cable on the housing cover.
2. Carefully fit the housing cover from the top.
3. Tighten the interior hexagon socket screws of the housing cover on the chassis.

10.2.4 Cleaning housing parts

⚠ DANGER

Electric shocks due to moisture penetrating into the device

Moisture that has penetrated into the device results in personal injury through electric shocks.

- ► Only operate the device in a dry environment.
- ► Operate the device away from fluids and humidity sources.
- ► Do not switch on the device if fluid has penetrated into it, instead contact Pfeiffer Vacuum Service.
- ► Always disconnect the current supply before cleaning the device.

⚠ WARNING

Health hazards due to cleaning agent

The cleaning agent being used causes health hazards which could include, for example, poisoning, allergies, skin irritations, chemical burns or damage to the airways.

- ► When handling cleaning agents, observe the applicable regulations.
- ► Adhere to safety measures regarding handling and disposal of cleaning agents.
- ► Be aware of potential reactions with product materials.

NOTICE

Damage caused by penetrating moisture

Penetrating moisture, e.g. through condensation or dripping water, damages the device.

- ► Protect the device against moisture penetrating.
- ► Only operate the device in a clean and dry environment.
- ► Operate the device away from fluids and humidity sources.
- ► Take special precautions if there is a risk of dripping water.
- ► Do not switch on the device if fluid has penetrated into it, instead contact the Pfeiffer Vacuum Service Center.

NOTICE

Damage caused by unsuitable cleaning agents

Unsuitable cleaning agents damage the product.

- ► Do not use solvents as they attack the surface.
- ► Do not use any aggressive or abrasive cleaning agents.

Prerequisites

- GSD 350 switched off
- Power cable disconnected

Required consumable material

- Cleaning agent (e.g. domestic detergent)
- Cloth (clean, soft, lint-free)
- Compressed air

Requirements for compressed air

- Oil-free
- Dry
- Free of particles > 30 µm
- < 2 bar overpressure

Cleaning housing parts

1. Use a soft, damp cloth to clean the outside of the housing.
2. Allow the surfaces to dry thoroughly after cleaning.
3. Remove dust layers inside the unit by blowing them out carefully with compressed air.

10.2.5 Cleaning the protection screens on the fans

Cleaning interval

Define the cleaning interval by visual inspections and as a function of the local dust incidence.

It is typically sufficient to occasionally vacuum the protection screen through the ventilation openings using a vacuum cleaner.

Prerequisites

- GSD 350 switched off
- Power cable disconnected
- Side covers removed

Equipment required

- Vacuum cleaner

Procedure

1. Clean the protection screen as soon as a visible coating can be seen, and before the air circulation drops below the required level.
2. Use a vacuum cleaner to remove the dust from the protection screen.

10.3 Maintaining the high vacuum system

10.3.1 Replace operating fluid reservoir on turbopump

Prerequisites

- GSD 350 switched off
- Power cable disconnected
- Turbopump at standstill

Required tool

- Screwdriver, **4 mm**

Required special tool

- Key for housing cover (part number PV M40 813)

Required material

- Operating fluid reservoir (part number PM 143 740 -T)

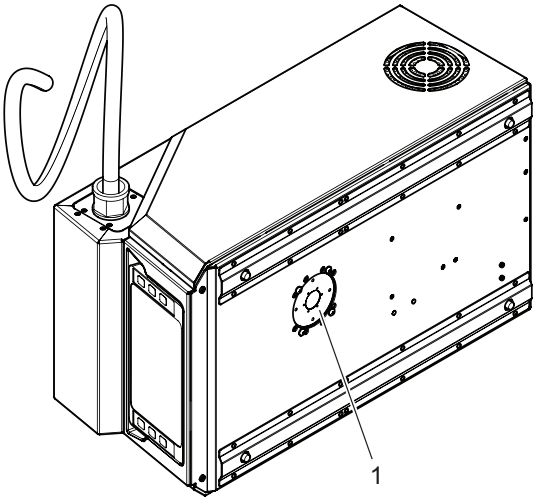


Fig. 49: Unit underside
1
Housing cover on turbopump

Procedure

1. Carefully place the GSD 350 on its side.
2. Open the turbopump housing cover using the wrench for the housing cover.
3. Replace the operating fluid reservoir and the Poroplast rods in line with the turbopump operating instructions.
4. Close the turbopump housing cover using the wrench for the housing cover.
5. Carefully erect the GSD 350 again.

10.3.2 Replacing the venting valve

Pfeiffer Vacuum Service handles the replacement.

► Contact Pfeiffer Vacuum Service.

10.4 Maintaining the fore-vacuum system

10.4.1 Replacing the diaphragm pump

Prerequisites

- GSD 350 switched off
- Power cable disconnected
- Turbopump at standstill
- Side covers removed
- Housing cover removed

Required tools

- Open-end wrench, **WAF 7**
- Allen key, **WAF 3**
- Crosshead screwdriver

Equipment required

- DCU 110, DCU 180 or DCU 310 control unit with connection cable

Spare part required

- MVP 010-3 DC diaphragm pump (part number PK T05 072)

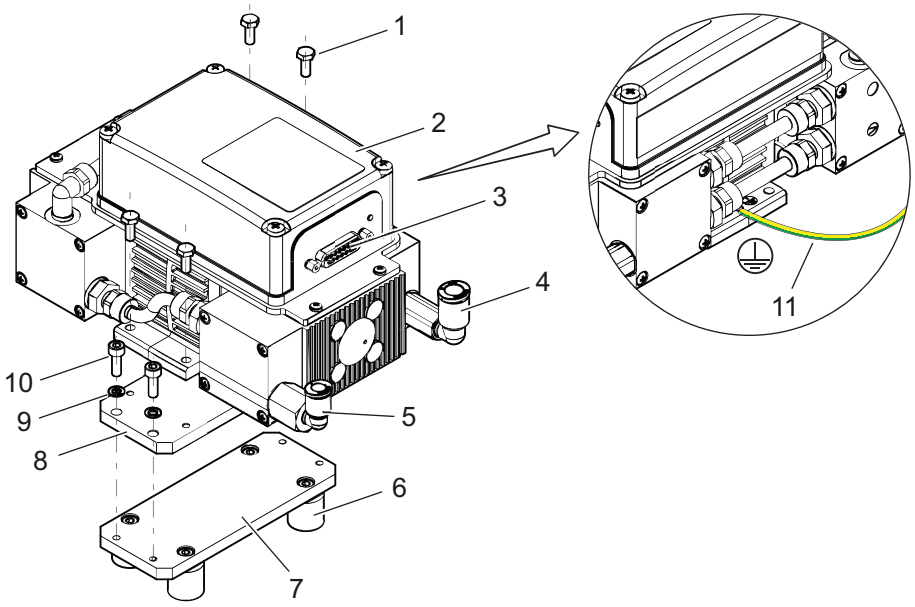


Fig. 50: Replacing the diaphragm pump

1 Hexagon head set screw (4×)
2 Diaphragm Pump
3 D-sub plug
4 Intake connection
5 Exhaust gas connection
6 Rubber buffer (4×)
7 Fixing plate
8 Diaphragm pump carrier
9 Lock washer (2×)
10 Interior hexagon socket screw (2×)
11 Ground terminal

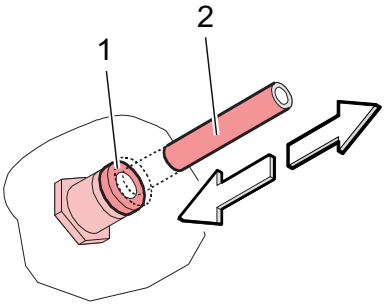


Fig. 51: Connect the exhaust gas and intake hose, and draw off

1 Release ring
2 Hose

Removing the diaphragm pump

1. Set the RS485 address of the new diaphragm pump to a value of "10" with the aid of a current DCU 110/180/310 and the appropriate connection cable.
2. Press the release ring on the exhaust gas connection of the diaphragm pump firmly down on both sides in order to open the holding claws uniformly and avoid scratches on the exhaust gas hose.
3. Pull the exhaust gas hose vertically out of the diaphragm pump.
4. Press the release ring on the intake connection of the diaphragm pump firmly down on both sides in order to open the holding claws uniformly and avoid scratches on the intake hose.
5. Pull the intake hose vertically out of the diaphragm pump.
6. Loosen the lock screws on the diaphragm pump's D-Sub plug.
7. Disconnect the D-Sub plug from the diaphragm pump.
8. Loosen the grounding connection on the diaphragm pump.
9. Loosen the interior hexagon socket screws and the circlips.
10. Remove the diaphragm pump and diaphragm pump carrier from the fastening plate by turning slightly.
11. Loosen the hexagon head set screws.
12. Remove the diaphragm pump carrier from the diaphragm pump.

Installing the diaphragm pump

1. Use the interior hexagon socket screws to fasten the diaphragm pump to the diaphragm pump carrier.
2. Use the interior hexagon socket screws and circlips to fasten the diaphragm pump and diaphragm pump carrier to the fastening plate.
3. Plug the D-Sub plug into the diaphragm pump.
4. Fasten the lock screws on the D-Sub plug.
5. Fasten the grounding connection on the diaphragm pump.
6. Insert the exhaust gas hose into the exhaust gas connection on the diaphragm pump.
   – Observe the correction position of the exhaust gas side.
7. Insert the intake hose into the vacuum connection on the diaphragm pump.
   – Observe the correction position of the intake side.

10.4.2 Replace diaphragm pump diaphragm

The typical service life of diaphragms and valves is 15,000 operating hours at nominal speed under clean operating conditions and with the GSD 350 analyzing inert gases only.

Prerequisites

- GSD 350 switched off
- Power cable disconnected
- Turbopump at standstill
- Side covers removed
- Housing cover removed
- Diaphragm pump removed from GSD 350

Required material

- Inspection set (part number PU E22 030 -T)

Procedure

1. Replace the diaphragms and valves after 15,000 operating hours at the latest.
2. Replace the diaphragms and valves in line with the diaphragm pump operating instructions.

10.5 Maintaining the gas analysis unit

10.5.1 Maintaining the QMA 250 M analyzer

NOTICE

Impairment from contamination and damage

Touching the devices or components with bare hands increases the desorption rate and leads to incorrect measurements. Dirt (e.g. dust, fingerprints, etc.) and damage impair the function.

- ► During assembly and maintenance work on high or ultra high vacuum systems, always wear clean, lint-free and powder-free laboratory gloves.
- ► Only use clean tools.
- ► Make sure that the connection flanges are free of grease.
- ► Remove protective caps and protective covers from flanges and connections only when necessary.
- ► Remove the analyzer's transport protection only when necessary.
- ► Carry out all work in a well lit area.

PrismaPro operating instructions

Information on disassembly and assembly of the electronic unit (QME) and analyzer (QMA) is available in the PrismaPro operating instructions.

Prerequisites

- GSD 350 switched off
- Power cable disconnected
- Turbopump at standstill
- Side covers removed
- Housing cover removed

Required tool

- 2 open-end wrenches, **WAF 10**

Required aid

- Assembly aid for QMA 250 Analyzer

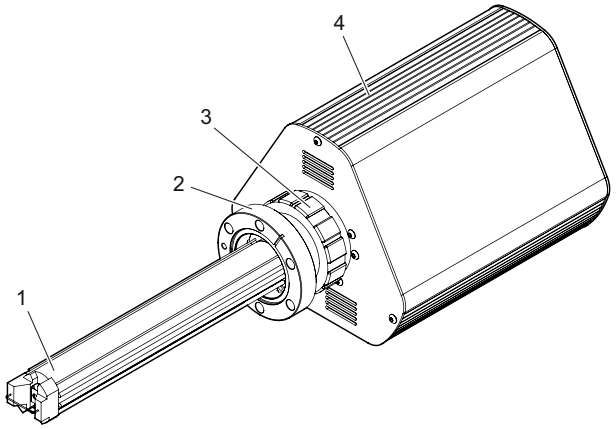


Fig. 52: PrismaPro Quadrupole mass spectrometer

1 QMA 250 M analyzer
2 Flange
3 Clamp collar
4 Electronic unit QME 250

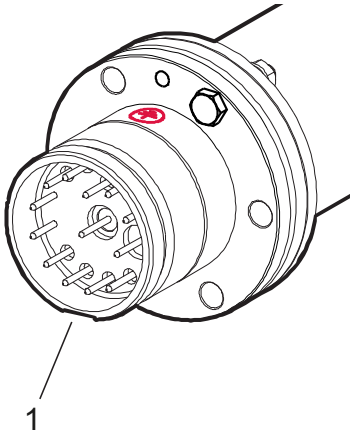


Fig. 53: Groove on analyzer

1 Groove on analyzer

Determining the sensitivity of the PrismaPro

If you notice a loss of measuring sensitivity, the cause may be decreasing gain of the built-in electron multiplier (EM) or contamination of the ion source. In such a case, Pfeiffer Vacuum recommends determining the sensitivity of the PrismaPro with the electron multiplier switched off, i.e. only with the Faraday detector.

1. Determine the sensitivity of the PrismaPro with the Faraday detector.
2. Allow air to flow into the system via the capillary inlet.
3. Add the ion currents (peak maximums) of the 8 to 10 largest peaks.
4. Compute the total ion current against the total pressure.
   – This gives you a good approximation of the sensitivity in A/hPa. The value should be > 4×10^{-5} A/hPa.
5. Counteract the wear of the electron multiplier by setting the amplifier voltage higher.

Value	Result	Remedy
< 4×10^{-5} A/hPa	Contamination of the ion source	Replace the ion source.
	Filament at end of life	Replace the filament.
> 4×10^{-5} A/hPa	Wear of electron multiplier	Increase the amplifier voltage.

Tbl. 13: Determined sensitivity of the PrismaPro

Replacing the filaments

If one of the two filaments fails, measuring may continue temporarily with the second filament.

► **Recommendation:** Replace both filaments as soon as possible if one of the filaments fails.
► Also check the condition of the ion source.
   – If the ion source is heavily polluted, Pfeiffer Vacuum recommends replacing the entire ion source.

Maintaining the analyzer

1. Disconnect all connection cables on the front panel of the QME 250 electronic unit.
2. Disconnect the black clamp collar on the electronics unit and pull the electronics unit off the analyzer.
3. Disconnect the flange connection between the analyzer and the vacuum chamber.
4. Carefully pull the analyzer out of the vacuum chamber.
5. Insert the analyzer with the flange pointing down into the assembly aid.
6. Perform the required maintenance work on the analyzer as per the PrismaPro operating instructions:
   - Replacing the filament unit, or
   - Replacing the ion source
7. Position the analyzer with a new silver-plated copper gasket in the vacuum chamber.
   – Pay attention to the correct position of the groove in the analyzer ("9 o'clock position") on the feedthrough flange.

8. Position the electronics unit on the analyzer.
   – The groove in the analyzer must engage in the lug on the electronics unit.
9. Tighten the black clamp collar on the electronics unit.
10. Connect all connection cables on the front panel of the QME 250 electronic unit.

10.5.2 Maintaining the total pressure gauge

The GSD 350's MPT 200 AR total pressure gauge is a combined measurement tube consisting of a Pirani sensor and a cold cathode sensor. Depending on the use of the GSD 350, often when using gas mixtures with a high argon content, it can happen that the total pressure gauge becomes polluted and the cold cathode sensor no longer ignites. In this case, the unit often only displays pressures > 1 × 10^{-4} hPa although the pumping system is working normally and there are no leakages. In such a case, it is also impossible to switch on the PrismaPro's filament. This problem can be resolved by replacing the gauge or the gauge sensor element.

Prerequisites

- GSD 350 switched off
- Power cable disconnected
- Turbopump at standstill
- Side covers removed
- Housing cover removed

Required tools

- 2 open-end wrenches, **WAF 10**

Spare parts required

- Copper gasket (DN 40 CF, silver-plated) (part number 490DFL040-S-G-S5)
- For replacing the sensor element:
  – Sensor (part number PT 120 212 -T)
- For replacing the total pressure gauge:
  – Total pressure gauge (order number: PT R40 351)

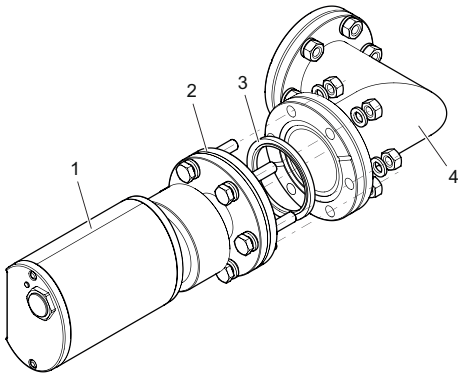


Fig. 54: Total pressure gauge on the gas analysis unit

1 Total pressure gauge
2 Flange connection
3 Copper seal
4 Elbow fitting with insulating pad (not shown)

Procedure

1. Remove the insulating mat around the elbow fitting and gauge flange.
2. Loosen the connection cables on the gauge.
3. Open the flange connection between the gauge and the elbow fitting and remove the gauge.
4. Replace the sensor element on the gauge as per the gauge operating instructions, or use a new gauge.
5. If you use a new gauge: Set the address on the address selection switch of the gauge to a value of "1".
6. Install the gauge onto the elbow fitting using a new silver-plated copper gasket.
7. Fit the insulating mat around the elbow fitting and gauge flange.
8. Connect the connection cables to the gauge.

10.6 Maintaining the gas inlet system of the OmniStar

NOTICE

Impairment from contamination and damage

Touching the devices or components with bare hands increases the desorption rate and leads to incorrect measurements. Dirt (e.g. dust, fingerprints, etc.) and damage impair the function.

- ► When working on high or ultra high vacuum systems, always wear clean, lint-free and powder-free laboratory gloves.
- ► Only use clean tools.
- ► Make sure that the connection flanges are free of grease.
- ► Remove protective caps and protective covers from flanges and connections only when necessary.
- ► Carry out all work in a well lit area.

First shorten or replace the stainless steel capillary

Pfeiffer Vacuum recommends first shortening or replacing the stainless steel capillary, and only then replacing the orifice if the work on the stainless steel capillary does not achieve the desired results.

If you open the gas inlet valve and the pressure in the GSD 350 does not increase at all or increases only slightly (pressure remains < 1 × 10^{-6} hPa), it can be assumed that either the stainless steel capillary or the orifice of the gas inlet is partly or completely blocked. The probability of a blocked stainless steel capillary is greater than the probability of a blocked orifice.

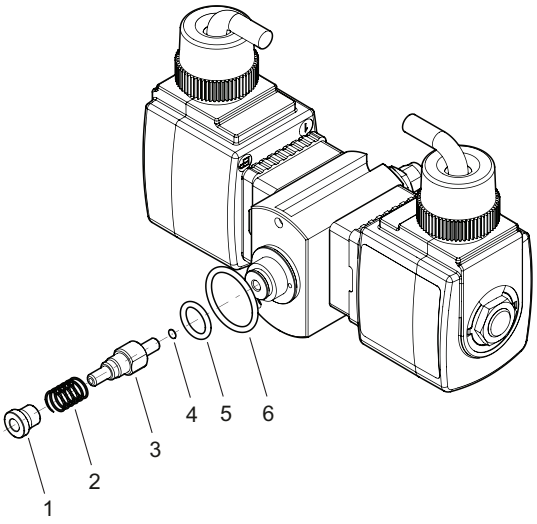


Fig. 55: Part of internal gas guide on OmniStar

1	Ceramic sleeve	4	Orifice
2	Compression spring	5	O-ring, inside
3	Gas guide	6	O-ring, outside

10.6.1 Removing the gas inlet flange

NOTICE

Destruction of the turbopump due to incomplete internal gas guide

If the ceramic sleeve, the pressure spring or one of the two O-rings of the inner gas guide are missing, putting the GSD 350 into operation will destroy the turbopump.

- ► Make sure the inner gas guide is complete.
- ► Make sure that the compression spring and the ceramic sleeve are located on the gas guide part.
- ► Remove missing parts from the vacuum chamber before starting up the GSD 350 again.

Prerequisites

- GSD 350 switched off
- Power cable disconnected
- Turbopump at standstill
- Gas inlet cover removed

Required tools

- Allen key, **WAF 2.5**
- Open-end wrench, **WAF 5/16"**
- Open-end wrench, **WAF 9/16"**

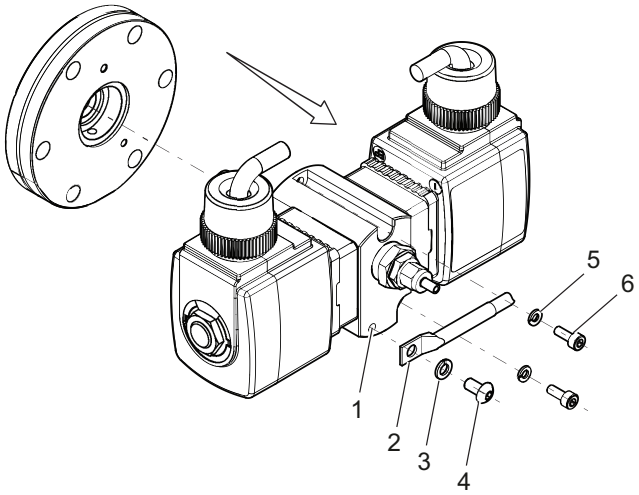


Fig. 56: Disassemble the valve block

1	Valve block	4	Fixing screw
2	Temperature sensor	5	Lock washer (2×)
3	Lock washer	6	Interior hexagon socket screw (2×)

Procedure

1. Remove the insulating collar from the gas inlet housing.
2. Loosen the connection cables on the valves.
3. Pull the stainless steel capillary in the glass inlet housing slightly out of the capillary hose.
   – If this is not possible: Open the capillary fitting on the valve block using an open-end wrench. Pull out the stainless steel capillary.
4. Loosen the fastening screw on the temperature sensor.
5. Loosen the interior hexagon socket screws on the valve block.
6. Carefully pull the valve block off towards the front.
7. Make sure the inner gas guide is complete.
8. Complete the further required work:
   – Replacing the orifice (see chapter “Replacing the orifice”, page 79)
   – Replacing the interior gas guide and orifice (see chapter “Replacing the interior gas guide and orifice”, page 80)
   – Replacing the complete gas inlet

10.6.2 Replacing the orifice

Prerequisites

- GSD 350 switched off
- Power cable disconnected
- Turbopump at standstill
- Gas inlet removed

Required tool

- Special tool for the orifice of the gas inlet system

Spare part required

- Orifice, 50 µm (part number BK212576)

Procedure

1. Unscrew and remove the gas guide from the valve block.
2. Turn the gas inlet so that the orifice drops out.
3. Drill the orifice manually using the special tool and pull the orifice out from the valve block if the orifice remains stuck.
4. Place the new orifice on the gas guide.
5. **Hand tighten** the gas guide in the valve block.
   – Do **not** use an open end wrench.

10.6.3 Replacing the interior gas guide and orifice

Prerequisites

- GSD 350 switched off
- Power cable disconnected
- Turbopump at standstill
- Gas inlet removed

Required tool

- Special tool for the orifice of the gas inlet system

Spare parts required

- Spare part set (part number PT 167 014 -T)

Procedure

1. Unscrew and remove the gas guide from the valve block.
2. Turn the gas inlet so that the orifice drops out.
3. Drill the orifice manually using the special tool and pull the orifice out from the valve block if the orifice remains stuck.
4. Replace the inner and outer o-rings on the valve block.
5. Replace the gas guide, compression spring and ceramic sleeve.
6. Place the new orifice on the gas guide.
7. **Hand tighten** the gas guide in the valve block.
   – Do **not** use an open end wrench.

10.6.4 Installing the gas inlet flange

NOTICE

Destruction of the turbopump due to incomplete internal gas guide

If the ceramic sleeve, the pressure spring or one of the two O-rings of the inner gas guide are missing, putting the GSD 350 into operation will destroy the turbopump.

► Make sure the inner gas guide is complete.
► Make sure that the compression spring and the ceramic sleeve are located on the gas guide part.
► Remove missing parts from the vacuum chamber before starting up the GSD 350 again.

Prerequisites

- GSD 350 switched off
- Power cable disconnected
- Turbopump at standstill
- Gas inlet cover removed

Required tools

- Allen key, **WAF 2.5**
- Open-end wrench, **WAF 5/16"**
- Open-end wrench, **WAF 9/16"**

Procedure

1. Check the seat of the compression spring and ceramic sleeve.
2. Carefully insert the valve block into the counter flange on the vacuum chamber.
3. Tighten the two interior hexagon socket screws on the valve block.

4. Push the stainless steel capillary back into the capillary tube.
   – If you removed the stainless steel capillary previously, mount the stainless steel capillary on the valve block (see chapter “Replacing the stainless steel capillary”, page 85).
5. Fasten the temperature sensor on the valve block with the fixing screw.
6. Connect the connection cables to the valves.
   – Make sure that you have the correct assignments.
7. Mount the insulating collar on the gas inlet housing.

10.7 Maintaining the gas inlet system of the ThermoStar

NOTICE

Impairment from contamination and damage

Touching the devices or components with bare hands increases the desorption rate and leads to incorrect measurements. Dirt (e.g. dust, fingerprints, etc.) and damage impair the function.

- ► When working on high or ultra high vacuum systems, always wear clean, lint-free and powder-free laboratory gloves.
- ► Only use clean tools.
- ► Make sure that the connection flanges are free of grease.
- ► Remove protective caps and protective covers from flanges and connections only when necessary.
- ► Carry out all work in a well lit area.

First shorten or replace the quartz capillary

Pfeiffer Vacuum recommends first shortening or replacing the quartz capillary, and only then replacing the orifice if the work on the quartz capillary does not achieve the desired results.

If the pressure in the GSD 350 is permanently < 1 × 10^{-6} hPa although atmospheric pressure is present at the inlet of the quartz capillary, it can be assumed that either the quartz capillary or the orifice of the gas inlet is partly or completely blocked. The probability of a blocked quartz capillary is greater than the probability of a blocked orifice.

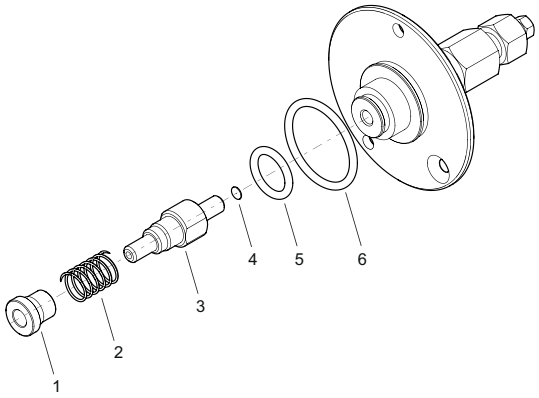


Fig. 57: Part of internal gas guide

1	Ceramic sleeve	4	Orifice
2	Compression spring	5	O-ring, inside
3	Gas guide	6	O-ring, outside

10.7.1 Removing the gas inlet flange

NOTICE

Destruction of the turbopump due to incomplete internal gas guide

If the ceramic sleeve, the pressure spring or one of the two O-rings of the inner gas guide are missing, putting the GSD 350 into operation will destroy the turbopump.

- ► Make sure the inner gas guide is complete.
- ► Make sure that the compression spring and the ceramic sleeve are located on the gas guide part.
- ► Remove missing parts from the vacuum chamber before starting up the GSD 350 again.

Prerequisites

- GSD 350 switched off
- Power cable disconnected
- Turbopump at standstill
- Gas inlet cover removed

Required tools

- Allen key, **WAF 2.5**
- Open-end wrench, **WAF 5.5**
- Open-end wrench, **WAF 1/4"**
- Open-end wrench, **WAF 3/8"**

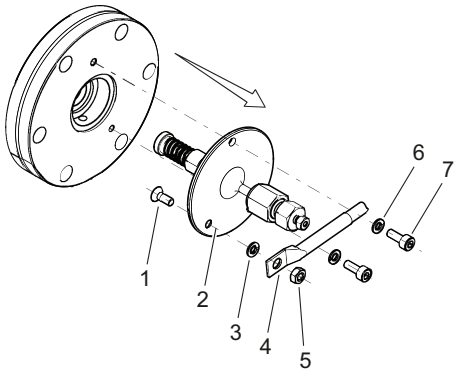


Fig. 58: Removing the gas inlet flange

1 Countersink screw
2 Gas inlet flange
3 Lock washer
4 Temperature sensor
5 fastening nut
6 Lock washer (2×)
7 Interior hexagon socket screw (2×)

Procedure

1. Remove the insulating collar from the gas inlet housing.
2. Pull the quartz capillary in the glass inlet housing slightly out of the capillary hose.
   – If this is not possible: Open the capillary fitting on the gas inlet flange. Pull out the quartz capillary.
3. Loosen both interior hexagon socket screws on the gas inlet flange.
4. Loosen the fastening nut on the temperature sensor.
5. Carefully pull the gas inlet flange off towards the front.
6. Make sure the inner gas guide is complete.
7. Complete the further required work:
   – Replacing the orifice (see chapter “Replacing the orifice”, page 83)
   – Replacing the interior gas guide and orifice (see chapter “Replacing the interior gas guide and orifice”, page 83)
   – Replacing the complete gas inlet

10.7.2 Replacing the orifice

Prerequisites

- GSD 350 switched off
- Power cable disconnected
- Turbopump at standstill
- Gas inlet removed

Required tool

- Special tool for the orifice of the gas inlet system

Spare part required

- Orifice, 50 µm (part number BK212576)

Procedure

1. Unscrew and remove the gas guide from the gas inlet flange.
2. Turn the gas inlet so that the orifice drops out.
3. Drill the orifice manually using the special tool and pull the orifice out from the valve block if the orifice remains stuck.
4. Place the new orifice on the gas guide.
5. **Hand tighten** the gas guide in the gas inlet flange.
   – Do **not** use an open end wrench.

10.7.3 Replacing the interior gas guide and orifice

Prerequisites

- GSD 350 switched off
- Power cable disconnected
- Turbopump at standstill
- Gas inlet removed

Required tool

- Special tool for the orifice of the gas inlet system

Spare parts required

- Spare part set (part number PT 167 014 -T)

Procedure

1. Unscrew and remove the gas guide from the gas inlet flange.
2. Turn the gas inlet so that the orifice drops out.
3. Drill the orifice manually using the special tool and pull the orifice out from the valve block if the orifice remains stuck.
4. Replace the inner and outer o-rings on the gas inlet flange.
5. Replace the gas guide, compression spring and ceramic sleeve.
6. Place the new orifice on the gas guide.
7. **Hand tighten** the gas guide in the gas inlet flange.
   – Do **not** use an open end wrench.

10.7.4 Installing the gas inlet flange

NOTICE

Destruction of the turbopump due to incomplete internal gas guide

If the ceramic sleeve, the pressure spring or one of the two O-rings of the inner gas guide are missing, putting the GSD 350 into operation will destroy the turbopump.

► Make sure the inner gas guide is complete.
► Make sure that the compression spring and the ceramic sleeve are located on the gas guide part.
► Remove missing parts from the vacuum chamber before starting up the GSD 350 again.

Prerequisites

- GSD 350 switched off
- Power cable disconnected

- Turbopump at standstill
- Gas inlet cover removed

Required tools

- Allen key, **WAF 2.5**
- Open-end wrench, **WAF 5.5**
- Open-end wrench, **WAF 1/4"**
- Open-end wrench, **WAF 3/8"**

Procedure

1. Check the seat of the compression spring and ceramic sleeve.
2. Fasten the temperature sensor on the gas inlet flange with the fixing screw.
3. Carefully insert the gas inlet flange into the counter flange on the vacuum chamber.
4. Tighten the two interior hexagon socket screws on the gas inlet flange.
5. Push the quartz capillary back into the capillary tube.
   – If you removed the quartz capillary previously, mount the quartz capillary on the gas inlet flange (see chapter “Replacing the quartz capillary”, page 87).
6. Mount the insulating collar on the gas inlet housing.

10.8 Servicing the capillary

Shortening or replacing the capillary

Pfeiffer Vacuum recommends first shortening or replacing the capillary, and only replacing the orifice if the work on the capillary does not achieve the desired results.

If the expected total pressure is not achieved in the GSD 350, and instead the total pressure remains at < 1 × 10^{-6} hPa with the gas inlet open (OmniStar), then it must be assumed that either the capillary or the orifice on the gas inlet is partly or completely blocked. The probability of a blocked capillary is greater than the probability of a blocked orifice.

10.8.1 Shorten stainless steel capillaries

If the stainless steel capillary is blocked, then the blockage frequently occurs in the front atmosphere side area of the stainless steel capillary. Shortening the stainless steel capillary can help to clear the blockage.

Prerequisites

- GSD 350 switched off
- Power cable disconnected
- Turbopump at standstill
- Stainless steel capillary disconnected from measurement point
- Length of stainless steel capillary still sufficient after shortening

Required tools

- Tube or capillary cutter (1/16") knife file

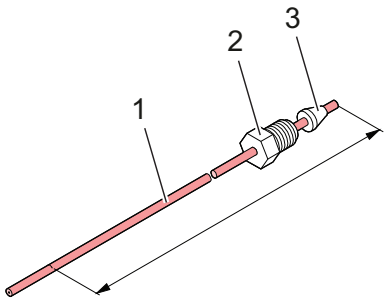


Fig. 59: Length of stainless steel capillary with clamping collar fitting

1 Stainless steel capillary
2 Clamping collar fitting
3 Capillary seal (ferrule)

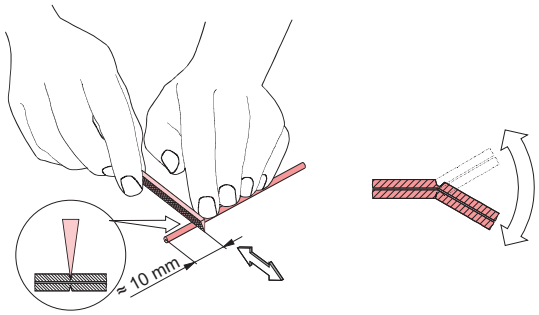


Fig. 60: Notch and snap off the stainless steel capillary

Trimming the stainless capillary with the pipe or capillary cutters

1. Pull the stainless capillary far enough out of the capillary hose.
2. Cut off the stainless capillary with the pipe or capillary cutters.

Trimming the stainless steel capillary with a file

1. Pull the stainless capillary far enough out of the capillary hose.
2. Notch the stainless steel capillary carefully at two opposing positions.
   – Notches = **max. depth 0.5 mm**
3. Carefully bend the stainless steel capillary until it brakes at the notches.

Commissioning the unit

1. Start the pumping system.
2. Wait for the turbopump to run-up (approx. 10 minutes).

Checking the pressure in the vacuum chamber

1. Check the pressure in the vacuum chamber.
   – The displayed pressure must be ≥ 1 × 10^{-6} hPa with the gas inlet valve open.
2. If the displayed pressure is < 1 × 10^{-6} hPa, this can be due to the following:
   – Stainless steel capillary plugged over the entire length (see chapter “Replacing the stainless steel capillary”, page 85)
   – Orifice blocked (see chapter “Replacing the orifice”, page 79) or (see chapter “Replacing the interior gas guide and orifice”, page 80)

10.8.2 Replacing the stainless steel capillary

Prerequisites

- GSD 350 switched off
- Power cable disconnected
- Turbopump at standstill
- Stainless steel capillary disconnected from measurement point
- Gas inlet cover removed

Required tools

- Open-end wrench, **WAF 9/16"**
- Open-end wrench, **WAF 5/16"**
- Tube or capillary cutter (1/16") knife file

Spare parts required

- Stainless steel capillary (part number PT 167 060 -T)
- Capillary seals (part number PT 167 017 -T)

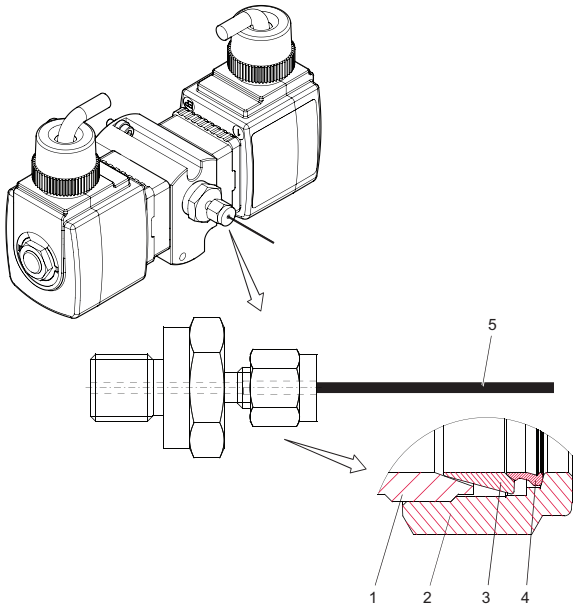


Fig. 61: Clamp collar fitting for stainless steel capillary

1 Adapter
2 Nut
3 Front clamp collar
4 Rear clamp collar
5 Stainless steel capillary

Procedure

1. Trim the length of the stainless steel capillary (see chapter “Shorten stainless steel capillaries”, page 84).
   – **Capillary length = length of capillary tube + 15 cm + required length at the measuring point**
2. Remove the insulating collar from the gas inlet housing.
3. Open the cooling clamping collar fitting.
4. Remove the old stainless steel capillary.
5. Push the clamping collar fitting and a new capillary seal onto the new, trimmed stainless steel capillary.
6. Push the stainless steel capillary with the capillary seal and the clamping collar fitting into the fitting on the valve block.
7. Lightly screw in the clamping collar fitting so that the stainless steel capillaries can still be displaced.
8. Push the stainless steel capillary in up to the stop.
9. Pull the stainless steel capillary back by 1 or 2 mm.
10. Tighten the clamping collar fitting with the open end wrenches.
11. Carefully push the free end of the stainless steel capillary into the capillary tube.

10.8.3 Trimming the quartz capillary

⚠ CAUTION

Risk of injury due to splintering of the quartz capillary

Quartz capillaries splinter in case of unintended use. There is a risk of eye injuries due to splinters being projected.

► Do not apply force when notching the quartz capillary.
► Wear safety goggles.

If the quartz capillary is blocked, then the blockage frequently occurs in the front atmosphere side area of the quartz capillary. Shortening the quartz capillary can help to clear the blockage.

Prerequisites

- GSD 350 switched off
- Power cable disconnected

- Turbopump at standstill
- Quartz capillary disconnected from measurement point
- Length of quartz capillary still sufficient after shortening

Required tools

- Capillary cutting tool

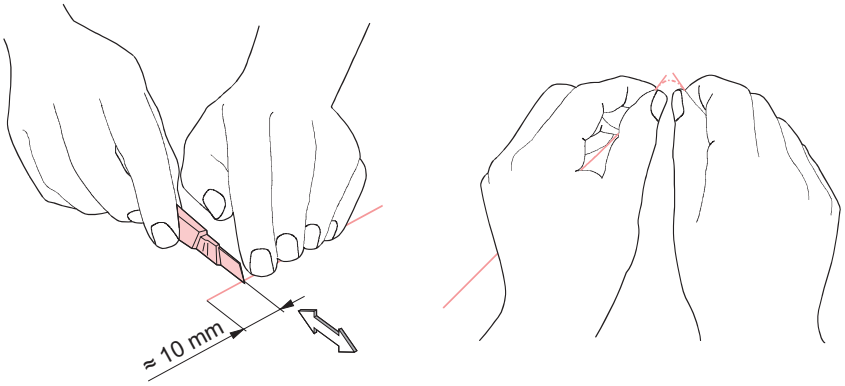


Fig. 62: Notching and snapping off the quartz capillary

Trimming the quartz capillary

1. Pull the quartz capillary far enough out of the capillary hose.
2. Carefully notch the quartz capillary without applying pressure.
3. Carefully snap off the quartz capillary at the point notched previously.

Commissioning the unit

1. Start the pumping system.
2. Wait for the turbopump to run-up (approx. 10 minutes).

Checking the pressure in the vacuum chamber

1. Check the pressure in the vacuum chamber.
   – The displayed pressure must be ≥ 1×10^{-6} hPa.
2. If the displayed pressure is < 1×10^{-6} hPa, this can be due to the following:
   – Quartz capillary plugged over entire length
   – Orifice blocked

10.8.4 Replacing the quartz capillary

Prerequisites

- GSD 350 switched off
- Power cable disconnected
- Turbopump at standstill
- Quartz capillary disconnected from measurement point
- Gas inlet cover removed

Required tools

- Open-end wrench, **WAF 1/4"**
- Open-end wrench, **WAF 3/8"**
- Capillary cutting tool

Spare parts required

- Quartz capillary (part number B1975082EC)
- Capillary seals (part number PT 167 015 -T)

Do not loosen the rear fitting

You must not open the rear fitting on the gas inlet flange. To replace the capillary, only open the front fitting.

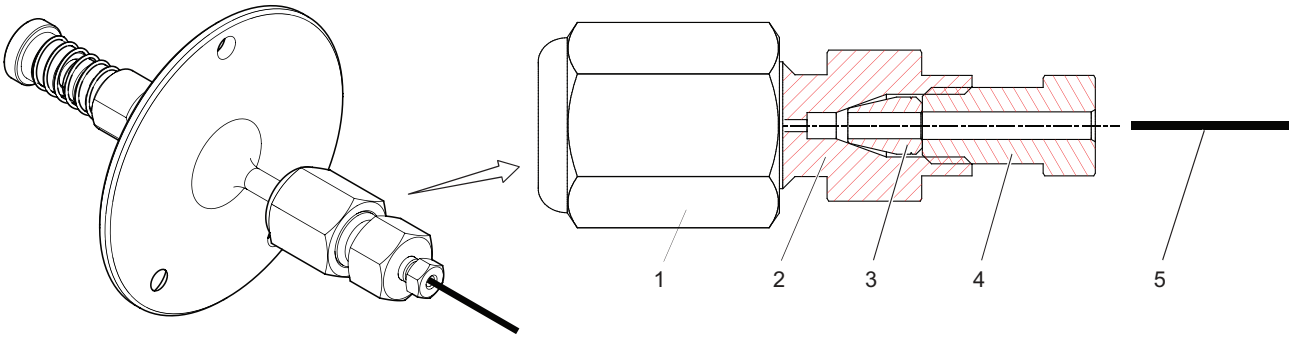


Fig. 63: Front fitting of quartz capillary

1 Rear fitting
2 Front fitting
3 Seal (ferrule)
4 Pressure screw
5 Quartz capillary

Procedure

1. Trim the length of the quartz capillary (see chapter “Trimming the quartz capillary”, page 86).
   – **Capillary length = length of capillary tube + 30 cm + required length at the measuring point**
2. Remove the insulating collar from the gas inlet housing.
3. Loosen the front fitting.
4. Remove the old quartz capillary.
5. Push the front fitting and a new capillary seal onto the new, trimmed quartz capillary.
   – Distance between end of capillary and ferrule = approx. 25 mm
6. Push the quartz capillary with the capillary seal and the front fitting into the rear fitting on the gas inlet flange.
7. Lightly screw in the front fitting so that the quartz capillaries can still be displaced.
8. Push the quartz capillary in up to the stop.
9. Pull the quartz capillary back by 1 or 2 mm.
10. Tighten the front fitting with the open end wrenches.
11. Carefully push the free end of the quartz capillary into the capillary tube.

10.9 Maintaining the heating units

⚠ WARNING

Danger of burns on hot surfaces

During operation high temperatures (> 50 °C) occur on touchable surfaces of the heating components and the gas inlet. There is a risk of burning.

- ► Secure hot parts against inadvertent touching.
- ► Display warning signs.
- ► Make sure that the product has cooled down before performing work.
- ► Wear protective gloves (in accordance with EN 420).

10.9.1 Replacing the capillary hose

Pfeiffer Vacuum Service handles the replacement.

- ► Contact Pfeiffer Vacuum Service.

10.9.2 Maintaining the gas inlet heating

If the GSD 350 has a defect on the gas inlet heating, you must replace the heating and/or the temperature sensor.

Pfeiffer Vacuum Service handles the replacement.

- ► Contact Pfeiffer Vacuum Service.

10.9.3 Servicing the vacuum chamber heating

If the temperature of the vacuum chamber does not reach the set temperature when baking out, even after a substantial waiting period, or if the GSD 350 indicates a defect in the vacuum chamber heating, the heating and/or the corresponding temperature sensor must be replaced.

Pfeiffer Vacuum Service handles the replacement.

► Contact Pfeiffer Vacuum Service.

10.10 Maintaining electronic components

All of the electronic components in the GSD 350 are maintenance-free. You must replace any defective electronic components.

10.10.1 Replacing the display

Prerequisites

- GSD 350 switched off
- Power cable disconnected
- Turbopump at standstill

Required tool

- Crosshead screwdriver

Spare part required

- 7" touch display (part number PT 167 025)

Display voltage supply

The PoE injector in the GSD 350 supplies voltage to the display via the connection cable. Do not connect any other Ethernet components to this connection cable.

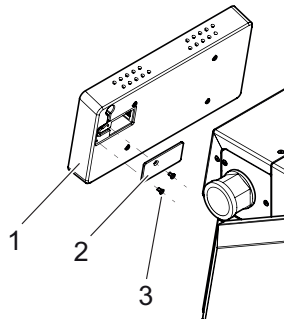


Fig. 64: Replacing the display

1 Display
2 Cable fastener
3 Countersunk screw (2×)

Procedure

1. Carefully remove the display from the GSD 350.
2. On the rear side of the display, loosen the countersunk screws of the cable fasteners.
3. Disconnect the connection cable from the display.
4. Plug the connection cable into the new display.
5. On the rear side of the display, fasten the countersunk screws of the cable fasteners.
6. Place the display in the GSD 350.

During the run-up, the GSD 350 automatically synchronizes the display with the configuration of the GSD 350.

10.10.2 Replacing the PoE injector

Pfeiffer Vacuum Service handles the replacement.

► Contact Pfeiffer Vacuum Service.

10.10.3 Replacing the mainboard

Pfeiffer Vacuum Service handles the replacement.

► Contact Pfeiffer Vacuum Service.

10.10.4 Replacing the power supply pack

Pfeiffer Vacuum Service handles the replacement.

► Contact Pfeiffer Vacuum Service.

10.10.5 Replacing the QME 250 electronic unit

Pfeiffer Vacuum Service handles the replacement.

► Contact Pfeiffer Vacuum Service.

10.10.6 Replacing the TC 110 electronic drive unit on the turbopump

Pfeiffer Vacuum Service handles the replacement.

► Contact Pfeiffer Vacuum Service.

10.11 Maintaining the calibration unit

10.11.1 Refilling with calibration medium

Prerequisites

- GSD 350 switched off
- Power cable disconnected
- Turbopump at standstill
- Side covers removed
- Housing cover removed

Required tools

- Allen key, **WAF 2.5**
- Open-end wrench, **WAF 17**

Required consumable material

- Calibration medium (PFTBA) (part number PT 167 031)

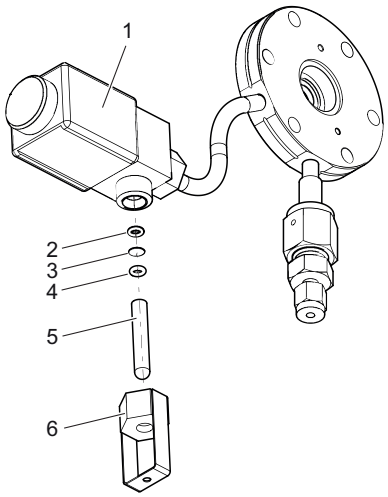


Fig. 65: Calibration unit

1 Shut-off valve EVI 005 M
2 Seal
3 Orifice
4 Seal
5 Glass storage vessel
6 Compression coupling

Procedure

1. Unscrew the fitting over the glass storage vessel by hand.
2. Pull the glass storage vessel off the shut-off valve in downward direction.
   – Pay attention to the washer and the orifice.
3. Fill the glass storage vessel with calibration medium.
4. Mount the glass storage vessel on the shut-off valve.
   – Pay attention to the washer and the orifice.
5. Tighten the fitting over the glass storage vessel by hand.

10.11.2 Replacing the calibration valve

Pfeiffer Vacuum Service handles the replacement.

► Contact Pfeiffer Vacuum Service.

10.12 Additional maintenance work for the corrosive gas version

10.12.1 Replacing the sealing gas valve

Prerequisites

- GSD 350 switched off
- Power cable disconnected
- Turbopump at standstill
- Side covers removed
- Housing cover removed

Required tools

- Allen key, **WAF 2.5**
- Allen key, **WAF 3**
- Open-end wrench, **WAF 15**
- Open-end wrench, **WAF 17**

Spare part required

- Sealing gas valve (part number PM Z01 310 A)

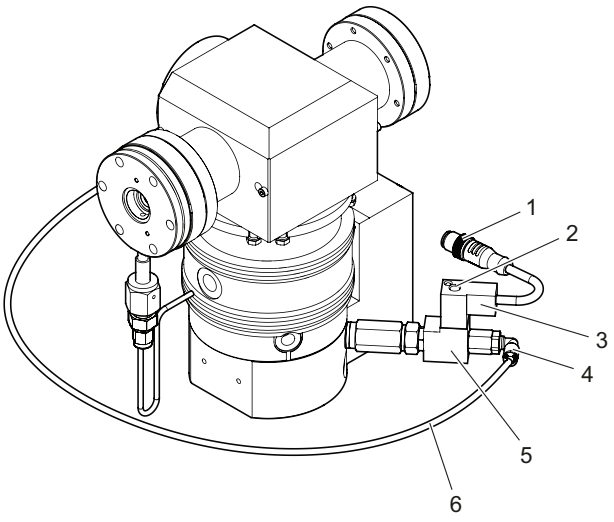


Fig. 66: Sealing gas valve on the turbopump

1	Electrical connection	4	Angled push-in fitting
2	Lock screw	5	Sealing gas valve
3	Power supply plug	6	Sealing gas feed

Remove the turbopump (optional)

Due to the cramped conditions in the GSD 350 is can be useful to first remove the turbopump before starting to remove or install the valve.

1. Remove the electronics unit on the PrismaPro
2. Remove the gas inlet flange
3. Reinstall components after replacing the valve.

Replacing the sealing gas valve

1. Loosen the lock screw on the power supply plug.
2. Disconnect the power supply plug from the sealing gas valve.
3. Disconnect the sealing gas supply from the sealing gas valve.
4. Unscrew and remove the sealing gas valve from the turbopump.
5. Unscrew and remove the angled push-in fitting from the old sealing gas valve.
6. Mount the angled push-in fitting on the new sealing gas valve.
7. Connect the new sealing gas valve in line with the operating instructions for the turbopump.
8. Plug the power supply plug into the sealing gas valve.
9. Fasten the lock screw on the power supply plug.
10. Connect the sealing gas supply to the sealing gas valve.

10.12.2 Replacing the manual pressure regulator

Pressure regulator preset

Do not change the presetting. Pfeiffer Vacuum has factory preset the pressure regulator.

Pfeiffer Vacuum Service handles the replacement.

► Contact Pfeiffer Vacuum Service.

10.12.3 Replacing the digital pressure regulator

Pressure regulator preset

Do not change the presetting. Pfeiffer Vacuum has factory preset the pressure regulator.

Pfeiffer Vacuum Service handles the replacement.

► Contact Pfeiffer Vacuum Service.

11 Troubleshooting

Notes on malfunction handling in the Help menus

Further information on troubleshooting and malfunction messages when operating the unit via the web interface or when using the PV MassSpec software can be found in the corresponding Help menus.

Problem	Possible cause	Remedy
The display remains dark after switching on.	No supply voltage at the unit	Check the mains connection and mains cable.
	Mains fuses (2×10 AT) defective	Replace the mains fuses.
	Display cable loose	Check the plug-and-socket connection on the display.
After switching on, the "Dashboard" start screen does not appear.	Run-up time not completed	Wait for the run-up time of < 60 seconds to complete.
	The unit was switched off and back on again too quickly	1. Turn off the unit. 2. Wait for 15 seconds. 3. Switch the unit back on again.
After the "Pump down" control command, the diaphragm pumps fail to start up (icon remains light gray).	Cable connection loose	Check the plug-and-socket connections on the diaphragm pump and the mainboard.
	Diaphragm pump defective	Service the diaphragm pump or replace the diaphragm pump.
	Sealing gas pressure too low (for corrosive gas version)	Check the sealing gas supply.
After the "Pump down" control command, the diaphragm pumps fail to reach the nominal rotation speed (icon remains dark green).	Diaphragm pump defective	Service the diaphragm pump or replace the diaphragm pump.
After the "Pump down" control command, the turbopump fail to start up (icon remains light gray).	Switch-on vacuum of 10 hPa not yet reached	Wait for the pump down action for the fore-vacuum to complete (target < 60 s).
	Moisture content in the vacuum system too high	Bake out the vacuum chamber.
	Condensate in the diaphragm pump	1. Dismantle and clean the diaphragm pump. 2. Wipe the diaphragm pump parts dry.
	Diaphragm pump defective	Service the diaphragm pump or replace the diaphragm pump.
	Cable connection loose	Check the plug-and-socket connections of the electronic drive unit and the mainboard.
	Turbopump defective	Replace the turbopump.
After the "Pump down" control command, the turbopump fail to reach the nominal rotation speed (icon remains dark green).	Run-up time of turbopump not completed	Wait for the run-up time of < 8 minutes to complete.
	Inlet pressure too high (only for TermoStar)	Reduce the pressure. on the inlet side of the capillary to < 1200 hPa.
	Leakage	Check the capillary seal in the gas inlet area.
	fore-vacuum pressure too high	Check the vacuum connection diaphragm pump/turbopump for leakages.

Problem	Possible cause	Remedy
Diaphragm pump switches off.	Overtemperature	1. Check the fans. 2. Service the diaphragm pump.
	Cable connection loose	Check the plug-and-socket connections on the diaphragm pump and the mainboard.
	Diaphragm pump defective	Service the diaphragm pump or replace the diaphragm pump.
Turbopump switches off.	Overtemperature	1. Check the fans. 2. Service the turbopump.
	Inlet pressure too high	Reduce the pressure. on the inlet side of the capillary to < 1200 hPa.
	Leakage	Check the capillary seal in the gas inlet area.
	fore-vacuum pressure too high	Check the vacuum connection diaphragm pump/turbopump for leakages.
	Condensate in the diaphragm pump	1. Dismantle and clean the diaphragm pump. 2. Wipe the diaphragm pump parts dry.
	Diaphragm pump defective	Service the diaphragm pump or replace the diaphragm pump.
Both vacuum pumps switch off and the system is automatically shut down.	Overtemperature	1. Check the fans. 2. Clean the protection screens on the fans. 3. Keep to the permissible ambient temperature.
	Sealing gas pressure too low (for corrosive gas version)	Check the sealing gas supply.
The pressure in the vacuum chamber with the gas inlet valve shut off is > 1 × 10^{-7} hPa (only for OmniStar).	System has not been running for long	Continue pumping down.
	Moisture content in the vacuum system too high	Bake out the vacuum chamber.
	Inlet valve not tight	Replace the valve block.
	fore-vacuum pressure too high	Check the vacuum connection diaphragm pump/turbopump for leakages.
	Condensate in the diaphragm pump	1. Dismantle and clean the diaphragm pump. 2. Wipe the diaphragm pump parts dry.
	Diaphragm pump defective	Service the diaphragm pump or replace the diaphragm pump.

Problem	Possible cause	Remedy
Pressure in vacuum chamber is too high (> 3 × 10^{-5} hPa) (for ThermoStar and/or OmniStar with open gas inlet valve).	Inlet pressure too high	Reduce the pressure. on the inlet side of the capillary to < 1200 hPa.
	Leakage	Check the capillary seal in the gas inlet area.
	Moisture content in the vacuum system too high	Bake out the vacuum chamber.
	fore-vacuum pressure too high	Check the vacuum connection diaphragm pump/turbopump for leakages.
	Condensate in the diaphragm pump	1. Dismantle and clean the diaphragm pump. 2. Wipe the diaphragm pump parts dry.
	Diaphragm pump defective	Service the diaphragm pump or replace the diaphragm pump.
	Pump valve polluted (only for OmniStar)	Replace the valve block.
	Pump valve defective (only for OmniStar)	Replace the valve block.
Pressure in vacuum chamber is too high (> 1 × 10^{-3} hPa).	Total pressure gauge polluted	Clean the total pressure gauge.
	Total pressure gauge defective	Replace the total pressure gauge.
Pressure in vacuum chamber is too low (< 1 × 10^{-6} hPa) (for ThermoStar and/or OmniStar with open gas inlet valve).	Inlet pressure too low	Increase the pressure on the inlet side of the capillary.
	Capillary blocked	Trim the capillary or replace the capillary.
	Orifice blocked	Replace the orifice.
Gas inlet valve fails to open (only for OmniStar)	Delay time for valve opening not yet completed	Wait for the delay time of < 7 seconds to complete.
	Gas inlet valve is not controlled.	Check the plug-and-socket connections on the gas inlet valve and the mainboard.
	Gas inlet valve polluted	Replace the valve block.
	Gas inlet valve defective	Replace the valve block.
No mass peaks visible in range > 200 u on calibrating the mass scale (for version with calibration unit)	Sensitivity of PrismaPro too low	See PrismaPro operating instructions.
	Stock of calibration medium too low	Top up the calibration medium.
	Shut-off valve on calibration unit is not controlled.	Check the plug-and-socket connections on the shut-off valve and the mainboard.
	Shut-off valve on calibration unit polluted	Replace shut-off valve on calibration unit.
	Shut-off valve on calibration unit defective	Replace shut-off valve on calibration unit.
Error during measurement	PrismaPro malfunction	See PrismaPro operating instructions.
Insufficient measurement sensitivity	PrismaPro settings incorrect	See PrismaPro operating instructions.
Poor peak form	PrismaPro settings incorrect	See PrismaPro operating instructions.

Problem	Possible cause	Remedy
High noise level	PrismaPro settings incorrect	See PrismaPro operating instructions.
After the "Vent" control commands, the vacuum pumps continue running and the system is not vented.	Delay time for venting not yet completed	Wait for the delay time of < 15 minutes to complete. (The time is shown top right in the display.)
After the "Vent" control command, the venting valve fails to open.	Delay time for venting not yet completed	Wait for the delay time of < 15 minutes to complete. (The time is shown top right in the display.)
	Venting valve is not controlled.	Check the plug-and-socket connections on the venting valve and the mainboard.
	Venting valve polluted	Replace the venting valve.
	Venting valve defective	Replace the venting valve.

Tbl. 14: Troubleshooting

12 Shipping

⚠ WARNING

Risk of poisoning from contaminated products

Where products that contain harmful substances are shipped for maintenance or repair purposes, the health and safety of service personnel is at risk.

► Comply with the instructions for safe distribution.

Decontamination subject to charge

Pfeiffer Vacuum decontaminates products not clearly declared "Free of contamination" at your expense.

Instructions for safe shipping

► Do not ship microbiological, explosive or radioactively contaminated products.
► Observe the shipping guidelines for the participating countries and transport companies.
► Highlight any potential dangers on the outside of the packaging.
► Download the explanation for contamination at Pfeiffer Vacuum Service.
► Always enclose a completed declaration of contamination.

13 Recycling and disposal

⚠ WARNING

Health hazard through poisoning from toxic contaminated components or devices

Toxic process media result in contamination of devices or parts of them. During maintenance work, there is a risk to health from contact with these poisonous substances. Illegal disposal of toxic substances causes environmental damage.

- ► Take suitable safety precautions and prevent health hazards or environmental pollution by toxic process media.
- ► Decontaminate affected parts before carrying out maintenance work.
- ► Wear protective equipment.

Environmental protection

You **must** dispose of the product and its components in accordance with all applicable regulations for protecting people, the environment and nature.

- Help to reduce the wastage of natural resources.
- Prevent contamination.

Environmental protection

The product and its components **must be disposed of in accordance with the applicable regulations relating to environmental protection and human health**, with a view to reducing natural resource wastage and preventing pollution.

13.1 General disposal information

Pfeiffer Vacuum products contain materials that you must recycle.

- ► Dispose of our products according to the following:
  - – Iron
  - – Aluminium
  - – Copper
  - – Synthetic
  - – Electronic components
  - – Oil and fat, solvent-free
- ► Observe the special precautionary measures when disposing of:
  - – Fluoroelastomers (FKM)
  - – Potentially contaminated components that come into contact with media

13.2 Dispose of a gas analysis system

Pfeiffer Vacuum gas analysis systems contain materials that you must recycle.

1. Dismantle the housing parts.
2. Dismantle all individual components.
3. Dismantle the electronic components.
4. Decontaminate the components that come into contact with process gases.
5. Separate the components into recyclable materials.
6. Recycle the non-contaminated components.
7. Dispose of the product or components in a safe manner according to locally applicable regulations.

14 Service solutions by Pfeiffer Vacuum

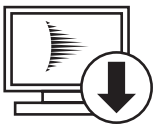
We offer first-class service
High vacuum component service life, in combination with low downtime, are clear expectations that you place on us. We meet your needs with efficient products and outstanding service.

We are always focused on perfecting our core competence – servicing of vacuum components. Once you have purchased a product from Pfeiffer Vacuum, our service is far from over. This is often exactly where service begins. Obviously, in proven Pfeiffer Vacuum quality.

Our professional sales and service employees are available to provide you with reliable assistance, worldwide. Pfeiffer Vacuum offers an entire range of services, from original replacement parts to service contracts.

Make use of Pfeiffer Vacuum service
Whether preventive, on-site service carried out by our field service, fast replacement with mint condition replacement products, or repair carried out in a Service Center near you – you have various options for maintaining your equipment availability. You can find more detailed information and addresses on our homepage, in the Pfeiffer Vacuum Service section.

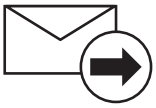
You can obtain advice on the optimal solution for you, from your Pfeiffer Vacuum representative.
For fast and smooth service process handling, we recommend the following:



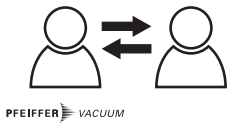
1. Download the up-to-date form templates.
   - Explanations of service requests
   - Service requests
   - Contamination declaration

a) Remove and store all accessories (all external parts, such as valves, protective screens, etc.).
b) If necessary, drain operating fluid/lubricant.
c) If necessary, drain coolant.

2. Complete the service request and contamination declaration.

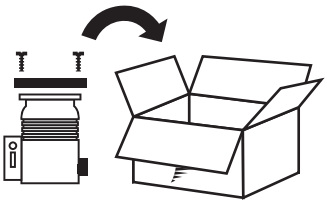


3. Send the forms by email, fax, or post to your local Service Center.

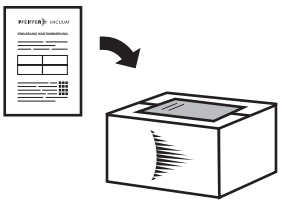


4. You will receive an acknowledgment from Pfeiffer Vacuum.

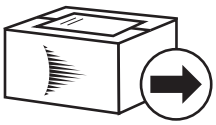
Submission of contaminated products
No microbiological, explosive, or radiologically contaminated products will be accepted. Where products are contaminated, or the contamination declaration is missing, Pfeiffer Vacuum will contact you before starting service work. Depending on the product and degree of pollution, **additional decontamination costs** may be incurred.



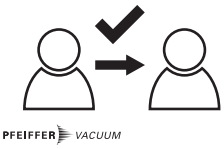
5. Prepare the product for transport in accordance with the provisions in the contamination declaration.
a) Neutralize the product with nitrogen or dry air.
b) Seal all openings with blind flanges, so that they are airtight.
c) Shrink-wrap the product in suitable protective foil.
d) Package the product in suitable, stable transport containers only.
e) Maintain applicable transport conditions.



6. Attach the contamination declaration to the **outside** of the packaging.



7. Now send your product to your local Service Center.



8. You will receive an acknowledgment/quotation, from Pfeiffer Vacuum.

Our sales and delivery conditions and repair and maintenance conditions for vacuum devices and components apply to all service orders.

15 Spare parts

Ordering spare parts

- ► Have the part number to hand, along with other details from the rating plate as required.
- ► Install original spare parts only.

Designation	Order number	Description/scope of delivery
Gas inlet (OmniStar)	PT 167 016 -T	Flange insert with valves, orifice 50 µm, 2 o-rings and gas guide, without stainless steel capillary
Gas inlet (ThermoStar)	PT 167 013 -T	Flange insert, orifice 50 µm, 2 o-rings and gas guide, without quartz capillary
Spare part set for gas inlet (OmniStar)	PT 167 014 -T	2 o-rings, orifice 50 µm, gas guide pipe, compression spring
Spare part set for gas inlet (ThermoStar)		
Orifice for gas inlet (ThermoStar)	BK212576	50 µm
Orifice for gas inlet (ThermoStar)		
Capillary (stainless steel)	PT 167 060	1/16", 0.12 mm × 5 m
Capillary (quartz)	B1975082EC	0.23", 0.14 mm × 5 m
Capillary seals (stainless steel capillary)	PT 167 017 -T	Capillary seals (ferrules) (pack of 10)
Capillary seals (quartz capillary)	PT 167 015 -T	
Capillary hose	PT 167 050 -T	200 °C, 1 m, without capillary
	PT 167 051 -T	200 °C, 2 m, without capillary
	PT 167 052 -T	350 °C, 1 m, without capillary
Overhaul set for diaphragm pump	PU E22 030 -T	Diaphragms and valves of the diaphragm pump ● 4 diaphragms EPDM/PTFE ● 8 valve plates EPDM ● 8 sealing rings EPDM
Diaphragm pump	PK T05 072	Diaphragm pump MVP 010-3 DC
Sensor of total pressure gauge	PT 120 212 -T	MPT sensor, DN 40 CF
Total pressure gauge	PT R40 351 -A	Replacement measurement tube MPT 200 AR
Filament unit for analyzer QMA 250 M	PT 163 331	Tungsten filament unit with 2 filaments
	PT 163 332	Ir-Y_2O_3 filament unit with 2 filaments
Ion source for analyzer QMA 250 M	PT 163 231	Complete ion source with 2 tungsten filaments
	PT 163 232	Complete ion source 2 Ir-Y_2O_3 filaments
Operating fluid reservoir	PM 143 740 -T	For turbopump
Venting valve	PM Z01 290 -T	
Sealing gas valve	PM Z01 310 A	
Copper seal	490DFL040-S-G-S5	DN 40 CF, silver-plated (pack of 5)
7" touch display	PT 167 025	Display module, without cable
Calibration medium (PFTBA)	PT 167 031	Bottled, 5 ml

Tbl. 15: Spare parts

16 Special tool

Designation	Order number	Use
Wrench for housing cover	PV M40 813	(see chapter “Replace operating fluid reservoir on turbopump”, page 72)

Tbl. 16: Special tool

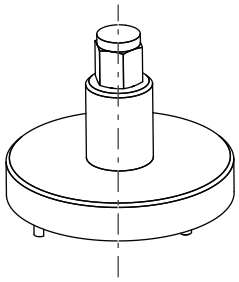


Fig. 67: Wrench PV M40 813 for housing cover of turbopump

17 Accessories

View the range of accessories for ThermoStar and OmniStar on our website.

17.1 Accessory information

Capillary hose adapter
The capillary hose adapter is used to reliably connect the capillary hose.

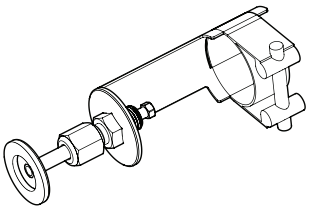


Fig. 68: Capillary hose adapter

17.2 Ordering accessories

Description	Order number
Capillary hose adapter	PT 167 070 -T

Tbl. 17: Accessories

18 Technical data and dimensions

18.1 General

	mbar	bar	Pa	hPa	kPa	Torr | mm Hg
mbar	1	$1 \cdot 10^{-3}$	100	1	0.1	0.75
bar	1000	1	$1 \cdot 10^{5}$	1000	100	750
Pa	0.01	$1 \cdot 10^{-5}$	1	0.01	$1 \cdot 10^{-3}$	$7.5 \cdot 10^{-3}$
hPa	1	$1 \cdot 10^{-3}$	100	1	0.1	0.75
kPa	10	0.01	1000	10	1	7.5
Torr | mm Hg	1.33	$1.33 \cdot 10^{-3}$	133.32	1.33	0.133	1
1 Pa = 1 N/m^2						

Tbl. 18: Conversion table: Pressure units

	mbar l/s	Pa m^3/s	sccm	Torr l/s	atm cm^3/s
mbar l/s	1	0.1	59.2	0.75	0.987
Pa m^3/s	10	1	592	7.5	9.87
sccm	$1.69 \cdot 10^{-2}$	$1.69 \cdot 10^{-3}$	1	$1.27 \cdot 10^{-2}$	$1.67 \cdot 10^{-2}$
Torr l/s	1.33	0.133	78.9	1	1.32
atm cm^3/s	1.01	0.101	59.8	0.76	1

Tbl. 19: Conversion table: Units for gas throughput

18.2 Technical data

Configuration (mass range)	1 to 100 u	1 to 200 u	1 to 300 u
Quadrupole mass spectrometer			
Type	PrismaPro QMG 250 M1	PrismaPro QMG 250 M2	PrismaPro QMG 250 M3
Detector	C-SEM		
Ion source	Crossbeam (C/B)		
Number of filaments	2		
Sensor performance according to mass range[12)]			
Minimum detection limits (C-SEM)	< 100 ppb	< 1 ppm	< 10 ppm
Amount for neighboring mass (40/41)	< 10 ppm	< 20 ppm	< 50 ppm
Dwell			
Adjustable from 1 ms/u to 16 s/u			
Gas inlet / process gas			
Type	OmniStar: with inlet valve ThermoStar: permanently open		
Sample gas pressure, max.	1 200 hPa		
Gas flow rate	1 to 2 sccm		
Contaminants	Particle size ≤ 1 µm		
Valve control (OmniStar)	Via color 7” display or web interface		
Capillary			
material	OmniStar: Stainless steel ThermoStar: Quartz		
Length	1 m (2 m also available)		

12) The mass range specifications are only applicable for non-interfering gases/species.

Configuration (mass range)	1 to 100 u	1 to 200 u	1 to 300 u
Diameter	OmniStar: OD = 1/16", ID = 0.15 mm ThermoStar: OD 0.23 mm, ID = 0.15 mm		
Operating temperature of capillary	200 °C (350 °C also available)		
Exhaust gas			
Permissible pressure	≤ atmospheric pressure		
Connection	IQS plug-and-socket connection, 6 mm PE hose (exterior Ø = 6 mm)		
Sealing gas (corrosive gas version)			
Sealing gas	Inert gas, nitrogen or argon recommended		
Pressure	5,000 to 7,000 hPa		
Gas flow rate	approx. 300 sccm		
Impurities	≤ 100 ppm oxygen		
Connection	IQS plug-and-socket connection, 4 mm PE hose (exterior Ø = 4 mm)		
Calibration unit (option)			
Calibration medium for mass calibration	PFTBA		
Ambient conditions			
Shipping and storage temperature	-20 to 55 °C		
Operating temperature	10 to 40 °C		
Relative humidity	max. 80 % up to 31 °C, linearly decreasing to 50 % at 40 °C		
Installation location	Interiors, weatherproof		
Installation altitude	≤ 2,000 m above sea level		
Protection class	I		
Excess voltage category	II		
Protection degree	IP30		
Pollution degree	2		
Materials on vacuum side			
Capillary hose	PTFE, stainless steel, FKM		
Gas inlet	Stainless steel, FKM		
Orifice	Platinum/Iridium		
Vacuum chamber	Aluminum/stainless steel		
Analyzer	Stainless steel, copper, silver, gold, quartz glass, ceramic		
Filament	Ir-Y_2O_3 or W		
Turbopump	Aluminum, stainless steel, epoxy resin, lubricant		
Diaphragm Pump	EPDM, aluminum, PVC, brass, polyamide		
Total pressure gauge	Tungsten, stainless steel, nickel, molybdenum, glass		
Mains connection			
Voltage	100 to 240 V AC		
Frequency	50 to 60 Hz		
Power consumption	830 W		
Mains fuse	2× 10 A (slow)		
Relay			
Quantity, number	2		
Switching voltage	24 V AC/DC		
Switching current	1 A		
User interfaces			
Operation	Via color 7” touch display or web interface		
Software	PV MassSpec		
Data exchange	TCP/IP Ethernet		
Pump characteristics			

Configuration (mass range)	1 to 100 u	1 to 200 u	1 to 300 u
Operational readiness	After 10 minutes		
Time between switching off and restart	> 10 seconds		
Switch-off time	15 minutes		
User control			
Analog inputs	5× ±10 V, resolution 14 and 16 bit		
Digital inputs	4× nominal +24 V		
Analog outputs	4× 0 to 10 V, I_{max} = 10 mA, resolution 16 bit		
Digital outputs	6× open collector, nominal +24 V, I_{max} = 200 mA		
Number of relays	2		
Switching voltage of relays	24 V AC/DC		
Switching current of relays	1 A		
Relay for pumping system status	"USER IO" connection: Pins 13, 14 and 15		
Connector assembly	USER I/O: 15-pin D-Sub AUX I/O: 25-pin D-Sub		
Noise level			
< 50 dB at maximum operation			
Weight			
23 kg to 26 kg (depending on respective version)			

Tbl. 20: Technical data

18.3 Dimensions

Dimensions in mm.

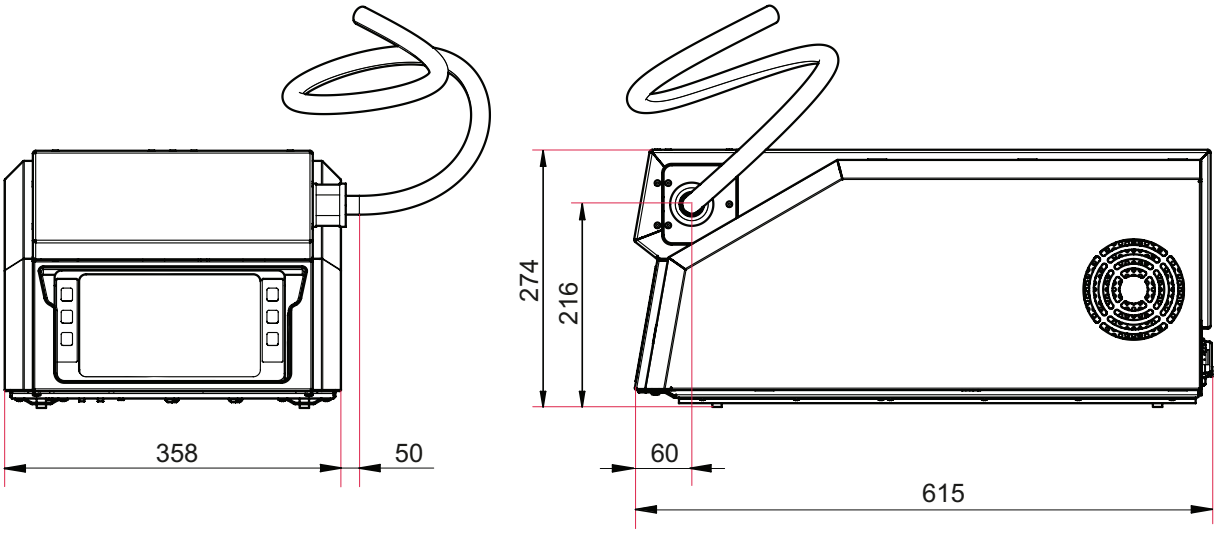


Fig. 69: Dimensions

TÜVRheinland®
CERTIFIED

The product GSD 350 OmniStar/ThermoStar

- conforms to the UL standards

UL 61010-1:2012 R4.16
Safety requirements for electrical equipment for measurement, control and laboratory use
Part 1: General requirements

UL 61010-2-010:2014
Safety requirements for electrical equipment for measurement, control and laboratory use
Part 2-010: Particular requirements for laboratory equipment for the heating of materials

- is certified to the CAN/CSA standards

CAN/CSA No. 61010-1:2012 + GI1 + GI2 (R2017)
Safety requirements for electrical equipment for measurement, control and laboratory use
Part 1: General requirements

CAN/CSA No. 61010-2-010:2014
Safety requirements for electrical equipment for measurement, control and laboratory use
Part 2-010: Particular requirements for laboratory equipment for the heating of materials

- conforms to the following rules and regulations

FCC, Title 47 CFR, Part 15, Subpart B
Telecommunication - Radio Frequency Devices - Unintentional Radiators

PFEIFFER VACUUM

Declaration of conformity

Declaration for product(s) of the type:

Gas analysis system
GSD 350 OmniStar
GSD 350 ThermoStar

We hereby declare that the listed product satisfies all relevant provisions of the following **European Directives**.

Electromagnetic compatibility 2014/30/EU
Restriction of the use of certain hazardous substances 2011/65/EU
Restriction of the use of certain hazardous substances, delegated directive 2015/863/EU

Harmonized standards and applied national standards and specifications:
IEC 61010-1:2010 + corr. :2011
IEC 61010-2-010:2014
EN ISO 12100:2010
EN 61326-1:2013
EN 55011:2009 + A1:2011
EN 61000-3-2:2014
EN 61000-3-3:2013
IEC 60529:1989 + A1:1999 + A2:2013

Signature:

Pfeiffer Vacuum GmbH
Berliner Straße 43
35614 Asslar
Germany

(Daniel Sälzer)
Managing Director

Aßlar, 2020-06-10

CE

PFEIFFER VACUUM

VACUUM SOLUTIONS FROM A SINGLE SOURCE

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We are the only supplier of vacuum technology that provides a complete product portfolio.

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Benefit from our know-how and our portfolio of training opportunities!
We support you with your plant layout and provide first-class on-site service worldwide.

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Are you looking for a perfect vacuum solution? Please contact us

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