



OPERATING INSTRUCTIONS

EN

Translation of the Original

QMG 250 PRISMAPRO®

Compact mass spectrometer

PFEIFFER  **VACUUM**

Dear Customer,

Thank you for choosing a Pfeiffer Vacuum product. Your new mass spectrometer should 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.

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We reserve the right to make changes to the technical data and information in this document.

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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
Operating instructions "PrismaPro Web UI" QMG 250	BG 6002
Quick-Start Guide "PrismaPro" QMG 250	BG 6003
Software documentation PV MassSpec	Part of the software
Declaration of conformity	Part of this manual

Tbl. 1: Applicable documents

1.1.2 Variants

This document applies to products with the following part numbers:

Part number	Designation
PT M15 ...	QMG 250 PrismaPro (Faraday)
PT M16 ...	QMG 250 PrismaPro (EM/Faraday)

Tbl. 2: QMG 250 PrismaPro

Part number	Short description	Mass range [u]	Detector	Ion source	Filament material	Wiring
PT M25 411	QMA 250 F1	1-100	Faraday	open	W	Nickel
PT M25 412					Ir-Y ₂ O ₃	
PT M25 413	QMA 250 M1		Faraday/EM	C/B	W	
PT M25 414					Ir-Y ₂ O ₃	
PT M25 415			Grid	W	Copper, silver-plated	
PT M25 416				Ir-Y ₂ O ₃		
PT M25 419				W		
PT M25 421	QMA 250 F2	1-200	Faraday	open	W	Nickel
PT M25 422					Ir-Y ₂ O ₃	
PT M25 423	QMA 250 M2		Faraday/EM	C/B	W	
PT M25 424					Ir-Y ₂ O ₃	
PT M25 425			Grid	W	Copper, silver-plated	
PT M25 426				Ir-Y ₂ O ₃		
PT M25 429				W		

Other materials against vacuum: stainless steel, ceramic (Al₂O₃), glass, gold

Part number	Short description	Mass range [u]	Detector	Ion source	Filament material	Wiring
PT M25 431	QMA 250 F3	1-300	Faraday	open	W	Nickel
PT M25 432					Ir-Y ₂ O ₃	
PT M25 433	QMA 250 M3		Faraday/EM		W	
PT M25 434					Ir-Y ₂ O ₃	
PT M25 435			C/B	W	Copper, silver-plated	
PT M25 436				Ir-Y ₂ O ₃		
PT M25 439	Grid	W				

Other materials against vacuum: stainless steel, ceramic (Al₂O₃), glass, gold

Tbl. 3: Analyzer QMA 250

Part number	Short description	Mass range [u]	Input/Output	Version
PT M28 641	QME 250 M1	1-100	Standard (without IO 250)	straight
PT M28 642	QME 250 M2	1-200		
PT M28 643	QME 250 M3	1-300		
PT M28 651	QME 250 M1	1-100	expanded (with IO 250)	
PT M28 652	QME 250 M2	1-200		
PT M28 653	QME 250 M3	1-300		

Tbl. 4: Electronic unit QME 250

The part number is found 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 in mm).

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

Pictographs used in the document indicate useful information.



Note



Tip

1.3.3 Product sticker

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

	<p>Rating plate</p> <p>You can find the rating plates for the overall system (QMG 250), the electronic unit (QME 250) and the analyzer (QMA 250) at the bottom of the QME 250 electric unit. The analyzer rating plate is also attached to the analyzer.</p>
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1.3.4 Abbreviations

Abbreviation	Explanation
AI	Analog Input (analog input)
C/B	Crossbeam
DEC	Digital Emission Controller (digital emission controller)
DHCP	Dynamic Host Communication Protocol (communication protocol for assigning the network configuration)
DI	Digital input (digital input)
DSP	Digital Signal Processing (digital signal processing)
EM	Electron Multiplier (electron multiplier)
ESD	Electrostatic Discharge (electrostatic discharge)
FC-5311	FC-5311 is a Perfluoro(tetradecahydrophenantrene) isomer mixture for mass scale calibration in the mass range of up to 624 u.
FRU	Field Replaceable Unit

Abbreviation	Explanation
HD	High Density (high density, with D-Sub connections with low pin spacing)
HF	High Frequency
HV	High Voltage (high voltage)
IP	Internet Protocol (Internet Protocol)
IQ	Ion source
LAN	Local Area Network (local network)
ME	Unit of quantity
PV	Pfeiffer Vacuum
RF	Radio Frequency (high frequency)
RGA	Residual Gas Analysis (residual gas analysis)
UTP	Unshielded Twisted Pair (unshielded cable with twisted pair of wires)
Web UI	User Interface via web connection (user interface)

Tbl. 5: Abbreviations used

1.4 Trademarks

- PrismaPro® is a trademark of Pfeiffer Vacuum GmbH.
- Windows® is a trademark of the Microsoft Corporation.

2 Safety

2.1 General safety information

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

⚠ DANGER
<p>Immediately pending danger Indicates an immediately pending danger that will result in death or serious injury if not observed.</p> <ul style="list-style-type: none"> ▶ Instructions to avoid the danger situation

⚠ WARNING
<p>Potential pending danger Indicates a pending danger that could result in death or serious injury if not observed.</p> <ul style="list-style-type: none"> ▶ Instructions to avoid the danger situation

⚠ CAUTION
<p>Potential pending danger Indicates a pending danger that could result in minor injuries if not observed.</p> <ul style="list-style-type: none"> ▶ Instructions to avoid the danger situation

NOTICE
<p>Danger of damage to property Is used to highlight actions that are not associated with personal injury.</p> <ul style="list-style-type: none"> ▶ Instructions to avoid damage to property

i	<p>Notes, tips or examples indicate important information about the product or about this document.</p>
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2.2 Safety instructions

i	<p>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.</p>
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Risks during installation

⚠ DANGER
<p>Danger to life caused by electric voltage on the QME electronic unit You may only attach the electronic unit to a correctly installed QMA analyzer (earth connection). The 24 V supply line of the SP current supply may never be connected if the connection of the QMA Analyzer is not screwed tight to the QME electronic unit. Only qualified service personnel may open the QME electronic unit.</p> <p>There are no parts in the QME electronic unit that should be maintained by the user.</p> <ul style="list-style-type: none"> ▶ Install the QMA analyzer correctly before installing the QME electronic unit. ▶ Establish a correct earth connection between the components. ▶ Only have the QME electronic unit opened by qualified service personnel. ▶ Never operate the QME electronic unit when opened.

⚠ DANGER**Danger to life caused by electric voltage on the analyzer**

During operation, dangerous voltage is present on the electrode system of the QMA analyzer. In unfavorable conditions, other parts installed in the vacuum chamber (e.g. gauges) may be exposed to this, and become dangerous to touch. (Also take into account lines and connected devices) You must arrange or protect these installed parts so that no contact, galvanic connection, flashover, or charge carrier flow can occur.

- ▶ Make sure that the QMA, vacuum chamber, and entire apparatus always have a proper connection to protective earth.
- ▶ Provide additional protection if the user can touch the analyzer when the vacuum system is open.
- ▶ Ensure mechanical protection against contact of the analyzer and the parts installed.
- ▶ Ensure compulsory separation of the current supply when opening the system (e.g. using a door contact).

⚠ 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.
 - After switching off, wait about 60 seconds and then disconnect all cables (power cable at the end).
- ▶ Never open the device with the current supply connected.
- ▶ Secure the current supply against unauthorized or unintentional reactivation.
- ▶ Do not insert any objects into the vent openings.
- ▶ Never open an external power supply unit.
- ▶ Never operate an open or defective device.
- ▶ Secure a defective device against accidental operation.
- ▶ Protect the device against moisture.

⚠ 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.

Risks during operation**⚠ 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

⚠ 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.

⚠ WARNING

Risk of burns during baking out

During or immediately after the baking out, the heating jacket and the metal surfaces near to the heating jacket are extremely hot. The metal surfaces can reach a temperature of over 100 °C. This causes burns if you do not wear suitable personal protective equipment.

- ▶ When baking out, always wear personal protective equipment (for example protective gloves).
- ▶ Never touch surfaces without suitable protective gloves, either during or directly after baking out.

Risks when shipping

⚠ WARNING

Risk of poisoning from contaminated products

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

- ▶ Comply with the instructions for safe shipping.

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.

i

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.

Safety aspects

If you use the device in a manner not specified by Pfeiffer Vacuum, protection provided by the device may be impaired.

Poisonous substances

The analyzer does not contain any poisonous substances.

If however, you want to use the analyzer in an application in which poisonous substances are used or generated, there will be residues of the poisonous substances on the surface of the analyzer.

When handling contaminated analyzers, you must meet appropriate safety precautions that guarantee the safety of the maintenance personnel.

Radiation

It is not known that the device generates harmful radiation.

Electric voltage

The device does not pose any electrical hazard, when connected and earthed in accordance with the installation instructions.

General safety precautions when handling the product

- ▶ When handling the gases and contaminated parts used, observe the applicable guidelines.
- ▶ Observe the protective measures.
- ▶ Observe the safety guidelines specified in this document.
 - All work is only permissible when observing the relevant guidelines and adhering to the protective measures.
- ▶ Inform yourself about any contamination before starting work.
- ▶ Pass on safety instructions to all other users.

2.4 Proper use

The compact mass spectrometer is used for partial pressure analysis. Typical applications are measurement, monitoring and process control tasks in vacuum systems.

- ▶ Install, operate and maintain the product only in accordance with these operating instructions.
- ▶ Comply with the application limits.
- ▶ Observe the technical data.

2.5 Foreseeable improper use

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 (for this purpose, see: Technical data)
- Use for measurements whose results determine the safety of persons or large values
- Use with corrosive or explosive media
- Use outdoors
- Use after technical changes (inside or outside on the product)
- Use with replacement or accessory parts that are inadequate or are not approved

2.6 Responsibilities and warranty

Pfeiffer Vacuum shall assume no responsibilities and warranty if the operating company or a third party:

- disregards this document.
- does not use the product for its intended purpose.

- carries out any modifications to the product (conversions, changes, maintenance work, etc.) that are not listed in the corresponding operating instructions.
- operates the product with accessories that are not listed in the corresponding operating instructions.

The operator is responsible for the process media used.

2.7 Owner requirements

Safety-conscious working

1. Only operate the product in a technically flawless state.
2. Operate the product in line with its intended purpose, safety and hazard-conscious and only in compliance with these operating instructions.
3. Fulfill the following instructions and monitor the observation of the following instructions:
 - Proper use
 - Generally applicable safety instructions and accident prevention regulations
 - International, national and locally applicable standards and guidelines
 - Additional product-related guidelines and regulations
4. Only use original parts or parts approved by Pfeiffer Vacuum.
5. Keep the operating instructions available at the place of installation.
6. Ensure personnel qualification.

2.8 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.

2.8.1 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.

2.8.2 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

2.8.3 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](#).

2.9 Operator requirements

Observing relevant documents and data

1. Read, observe and follow this operating instruction and the work instructions prepared by the operating company, in particular the safety and warning instructions.
2. Install, operate and maintain the product only in accordance with these operating instructions.
3. Carry out all work only on the basis of the complete operating instructions and applicable documents.
4. Comply with the application limits.
5. Observe the technical data.
6. Please contact the Pfeiffer Vacuum Service Center if your questions on operation or maintenance of the product are not answered by these operating instructions.
 - You can find information in the [Pfeiffer Vacuum service area](#).

3 Product description

3.1 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.

3.2 Scope of delivery

The shipment includes the following parts:

Designation	Quantity	Part number	Description
Complete unit			
QMG 250 PrismaPro	1	PT M15 ... or PT M16 ...	Complete unit
Analyzer QMA 250	1	PT M25 4.	
Transport protection for QMA 250	1	PT 163 502 PT 163 503	Faraday EM
Intermediate piece for QMA 250 M	1	PT 163 501	Additionally installed intermediate piece, DN 40 CF, 116 mm long
Copper seal	1	490DFL040-S-G-S5	Silver-plate, DN 40 CF-F
electronic unit QME 250	1	PT M28 6.	with or without integrated optional IO 250 I/O module
SP 250 Power supply unit	1	PT 163 504	external power supply unit with mains cable (100–240 V(AC) / 24 V, 80 W (DC))
installation hardware and small parts			
Analyzer installation kit	1	-	<ul style="list-style-type: none"> ● fastening nut ● O-ring ● 6 sets hexagon head set screws with nuts (M6) and washers
Socket key	1	PT 163 508	For filament replacement
Installation tool	1	PT 163 510	For QMA 250 analyzer
connector assembly and cable			
Ethernet cable	1	PT 163 512	UTP patch cable, red, length 3 m, crossed connection
D-sub plug	1	-	15-pin, male, with housing and strain relief
HD D-sub plug ¹⁾	1	-	62-pin, male, with housing and strain relief
Cable plug ²⁾	1	-	Amphenol, 6-pin, male, for measuring tube connection
Documentation			
Operating instructions	1	-	multilingual
Quick-Start Guide	1	-	multilingual
Miscellaneous			
Test log	1	-	Available on device

1) Only in conjunction with IO 250 I/O module option

2) Only in conjunction with IO 250 I/O module option

Designation	Quantity	Part number	Description
Web UI	1	-	Available on device
PV MassSpec software	1	-	Can be downloaded via PV cloud

Tbl. 6: Shipment

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.

3.3 Operating principle

The PrismaPro compact mass spectrometer is a quadrupole mass spectrometer that can be used in the high or ultra-high vacuum range for a qualitative and quantitative gas analysis, for leak detection and for determination of trace contamination.

An electron beam ion source ionizes the neutral gas particles. A high-frequency electric quadrupole field separates the generated ions from one another according to their mass to charge ratio. The detection of the filtered ions is carried out using a Faraday Cup or secondary electron multiplier (EM). In doing so, the ion flow detected is proportional to the partial pressure of the respective gas components.

The quadrupole mass spectrometer system is a relative measuring instrument. For a more accurate quantitative gas analysis, you must calibrate it with suitable calibration gases. The quadrupole mass spectrometer system electronics generate and control the direct, high, and HF voltages required for the ion sources, mass filter, and detector.

You can configure and operate the quadrupole mass spectrometer via a web-based UI, or the PV MassSpec quadrupole software. PV MassSpec also allows you to evaluate, store, and compare measured data.

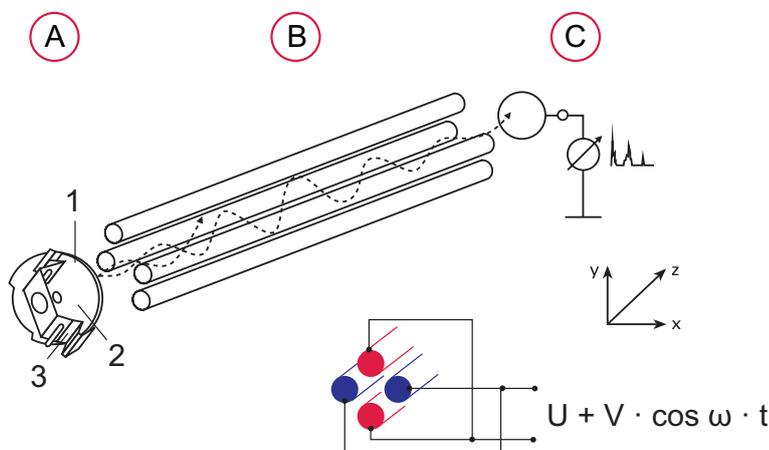


Fig. 1: Principle of the quadrupole mass spectrometer system

- A Ion formation in the ion source from electron impact ionization
 - 1 Ion optic
 - 2 Formation room
 - 3 Filament
- B Ion separation according to the ratio mass to charge
- C Ion detection in the ion detector

3.4 System overview

3.4.1 Structure of the system

The PrismaPro is comprised of 4 main components:

- Analyzer (see chapter “Analyzer QMA 250”, page 21)
- Electronic unit (see chapter “Electronic unit QME 250”, page 22)
- Power supply unit with mains cable
- PV MassSpec software (see chapter “PV MassSpec software”, page 23)

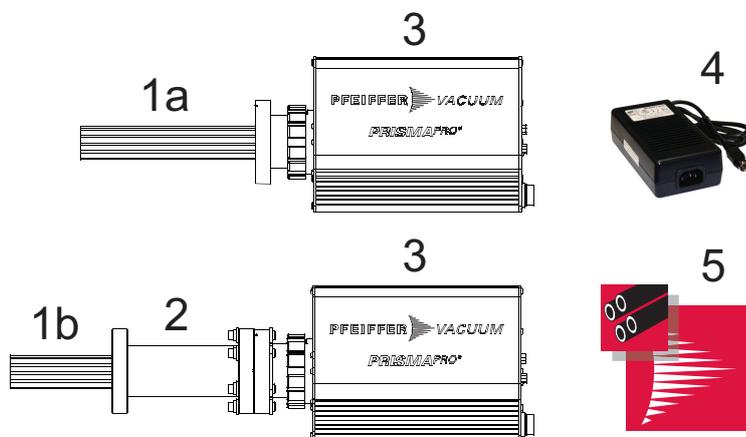


Fig. 2: PrismaPro overview

- 1 Analyzer
 - 1 QMA 250 F Analyzer (with Faraday Cup)
 - a
 - 1 QMA 250 M Analyzer (with EM)
 - b
 - 2 Intermediate piece (only with EM version)
- 3 Electronic unit QME 250
- 4 Power supply unit with mains cable
- 5 PV MassSpec software

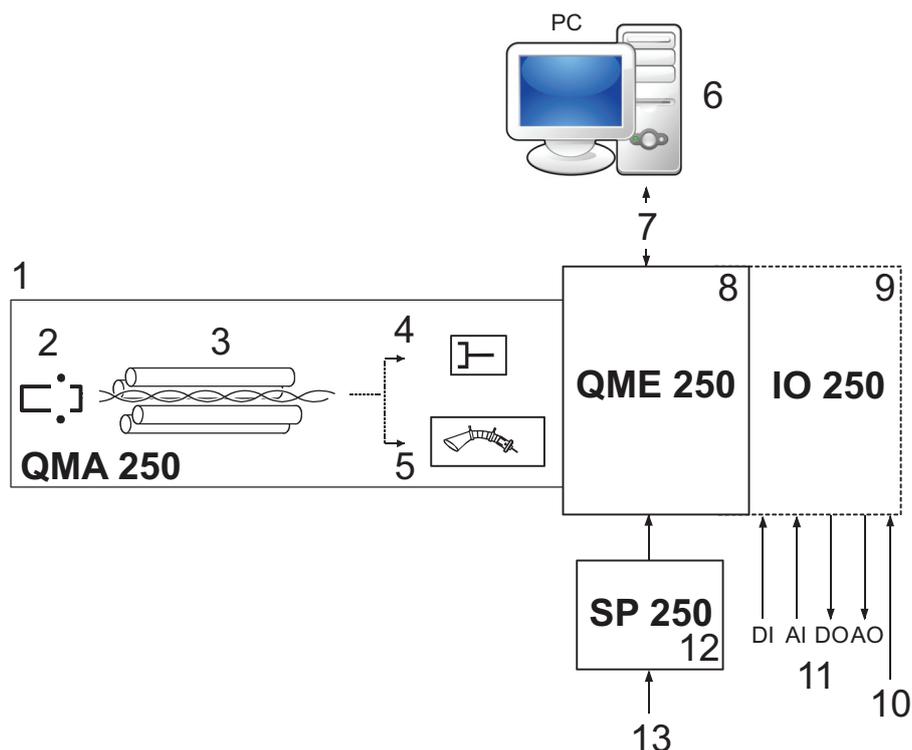


Fig. 3: System overview

- | | |
|--------------------------------------|---|
| 1 Analyzer QMA 250 | 8 Electronic unit QME 250 |
| 2 Ion source | 9 Input / Output module IO 250 (optional) ³⁾ |
| 3 Mass filter | 10 Gauges |
| 4 Faraday detector | 11 Additional inputs and outputs (analog / digital) |
| 5 Secondary electron multiplier (EM) | 12 SP 250 power supply |
| 6 PV MassSpec software | 13 Mains |
| 7 Connection to the PC (Ethernet) | |

Web UI and PV MassSpec

You can operate the PrismaPro via the Web UI user interface as well as also via the highly comprehensive PV MassSpec software. You can however only store measured data and measurement result evaluations with PV MassSpec. For the operation of PV MassSpec, you need a PC with Windows operating system (Windows 7 or higher).

Detailed information on the use of PrismaPro Web UI can be found in the corresponding operating instructions.

3.4.2 Analyzer QMA 250

The analyzer basically consists of the following:

- Ion source
- Quadrupole mass filter
- Ion detector

There are 2 variants of ion detectors:

- QMA 250 F analyzer
 - with Faraday cup
- QMA 250 M analyzer
 - with combination of Faraday cup and secondary electron multiplier (EM) and intermediate piece DN 40 CF-F (116 mm)

³⁾ Use of the optional IO 250 I/O module enables use of additional interfaces. You can order the QME 250 electronic unit with pre-installed IO 250. Pfeiffer Vacuum can however also retrofit this with a IO 250.

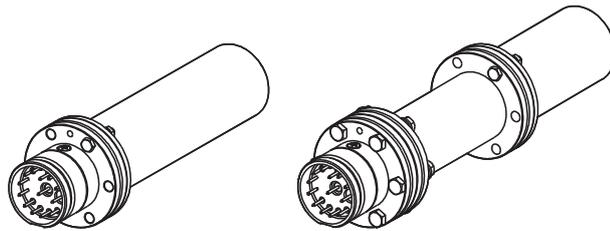


Fig. 4: QMA 250 F/M analyzers (with transport protection)

The secondary electron multiplier (EM) is a current amplifier working under high-vacuum conditions. Analyzers with EM are used for residual gas and trace gas analysis at very low total pressure and applications in which a high measuring speed is required.

Analyzers with Faraday detector serve the residual gas analysis in the total pressure range $> 10^{-7}$ hPa. Pfeiffer Vacuum supplies the analyzer with Faraday cup in the open ion source version only. The QMA 250 M is optionally available with open ion source, cross beam ion source, or grid ion source.

Type	Description
open ion source	Standard ion source with the highest sensitivity
Cross beam ion source	for molecular beam applications
Grid ion source	for residual gas analysis in UHV ($< 10^{-8}$ hPa)

Tbl. 7: Ion source for QMA 250 M

3.4.3 QMA 250 analyzer contacts

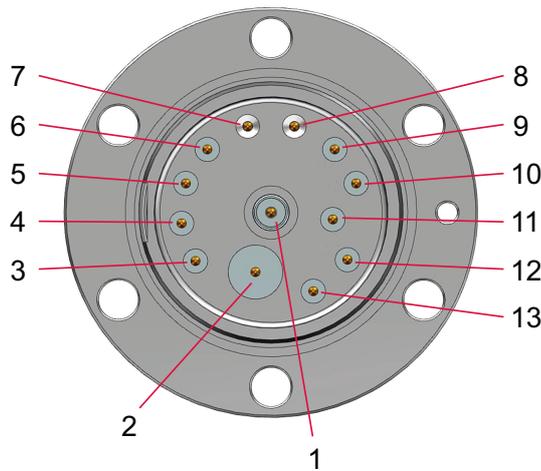


Fig. 5: QMA 250 analyzer implementation

- | | |
|---------------|------------------------|
| 1 PP (signal) | 8 GND |
| 2 EM HV | 9 RF+ |
| 3 Filament 1 | 10 Filament Common |
| 4 Filament 2 | 11 Reserved |
| 5 Anode | 12 Focus |
| 6 RF- | 13 TP (total pressure) |
| 7 GND | |

3.4.4 Electronic unit QME 250

The electronic unit is located on the analyzer and communicates with the host computer.

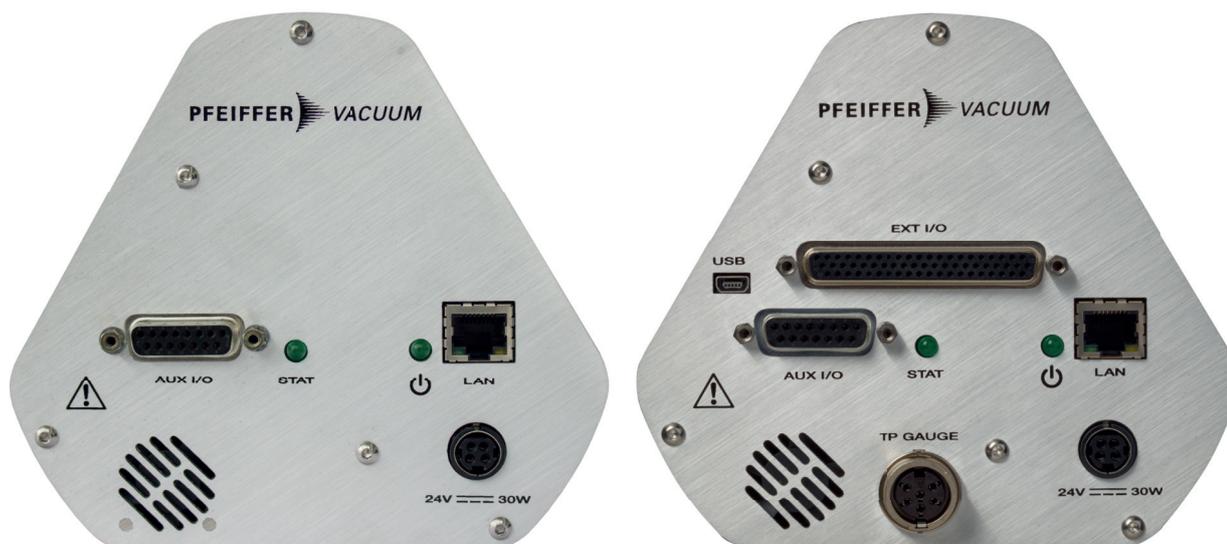


Fig. 6: QME 250 front panel: left standard, right with IO 250

Designation	Explanation	Note
<AUX I/O> socket	I/O interface (standard)	1 analog input 2 digital inputs 1 relay (see chapter "AUX I/O", page 24)
<LAN> socket	Ethernet connection (PC)	(see chapter "Ethernet (LAN)", page 24)
<24 V = 30 W> socket	Connecting socket for QME 250 current supply SP 250	(see chapter "POWER SUPPLY", page 24)
<USB> socket (Only with IO 250)	USB connection	(see chapter "USB", page 27)
<EXT I/O> socket (Only with IO 250)	I/O interface (extended)	8 analog outputs and inputs each 5 digital inputs 10 digital outputs (see chapter "EXT I/O", page 25)
<TP GAUGE> socket (Only with IO 250)	Gauge connection	ActiveLine or DigiLine with analog relay option (xPT 200 AR). (see chapter "TP GAUGE", page 27)
LED <STAT>	Display: Emission status	Switch the emission on or off
LED <POWER> 🔌	Display: Power supply available	(see chapter "Connecting the current supply", page 33)

Tbl. 8: Front panel elements

3.4.5 PV MassSpec software

You can configure and operate the PrismaPro mass spectrometer system with the PV MassSpec software. The software allows you to display, evaluate, compare, and store measured data.

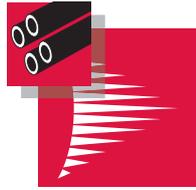


Fig. 7: PV MassSpec

3.5 Interfaces

3.5.1 POWER SUPPLY

The <24V = 30W> connection is comprised of a 4-pin lockable mains part socket that is insulated internally from the system earthing.

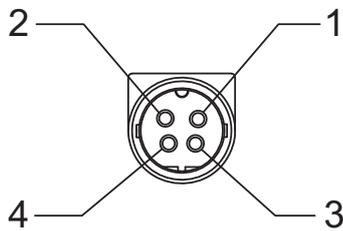


Fig. 8: View on the mains part plug

- 1 V-
- 2 V-
- 3 V+
- 4 V+

3.5.2 Ethernet (LAN)

The <LAN> connection is comprised of a 8-pin RJ-45 socket.

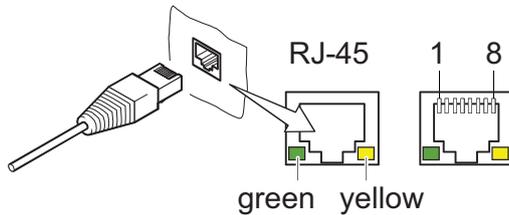


Fig. 9: Ethernet connection

- 1 Transmission data (TD+)
- 2 Transmission data (TD-)
- 3 Reception data (RD+)
- 4, 5, 7, 8 Not used
- 6 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. 9: Status of the Ethernet connection

3.5.3 AUX I/O

The <AUX I/O> connection is comprised of a 15-pin D-Sub socket.

The PrismaPro electronic unit QME supports I/O functions via the <AUX I/O> connection on the front panel.

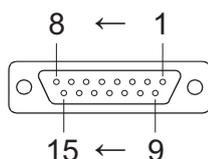


Fig. 10: AUX I/O (15-pin D-Sub socket)

1	Relay (COM)	10	Analog input 1 (-)
2	Relay (NO)	13	Digital input 1 (pre-setting: Emission OFF)
3	Relay (NC)	14	Digital input 0 (pre-setting: Emission ON)
7	0 V (GND for 24 V output)	15	GND
8	+ 24 V (output, max. 1 A)	4, 5, 6, 11, 12	unassigned
9	Analog input 1 (+)		

Contact types

- COM: Change-over contact (common)
- NC: Normally closed contact
- NO: Normally open contact

Relay

The status relay output is active (closed) when the emission is switched on.

- Emission ON: Pin 1 + Pin 2 connected = Relay closed.
- Emission OFF: Pin 1 + Pin 2 not connected = Relay open.
- Contact load: 24 V (DC) at 0.5 A



The pre-setting for the relay output specifies the status of the emission. You can, however, allocate the relay to other switching functions in the PV MassSpec software.

Analog input

The analog input (Pins 9 and 10) are differential and process inputs between 0 and +10 V.

PV MassSpec supports the analog input.

Digital inputs

PV MassSpec software reads the inputs DI 0 and DI 1 (pins 13 and 14) to remotely control the emission status by default. However, you can use the digital inputs for other functions via the PV MassSpec software.

- Emission ON: Pin 14 + Pin 15 connected.
- Emission OFF: Pin 13 + Pin 15 connected.



Use of digital inputs for controlling the emission

The control of the emission through the digital inputs bypasses all software and hardware locks.

In this case, you must develop a locking mechanism that does not allow the emissions to be switched on when the pressure for operation of the PrismaPro is too high.

3.5.4 EXT I/O

The <EXT I/O> connection is comprised of a 62-pin HD D-Sub socket.

The PrismaPro QME electronic unit supports advanced I/O functions via the <EXT I/O> connection on the front panel, if you have installed the optional IO 250.

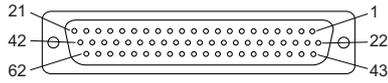


Fig. 11: EXT I/O (62-pin HD D-Sub socket)

1	Digital input 13	32	Digital output 9
2	Digital input 14	33	Digital output 10
3	Digital input 15	34	Digital output 11
4	Digital input 16	35	Analog output 4
5	Digital input 17	36	Analog output 5
7	Digital output 2	37	Analog output 6
8	Digital output 3	38	Analog output 7
9	Digital output 4	21, 39, 40, 60	+24 V ⁴⁾
10	Digital output 5	20, 41, 42, 62	0 V ⁵⁾
12	Analog output 3	43	Analog input 6 (+)
14	Analog output 2	44	Analog input 6 (-)
16	Analog output 1	45	Analog input 7 (+)
18	Analog output 0	46	Analog input 7 (-)
22	Analog input 2 (+)	47	Analog input 8 (+)
23	Analog input 2 (-)	48	Analog input 8 (-)
24	Analog input 3 (+)	49	Analog input 9 (+)
25	Analog input 3 (-)	50	Analog input 9 (-)
26	Analog input 4 (+)	51	Digital output 6
27	Analog input 4 (-)	52	Digital output 7
28	Analog input 5 (+)	6, 19, 30, 53, 54, 61	GND_Signal
29	Analog input 5 (-)	11, 13, 15, 17, 55, 56, 57, 58, 59	Analog ground
31	Digital output 8		

Analog outputs

- 8 16 bit analog output channels (analog output 0 to 7)
- Voltage range: 0 to 10 V

Analog inputs

- 8 16 bit differential analog input channels (analog input 2 to 9)
- Voltage range: +/- 10 V

Digital outputs

- 10 digital output channels (digital output 2 to 11), open collector

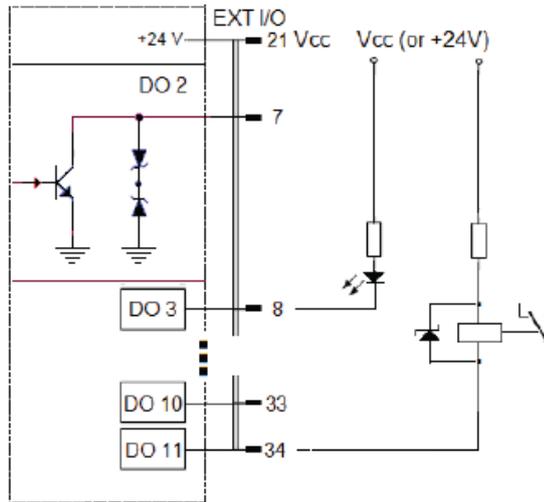


Fig. 12: Connection example: digital output (EXT I/O)

Digital inputs

- 5 digital input channels (digital input 13 to 17), low active

4) * The 24 V supply voltage is available at Pins +24 V/0 V for switching with digital inputs / outputs. Together, a maximum of 1 A current may flow through.

5) * The 24 V supply voltage is available at Pins +24 V/0 V for switching with digital inputs / outputs. Together, a maximum of 1 A current may flow through.

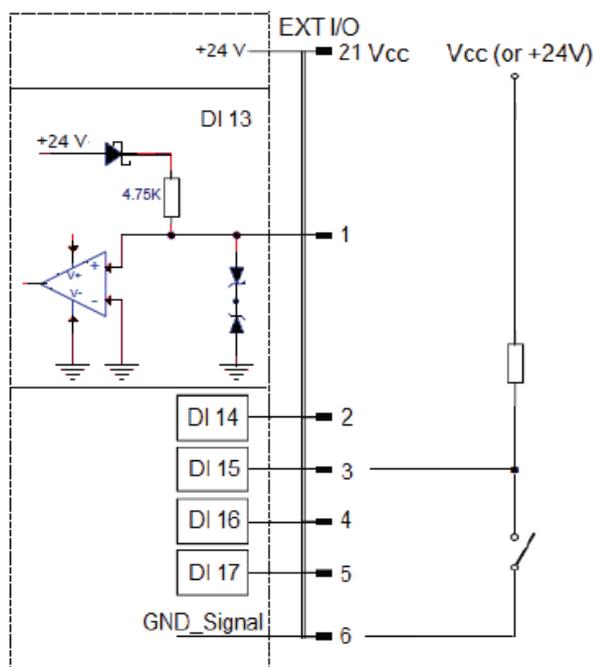


Fig. 13: Connection example: Digital input (AUX I/O and EXT I/O)

3.5.5 TP GAUGE

The <TP GAUGE> connection is comprised of a 6-pin Amphenol C 091 A socket.

Here you can connect gauges of the Pfeiffer Vacuum ActiveLine or DigiLine with analog relay option (AR); for example to protect the mass spectrometer against unintentional increase in pressure.

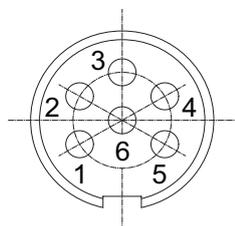


Fig. 14: TP GAUGE (6-pin Amphenol C 091 A socket)

- | | |
|---|--|
| 1 Identification | 4 Analog ground (measurement signal -) |
| 2 Earth (GND) | 5 Screening, shielding |
| 3 Signal input (measuring signal 0 to +10 V DC) | 6 Supply voltage (+24 V DC) |

3.5.6 USB

The mini USB connection <USB> is reserved for use by Pfeiffer Vacuum service personnel, for service purposes.

4 Transport and storage

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

- ▶ Observe the weight specified on the transport packaging.
- ▶ Where possible, always transport or ship the product in the original transport packaging.
- ▶ Always use dense and impact-proof transport packaging for the product.
- ▶ Remove the existing protective cover and transport protections only immediately prior to installation.
- ▶ Reattach transport locks and transport protections prior to each transport.

4.2 Storing the product

NOTICE

Damage caused by improper storage

Improper storage will lead to damage to the product.

Static charging, moisture, etc. lead to defects on the electronic components.

- ▶ 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 Installing the product

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.
 - After switching off, wait about 60 seconds and then disconnect all cables (power cable at the end).
- ▶ Never open the device with the current supply connected.
- ▶ Secure the current supply against unauthorized or unintentional reactivation.
- ▶ Do not insert any objects into the vent openings.
- ▶ Never open an external power supply unit.
- ▶ Never operate an open or defective device.
- ▶ Secure a defective device against accidental operation.
- ▶ Protect the device against moisture.

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.

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.
- ▶ During assembly, ensure for connecting flanges free of grease.
- ▶ Only remove protective caps and protective covers from flanges and connections when necessary.
- ▶ Only remove the analyzer transport protection when necessary.
- ▶ Carry out all work in a well lit area.



Easy access

During the installation, we recommend ensuring an easy access to the device for future installation and maintenance work.

The system components and connections must be installed in the following sequence:

1. Analyzer (see chapter “Installing the Analyzer”, page 30)
2. Electronic unit (see chapter “Installing the electronic unit”, page 32)
3. Communication cable from the host computer to the electronic unit (see chapter “Establishing the Ethernet connection”, page 33)
4. Current supply (see chapter “Connecting the current supply”, page 33)

5.2 Installing the Analyzer

⚠ DANGER

Danger to life caused by electric voltage on the analyzer

During operation, dangerous voltage is present on the electrode system of the QMA analyzer. In unfavorable conditions, other parts installed in the vacuum chamber (e.g. gauges) may be exposed to this, and become dangerous to touch. (Also take into account lines and connected devices) You must arrange or protect these installed parts so that no contact, galvanic connection, flashover, or charge carrier flow can occur.

- ▶ Make sure that the QMA, vacuum chamber, and entire apparatus always have a proper connection to protective earth.
- ▶ Provide additional protection if the user can touch the analyzer when the vacuum system is open.
- ▶ Ensure mechanical protection against contact of the analyzer and the parts installed.
- ▶ Ensure compulsory separation of the current supply when opening the system (e.g. using a door contact).

NOTICE

Damage to the analyzer caused by external voltages and magnetic fields

Never expose the analyzer electrode system to external voltages that are hazardous in the event of contact, as a result of galvanic connections, contact, flashover, plasma, ion or electron beams, etc. If such danger sources exist in the vacuum chamber, you must provide protective measures that safely rule out such influences. Even smaller external voltages acting on the analyzer will lead to damage to the electronics and unreliable measuring results.

- ▶ Meet appropriate protective measures against external voltages (e.g. for better arrangement, shielding, earthing, etc.).
- ▶ Do not mount the analyzer near to magnetic fields with > 2 Gauss.
- ▶ Ensure mechanical protection against contact of the analyzer and the parts installed.
- ▶ Ensure compulsory separation of the current supply when opening the system (using a door contact, for example).
- ▶ Observe the standards applicable for the vacuum system.

NOTICE

Impairment of the function caused by incorrect installation

You must install the QMA analyzer correctly in terms of vacuum technology, so that the gases to be tested have unobstructed access to the analyzer. This is the only way to correctly determine the gas composition in the vacuum chamber. When materials vaporize or vacuum coatings have deposited in the vacuum chamber, you must protect the analyzer against separation of these materials onto its surfaces, using a deflector plate or baffle.

- ▶ Always carry out a correct installation.
- ▶ Make sure that the gas exchange between the analyzer and the vacuum chamber is not impaired.
- ▶ Install a cover plate or a baffle in order to avoid vacuum coating of the analyzer.
- ▶ Include the analyzer in the baking out area if you are heating the system.
 - You can also fit the analyzer with a separate heating.



Horizontal Analyzer positioning

The Analyzer is suitable for installation on the vacuum system in any position. Pfeiffer Vacuum recommends a horizontal mounting position. This has the following advantages:

- optimum protection of the QME electronic unit against falling debris
- easier installation
- easy access to the front panel

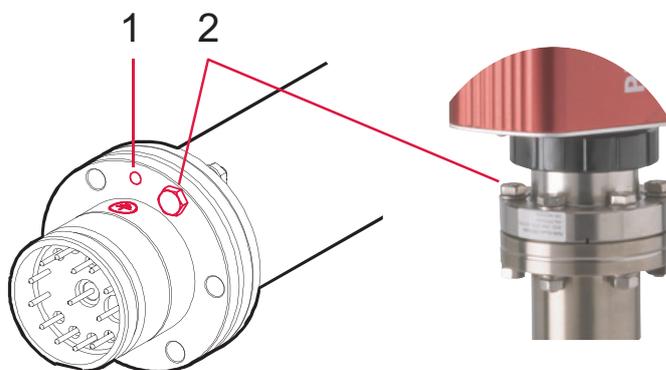


Fig. 15: Attaching the analyzer

- 1 Ground terminal (M4) 2 Position of the screw heads

QMA (Faraday) QMA (Faraday/EM)

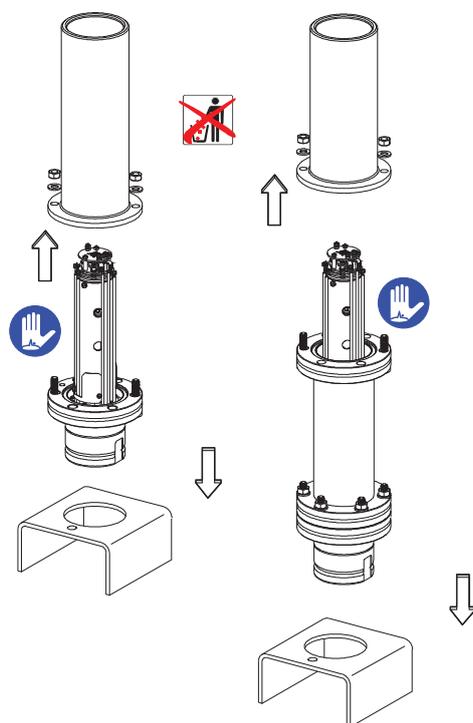


Fig. 16: Assembly aid and transport protection

Installing the Analyzer

You install the analyzer to a vacuum system with a CF flange DN 40.

Required tool

- Open-end wrench (2 pieces), 10 WAF

Spare parts required

- Copper gasket (490DFL040-S-G-S5, 1×)
 1. Place the Analyzer in the installation tool supplied.
 2. Carefully remove the transport protection and store in case it has to be used again in the future.
 3. Fix the analyzer to the vacuum chamber with a new copper gasket electrically conductive.
 - This properly earths the analyzer.
 4. Fix the screws with the screw heads on the same side as the electronic unit.
 - This prevents impairment between the black fixing nuts and the analyzer assembly material.
 5. **With vacuum equipment not earthed:** prepare a grounding conductor made of yellow-green or bare copper wires.
 - 2.5 mm² if mechanically protected
 - 4.0 mm² if unprotected
 6. Connect the analyzer flange to the functional earth using a separate grounding conductor.
 - There is a special ground terminal (M4) on the analyzer marked for this purpose.

5.3 Installing the electronic unit

⚠ DANGER**Danger to life caused by electric voltage on the QME electronic unit**

You may only attach the electronic unit to a correctly installed QMA analyzer (earth connection). The 24 V supply line of the SP current supply may never be connected if the connection of the QMA Analyzer is not screwed tight to the QME electronic unit. Only qualified service personnel may open the QME electronic unit.

There are no parts in the QME electronic unit that should be maintained by the user.

- ▶ Install the QMA analyzer correctly before installing the QME electronic unit.
- ▶ Establish a correct earth connection between the components.
- ▶ Only have the QME electronic unit opened by qualified service personnel.
- ▶ Never operate the QME electronic unit when opened.

NOTICE**Damage caused by overheating the QME electronic unit**

The ambient temperature must not exceed the permissible operating temperature of the device. The best performance is achieved when the QME electronic unit is not in the vicinity of high sources of heat where it is exposed to high temperature fluctuations.

- ▶ Ensure unobstructed air circulation.
- ▶ Make sure that the ventilator installed on the front panel is working during operation.
- ▶ Make sure that air can enter through the openings on the front panel of the QME and exit unobstructed at the back of the device.
- ▶ Observe the operating temperatures (see Technical data).

Installing the electronic unit

The PrismaPro Analyzer installation kit contains a fastening nut and an O-ring.

Prerequisites

- You have installed the UMA analyzer correctly on the vacuum chamber.

Required material

- Analyzer installation kit
 1. Slide the fastening nut over the end of the Analyzer.
 2. Place the O-ring on the end of the Analyzer.
 3. Roll the O ring down the Analyzer until it sits in the groove.
 4. Carefully insert the QME up to the notched mark on the previously installed QMA.
 - When doing this, ensure correct positioning through the earthing tongue and guide groove.
 5. Ensure that the QME is pushed back fully.
 6. Manually tighten the fastening nut on the electronic unit.
 - The fastening nut compresses the O-ring and ensures firm seating on the Analyzer housing.

5.4 Establishing an electrical connection

5.4.1 Establishing the Ethernet connection

As the PrismaPro is not equipped with its own operation elements, it can be operated using a PC (host computer) or via a network.

Connecting the Ethernet cable

- ▶ Connect the Ethernet cable supplied to the QME 250 electronic unit and the PC.

2 LEDs in the RJ-45 socket indicate the interface status (see chapter "Ethernet (LAN)", page 24).

5.4.2 Connecting the current supply

NOTICE

Damage caused by mechanical loading of electrical connections

Mechanical loads, violent movements, etc. load and damage electrical connections.

- ▶ Ensure strain relief for all electrical connections.

NOTICE

Impairment of electrical connections caused by external disruptive influences

For reasons of electromagnetic compatibility (EMC) (external disruptive influences), we strongly recommend a central grounding point for all devices coupled together (for example, pumping station, control unit, PC, recorder, etc.). A multiple socket, or even better, a common power distributor with mains switch fulfills this in a simple manner.

Exception: For computers that are installed far away from each other or a heavily disturbed environment.

- ▶ Use a multiple socket or a common mains distributor with mains switch.
- ▶ Route the control cable separately from the interference source.

Connecting the current supply to the electronic unit

Prerequisites

- You have protected the current supply against moisture.
 - The ambient conditions meet the specifications.
 - Sufficient and unobstructed ventilation is available.
1. Slide back the lock on the 24 V cable plug of the current supply.
 2. Connect the cable to the 24 V socket on the QME electronic unit.
 3. Release the lock to lock the plug to the QME.
 4. Connect the current supply mains cable to the power supply pack.
 5. Ensure that the on-site voltage has the required properties.
 - 100–240 V (AC)/50–60 Hz/80 W max.
 6. Plug the mains cable AC plug into a suitable outlet.
 7. Ensure that the <POWER> LED on the front panel lights up.
 8. Check the power connections if the <POWER> LED does not light up.

5.5 Connecting the gauges (only for QME with IO 250)



Automatic gauge detection of the QME

The QME detects the gauge type automatically when switched on.

After changing a gauge, you must disconnect the mains of the 24 V DC current supply of the QME for 10 seconds, and then reinsert it again.

The QME reads the new gauge type during this process.

The following gauges can be operated with installed I/O option (IO 250) on the QME:

Gauge type	Plug	Degas
PKR 251 / PKR 261 / PKR 360 / PKR 361	<TP GAUGE>	no
PBR 260		yes
TPR 270 / TPR 271 / TPR 280 / TPR 281		no
HPT 200 AR		no
PPT 200 AR		no
RPT 200 AR		no
MPT 200 AR		no

Tbl. 10: Applicable gauges

5.6 Establishing a network connection

The PrismaPro uses Ethernet as standard communication method and has an IP address and a MAC address.

- A network uses **IP addresses** as a means of identifying individual devices. IP addresses are unique in a network but are not universal which means that only one device in a network can have a certain IP address, but two devices in a separate network can have the same IP address.
- **MAC addresses** are another identification that is unique for each device. MAC addresses are never duplicated.

PV MassSpec uses IP addresses to localize and identify PrismaPro systems in a network.

You can find information on some general network variables that may influence the PrismaPro connection in the following sections.

5.6.1 IP addresses

NOTICE
<p>IP address conflicts when connecting several devices</p> <p>Pfeiffer Vacuum supplies each PrismaPro with the same default IP address. If you want to connect several PrismaPro devices, their IP addresses are therefore initially not yet unique and you have to change these. Otherwise the simultaneous connection of several PrismaPro devices will lead to IP address conflicts in the network.</p> <ul style="list-style-type: none"> ▶ First change the IP address of the devices that you want to connect in the network. ▶ Where possible, use static IP addresses. ▶ Then connect the devices to a network.

Standard IP address of the PrismaPro

- Network prefix: 192.168.x.xxx
- IP address: 192.168.1.100

The PrismaPro uses IPv4 IP addresses.

IPv4 IP addresses consist of 32 bits in dotted decimal notation. They consist of four decimal numbers from 0 to 255 that are each separated by dots, e.g. 192.168.1.100. Each part represents an octet.

Normally, IP addresses comprise one network prefix and one host protocol.

You can set IP addresses manually or automatically:

- **recommended:** You can set and manually adjust static (manual) IP addresses yourself.
- **not recommended:** Dynamic (automatic) IP addresses are set automatically by a host (DHCP).

An alternative to changing the PrismaPro IP address is changing the IP address of the host computer, to enable communication between the host computer and PrismaPro (see chapter “Changing the host computer IP address”, page 35).



Using IP addresses

We recommend the use of **static IP addresses** for the PrismaPro. For this purpose, you should reserve a block of addresses for the static use and ban them on the DHCP server (host). Conflicts with double IP addresses can be avoided as a result. If you connect the PrismaPro to an existing local network, a static IP address must be available for each PrismaPro installed. Consult your network administrator for assigning the IP addresses.



Static IP addresses protect against the loss of data

As PV MassSpec uses the IP address to identify each PrismaPro connected, the IP address must not be changed when operating the PrismaPro . With DHCP, the host can generate a new IP address each time if the PrismaPro goes off-line and back online again. DHCP can also automatically change the IP address if there is an IP address conflict in the network. If the PrismaPro IP address is changed during data acquisition, the PV MassSpec is not automatically reconnected with the PrismaPro as PV MassSpec does not recognize the new IP address assigned. 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 PrismaPro against the loss of communication and data.

5.6.2 Sub-networks

Standard Subnet mask of the PrismaPro

- Subnet mask: 255.255.0.0

A Sub-network is a logical visual sub-division of an IP network.

The division of an IP network into several Sub-networks is called as Sub-netting.

Sub-netting sets the region of the IP address that is used as network prefix for all IP addresses within a Sub-network. This is carried out via the Sub-network 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. 11: Examples for Sub-networks

The Sub-network masks specify which octet the IP address should use as network prefix.

To allow 2 network devices to communicate, these 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.

If 2 devices have 2 different network prefixes, this means that both devices are located in different Sub-networks.

5.6.3 Changing the PrismaPro IP address

There are 2 methods to change the IP address of the PrismaPro.

- with PrismaPro Web UI
- with PV MassSpec Search

Detailed information can be found in the corresponding operating instructions for the software.

5.6.4 Changing the host computer IP address



Administrator rights

The following steps apply to the Windows 7 operating system. Changing the host computer IP address requires administrator rights. Contact your system administrator if necessary.

**IP address 192.168.1.100**

The PrismaPro factory-assigned IP address is 192.168.1.100. It cannot be used here.

**Changing the IP address back to the default**

To change the IP address back to the default, carry out these steps again and replace the IPv4 properties with the default values.

Changing the host computer IP address

1. Click the **Start** button on the taskbar.
2. Click "**Control Panel**".
3. In the "Network and Internet" section, click "**View network status and tasks**".
4. Click "**Change adapter settings**".
5. Right-click on the existing connection (e.g. LAN). Select "**Properties**".
6. Select Internet Protocol Version 4 (**TCP/IPv4**). Click "**Properties**".
7. In the Properties menu, under "**Use the following IP address**", enter **IP address** 192.168.1.xxx and **Subnet mask** 255.255.0.0.
 - "xxx" must not be 100 in the IP address.
8. Confirm your entries with **OK**.
 - This sets the IP address to the selected manual IP address.
9. Close all open Control Panel windows.

5.7 Installing PV MassSpec

**Access credentials**

The access credentials can be found in the PrismaPro Web UI under the "HELP" menu.



Fig. 17: Desktop shortcut

Installing PV MassSpec

1. Open the directory in the Pfeiffer Vacuum Cloud.
2. Download the software.
3. Start the **software installation** by double-clicking  "PVMassSpec_Installer.exe".
4. If necessary, acknowledge the **User Account Control** prompt with "Yes".
5. Follow the installation in the wizard.
6. Accept the **license** with "Yes".
7. Enter your name and company name in the "**Customer Information**" window.
8. Confirm your entries with "Next".
 - The software performs and completes the installation, and stores the program data on the C drive in the newly created "Pfeiffer Vacuum" folder.

There is now a **desktop shortcut**.

5.8 Connecting the PrismaPro

Before you connect the PrismaPro, you have to determine

- **into which network** you want to setup the PrismaPro,
 - into a **private network**, directly into a host computer or a router that is not connected to the internet or
 - into an **internal network**, where several computers are connected with access to the internet and
- **how many PrismaPro devices** you want to connect at the same time.

5.8.1 Connecting each individual PrismaPro

When you install the PrismaPro in a **private network** or connect it to a host computer directly, you may only change the PrismaPro IP address if the host computer used has a different network prefix to that of the PrismaPro.

The host computer must have the same network prefix and the same subnet mask as the PrismaPro. If this is not the case, you then have to change the IP address of the host computer according to the network prefix of the PrismaPro.

If you want to install the PrismaPro into an **existing local network**, the standard IP address of the PrismaPro may not be compatible with the network and you will have to change this.

5.8.2 Connecting several PrismaPro devices

NOTICE

IP address conflicts when connecting several devices

Pfeiffer Vacuum supplies each PrismaPro with the same default IP address. If you want to connect several PrismaPro devices, their IP addresses are therefore initially not yet unique and you have to change these. Otherwise the simultaneous connection of several PrismaPro devices will lead to IP address conflicts in the network.

- ▶ First change the IP address of the devices that you want to connect in the network.
- ▶ Where possible, use static IP addresses.
- ▶ Then connect the devices to a network.

If you want to connect several PrismaPro devices to one single **host computer** and not to an existing local network, you have to then setup a **private local network**.

You must install the PrismaPro on either a router or an Ethernet switch. Then connect the router or Ethernet switch to the host computer via the **LAN port** of the router/Ethernet switch.

If you want to install several PrismaPro devices into an **existing local network**, then use an Ethernet switch instead of the router.



Conflicts with local networks

Routers may cause conflicts with local networks as the router attempts to set IP addresses for all devices connected to the network.

As PrismaPro devices are connected to the network, each device must have an IP address assigned to it by a network administrator. After you have changed each IP address manually, connect all PrismaPro devices to the Ethernet switch and the Ethernet switch to the local network.

6 Commissioning

6.1 Before switching on, the following points must be fulfilled:

- The mains plug of the current supply has been removed. (see chapter “Connecting the current supply”, page 33)
- All system components are correctly mounted.
- The vacuum or system conditions are tested and fulfilled.
- The wiring of the system components are correct. (see chapter “Interfaces”, page 24)
- There is a LAN connection to the PC (direct or via a network). (see chapter “Ethernet (LAN)”, page 24)
- The PC is ready for operation and prepared according to the Software documentation.
- The technical data was observed. (see chapter “Technical data and dimensions”, page 68)
- Relevant operating instructions of other systems have been observed. (see chapter “Applicable documents”, page 8)
- The vacuum in the QMA analyzer has been checked before inserting the mains plug of the power supply.

The pressure must be as follows:

- $< 10^{-4}$ hPa for QMA 250 F (analyzer with Faraday detector)
- $< 10^{-5}$ hPa for QMA 250 M (analyzer with EM/Faraday detector)

After checking the points above, you can switch on the system.

6.2 Switch on the device

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.
 - After switching off, wait about 60 seconds and then disconnect all cables (power cable at the end).
- ▶ Never open the device with the current supply connected.
- ▶ Secure the current supply against unauthorized or unintentional reactivation.
- ▶ Do not insert any objects into the vent openings.
- ▶ Never open an external power supply unit.
- ▶ Never operate an open or defective device.
- ▶ Secure a defective device against accidental operation.
- ▶ Protect the device against moisture.



PrismaPro Web UI does not allow data storage

PrismaPro Web UI is a remote monitoring and diagnostic tool, and is designed for data monitoring and simple vacuum diagnostics.

PrismaPro Web UI does **not** allow data to be saved, or displayed in a trend graph.

For data storage, the selected peak mode, or trend graphs, you will need to use a complete software program such as PV MassSpec.



Switching the QME on and off

Switch the QME on or off only by inserting or removing the mains plug. Always leave the 24 V connector plugged in.

**Data transfer problem**

If the yellow LED stays dark, there is a data transmission problem between the device and the PC.

In this case, check the cable and components in the connection path as well as the correct PC configuration (software, firewall status, etc.).

Switch on the device

1. Insert the mains plug of the SP 250 power supply unit.
 - The <POWER> LED  on the front QME panel illuminates, and the QMG 250 PrismaPro is ready for operation.
2. Switch on the PC.
3. Start the PV MassSpec software.
 - Flickering of the yellow LED on the ethernet socket on the QME (RJ-45 connection of the LAN cable) indicates a data exchange. (see chapter “Ethernet (LAN)”, page 24)
4. Carry out the further steps of commissioning in PV MassSpec. (see chapter “Using PV MassSpec”, page 40)

As an alternative to operation with the PV MassSpec software, you can also operate the PrismaPro via the Web UI.

In this WEB UI, you can carry out simple measurements as well as a leak detection. Moreover, you can also calibrate and set different device parameters. Detailed information on the use of PrismaPro Web UI can be found in the corresponding operating instructions. (see chapter “Applicable documents”, page 8)

7 Operation

7.1 Using PrismaPro Web UI

Detailed information on the use of PrismaPro Web UI can be found in the corresponding operating instructions.

7.2 Using PV MassSpec

Detailed information on the use of PV MassSpec can be found in the corresponding operating instructions.

8 Inspection



Visual inspection prior to filament unit replacement

Before replacing the filament unit, you must also inspect and assess the rest of the ion source.

Pfeiffer Vacuum recommends replacing the complete ion source in the event of damage, visible deposits or impurities, or signs of contamination (e.g. discoloration).

Carrying out visual ion source inspection

1. Check the ion source for damage, deposits and discoloration.
 - **Light metallic discoloration** is acceptable.
2. Replace the ion source if you determine the following:
 - **significant deposits**
 - **impurities, contaminations**
 - **brown or black discoloration**

9 Maintenance



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.

9.1 Execution of maintenance work

Analyzer

The PrismaPro analyzer is subject to aging in normal use. For several components, repairs or replacement may also be necessary. No preventive, cyclic maintenance work is intended for the analyzer. Malfunctions and faults resulting from a contaminated ion source or from a contaminated analyzer may, under certain circumstances, be eliminated using the degas function of the ion source or by baking out the analyzer.

Inadequate sensitivity, malfunctions, and faults may also be due to adjusted ion source parameters. Before carrying out comprehensive maintenance works, please check whether you can achieve better results with the settings from the test report.

Electronic unit

Normally, the electronic unit QME 250 is not subject to any repair or maintenance.

9.2 Test report

In a test report, you will find ion source parameters, which have achieved good results during the final factory test.

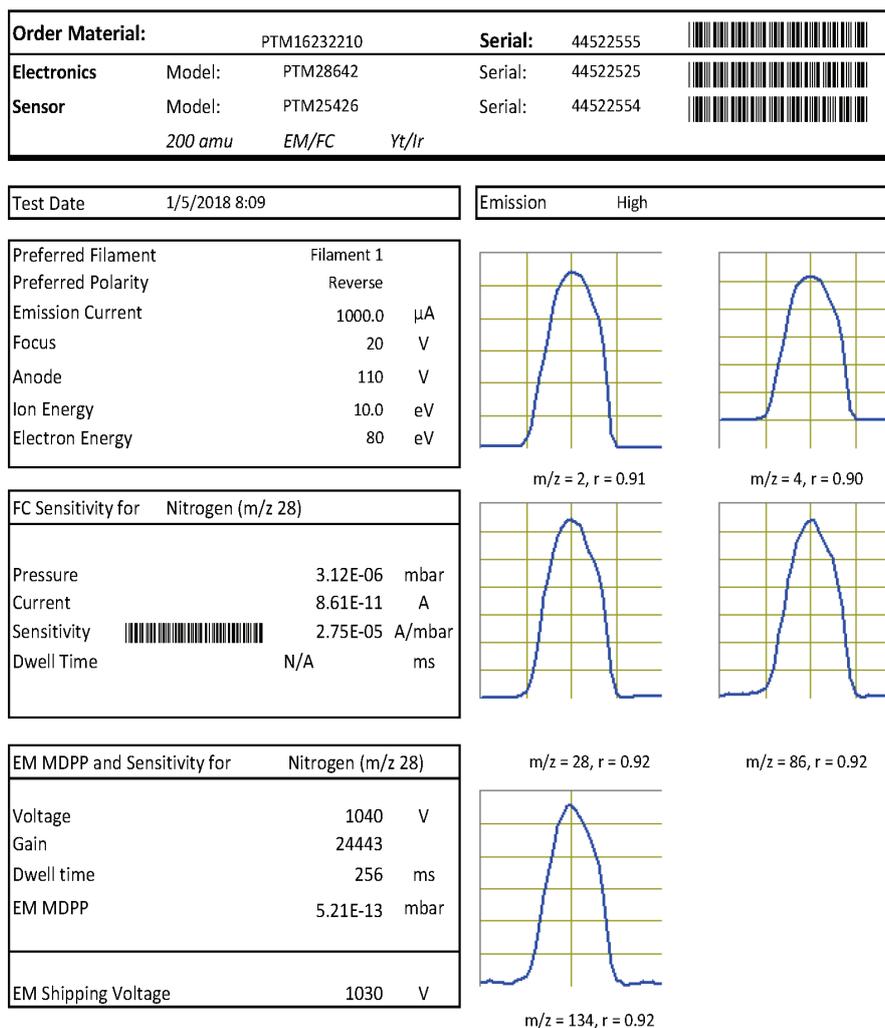


Fig. 18: Test report extract (example)

View test report

1. Open your web browser.
2. In the address bar, enter: <http://<IP ADDRESS>/testreport.pdf>
 - In place of <IP ADDRESS>, enter the PrismaPro IP address.

The test report PDF file opens.

9.3 Baking out the analyzer

WARNING

Risk of burns during baking out

During or immediately after the baking out, the heating jacket and the metal surfaces near to the heating jacket are extremely hot. The metal surfaces can reach a temperature of over 100 °C. This causes burns if you do not wear suitable personal protective equipment.

- ▶ When baking out, always wear personal protective equipment (for example protective gloves).
- ▶ Never touch surfaces without suitable protective gloves, either during or directly after baking out.

NOTICE

Damage to the electronic unit (QME) caused by baking out
 Excessively high temperatures damage the electronic unit.
 ► Dismantle the electronic unit from the analyzer (Q&A) before baking out at temperatures > 200°C.

NOTICE

Damage to the electron multiplier (EM) caused by too high temperatures
 Switching on the electron multiplier at high temperature will lead to permanent damage to the detector.
 ► Do not switch on the electron multiplier at analyzer temperatures > 150°C.

To bake out the analyzer, the area of the vacuum system in which the analyzer is installed must have the necessary heating. You must be able to reach **temperatures > 120 °C** with the heating.

Detector type		In operation	QME disassembled
Faraday		200 °C	300 °C
EM/Faraday combination	EM mode	150 °C	300 °C
	Faraday module	200 °C	300 °C

Tbl. 12: Maximum bakeout temperatures

Baking out the analyzer

High vacuum required

- min. 1×10^{-5} hPa
1. First attempt to restore the normal performance by baking out the analyzer under a high vacuum for several hours - at best overnight.
 2. If you do not achieve the required results by baking out the analyzer, check the filaments and the ion source.
 3. In case the existing problem cannot be rectified by this, contact the Pfeiffer Vacuum service department.

9.4 Checking the filaments and ion source

NOTICE

Damage to components caused by cleaning
 Do not clean either the filament or ion source, as this can damage or destroy the parts.
 ► Replace the parts if they are defective or contaminated.

The ion source of the PrismaPro has 2 filaments.
 If one filament is defective but the other one is still intact, you can still use the PrismaPro with the second filament.
 Previous use of the PrismaPro can however influence the performance of the second filament.

Measurement	Pins	Measured resistance	Result
Filament 1	3 and 10	approx. 0.8 Ω	Filament intact
		> 0.8 Ω	Filament defective
Filament 2	4 and 10	approx. 0.8 Ω	Filament intact
		> 0.8 Ω	Filament defective

(see chapter "QMA 250 analyzer contacts", page 22)
 *) Although the measurements with the installed filament and ceramic EM shielding may be < 30 MΩ, they should be > 30 MΩ when the filament and ceramic EM shielding are removed.
) Exceptions: Resistance between filament 1 and 2 (pins 3 and 4**) and filament Common (**pin 10**)

Measurement	Pins	Measured resistance	Result
Pin to ground	all pins to GND (7 or 8)	> 30 MΩ *	Ion source intact
		< 30 MΩ	Ion source defective
Pin to Pin	all pins to each other **	> 30 MΩ	Ion source intact
		< 30 MΩ	Ion source defective

(see chapter "QMA 250 analyzer contacts", page 22)

*) Although the measurements with the installed filament and ceramic EM shielding may be < 30 MΩ, they should be > 30 MΩ when the filament and ceramic EM shielding are removed.

***) Exceptions: Resistance between filament 1 and 2 (**pins 3 and 4**) and filament Common (**pin 10**)

Tbl. 13: Measurements

Checking the filaments and ion source

Required tool

- Ohmmeter
1. Measure the resistance of each filament.
 - You can carry this out even if the analyzer is under vacuum.
 2. Measure the resistance of each pin with regard to the mass.
 3. Measure the resistance of each pin with regard to each other.
 4. Replace the filament or ion source if the measured resistance is not within the acceptable range.

9.5 Calibrating the mass scale

Pfeiffer Vacuum calibrates the HF/DC ratio of a PrismaPro so that only one mass can pass the quadrupole filter at a given HF/DC ratio. The HF/DC ratio for each mass selected can be precisely determined by a fine calibration.

9.5.1 Factory calibration

At the factory, Pfeiffer Vacuum aligns the PrismaPro to different masses to its mass range.

Mass [u]	Gas used	Mass position tolerance [u]	100 u	200 u	300 u
			Peak width at 10% of the peak height (resolution)		
1	H	±0.05	0.5 ±0.10	0.5 ±0.10	0.5 ±0.10
2	H		0.9 ±0.05	0.9 ±0.05	0.9 ±0.05
4	He				
28	N				
86	Kr				
134	Xe		-	-	-
293	FC-5311 ⁶⁾				

Tbl. 14: Mass calibration

9.5.2 Mass calibration (TUNE)

A mass calibration of the PrismaPro may be necessary after an indeterminate period or also for certain measurement tasks.

There is the "Tune" function for the mass calibration available in the software PV MassSpec:

Execute the "Tune" function in PV MassSpec

1. Open the "Maintenance" menu.
2. Select the desired PrismaPro .
3. Click on "Tune" in the "Maintenance" menu.

6) FC-5311 is a Perfluoro(tetradecahydrophenantrene) isomer mixture for mass scale calibration in the mass range of up to 624 u.

Pfeiffer Vacuum has preset masses 1, 2, 4, 28, 86 in the default settings.

The masses can be adjusted to the gas mixture with which you want to perform mass calibration by adding and deleting masses. However, masses 1 and 2 should not be deleted.

9.5.3 Selecting the gas mixture for the mass calibration

You can use various gas mixtures for the mass calibration depending on the mass range and the requirements on the accuracy.

For the calibration, you should determine at least 3 masses, one each in the lower, average and upper mass range.

If you determine more than 3 masses, this increases the quality of the calibration.

9.5.4 Calibrating with a test gas mixture

In some applications, it can be helpful if you use a test gas mixture produced by a gas supplier.

The ideal mixture includes the masses from the factory coordination for the respective mass range of the PrismaPro to be calibrated.

9.5.5 Calibration with process gases

For the measurement calibration, you can also use the process gas to be analyzed and determine the typical masses for the calibration important for the process analysis.

Calibration with low mass

1. Do not calibrate the **1 u and 2 u (H) masses** if **hydrogen** is not present in the process.
2. Do not delete hydrogen out of the calibration table.
3. Calibrate the **mass 4 u (He)** in particular when using the PrismaPro for leak testing.
 - One possibility is to spray helium into a generated leak. This provides the calibration for the low mass required.

Calibration with average mass

1. If possible, use **nitrogen (N)** or any other mass in this range (for example, **water, oxygen**, etc) as **the average mass**.

Calibration with higher mass

1. Calibrate with **Argon (Ar)** if the process does not contain **any gases with masses >40 u**.
2. If the process contains **gas with higher masses**, proceed as follows:
3. Calibrate a mass **between the average mass and 100 u** for analyzers with **mass range of 100 u**.
4. Calibrate a mass **between 100 u and 200 u** for analyzers with **mass range of 200 u**.
5. Calibrate further masses **>200 u** for analyzers with **mass range of 300 u**.

9.5.6 Calibration of the helium leak detection

The calibration of **mass 4 u (He)** is necessary for correct leak detection.

If you want to use the PrismaPro exclusively for leak testing, then you only have to calibrate **mass 4 u (He)**.

You have to provide the helium required for calibration, and find a suitable way to introduce the helium into the vacuum chambers.

Calibration with underground gases or with air

If you do not have **any test gas mixtures or process gases** available for the mass calibration, using the gas remaining in the vacuum chamber or by feeding small quantities of ambient air, you can also carry out the mass calibration as follows:

1. Set the tune parameter to the default setting.
2. Delete all masses except for 1, 2 and 4 u.
3. Add mass 28, 40 or 44 u and calibrate this.
4. Delete mass 4 u.
5. Calibrate the highest available mass in the system
 - In several cases, this may be the mass 40 or 44 u.

9.6 Replace filament unit



Visual inspection prior to filament unit replacement

Before replacing the filament unit, you must also inspect and assess the rest of the ion source.

Pfeiffer Vacuum recommends replacing the complete ion source in the event of damage, visible deposits or impurities, or signs of contamination (e.g. discoloration).

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.
- ▶ During assembly, ensure for connecting flanges free of grease.
- ▶ Only remove protective caps and protective covers from flanges and connections when necessary.
- ▶ Only remove the analyzer transport protection when necessary.
- ▶ Carry out all work in a well lit area.

NOTICE

Filament damage from incorrect handling

Filaments are highly sensitive, pre-assembled units. You can easily damage filaments by incorrect handling.

- ▶ Allow only qualified personnel to replace filaments.
- ▶ Never touch the filament, even with gloves.
- ▶ Never bend the filament unit.
- ▶ Never tilt the filament unit, as otherwise you will bend the formation room.

9.6.1 Filament unit (open ion source)

NOTICE

Damage to open ion source filament anode from horizontal movement

Excessive horizontal movement will lead to damage to the anode.

- ▶ Place the filament unit onto the ion source carefully and thoroughly.
- ▶ Make sure that the anode and the counterbore are aligned.

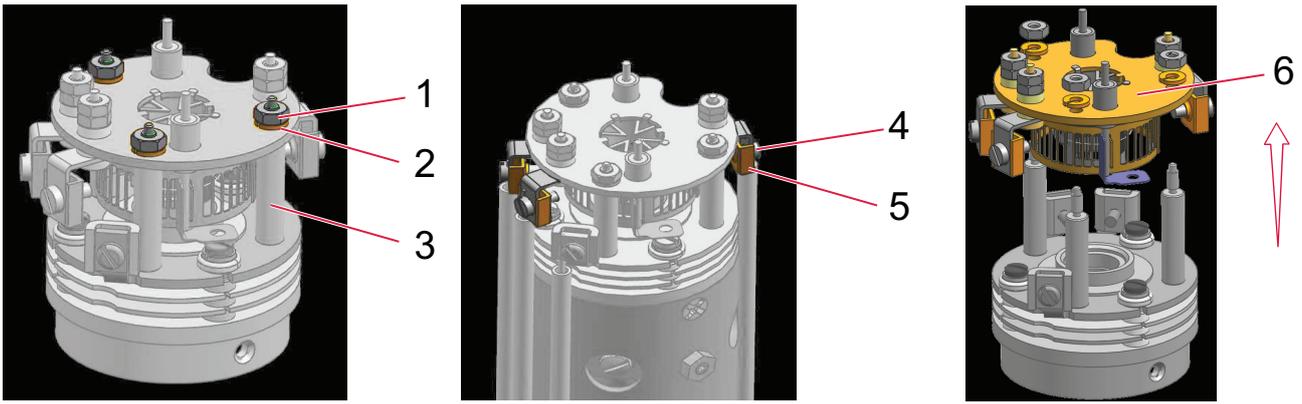


Fig. 19: Disassembly of the filament unit

- | | |
|--|--------------------------------------|
| 1 Nut (3×)
(M1.6, hex, stainless steel, gilt) | 4 Screw (3×)
(M1.6x4, flathead) |
| 2 Lock washer (3×) | 5 Clamp (3×)
(M1.6, for filament) |
| 3 Brace (3×) | 6 Filament unit (old) |

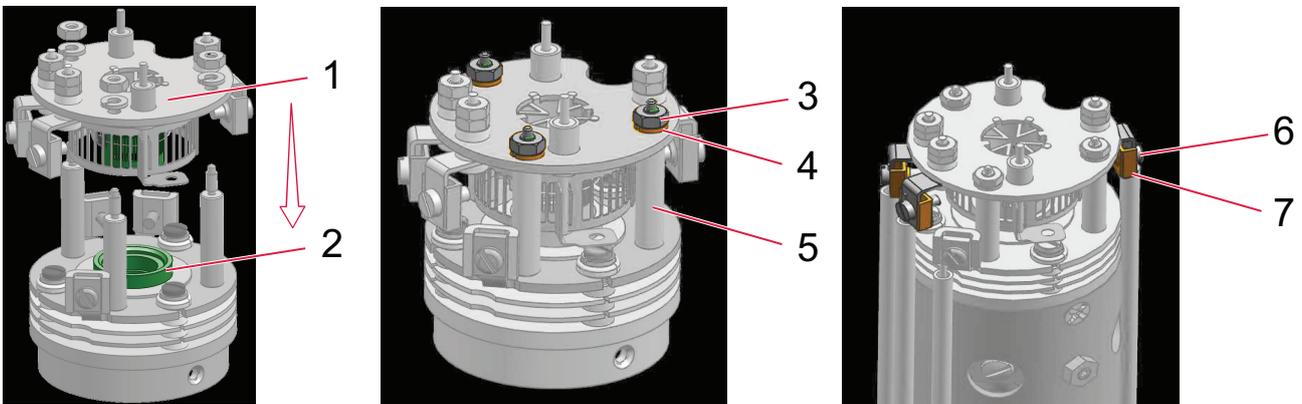


Fig. 20: Inserting a new filament unit

- | | |
|--|--------------------------------------|
| 1 Filament unit (new) | 5 Brace (3×) |
| 2 Counterbore | 6 Screw (3×)
(M1.6x4, flathead) |
| 3 Nut (3×)
(M1.6, hex, stainless steel, gilt) | 7 Clamp (3×)
(M1.6, for filament) |
| 4 Lock washer (3×) | |

Disassembly of the filament unit

Required tools

- Socket key (3.2 mm WAF)
- Screwdriver (flat, 1.6 mm)
- Flat pliers

Required aids

- Analyzer installation tool



1. Insert the analyzer in the installation tool.
2. Remove the nuts and lock washers from the braces with the socket key.
3. Hold the clamps with the flat pliers.
4. Loosen the screws of the clamps with the screwdriver.
 - Do not unscrew the screws too far.
5. Carefully pull the filament connections away from the filament unit.
6. Carefully pull the filament unit away from the ion source.

Installing new filament unit

Required tools

- Socket key (3.2 mm WAF)
- Screwdriver (flat, 1.6 mm)

Required aids

- Analyzer installation tool



Spare parts required

- Filament unit for open ion source with tungsten filaments or Y_2O_3 -coated iridium filaments
1. Insert the analyzer in the installation tool.
 2. Carefully remove the filament unit from the transport lock.
 3. Place the new filament unit on the braces.
 - The filament unit anode and the counterbore must be aligned.
 4. Secure the filament unit to the braces with new nuts and lock washers.
 5. Tighten the nuts with the socket key.
 6. Guide the filament connections into the clamps.
 7. Tighten the screws with the screwdriver.
 8. Measure the resistance of each filament.

9.6.2 Filament unit (cross beam ion source)

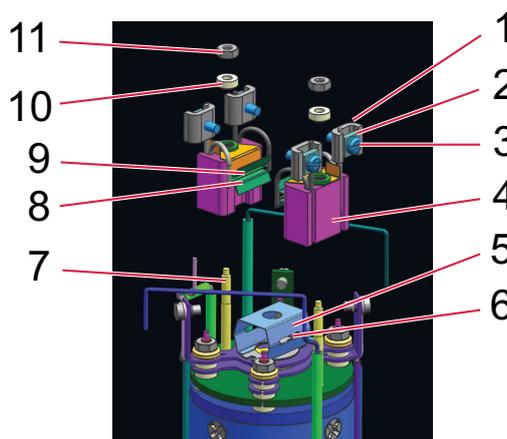
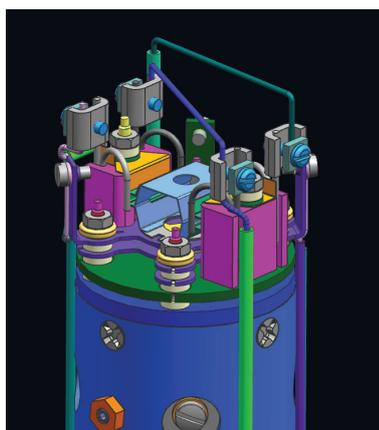


Fig. 21: Replace filament unit

- | | |
|--|---|
| 1 Clamp (4x) | 7 Stud bolts (2x) |
| 2 Nut (4x)
(rectangular) | 8 Wehnelt sheet (2x) |
| 3 Screw (4x)
(M1.6x5, slotted, stainless steel, gilt) | 9 Filament (2x) |
| 4 Filament holder with filament (2x) | 10 Ceramic isolator (2x) |
| 5 Formation room | 11 Nut (2x)
(M1.6, hex, stainless steel) |
| 6 Side formation room openings | |

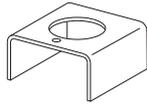
Disassembly of the filament unit

Required tools

- Socket key (3.2 mm WAF)
- Screwdriver (flat, 3 mm)
- Flat pliers

Required aids

- Analyzer installation tool



1. Insert the analyzer in the installation tool.
2. Hold the clamps with the flat pliers.
3. Loosen the screws and nuts of the clamps with the screwdriver.
 - Do not unscrew the screws too far.
4. Carefully remove the filament connections from the filament holder clamps.
5. Loosen and remove the nuts with the socket key.
6. Carefully pull both filament holder and ceramic isolators away from the ion source.

Installing new filament unit



Renew filaments of both filament holders

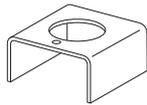
Pfeiffer Vacuum recommends always renewing both filament holders with filaments.

Required tools

- Socket key (3.2 mm WAF)
- Screwdriver (flat, 3 mm)
- Flat pliers

Required aids

- Analyzer installation tool



Spare parts required

- Filament unit for cross beam ion source with tungsten filaments or Y_2O_3 -coated iridium filaments
1. Insert the analyzer in the installation tool.
 2. Carefully remove the new filament holder from the transport packaging.
 3. Place the new filament holder on the ion source stud bolts.
 4. Insert the ceramic isolators in the mounting hole with the side with the recess facing downwards, towards the filament holder.
 5. Install the nuts and tighten them with the socket key.
 6. Make sure that Wehnelt sheets and filaments are positioned correctly.
 - The Wehnelt sheets and filaments must be parallel to and at the same height as the formation room side openings. If this is not the case, you have not installed the filament unit correctly.
 7. Guide the filament connections into the clamps.
 8. Hold the clamps with the flat pliers.
 9. Tighten the screws and nuts with the screwdriver.
 10. Measure the resistance of each filament.

9.6.3 Filament unit (grid ion source)

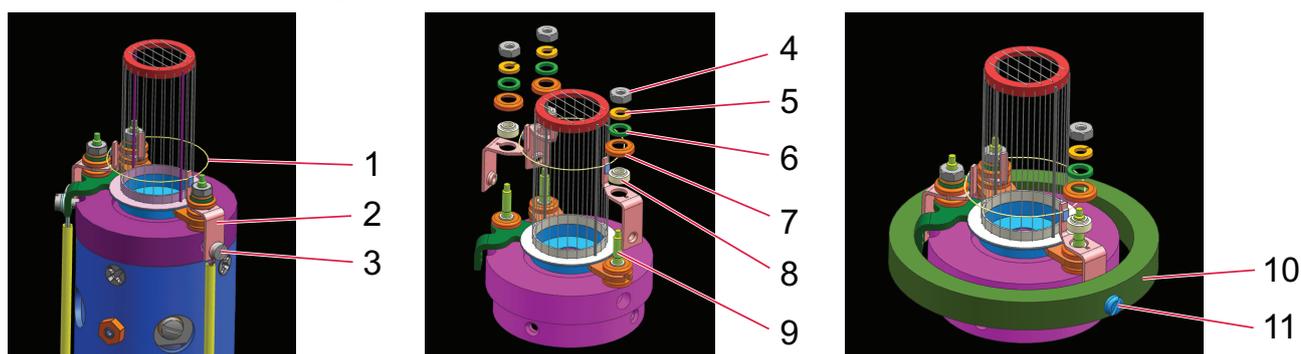


Fig. 22: Replace filament unit

- | | |
|--|----------------------------|
| 1 Filament unit | 7 Hood (3×) |
| 2 Filament unit connection (3×) | 8 Ceramic isolator (3×) |
| 3 Screw (3×)
(M1.6, flathead) | 9 Stud bolts (3×) |
| 4 Nut (3×)
(M1.6, hex, stainless steel) | 10 Support ring |
| 5 Circlip (3×) | 11 Support ring screw (3×) |
| 6 Washer (3×) | |

Disassembly of the filament unit

Required tools

- Socket key (3.2 mm WAF)
- Screwdriver (flat, 3 mm)
- Flat pliers

Required aids

- Analyzer installation tool



1. Insert the analyzer in the installation tool.
2. Hold the filament unit connections holder with the flat pliers.
3. Loosen filament unit screws with the screwdriver.
4. Carefully dismantle the ion source from the quadrupole rod system (see chapter "Grid ion source", page 55).
5. Loosen the nuts with the socket key.
6. Remove nuts, circlips, washers, hoods, and ceramic isolators.
7. Carefully pull the filament unit away from the ion source.

Installing new filament unit

Required tools

- Socket key (3.2 mm WAF)
- Screwdriver (flat, 3 mm)
- Flat pliers

Required aids

- Analyzer installation tool



Spare parts required

- Filament unit for grid ion source with tungsten filaments

1. Insert the analyzer in the installation tool.
2. Carefully remove the new filament unit with installed support ring from the transport packaging.

3. Place the new filament unit on the ion source stud bolts.
4. Install the ceramic isolators, hoods, washers, and circlips.
5. Install the nuts and tighten them with the socket key.
6. Loosen support ring screws using the screwdriver, and remove the support ring.
7. Carefully install the ion source onto the quadrupole rod system (see chapter "Grid ion source", page 55).
8. Guide the screws through the wiring eyelets.
9. Hold the filament unit connections with the flat pliers.
10. Tighten the screws in the filament unit connections with the screwdriver.
11. Measure the resistance of each filament.

9.7 Replacing the ion source

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.
- ▶ During assembly, ensure for connecting flanges free of grease.
- ▶ Only remove protective caps and protective covers from flanges and connections when necessary.
- ▶ Only remove the analyzer transport protection when necessary.
- ▶ Carry out all work in a well lit area.

NOTICE

Filament damage from incorrect handling

Filaments are highly sensitive, pre-assembled units. You can easily damage filaments by incorrect handling.

- ▶ Allow only qualified personnel to replace filaments.
- ▶ Never touch the filament, even with gloves.
- ▶ Never bend the filament unit.
- ▶ Never tilt the filament unit, as otherwise you will bend the formation room.

9.7.1 Open ion source

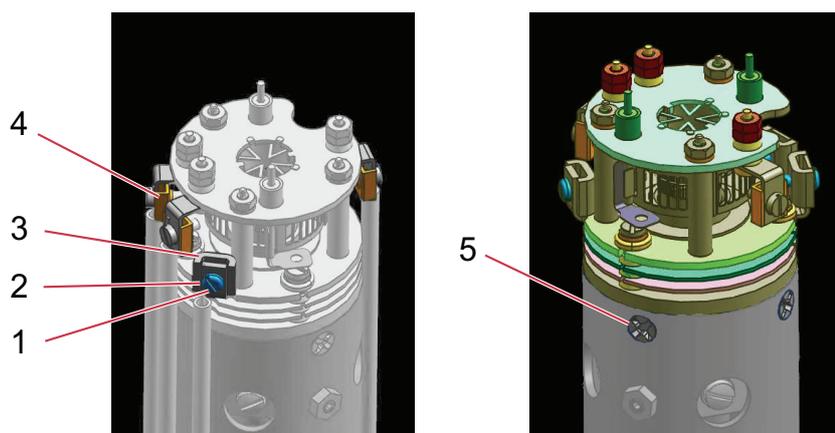


Fig. 23: Replacing the open ion source

- 1 Screw (3×)
(M1.6×5, slotted, stainless steel, gilt)
- 2 Nut (3×)
(rectangular)
- 3 Clamps for ion source supply (3×)
- 4 Clamps for filament unit (3×)
- 5 Ion source fixing screw (3x)
(M2×3, crosshead, stainless steel, gilt)

Replacing the ion source

Required tools

- Screwdriver (flat, 1.6 mm)
- Crosshead screwdriver (Philips #2)
- Flat pliers

Spare parts required

- Ion source
1. Hold the 3 clamps for the filament wiring (A) and the three clamps for the ion source supply (b) tight with the flat pliers.
 2. Loosen the respective screws with the screwdriver.
 3. Carefully bend the wiring away from the ion source using the flat pliers.
 4. Loosen and remove the three gold-plated screws (C), fix the ion source on the quadrupole using the crosshead screwdriver.
 5. Carefully lift the ion source from the quadrupole rod system.
 6. Carefully remove the ion source from the transport packaging.
 7. Carefully place the ion source onto the quadrupole rod system.
 8. Secure the three gold-plated screws (C), fix the ion source to the quadrupole using the crosshead screwdriver.
 9. Carefully bend the wiring away onto the ion source using the flat pliers.
 10. Hold the 3 clamps for the filament wiring (A) and the three clamps for the ion source supply (b) tight with the flat pliers.
 11. Tighten the respective screws with the screwdriver.
 12. Check the filament and the ion source. (see chapter "Checking the filaments and ion source", page 44)

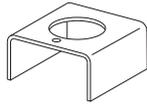
Installing new ion source

Required tools

- Screwdriver (flat, 1.6 mm)
- Crosshead screwdriver (Philips #2)
- Flat pliers

Required aids

- Analyzer installation tool



Spare parts required

- Open ion source with tungsten filament or Y₂O₃-coated iridium filament
1. Insert the analyzer in the installation tool.
 2. Carefully remove the ion source from the transport packaging.
 3. Carefully place the ion source onto the quadrupole rod system.
 4. Secure the ion source screws, which attach the ion source to the quadrupole, using the crosshead screwdriver.
 5. Carefully bend the wiring away onto the ion source using the flat pliers.
 6. Hold the clamps for the filament unit and the clamps for the ion source supply with the flat pliers.
 7. Tighten the respective screws and nuts with the screwdriver.
 8. Check the filament and the ion source.

9.7.2 Cross beam ion source

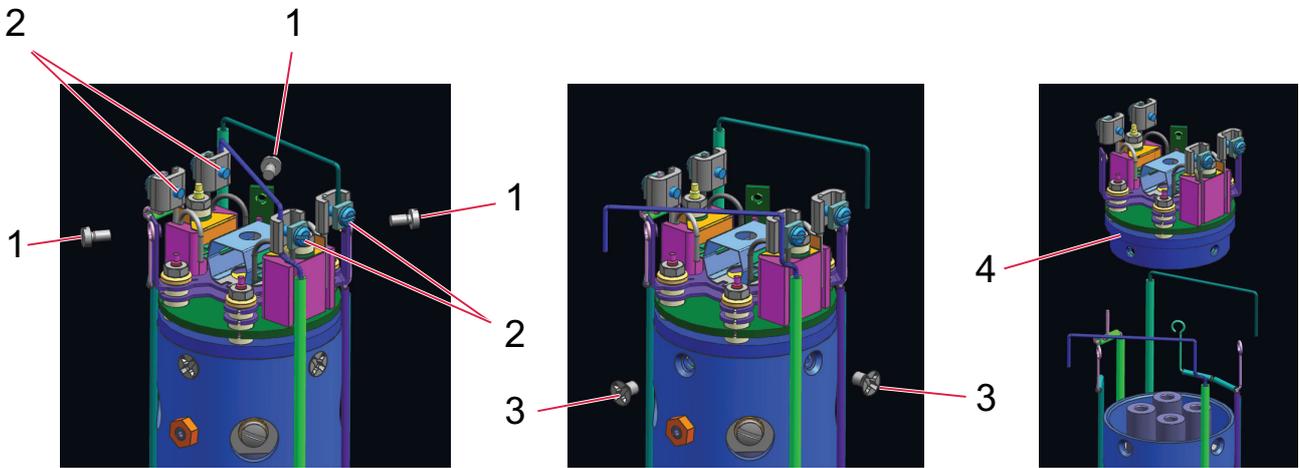


Fig. 24: Replacing the cross beam ion source

- | | |
|--|--|
| <ul style="list-style-type: none"> 1 Ion source wiring screw (3x) (M1.6x3, flathead) 2 Filament unit screw (4x) (M1.6x5, slotted, stainless steel, gilt) | <ul style="list-style-type: none"> 3 Crosshead screw (3x) (M2x3, crosshead, stainless steel, gilt) 4 Cross beam ion source |
|--|--|

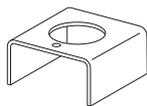
Dismantling the ion source

Required tools

- Screwdriver (flat, 3 mm)
- Crosshead screwdriver (Philips #1)
- Flat pliers

Required aids

- Analyzer installation tool



1. Insert the analyzer in the installation tool.
2. Hold the clamps and connections with the flat pliers.
3. Loosen and remove the screws of the filament unit and ion source wiring with the screwdriver.
4. Carefully rotate the wiring away from the filament unit and ion source.
5. Loosen and remove the crosshead screws with the crosshead screwdriver.
6. Carefully pull the ion source away from the quadrupole rod system.

Installing new ion source

Required tools

- Screwdriver (flat, 3 mm)
- Crosshead screwdriver (Philips #1)
- Flat pliers

Required aids

- Analyzer installation tool



Spare parts required

- Cross beam ion source with tungsten filaments or Y_2O_3 -coated iridium filaments
1. Insert the analyzer in the installation tool.
 2. Carefully remove the ion source from the transport packaging.
 3. Carefully place the ion source onto the quadrupole rod system.
 4. Secure the crosshead screws using the crosshead screwdriver.
 5. Secure the wiring to the filament unit and ion source.
 6. Hold the clamps and connections with the flat pliers.
 7. Secure the screws of the filament unit and ion source wiring with the screwdriver.
 8. Check the filament and the ion source.

9.7.3 Grid ion source

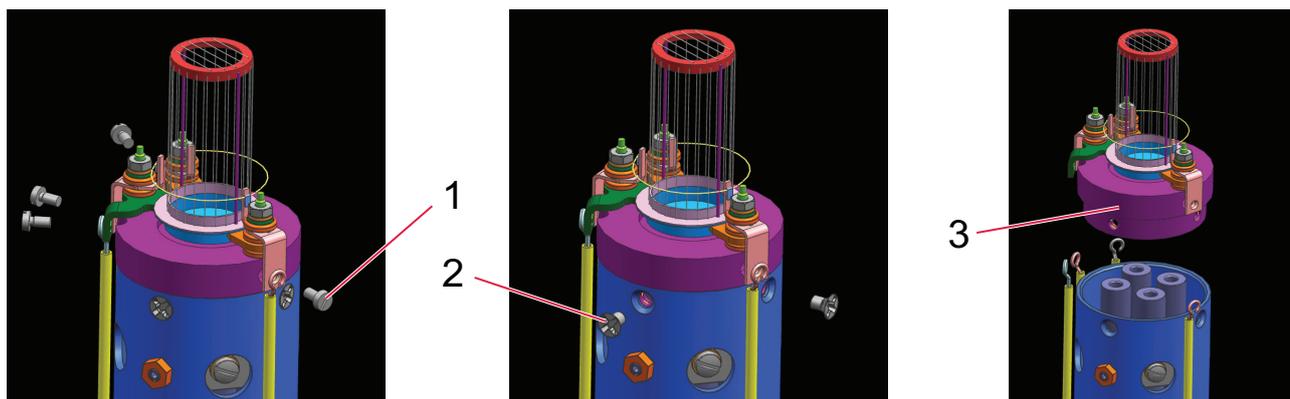


Fig. 25: Replacing the grid ion source

- | | |
|---|-------------------|
| 1 Wiring screw (4×)
(M1.6, flathead) | 3 Grid ion source |
| 2 Ion source mount crosshead screw (3×)
(M2×3, crosshead, stainless steel, gilt) | |

Dismantling the ion source

Required tools

- Screwdriver (flat, 3 mm)
- Crosshead screwdriver (Philips #1)
- Flat pliers

Required aids

- Analyzer installation tool



1. Insert the analyzer in the installation tool.
2. Hold connections with the flat pliers.
3. Loosen and remove wiring screws with the screwdriver.

4. Loosen and remove the ion source mount crosshead screws with the crosshead screwdriver.
5. Carefully pull the ion source away from the quadrupole rod system.

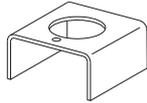
Installing new ion source

Required tools

- Screwdriver (flat, 3 mm)
- Crosshead screwdriver (Philips #1)
- Flat pliers

Required aids

- Analyzer installation tool



Spare parts required

- Grid ion source with tungsten filaments
1. Insert the analyzer in the installation tool.
 2. Carefully remove the ion source from the transport packaging.
 3. Place the new ion source onto the quadrupole rod system.
 4. Secure the crosshead screws of the ion source mount using the crosshead screwdriver.
 5. Guide the wiring screws through the wiring eyelets.
 6. Hold the ion source connections with the flat pliers.
 7. Tighten the wiring screws in the ion source connections with the screwdriver.
 8. Check the filament and the ion source.

10 Malfunctions

Troubleshooting

Required aids

- Multimeter
1. First make sure that the insulation on all cables is intact and that there is no damage to the insulating material.
 2. Take a look at the following table of symptoms to see if the problem is listed there and how it can be rectified.
 3. Check the following points to rectify communication problems. (see chapter "Establishing a network connection", page 34)
 - The Ethernet cable is connected to the PrismaPro and the host computer (either directly or via the router / Ethernet switch).
 - The PrismaPro IP address has the same network prefix as the host computer.
 - Port 80 is open on the host computer.
 - There is no IP address conflict between the PrismaPro and another network device.
 4. In case the existing problem cannot be rectified by this, contact the Pfeiffer Vacuum service department.

Symptom / malfunction messages	Possible causes	Remedy
LED <POWER> does not light up.	No external current supply (24 V)	Check the mains voltage at the input of the SP 250 external power supply unit. It must be between 100 and 240 V (AC).
		Check the output voltage at the SP 250 external power supply unit. It must be between 20 and 30 V (DC).
		Replace the SP 250 external power supply unit.
No communication to the host computer	Error in the electronic unit (QME)	Send the QME to Pfeiffer Vacuum for repairs.
	IP address of the analyzer is not compatible with the network.	(see chapter "Establishing a network connection", page 34)
	PrismaPro communication connection (Port 80) is not open on the host computer.	Open the Port 80 on the host computer or change the communication port of PrismaPro.
	Faulty cable connection	Make sure that all cables are connected to the correct connections.
	Ethernet card of the host computer is faulty.	Replace the Ethernet card of the host computer.
Emission error at cold or warm start (Emission error)	Ethernet interface of the electronic unit (QME) is faulty	Send the QME to Pfeiffer Vacuum for repairs.
	Insufficient vacuum	Make sure that the pressure is below the max. operating pressure. (see chapter "Technical data and dimensions", page 68)
	Defective analyzer filament open, short-circuited	Check the analyzer using a multimeter. (see chapter "Checking the filaments and ion source", page 44)
		Replace the filament unit, the ion source or the analyzer.
	Electronic unit (QME) not attached to the analyzer correctly	Make sure that the electronic unit (QME) has been completely pushed onto the analyzer .
Incorrect analyzer operating voltage	Check that all settings are correct. Contact Pfeiffer Vacuum for assistance.	
Error in the electronic unit (QME)	Send the QME to Pfeiffer Vacuum for repairs.	

Symptom / malfunction messages	Possible causes	Remedy
Anode voltage error (Anode error)	Analyzer defective, anode short-circuited	Check the analyzer connections for short-circuits using a multimeter. (see chapter "QMA 250 analyzer contacts", page 22) Repair or replace the analyzer.
	Error in the electronic unit (QME)	Send the QME to Pfeiffer Vacuum for repairs.
High-frequency error (RF error)	Analyzer defective, check the HF connections	Check the HF connections on the analyzer for short-circuits using a multimeter. (see chapter "QMA 250 analyzer contacts", page 22) Repair or replace the analyzer.
	HF/DC card error	Send the QME to Pfeiffer Vacuum for repairs.
	Error in the electronic unit (QME)	
Secondary electron multiplier error (electron multiplier error)	Analyzer defective, electron multiplier short-circuited	Check the analyzer connections for short-circuits using a multimeter. (see chapter "QMA 250 analyzer contacts", page 22) Replace the analyzer.
	Error in the electronic unit (QME)	Send the QME to Pfeiffer Vacuum for repairs.
Temperature sensor (Temperature error)	Ambient temperature of the PrismaPro > 50 °C	Make sure that the device is installed correctly, ambient temperature < 50°C.
		Make sure that there are no heat sources in the vicinity.
	Error in the electronic unit (QME)	Send the QME to Pfeiffer Vacuum for repairs.
Overpressure (Overpressure)	Total pressure too high	Reduce the pressure.
	Ion source contaminated	Replace the ion source.
Electrometer error (Electrometer error)	Current too high (> 2 ⁻⁶ A)	Reduce the pressure.
		Reduce the EM voltage.
	Error in the electronic unit (QME)	Send the QME to Pfeiffer Vacuum for repairs.
Mass filter error (Mass filter error)	Poor coordination	Recalibrate the device (tune). (see chapter "Mass calibration (TUNE)", page 45)
	Contaminated quadrupole field	Send the device to Pfeiffer Vacuum for repairs.
Ion source error (Ion source error)	Settings of the ion source faulty.	Load the original configuration file.
	Ion source is contaminated.	Replace the ion source.
Detector error (Detector error)	EM voltage set too high.	Reduce the EM voltage.
	Detector does not work properly.	Replace the EM detector.
Communication error (DSP) (DSP communication error)	Incorrect DSP response detected.	Reset the electronic unit (QME).
		Send the QME to Pfeiffer Vacuum for repairs.
Communication error (DEC) (DEC communication error)	Incorrect DEC response detected.	Reset the electronic unit (QME).
		Send the QME to Pfeiffer Vacuum for repairs.
Peak detection error (Peak detection error)	No peak at the target mass.	Load the original configuration file.
		Send the QME to Pfeiffer Vacuum for repairs.
Filament potential error (Filament potential error)	Insufficient vacuum	Make sure that the pressure is below the max. operating pressure. (see chapter "Technical data and dimensions", page 68)
	Defective analyzer filament broken, short-circuited	Check the analyzer using a multimeter. (see chapter "Checking the filaments and ion source", page 44) Replace the filament unit, the ion source or the analyzer.

Symptom / malfunction messages	Possible causes	Remedy
Filament current error (Filament current error)	Insufficient vacuum	Make sure that the pressure is below the max. operating pressure. (see chapter "Technical data and dimensions", page 68)
	Defective analyzer filament broken, short-circuited	Check the analyzer using a multimeter. (see chapter "Checking the filaments and ion source", page 44) Replace the filament unit, the ion source or the analyzer.
Focus error (Focus error)	Focus voltage cannot be started or maintained.	Reset the electronic unit (QME).
		Send the QME to Pfeiffer Vacuum for repairs.
No spectra (No spectra)	Emission is off.	Switch on the emission.
	EM is in operation.	Switch the EM off.
	Analyzer contaminated	Degas or maintain the analyzer. (see chapter "Baking out the analyzer", page 43)
		Replace the analyzer.
	Error in the electronic unit (QME)	Send the QME to Pfeiffer Vacuum for repairs.
	Pressure too low for Faraday detector	Use an EM detector.
	EM voltage too low.	Increase the EM voltage.
	Electronic unit (QME) not attached to the analyzer correctly	Make sure that the electronic unit (QME) has been completely pushed onto the analyzer.
Mass calibration faulty.	Carry out a mass calibration (Tune). (see chapter "Mass calibration (TUNE)", page 45)	
Low sensitivity (Poor sensitivity)	Analyzer contaminated.	Degas the ion source.
		Bake out the analyzer. (see chapter "Baking out the analyzer", page 43)
		Send the QMA to Pfeiffer Vacuum for repairs.
	System pressure too low.	Increase the sample pressure, if possible.
	Mass calibration (resolution) faulty.	Carry out a mass calibration (Tune) and increase the peak width. (see chapter "Mass calibration (TUNE)", page 45)
	Analyzer operating parameters set incorrectly.	Check the settings of the electron energy, ion energy and focus emission current.
	Incorrect total pressure measurement with external gauges	Make sure that the gauges used for the sensitivity calibration have been correctly calibrated.
	Error in the electronic unit (QME)	Send the QME to Pfeiffer Vacuum for repairs.
Amplification of the EM is too low.	Bake out the analyzer. (see chapter "Baking out the analyzer", page 43)	
	Replace the analyzer.	
Poor peak shape (Poor peak shape)	Analyzer contaminated.	Degas the ion source.
		Bake out the analyzer. (see chapter "Baking out the analyzer", page 43)
		Send the QMA to Pfeiffer Vacuum for repairs.
	System pressure too high.	Make sure that the pressure is below the max. operating pressure. (see chapter "Technical data and dimensions", page 68)
	Mass calibration necessary.	Carry out a mass calibration.
Error in the electronic unit (QME)	Send the QME to Pfeiffer Vacuum for repairs.	

Malfunctions

Symptom / malfunction messages	Possible causes	Remedy
High noise level (High noise level)	System grounding	Make sure that the vacuum system is grounded.
	Error in the electronic unit (QME)	Send the QME to Pfeiffer Vacuum for repairs.
	Electronic unit (QME) not attached to the analyzer correctly	Make sure that the electronic unit (QME) has been completely pushed onto the analyzer .
	EM defective.	Replace the EM or the analyzer.
	Scan speed is too quick for the amplification setting	Increase the dwell time (Dwell).

Tbl. 15: Troubleshooting

11 Shipping

WARNING

Risk of poisoning from contaminated products

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

- ▶ Comply with the instructions for safe shipping.



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.

12 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.

12.1 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

12.2 Dispose of a compact mass spectrometer

Pfeiffer Vacuum compact mass spectrometers contain materials that you must recycle.

1. Dismantle the housing parts.
2. Dismantle all individual components and circuit boards.
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.

13 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.

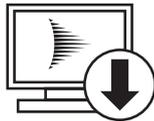
Our professional sales and service employees are available to provide you with reliable assistance, worldwide. Pfeiffer Vacuum offers an entire range of services, from [original replacement parts](#) to [service contracts](#).

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](#).

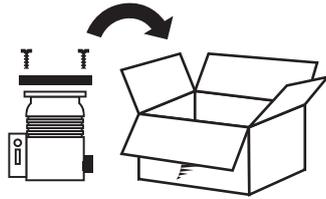


4. You will receive an acknowledgment from Pfeiffer Vacuum.

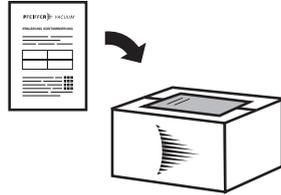
PFEIFFER VACUUM

Submission of contaminated products

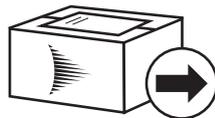
No microbiological, explosive, or radiologically contaminated products will be accepted. Where products are contaminated, or the contamination declaration is missing, Pfeiffer Vacuum will contact you before starting service work. Depending on the product and degree of pollution, **additional decontamination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



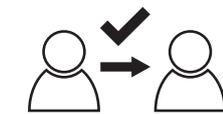
5. Prepare the product for transport in accordance with the provisions in the contamination declaration.
 - a) Neutralize the product with nitrogen or dry air.
 - b) Seal all openings with blind flanges, so that they are airtight.
 - c) Shrink-wrap the product in suitable protective foil.
 - d) Package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

PFEIFFER VACUUM

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

14 Ordering information

14.1 Ordering parts

Ordering spare parts, accessories or optional components

- ▶ Always specify the following details when ordering spare parts, accessories or optional components:
 - all details according to the rating plate
 - description and order number according to the parts list

14.2 System components

You can replace individual defective system components, such as electronic unit QME 250 or Analyzer QMA 250.



Tuning the components

Please be aware, that replaced electronic units or analyzers must be tuned to the existing components. Pfeiffer Vacuum recommends arranging for a Pfeiffer Vacuum Service Center to carry this out.

Part number	Short description	Mass range [u]	Input/Output	Version
PT M28 641	QME 250 M1	1-100	Standard (without IO 250)	straight
PT M28 642	QME 250 M2	1-200		
PT M28 643	QME 250 M3	1-300		
PT M28 651	QME 250 M1	1-100	expanded (with IO 250)	
PT M28 652	QME 250 M2	1-200		
PT M28 653	QME 250 M3	1-300		

Tbl. 16: Electronic unit QME 250

Part number	Short description	Mass range [u]	Detector	Ion source	Filament material	Wiring
PT M25 411	QMA 250 F1	1-100	Faraday	open	W	Nickel
PT M25 412					Ir-Y ₂ O ₃	
PT M25 413	QMA 250 M1		Faraday/EM	C/B	W	
PT M25 414					Ir-Y ₂ O ₃	
PT M25 415			Grid	W	Copper, silver-plated	
PT M25 416				Ir-Y ₂ O ₃		
PT M25 419				W		
PT M25 421	QMA 250 F2	1-200	Faraday	open	W	Nickel
PT M25 422					Ir-Y ₂ O ₃	
PT M25 423	QMA 250 M2		Faraday/EM	C/B	W	
PT M25 424					Ir-Y ₂ O ₃	
PT M25 425			Grid	W	Copper, silver-plated	
PT M25 426				Ir-Y ₂ O ₃		
PT M25 429				W		

Other materials against vacuum: stainless steel, ceramic (Al₂O₃), glass, gold

Part number	Short description	Mass range [u]	Detector	Ion source	Filament material	Wiring	
PT M25 431	QMA 250 F3	1-300	Faraday	open	W	Nickel	
PT M25 432					Ir-Y ₂ O ₃		
PT M25 433	QMA 250 M3		Faraday/EM		C/B		W
PT M25 434							Ir-Y ₂ O ₃
PT M25 435	C/B		W	Grid	W		Copper, silver-plated
PT M25 436					Ir-Y ₂ O ₃		
PT M25 439					W		

Other materials against vacuum: stainless steel, ceramic (Al₂O₃), glass, gold

Tbl. 17: Analyzer QMA 250

14.3 Ion sources and filament units for QMA 250 analyzers

Part number	Type	Filament material
PT 163 211	open	W
PT 163 212		Ir-Y ₂ O ₃
PT 163 231	C/B	W
PT 163 232		Ir-Y ₂ O ₃
PT 163 241	Grid	W

Tbl. 18: Ion sources

Part number	For IQ types	Filament material
PT 163 311	open	W
PT 163 312		Ir-Y ₂ O ₃
PT 163 331	C/B	W
PT 163 332		Ir-Y ₂ O ₃
PT 163 341	Grid	W

Tbl. 19: Filament units

14.4 Spare parts and parts sets

Part number	Quantity (pieces)	Description	Use
PT 163 501	1	Intermediate piece (DN 40 CF, 116 mm long)	QMA 250 with EM
PT 163 502	1	Transport protection (transparent plastic tube)	QMA 250 with Faraday
PT 163 503	1		QMA 250 with EM
PT 163 504	1	SP 250 (external power supply pack with mains cable 100–240 V(AC)/24 V, 80 W (DC))	QMG 250
PT 163 508	1	Socket key	Filament unit
PT 163 510	1	Installation tool	QMA 250
PT 163 512	1	UTP patch cable, red, length 3 m, crossover connection	QMG 250
490DFL040-S-G-S5	5 (pack)	Copper gasket (DN 40 CF, silver-plated)	QMA 250

Tbl. 20: Spare parts

Parts set PT 163 544

Designation	Quantity (pieces)
Screw (M2×3, crosshead, stainless steel, gilt)	3
Lock washer (slotted, stainless steel)	6
Nut (M1.6, hex, stainless steel, gilt)	9
Clamp (M1.6, for filament)	3
Screw (M1.6x4, flathead)	3
Clamp (M1.6, for ion source)	3
Screw (M1.6×5, slotted, stainless steel, gilt)	3

Tbl. 21: Small parts set (open ion source)**Parts set PT 163 543**

Designation	Quantity (pieces)
Screw (M2×3, crosshead, stainless steel, gilt)	3
Clamp (with M1.6 thread, U-shaped, for ion source)	4
Screw (M1.6×5, slotted, stainless steel, gilt)	4
Ceramic isolator	2
Nut (M1.6, hex, stainless steel)	2
Nut (square, for connection)	4
Screw (M1.6x3, flathead, stainless steel, for ion source connections)	3

Tbl. 22: Small parts set (cross beam ion source)**Parts set PT 163 534**

Designation	Quantity (pieces)
Circlip (slotted, stainless steel)	3
Washer (ceramic)	3
Hood (ceramic)	9
Ceramic isolator	9
Screw (M1.6x3, flathead, stainless steel)	4
Nut (M1.6, hex, stainless steel)	3
Screw (M2×3, crosshead, stainless steel, gilt)	3

Tbl. 23: Small parts set (grid ion source)

15 Technical data and dimensions

15.1 Technical data and dimensions (Faraday)



Standard conditions

All values were measured after a 30 minute heat-up phase under standard conditions as long as not specified otherwise.

Parameter	QMG 250 F1	QMG 250 F2	QMG 250 F3
Detector type	Faraday		
Mass range	1–100 u	1-200 u	1-300 u
Connection flange	DN 40 CF-F		
Material against vacuum	(see table “Analyzer QMA 250”, page 9)		
Vacuum required (max. operating pressure)	< $5 \cdot 10^{-4}$ hPa		
Detection limit	$4 \cdot 10^{-13}$ hPa	$5 \cdot 10^{-12}$ hPa	$7 \cdot 10^{-13}$ hPa
Maximum underground cross-sensitivity at 2 u	< 5 ppm	< 65 ppm	< 100 ppm
Sensitivity			
Open ion source	> $5 \cdot 10^{-4}$ A/hPa	> $4 \cdot 10^{-4}$ A/hPa	> $3 \cdot 10^{-4}$ A/hPa
Use			
Installation location	Interiors, weatherproof		
Ambient conditions			
Protection category	IP 30		
Relative humidity	≤ 98 % at operating temperature, non-condensing		
Temperatures			
Operating temperature (analyzer)	≤ 200 °C		
Operating temperature (QME)	5-50 °C		
Bakeout temperature (analyzer) (QME disassembled)	≤ 300 °C		
Temperature (transport / storage)	-25 – +70 °C		
Temperature coefficient (during 8 hours, after 30 min. warm-up time)	< 1 % of the peak height per °C		
Electrical data			
Supply voltage (power supply pack)	100–240 V AC, 50/60 Hz		
Connection voltage (QME 250)	20–30 V DC, usually 24 V DC		
Rated (nominal) current	1.25 A max.		
Interfaces			
Operation, operating	Ethernet		
Standard control connection (AUX I/O)			
Plug-in connector	D-Sub, 15-pin, female		
Relay output	1×, two-way contacts, max. 24 V DC, 0.5 A		
Analog inputs	1× 0–+10 V, output resistance 1 MΩ, resolution 12 bit		
Digital inputs	2×; low < +2 V; high > +3 V, nominal +24 V, max. +28 V		
Output voltage	+24 V, max. 1 A		
Extended control connection (AUX I/O, optional)			
Plug-in connector	HD D-Sub, 62-pin, female		
Analog outputs	8× 0–+10 V, output resistance 100 Ω, $I_{\max.} = 10$ mA, resolution 16 bit		
Analog inputs	8× -10–+10 V, input resistance 50 MΩ, resolution 16 bit		
Digital outputs	10×; open collector, nominal +24 V, max. +28 V, 200 mA		

Parameter	QMG 250 F1	QMG 250 F2	QMG 250 F3
Digital inputs	5×, low active, low < +2 V; high > +3 V, ≤ +24 V		
Output voltage	+24 V, max. 1 A (including current to +24 V output at standard control connection)		
Mounting orientation			
Venting requirements	min. 25 mm open space around the QME 250		
Mounting orientation	Arbitrary		
Weight			
Analyzer QMG 250 F	0.8 kg		
electronic unit QME 250	1.53 kg		
SP 250 Power supply unit	0.15 kg		

Tbl. 24: Technical data (Faraday)

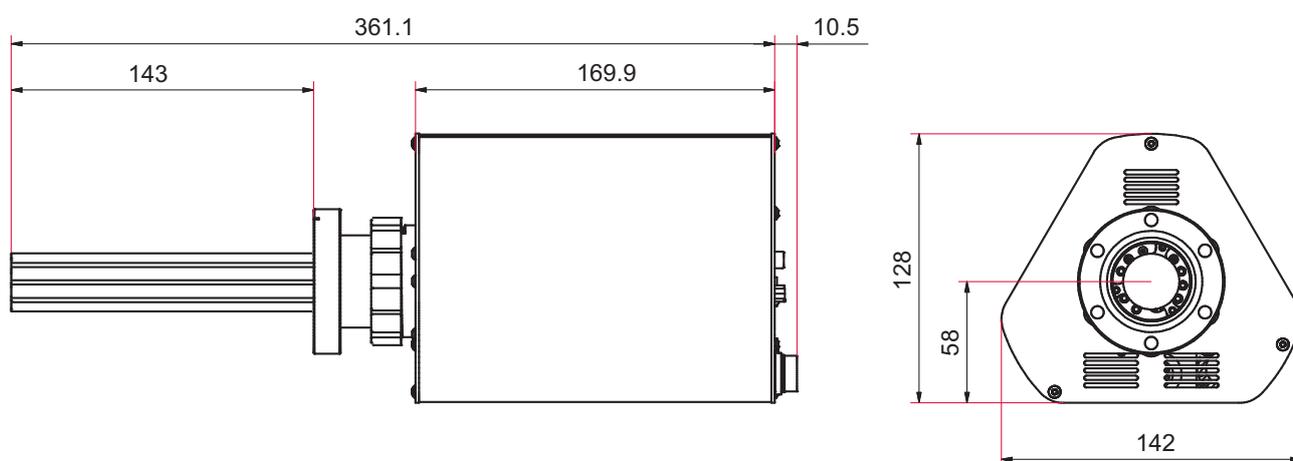


Fig. 26: Dimensions (Faraday | open ion source)

15.2 Technical data and dimensions (EM / Faraday)



Standard conditions

All values were measured after a 30 minute heat-up phase under standard conditions as long as not specified otherwise.

Parameter	QMG 250 M1	QMG 250 M2	QMG 250 M3
Detector type	EM / Faraday		
Mass range	1–100 u	1-200 u	1-300 u
Connection flange	DN 40 CF-F		
Material against vacuum	(see table "Analyzer QMA 250", page 9)		
Vacuum required (max. operating pressure)	< $5 \cdot 10^{-4}$ hPa		
Maximum underground cross-sensitivity at 2 u	< 5 ppm	< 65 ppm	< 100 ppm
Detection limit (EM)			
Open ion source	$3.0 \cdot 10^{-15}$ hPa	$4.0 \cdot 10^{-15}$ hPa	$5.0 \cdot 10^{-15}$ hPa
C/B ion source	$3.0 \cdot 10^{-13}$ hPa	$6.0 \cdot 10^{-13}$ hPa	$1.0 \cdot 10^{-12}$ hPa
Grid ion source	$1.0 \cdot 10^{-13}$ hPa	$2.0 \cdot 10^{-13}$ hPa	$4.0 \cdot 10^{-13}$ hPa
Sensitivity ⁷⁾			
Open ion source (Faraday)	> $5 \cdot 10^{-4}$ A/hPa	> $4 \cdot 10^{-4}$ A/hPa	> $3 \cdot 10^{-4}$ A/hPa

7) In EM mode, significantly increased sensitivities can be achieved, depending on the voltage at the EM

Technical data and dimensions

Parameter	QMG 250 M1	QMG 250 M2	QMG 250 M3
C/B ion source (Faraday)	$> 2 \cdot 10^{-5}$ A/hPa	$> 1 \cdot 10^{-5}$ A/hPa	$> 5 \cdot 10^{-6}$ A/hPa
Grid ion source (Faraday)	$> 1 \cdot 10^{-4}$ A/hPa	$> 5 \cdot 10^{-5}$ A/hPa	$> 3 \cdot 10^{-5}$ A/hPa
Use			
Installation location	Interiors, weatherproof		
Ambient conditions			
Protection category	IP 30		
Relative humidity	≤ 98 % at operating temperature, non-condensing		
Temperatures			
Operating temperature (analyzer)	≤ 150 °C		
Operating temperature (QME)	5-50 °C		
Bakeout temperature (analyzer) (QME disassembled)	≤ 300 °C		
Temperature (transport / storage)	-25 – +70 °C		
Temperature coefficient (during 8 hours, after 30 min. warm-up time)	< 1 % of the peak height per °C		
Electrical data			
Supply voltage (power supply pack)	100–240 V AC, 50/60 Hz		
Connection voltage (QME 250)	20–30 V DC, usually 24 V DC		
Rated (nominal) current	1.25 A max.		
Interfaces			
Operation, operating	Ethernet		
Standard control connection (AUX I/O)			
Plug-in connector	D-Sub, 15-pin, female		
Relay output	1×, two-way contacts, max. 24 V DC, 0.5 A		
Analog inputs	1× 0–+10 V, output resistance 1 MΩ, resolution 12 bit		
Digital inputs	2×; low < +2 V; high > +3 V, nominal +24 V, max. +28 V		
Output voltage	+24 V, max. 1 A		
Extended control connection (AUX I/O, optional)			
Plug-in connector	HD D-Sub, 62-pin, female		
Analog outputs	8× 0–+10 V, output resistance 100 Ω, $I_{max.} = 10$ mA, resolution 16 bit		
Analog inputs	8× -10–+10 V, input resistance 50 MΩ, resolution 16 bit		
Digital outputs	10×; open collector, nominal +24 V, max. +28 V, 200 mA		
Digital inputs	5×, low active, low < +2 V; high > +3 V, ≤ +24 V		
Output voltage	+24 V, max. 1 A (including current to +24 V output at standard control connection)		
Mounting orientation			
Venting requirements	min. 25 mm open space around the QME 250		
Mounting orientation	Arbitrary		
Weight			
QMA 250 M Analyzer (with mounted intermediate piece)	1.54 kg		
electronic unit QME 250	1.53 kg		
SP 250 Power supply unit	0.15 kg		

Tbl. 25: Technical data (EM/Faraday)

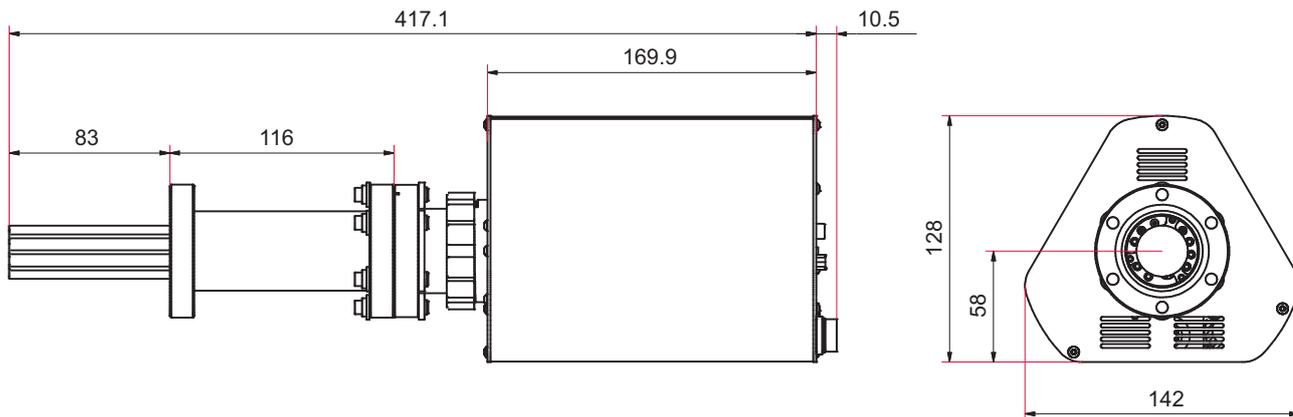


Fig. 27: Dimensions (EM/Faraday | open ion source)

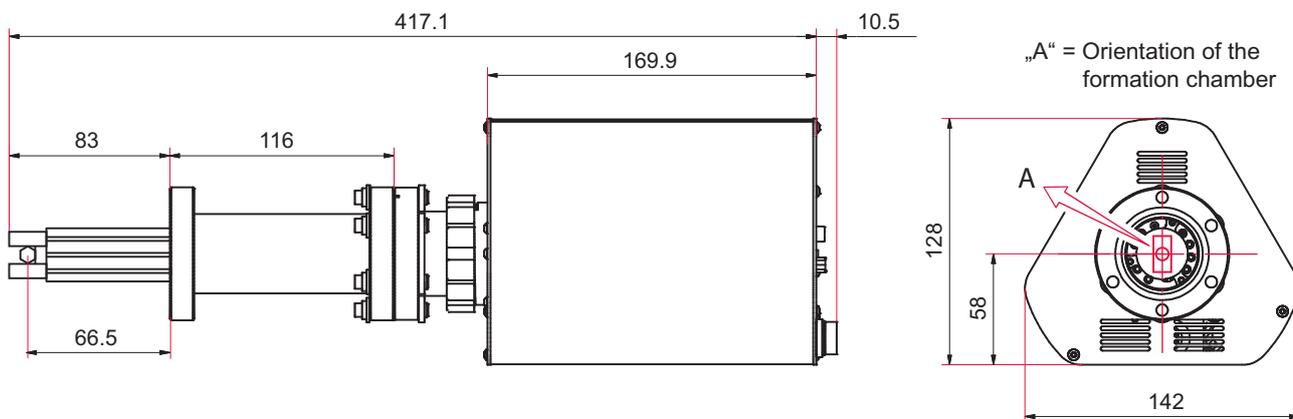


Fig. 28: Dimensions (EM/Faraday | cross beam ion source)

A Formation room orientation

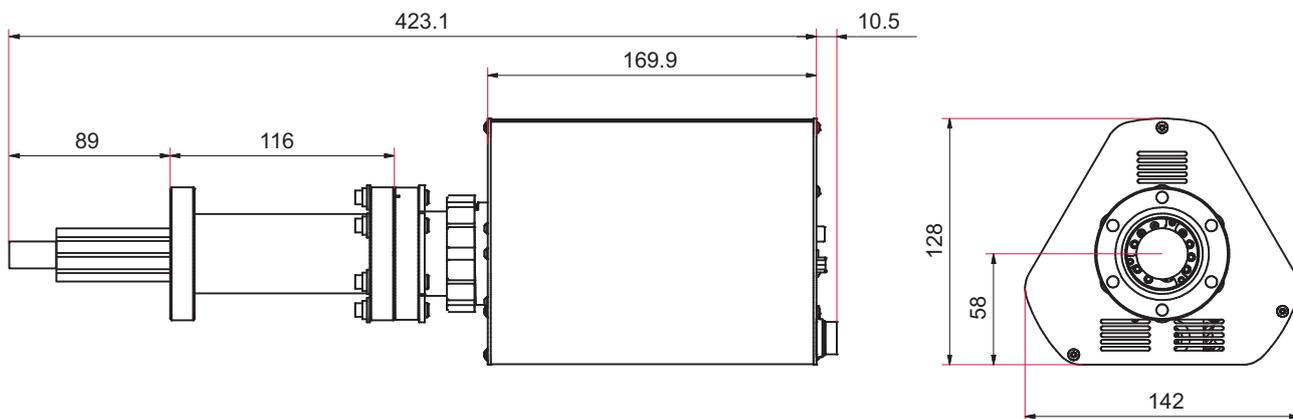


Fig. 29: Dimensions (EM/Faraday | grid ion source)



- The product QMG 250 PrismaPro
- conforms to the UL standard
UL 61010-1:2012.
 - is certified to the CAN/CSA standard
CAN/CSA C22.2 No. 61010-1-12.
 - conforms to the IEC standard
IEC 61010-1:2010.

Declaration of conformity

We hereby declare that the product cited below satisfies all relevant provisions of the following **EU Directives**:

- **Low voltage 2014/35/EC**
- **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**

**Compact mass spectrometer
QMG 250 PrismaPro®**

Harmonized standards and applied national standards and specifications:

DIN EN 61010-1:2011-07

DIN EN 61326-1:2013-07

DIN EN 55011:2009 + A1:2010 (Class A)

CISPR 11:2009 + A1:2010

FCC, Title 47 CFR, Part 18, Class A

Signature:



(Daniel Sälzer)
Managing Director

Pfeiffer Vacuum GmbH
Berliner Straße 43
35614 Asslar
Germany

Asslar, 2020-01-06



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