



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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Table of contents

1	About this manual	8
1.1	Validity	8
	1.1.1 Applicable documents	8
	1.1.2 Variants	8
1.2	Target group	9
1.3	Conventions	9
	1.3.1 Instructions in the text	9
	1.3.2 Pictographs	10
	1.3.3 Stickers on the product	10
	1.3.4 Abbreviations	11
1.4	Trademark proof	11
2	Safety	12
2.1	General safety information	12
2.2	Safety instructions	12
2.3	Safety precautions	15
2.4	Proper use	16
2.5	Foreseeable improper use	16
2.6	Responsibilities and warranty	16
2.7	Owner requirements	16
2.8	Personnel qualification	16
	2.8.1 Ensuring personnel qualification	17
	2.8.2 Personnel qualification for maintenance and repair	17
	2.8.3 Advanced training with Pfeiffer Vacuum	17
2.9	Operator requirements	17
3	Product description	18
3.1	Scope of delivery	18
3.2	System overview	18
	3.2.1 Structure of the system	18
	3.2.2 Analyzer QMA 250	20
	3.2.3 Electronic unit QME 250	21
	3.2.4 PV MassSpec software	22
3.3	Interfaces	22
	3.3.1 POWER SUPPLY	22
	3.3.2 Ethernet (LAN)	23
	3.3.3 AUX I/O	23
	3.3.4 EXT I/O	24
	3.3.5 TP GAUGE	26
	3.3.6 USB	26
3.4	Identifying the product	26
3.5	Operating principle	27
4	Transport and storage	28
4.1	Transporting the product	28
4.2	Storing the product	28
5	Installation	29
5.1	Installing PrismaPro	29
5.2	Installing the analyzer	30
5.3	Assemble the electronic unit	33
5.4	Establishing an electrical connection	33
	5.4.1 Establishing the Ethernet connection	33
	5.4.2 Connecting the current supply	34
5.5	Connecting gauges	34
5.6	Establishing a network connection	35

5.6.1	IP addresses	35
5.6.2	Sub-networks	36
5.6.3	Changing the PrismaPro IP address	36
5.6.4	Changing the host computer IP address	36
5.7	Connecting the PrismaPro	37
5.7.1	Connecting each individual PrismaPro	37
5.7.2	Connecting several PrismaPro devices	37
5.8	Installing PV MassSpec	38
6	Commissioning	39
6.1	Commissioning the device	39
6.2	Switch on the device	39
7	Operation	41
7.1	Using PrismaPro Web UI	41
7.2	Use PV MassSpec	41
8	Decommissioning	42
9	Maintenance	43
9.1	Execution of maintenance work	43
9.2	Test report	43
9.3	Maintaining the analyzer QMA 250	44
9.3.1	Visually inspect the QMA 250 analyzer	45
9.3.2	Baking out the analyzer	47
9.4	Replace filament unit	47
9.4.1	Replacing the filament unit of the open ion source	48
9.4.2	Replacing the filament unit of the crossbeam ion source	50
9.4.3	Replacing the filament unit of the grid ion source	51
9.5	Replacing the ion source	53
9.5.1	Replacing the open ion source	53
9.5.2	Replacing the cross beam ion source	54
9.5.3	Replacing the grid ion source	56
9.6	Calibrating high frequency and the mass scale	57
9.6.1	Factory calibration	57
9.6.2	Attaining a stable operating temperature for PrismaPro	58
9.6.3	Selecting the gas mixture for the mass calibration	58
9.6.4	Setting high frequency for both polarities	58
9.6.5	Perform mass calibration (TUNE)	59
9.6.6	Calibrating with a test gas mixture	60
9.6.7	Calibration with process gases	60
9.6.8	Calibration of the helium leak detection	60
10	Malfunctions	61
10.1	Troubleshooting	61
10.1.1	Remedying system and communication errors	61
10.1.2	Remedying hardware errors	62
10.1.3	Remedying operating and measuring errors	65
10.1.4	Calling software error messages from PV MassSpec	66
10.2	Contacts on QMA 250 and QME 250	67
10.3	Checking the QMA 250 analyzer	67
11	Shipping	69
12	Recycling and disposal	70
12.1	General disposal information	70
12.2	Dispose of a compact mass spectrometer	70
13	Service solutions by Pfeiffer Vacuum	71
14	Ordering information	73

14.1	Ordering parts	73
14.2	Spare parts Maintenance Level 1	73
14.2.1	Electronic unit QME 250	73
14.2.2	Analyzer QMA 250	73
14.2.3	Filament units	74
14.3	Spare parts Maintenance Level 2	74
14.4	Spare parts and small parts sets	74
14.4.1	Spare parts	74
14.4.2	Set of small parts PT 163 544 for open ion source	75
14.4.3	Set of small parts PT 163 543 for crossbeam ion source	75
14.4.4	Set of small parts PT 163 534 for grid ion source	75
15	Technical data and dimensions	76
15.1	General	76
15.2	Technical data PrismaPro QMG 250 F	76
15.3	Technical data PrismaPro QMG 250 M	77
15.4	Dimensions	79
	NRTL certification	83
	Declaration of conformity	84

List of tables

Tbl. 1:	Applicable documents	8
Tbl. 2:	QMG 250 PrismaPro	8
Tbl. 3:	Analyzer QMA 250	9
Tbl. 4:	Electronic unit QME 250	9
Tbl. 5:	Abbreviations used	11
Tbl. 6:	Ion sources for analyzer QMA 250 M	21
Tbl. 7:	Front panel elements	22
Tbl. 8:	Status of the Ethernet connection	23
Tbl. 9:	Required tightening torques	30
Tbl. 10:	Gauges	34
Tbl. 11:	Examples for sub-networks	36
Tbl. 12:	Connections of the filament and the ion source	46
Tbl. 13:	Maximum bakeout temperatures	47
Tbl. 14:	Mass calibration	58
Tbl. 15:	System and communication errors	62
Tbl. 16:	Hardware errors	64
Tbl. 17:	Operating and measuring errors	66
Tbl. 18:	Software error messages from PV MassSpec	66
Tbl. 19:	Measurements for checking the analyzer	68
Tbl. 20:	Electronic unit QME 250	73
Tbl. 21:	Analyzer QMA 250	74
Tbl. 22:	Filament units	74
Tbl. 23:	Ion sources	74
Tbl. 24:	Spare parts	75
Tbl. 25:	Set of small parts PT 163 544 for open ion source	75
Tbl. 26:	Set of small parts PT 163 543 for crossbeam ion source	75
Tbl. 27:	Set of small parts PT 163 534 for grid ion source	75
Tbl. 28:	Conversion table: Pressure units	76
Tbl. 29:	Conversion table: Units for gas throughput	76
Tbl. 30:	Technical data PrismaPro QMG 250 F	77
Tbl. 31:	Technical data PrismaPro QMG 250 M	79

List of figures

Fig. 1:	Position of the stickers on the product	10
Fig. 2:	Main components of the PrismaPro	19
Fig. 3:	System overview	20
Fig. 4:	Analyzers with transport protection	20
Fig. 5:	Components of the analyzer QMA 250 with open ion source	21
Fig. 6:	QME 250 front panel: left standard, right with IO 250	22
Fig. 7:	PV MassSpec	22
Fig. 8:	View on the mains part plug	23
Fig. 9:	Ethernet connection	23
Fig. 10:	AUX I/O, 15-pin D-Sub socket	23
Fig. 11:	EXT I/O, 62-pin HD D-Sub socket	24
Fig. 12:	Connection example: Digital output EXT I/O	25
Fig. 13:	Connection example: Digital input AUX I/O and EXT I/O	26
Fig. 14:	TP GAUGE, 6-pin Amphenol C 091 A socket	26
Fig. 15:	Principle of the quadrupole mass spectrometer system	27
Fig. 16:	Fastening and grounding of analyzer	32
Fig. 17:	Mounting aid and transport protection	32
Fig. 18:	Desktop shortcut	38
Fig. 19:	Excerpt of an exemplary a test report	44
Fig. 20:	Ion source with open ion source as an example	45
Fig. 21:	Connections of the filament and the ion source with clamps	46
Fig. 22:	High-frequency connections of the quadrupole mass filter	46
Fig. 23:	Disassembling the filament unit of the open ion source	49
Fig. 24:	Installing the filament unit of the open ion source	49
Fig. 25:	Filament unit of the crossbeam ion source	50
Fig. 26:	Support spring on the analyzer with crossbeam ion source	51
Fig. 27:	Filament unit of the grid ion source	52
Fig. 28:	Replacing the open ion source	54
Fig. 29:	Replacing the cross beam ion source	55
Fig. 30:	Support spring on the analyzer with crossbeam ion source	55
Fig. 31:	Replacing the grid ion source	57
Fig. 32:	Warning message with security prompt	59
Fig. 33:	New high frequency/reverse polarity	59
Fig. 34:	Contacts on QMA 250 and QME 250	67
Fig. 35:	Dimensions QMG 250 F / open IS / straight QME 250	79
Fig. 36:	Dimensions QMG 250 M / open IS / straight QME 250	80
Fig. 37:	Dimensions QMG 250 M / crossbeam IS / straight QME 250	80
Fig. 38:	Dimensions QMG 250 M / grid IS / straight QME 250	80
Fig. 39:	Dimensions QMG 250 F / open IS / 90° QME 250	81
Fig. 40:	Dimensions QMG 250 M / open IS / 90° QME 250	81
Fig. 41:	Dimensions QMG 250 M / crossbeam IS / 90° QME 250	82
Fig. 42:	Dimensions QMG 250 M / grid IS / 90° QME 250	82

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
"PrismaPro Web UI" Operating instructions 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 these instructions)

Tbl. 1: Applicable documents

You can find these documents in the [Pfeiffer Vacuum Download Center](#).

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 (Faraday/electron multiplier)

Tbl. 2: QMG 250 PrismaPro

Part number	Short description	Mass range [u]	Detector	Ion source	Filament	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	CB	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	CB	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		

Part number	Short description	Mass range [u]	Detector	Ion source	Filament	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					CB		W	Copper, silver-plated
PT M25 436					Ir-Y ₂ O ₃			
PT M25 439					Grid		W	

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		
PT M28 661	QME 250 M1	1 – 100	Standard (without IO 250)	90° angled
PT M28 662	QME 250 M2	1 – 200		
PT M28 663	QME 250 M3	1 – 300		
PT M28 671	QME 250 M1	1 – 100	expanded (with IO 250)	
PT M28 672	QME 250 M2	1 – 200		
PT M28 673	QME 250 M3	1 – 300		

Tbl. 4: Electronic unit QME 250

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

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

The figures in this document are not to scale.

Dimensions are in mm unless stated otherwise.

1.2 Target group

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

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

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

1.3 Conventions

1.3.1 Instructions in the text

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

Individual action step

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

- ▶ This is an individual action step.

Sequence of multi-part action steps

The numerical list indicates an action with multiple necessary steps.

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

1.3.2 Pictographs

The pictographs used in the document indicate useful information.



Note



Tip



Wear laboratory gloves



Perform a visual inspection

1.3.3 Stickers on the product

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

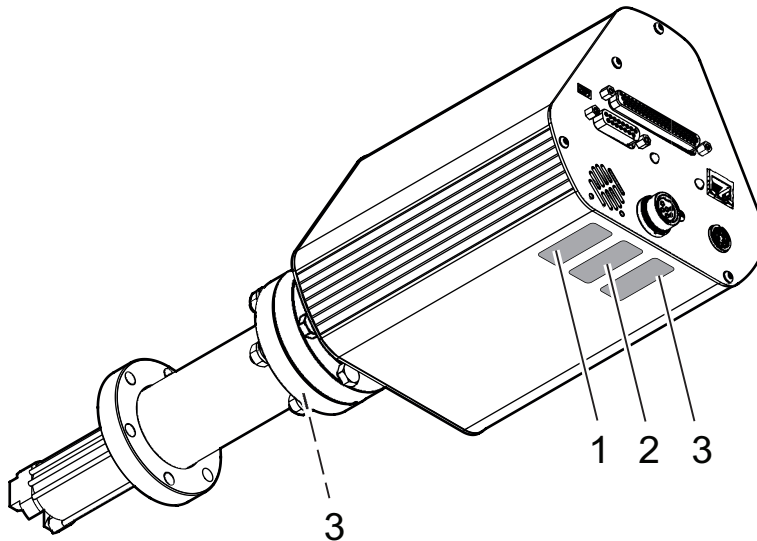
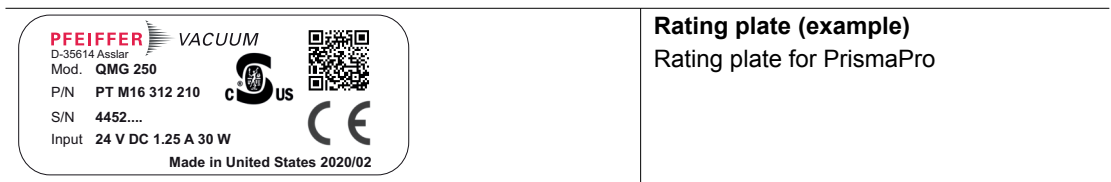


Fig. 1: Position of the stickers on the product

- | | |
|--------------------------------------------|-------------------------------------|
| 1 Rating plate for entire system QMG 250 | 3 Rating plate for analyzer QMA 250 |
| 2 Rating plate for electronic unit QME 250 | |

1.3.4 Abbreviations

Abbreviation	Explanation
AI	Analog input
AO	Analog output
BHCS	Button head cap screw
C/B	Cross beam (ion source type)
DEC	Digital emission controller
DHCP	Communication protocol for assigning the network configuration (Dynamic Host Communication Protocol)
DI	Digital input
DO	Digital output
DSP	Digital signal processing
EE	Electron energy
EM	Electron multiplier
ESD	Electrostatic discharge
FC	Faraday cup
FC-5311	Perfluoro(tetradecahydrophenantrene) isomer mixture for mass scale calibration in the mass range up to 624 u.
GND	Ground
HD	High density, with D-Sub connections with low pin spacing
HF	High Frequency
HV	High voltage
IP	Internet Protocol
IQ	Ion source
Ir-Y ₂ O ₃	Yttrium oxide (Y ₂ O ₃) coated iridium (Ir)
LAN	Local area network
M	Metric ISO thread
MAC	Hardware address of a network adapter providing an unambiguous identifier for the device in a computer network (media access control)
ME	Unit of quantity
MSL	Mean sea level
PP	Partial pressure
PV	Pfeiffer Vacuum
RF	Radio frequency
RGA	Residual gas analysis
TCP/IP	Internet protocol family (transmission control protocol/internet protocol)
TP	Total pressure
UHV	Ultra high vacuum
UTP	Unshielded twisted pair (of wires in cable)
W	Tungsten
Web UI	User Interface via web connection

Tbl. 5: Abbreviations used


1.4 Trademark proof

- PrismaPro® is a registered 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 	
<div style="border: 1px solid black; padding: 5px; display: inline-block;">  </div>	Notes, tips or examples indicate important information about the product or about this document.

2.2 Safety instructions

<div style="border: 1px solid black; padding: 5px; display: inline-block;">  </div>	<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>
------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

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 pack.
- ▶ 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



⚠ 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 pack.
- ▶ Never operate an open or defective device.
- ▶ Secure a defective device against accidental operation.
- ▶ Protect the device against moisture.

⚠ 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 health and safety of service personnel is at risk.

- ▶ Comply with the instructions for safe distribution.

Risks during disposal

WARNING

Health hazard through poisoning from toxic contaminated components or devices

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

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

2.3 Safety precautions

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



Duty to provide information on potential dangers

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

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



Infringement of conformity due to modifications to the product

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

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

Safety aspects

- Proper use will guarantee that personnel are provided protection by the device.
- There are no electrical hazards posed by the device as long as proper use is observed as prescribed.
- It is not known that the device generates harmful radiation.
- The analyzer does not contain any poisonous substances.
- Use of the analyzer in applications with toxic process media will result in residues of the toxic media settling on the surfaces of the analyzer.
- Suitable safety precautions must be observed by the maintenance personnel when working with contaminated analyzers.

General safety precautions when handling the product

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

2.4 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, etc.) that are not listed in the corresponding product documentation
- operates the product with accessories that are not listed in the corresponding product documentation

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 Scope of delivery

The scope of delivery includes the following parts:

- QMG 250 PrismaPro
 - Analyzer QMA 250 with transport protection and intermediate piece (EM variant only)
 - Electronic unit QME 250
 - SP 250 Power supply unit
 - Copper gasket DN 40 CF
- Installation hardware and small parts
 - Analyzer assembly set (fastening nut, o-ring, 6× hexagon head set screw with nuts (M6) and washers)
 - Socket key for the filament replacement
 - assembly tool for QMA 250 Analyzer
- Connector assemblies and cables
 - Ethernet cable (UTP patch cable, red, length 3 m, crossed connection)
 - D-sub plug (15-pin, male, with housing and strain relief)
 - HD D-sub plug ¹⁾ (62-pin, male, with housing and strain relief)
 - Cable plug ²⁾ (Amphenol, 6-pin, male, for measuring tube connection)
- Documentation
 - Operating instructions (multilingual)
 - Quick-Start Guide (multilingual)
- Miscellaneous
 - Test report (accessible on device)
 - Web UI (accessible on device)
 - PV MassSpec software (downloadable via PV Cloud)

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.

3.2 System overview

3.2.1 Structure of the system

The PrismaPro is comprised of 4 main components:

- Analyzer
- Electronic unit
- SP 250 power supply pack with mains cable
- PV MassSpec software

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

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

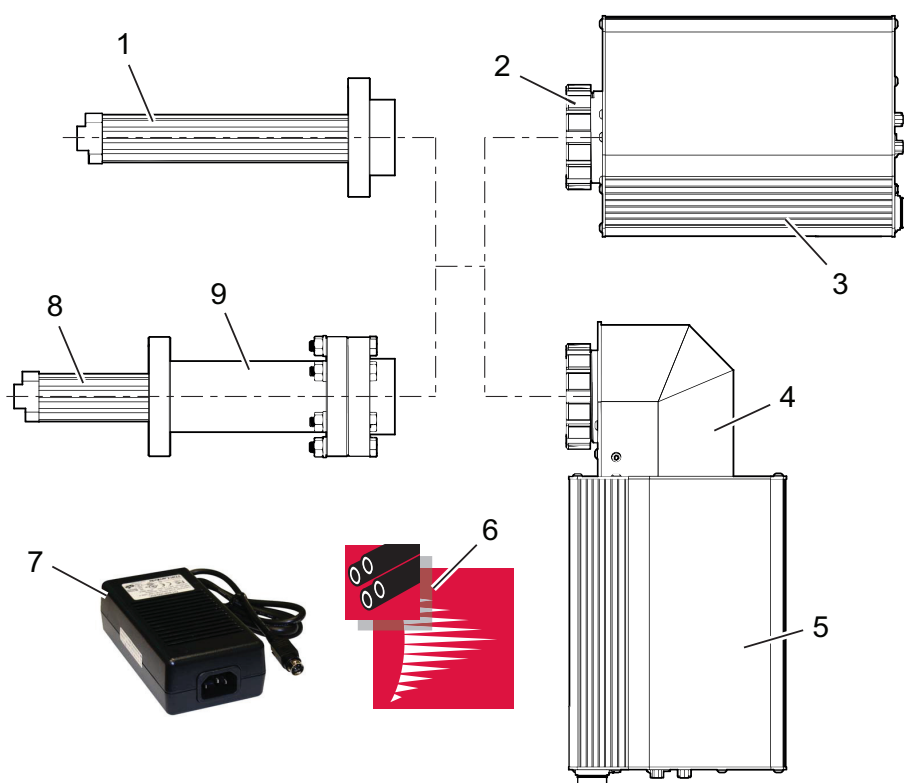


Fig. 2: Main components of the PrismaPro

- | | |
|---------------------------------------------|---------------------------------------------|
| 1 QMA 250 F Analyzer (with Faraday Cup) | 6 PV MassSpec software |
| 2 Fastening nut | 7 SP 250 power supply pack with mains cable |
| 3 Electronic unit QME 250 (straight design) | 8 QMA 250 M Analyzer (with EM) |
| 4 Connection housing | 9 Intermediate piece (only with EM version) |
| 5 Electronic unit QME 250 (angled design) | |

The use of the optional IO 250 I/O module permits the use of additional interfaces. The QME 250 electronic unit is available with the IO 250 already installed. Pfeiffer Vacuum can, however, also retrofit the QME 250 electronic unit with a IO 250.



PrismaPro Web UI

You can find detailed information on the use of PrismaPro Web UI in the corresponding operating instructions.

Operation of the PrismaPro is possible via the Web UI user interface, or with the highly comprehensive PV MassSpec software. Storage of measured data and the evaluation of measurement results is only possible with the PV MassSpec software. For the operation of PV MassSpec, you will require a PC with Windows operating system (Windows 7 or higher).

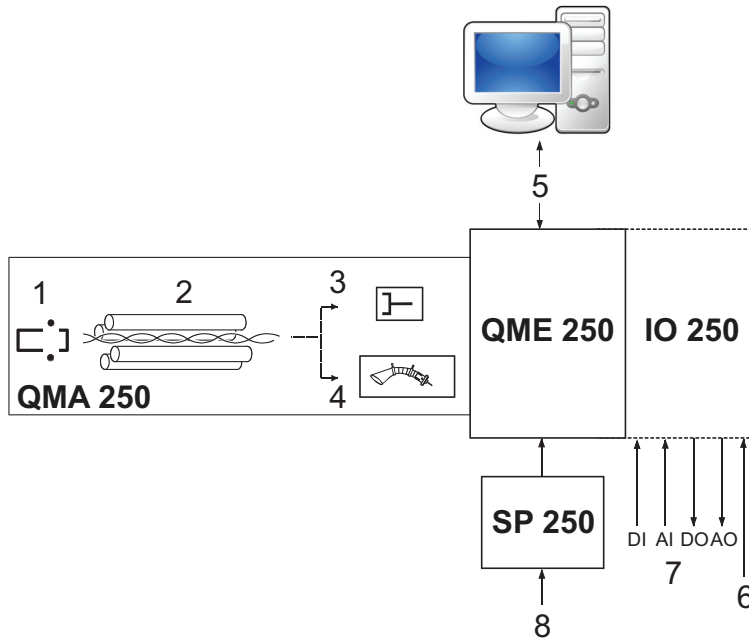


Fig. 3: System overview

- | | |
|--------------------------------------|----------------------------------------------------|
| 1 Ion source | 5 Connection to PC (Ethernet) with PV MassSpec |
| 2 Mass filter | 6 Gauges |
| 3 Faraday detector | 7 Additional inputs and outputs (analog / digital) |
| 4 Secondary electron multiplier (EM) | 8 Voltage supply |

3.2.2 Analyzer QMA 250

The analyzer is made up of the following components:

- Ion source
- Quadrupole mass filter
- Ion detector

There are 2 variants of ion detectors:

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

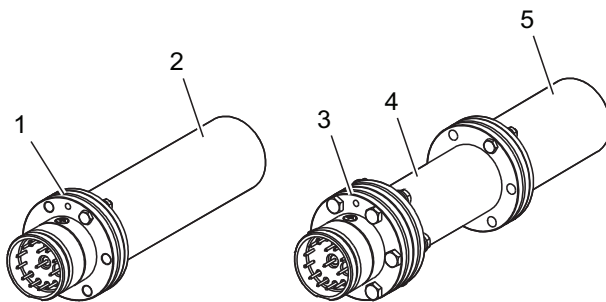


Fig. 4: Analyzers with transport protection

- | | |
|------------------------|------------------------|
| 1 Analyzer QMA 250 F | 4 Intermediate piece |
| 2 Transport protection | 5 Transport protection |
| 3 Analyzer QMA 250 M | |

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 provide a residual gas analysis in the total pressure range $> 10^{-7}$ hPa. Pfeiffer Vacuum supplies the analyzer QMA 250 F 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 maximum sensitivity
Cross beam ion source	for molecular beam applications
Grid ion source	for residual gas analysis in UHV ($< 10^{-8}$ hPa)

Tbl. 6: Ion sources for analyzer QMA 250 M

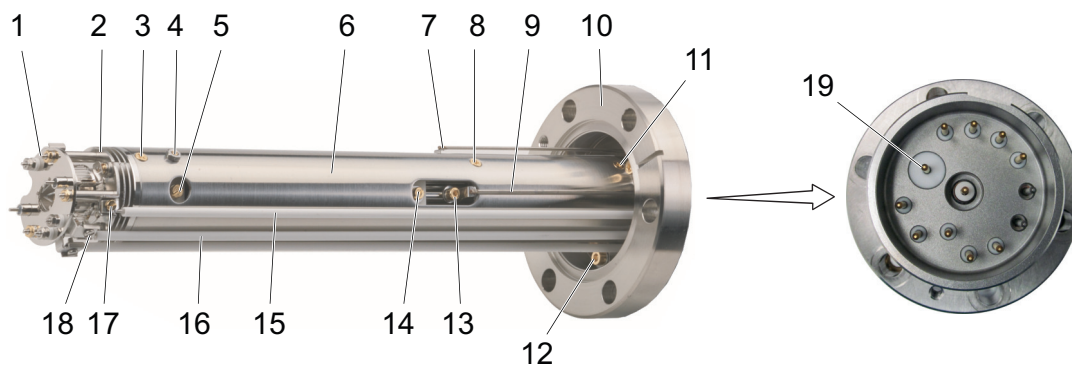


Fig. 5: Components of the analyzer QMA 250 with open ion source

- | | | | |
|----|------------------------------------------------------------------------------------------------|----|----------------------------------------------------------------------|
| 1 | Filament unit of ion source | 11 | Fixing screw (2×) of electron multiplier in the jacket tube |
| 2 | Ion source | 12 | Fixing screw and lock washer (3×) of the analyzer at the feedthrough |
| 3 | Fixing screw (3×) of ion source | 13 | Fixing screws (2×) for HF connections of the quadrupole rod system |
| 4 | Nut and adjusting screw for aligning and securing the quadrupole rod system in the jacket tube | 14 | Screws (2×) of the quadrupole mass filter |
| 5 | Screws (2×) of the quadrupole mass filter | 15 | Ceramic insulators of the ion source wiring |
| 6 | Jacket tube | 16 | Ceramic insulators of the filament wiring ³⁾ |
| 7 | HF-connection for quadrupole rod system | 17 | Ion source connections (3×) |
| 8 | Fixing screws (2×) of connection flange in the jacket tube | 18 | Filament unit connections (3×) |
| 9 | HF-connection for quadrupole rod system | 19 | Contacts on the analyzer (see page 67) |
| 10 | Feedthrough | | |

3.2.3 Electronic unit QME 250

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

3) The ceramic insulators of the filament wiring are longer than the ceramic insulators of the ion source wiring.

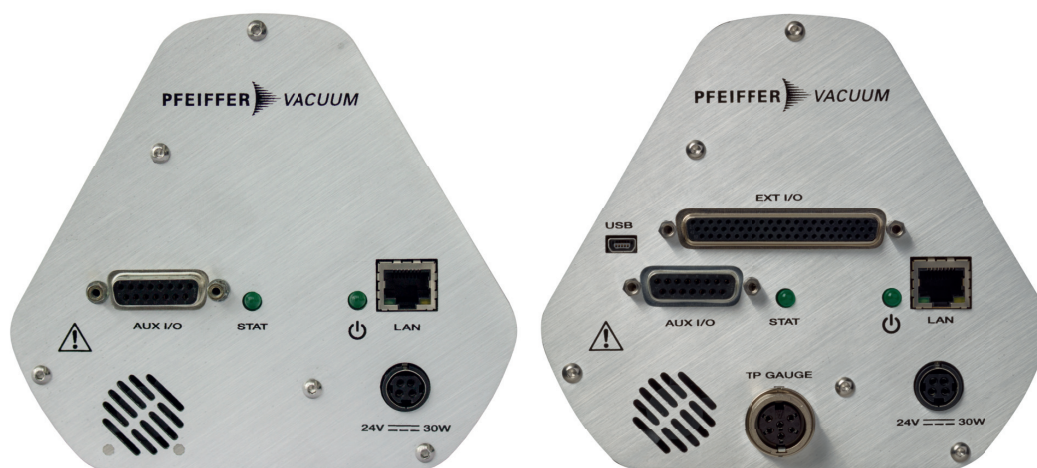



Fig. 6: QME 250 front panel: left standard, right with IO 250

Designation	Explanation
<AUX I/O> socket	I/O interface (standard)
<LAN> socket	Ethernet connection (PC)
<24 V = 30 W> socket	Connecting socket for SP 250
<USB> socket	USB connection for IO 250
<EXT I/O> socket	I/O interface (extended) for IO 250
<TP GAUGE> socket	Gauge connection for IO 250
LED <STAT>	Emission status on/off
LED <POWER>	Power supply on/off
	

Tbl. 7: Front panel elements

3.2.4 PV MassSpec software

The PrismaPro mass spectrometer system can be configured and operated with the PV MassSpec software. The software allows measured data to be displayed, evaluated, compared and saved.

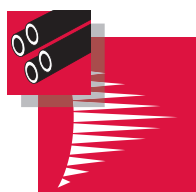


Fig. 7: PV MassSpec

3.3 Interfaces

3.3.1 POWER SUPPLY

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

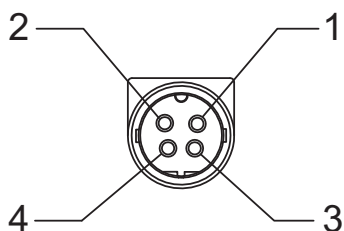


Fig. 8: View on the mains part plug

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

3.3.2 Ethernet (LAN)

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

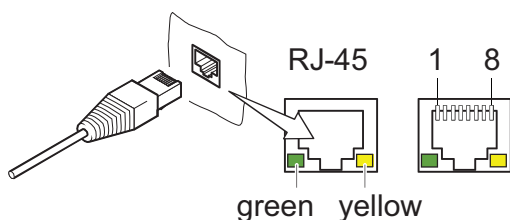


Fig. 9: Ethernet connection

- 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. 8: Status of the Ethernet connection

3.3.3 AUX I/O

The <AUX I/O> connection is comprised of a 15-pin D-Sub socket. The PrismaPro electronic unit QME 250 supports I/O functions via the <AUX I/O> connection on the front panel.

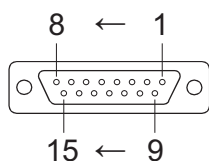


Fig. 10: AUX I/O, 15-pin D-Sub socket

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

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 assign other switching functions to the relay via the PV MassSpec software.

Analog input

The analog input (pins 9 and 10) are different and process inputs between 0 and +10 V. PV MassSpec supports the analog input.

Digital inputs

The inputs DI 0 and DI 1 (pins 13 and 14) are set to remotely control the emission status as standard. You can use the digital inputs via the PV MassSpec software for other functions.

- 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, an interlock is required to prevent activation of the emission when the pressure for operation of PrismaPro is too high.

3.3.4 EXT I/O

The <EXT I/O> connection is comprised of a 62-pin HD D-Sub socket. The PrismaPro electronic unit QME 250 supports extended I/O functions via the <EXT I/O> connection on the front panel with IO 250 installed.

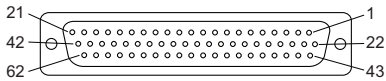


Fig. 11: EXT I/O, 62-pin HD D-Sub socket

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		

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.

Analog output

- 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

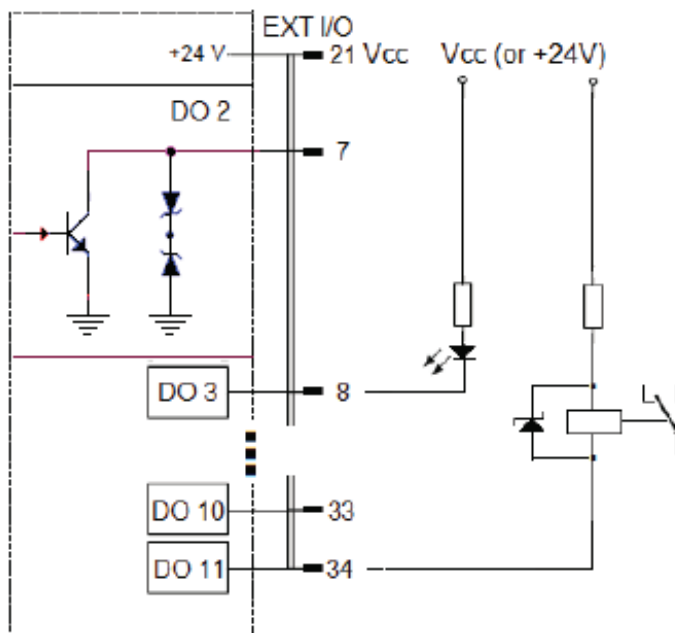


Fig. 12: Connection example: Digital output EXT I/O

Digital inputs

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

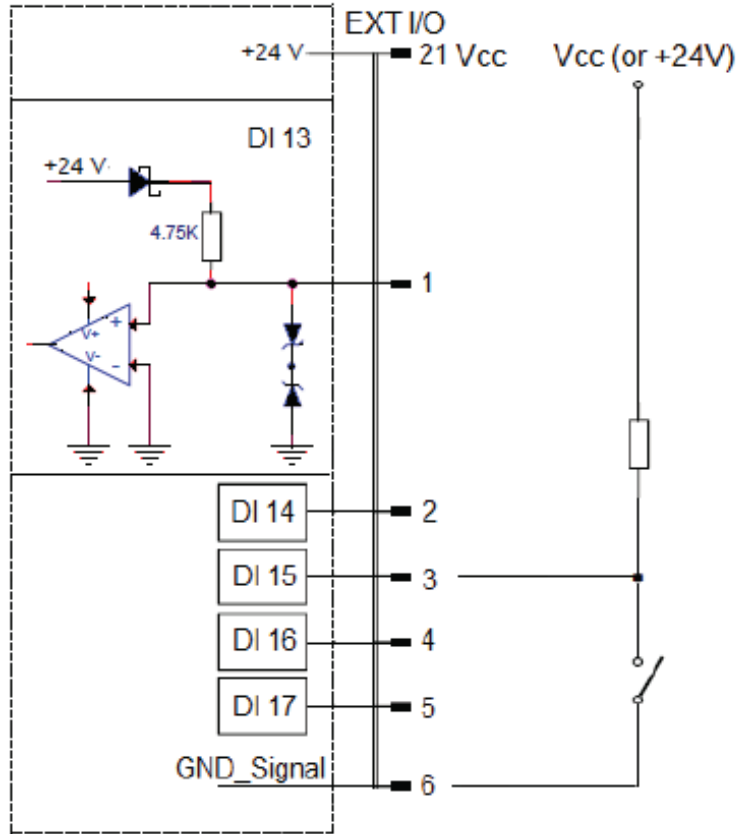


Fig. 13: Connection example: Digital input AUX I/O and EXT I/O

3.3.5 TP GAUGE

The <TP GAUGE> connection comprises a 6-pin Amphenol C 091 A socket for the connection of gauges from Pfeiffer Vacuum ActiveLine or DigiLine with Analog-Relay option (AR), for example as protection for the mass spectrometer against unintentional increases in pressure.

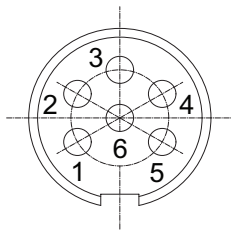


Fig. 14: TP GAUGE, 6-pin Amphenol C 091 A socket

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

3.3.6 USB

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

3.4 Identifying the product

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

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

3.5 Operating principle

The PrismaPro compact mass spectrometer is a quadrupole mass spectrometer system for qualitative and quantitative gas analysis within the high, and ultra-high vacuum range, for leak detection and to identify any trace contaminations.

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 which requires calibration with respective calibration gases in order to achieve an accurate quantitative gas analysis. The quadrupole mass spectrometer system electronics generate and control the direct, high, and HF voltages required for the ion sources, mass filter, and detector.

The quadrupole mass spectrometer system enables configuration and operation via web-based Web UI or by way of the quadrupole software PV MassSpec. PV MassSpec enables the evaluation, storage and comparison of measured data.

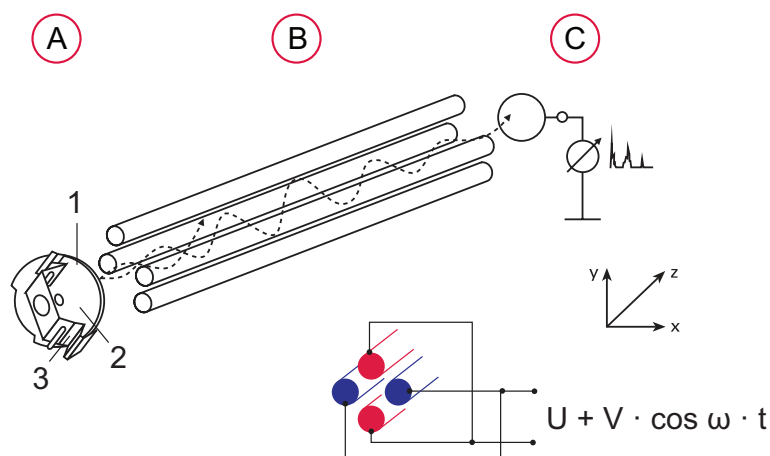


Fig. 15: Principle of the quadrupole mass spectrometer system

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

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 PrismaPro



⚠ 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 pack.
- ▶ 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.
- ▶ Make sure that the connection flanges are free of grease.
- ▶ Remove protective caps and protective covers from flanges and connections only when necessary.
- ▶ Remove the analyzer's transport protection only when necessary.
- ▶ Carry out all work in a well lit area.

NOTICE

Property damage as a result of inadequate spatial conditions

Inadequate spatial conditions will lead to property damage caused by short circuits between analyzer and wall.

- ▶ Observe the spatial conditions required for the PrismaPro.
- ▶ Always install the analyzer in flanges or pipes featuring an internal diameter ≥ 37 mm, and where possible > 39 mm.
- ▶ Observe the installation depth for the analyzer.
- ▶ Observe the cable bending radii.
- ▶ Do not allow kinks in the cable.



Easy access

When installing, ensure easy access to the unit to facilitate subsequent installation and maintenance work.

Required tools

- Socket set
- Socket key PT 163 508 for M 1.6 nuts
- Torque wrench

Thread	Tightening torque
M 1.6	0.15 Nm
M 2.0	0.40 Nm
M 2.5	0.85 Nm

Tbl. 9: Required tightening torques

Procedure

1. Tighten all screws and nuts with the necessary tightening torque.
2. Install the analyzer.
3. Install the electronic unit.
4. Connect the communication cable.
5. Connect the power supply.

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 (for example, better arrangement, shielding, earthing, etc.).
- ▶ Do not mount the analyzer near to magnetic fields with > 0.2 mT.
- ▶ 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 for the electronic unit against falling items
- Easier installation
- Easy access to the front panel of the electronic unit

Required tools

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

Required material

- 1 copper gasket (490DFL040-S-G-S5)
- Yellow-green or bare copper wires, 2.5 mm^2 or 4.0 mm^2 cross section surface

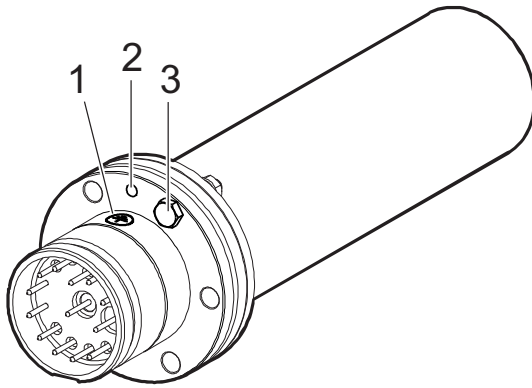


Fig. 16: Fastening and grounding of analyzer

- 1 Marking of grounding connection with ground symbol
- 2 Grounding connection (M4)
- 3 Position of the screw heads

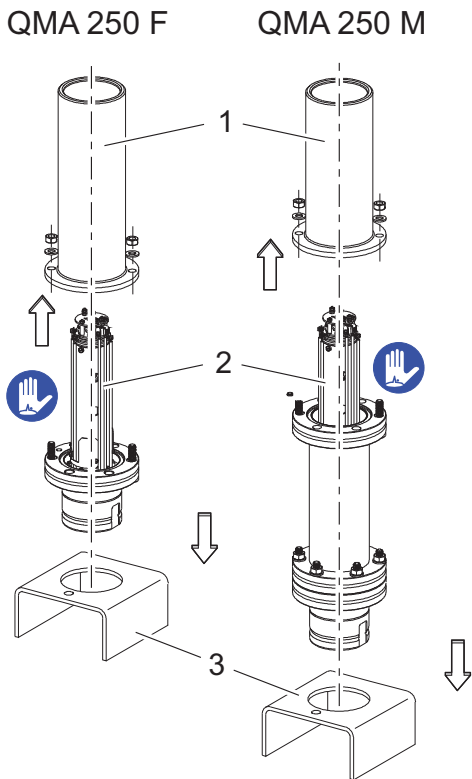


Fig. 17: Mounting aid and transport protection

- 1 Transport protection
- 2 Analyzer
- 3 Mounting aid

Procedure

1. Place the Analyzer in the mounting aid supplied.
2. Carefully remove the transport protection.
3. Store the transport protection in a safe place for future use.
4. Secure the analyzer with a new copper gasket electroconductively to the vacuum chamber (CF-flange DN 40) to ensure grounding of the analyzer as prescribed.
5. Attach the screws with the screw heads on the same side as the electronic unit to avoid impairments between the black fastening nut and the analyzer installation materials.
6. **For vacuum system without grounding:** Prepare a grounding connector out of yellow-green or bare copper wire (2.5 mm² if mechanically protected, 4.0 mm² if unprotected).
7. Connect the specifically marked grounding connection (M4) to the functional earth using a separate grounding conductor.

5.3 Assemble 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).

NOTICE

Damage due to bending contacts

If you apply force to the red electronics housing when mounting the angled electronics unit, you may cant the contacts. This bends and damages the contacts.

- ▶ Only apply force to the angled connection housing of the electronics unit.

Prerequisite

- QMA 250 analyzer correctly installed on the vacuum chamber.

Required material

- Analyzer installation kit including fastening nuts and O-ring

Procedure

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 groove.
4. Carefully insert the electronic unit up to the notched mark on the previously installed analyzer.
5. Ensure correct positioning of the earthing tongue and the guide groove.
6. Ensure the electronic unit is properly mounted.
7. Manually tighten the fastening nut on the electronic unit.

The fastening nut compresses the o-ring and ensures firm seating of the electronic unit on the analyzer housing.

5.4 Establishing an electrical connection

5.4.1 Establishing the Ethernet connection

The PrismaPro does not feature its own controls. A PC (host computer) or network is required for operation. 2 LEDs in the RJ-45 socket indicate the status of the interface.

Connecting the Ethernet cable

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

5.4.2 Connecting the current supply

NOTICE
<p>Damage caused by mechanical loading of electrical connections</p> <p>Mechanical loads, violent movements, etc. load and damage electrical connections.</p> <ul style="list-style-type: none"> ▶ Ensure strain relief for all electrical connections.

NOTICE
<p>Impairment of electrical connections caused by external disruptive influences</p> <p>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.</p> <p>Exception: For computers that are installed far away from each other or a heavily disturbed environment.</p> <ul style="list-style-type: none"> ▶ Use a multiple socket or a common mains distributor with mains switch. ▶ Route the control cable separately from the interference source.

Prerequisites

- Appropriate ambient conditions
- Adequate ventilation is guaranteed
- Mains voltage 100 – 240 V (AC) / 50 – 60 Hz / 80 W max.

Procedure

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 electronic unit QME 250.
3. Release the lock to engage the plug on the electronic unit QME 250.
4. Connect the current supply mains cable to the power supply pack.
5. Plug the mains cable AC plug into a suitable outlet.
6. Ensure that the <POWER> LED on the front panel lights up.
7. Check the power connections if the <POWER> LED does not light up.

5.5 Connecting gauges

Prerequisite

- IO 250 installed

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

Tbl. 10: Gauges

Procedure

- ▶ Connect a gauge to the <TP GAUGE> connection of the PrismaPro.
 - The electronic unit detects the gauge type automatically when it is switched on.
- ▶ After replacing a gauge, disconnect the power supply plug of the electronic unit for 10 seconds and then plug it in again.
 - The electronic unit reads in the new gauge type.

5.6 Establishing a network connection

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

- **IP addresses**

A network uses IP addresses as a means of identifying individual units. 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**

MAC addresses are another identification that is unique for each device. MAC addresses are singular.

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

IP address conflicts when using multiple PrismaPro devices

Pfeiffer Vacuum supplies each PrismaPro with the same default IP address. Simultaneous connection of multiple PrismaPro devices with the same IP address leads to IP address conflicts in the network.

1. Change the IP addresses of the PrismaPro devices being connected.
2. Connect the PrismaPro devices to a network.



Using IP addresses

Pfeiffer Vacuum recommends the use of **static IP addresses**.

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

If you connect the PrismaPro to an existing local network, a static IP address is required for each PrismaPro installed. Consult your network administrator for assigning the IP addresses.



Static IP addresses protect against the loss of data

The PV MassSpec software uses the IP address of the PrismaPro to identify each connected PrismaPro. The IP address of the PrismaPro may not be changed during operation.

With DHCP, the host can generate a new IP address each time if the PrismaPro goes offline and back online again. DHCP can also automatically change the IP address if there is an IP address conflict in the network. If the PrismaPro IP address changes randomly during data acquisition, PV MassSpec does not automatically reconnect with the PrismaPro as PV MassSpec does not recognize the newly assigned IP address. This leads to the loss of communication and the loss of data.

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

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 that are each separated from 0 to 255 by dots, for example: 192.168.1.100. Each part represents an octet. Normally, IP addresses comprise one network prefix and one host protocol.

Setting IP addresses

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

5.6.2 Sub-networks

Standard subnet mask of the PrismaPro

- Subnet mask: 255.255.0.0

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

	Example 1	Example 2	Example 3
IP address	192.168.1.104	192.168.1.105	192.168.1.150
Subnet mask	255.255.255.0	255.255.0.0	255.255.255.192
Network prefix	192.168.1.0	192.168.0.0	192.168.1.128
Host protocol	0.0.0.104	0.0.1.105	0.0.0.22

Tbl. 11: Examples for sub-networks

The subnet masks define which octets of the IP address are used as a 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



Operating instructions for Web UI and PV MassSpec

You can obtain information regarding operation of the PrismaPro via the Web UI and PV MassSpec in the separate operating instructions for Web UI and in the software documentation for PV MassSpec.

Procedure

- ▶ Change the unit's IP address using the Web UI.
- ▶ Change the unit's IP address with PV MassSpec Search.

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.



Ex factory IP address 192.168.1.100

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



Changing the IP address back to the default

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

Procedure

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

5.7 Connecting the PrismaPro

5.7.1 Connecting each individual PrismaPro

Installing a single PrismaPro in a private network

- ▶ Only change the IP address of the PrismaPro if the host computer being used has a different network prefix than that of the PrismaPro.
- ▶ Change the IP address of the host computer if the host computer does not have the same network prefix and the same subnet mask as the PrismaPro.

Connecting a single PrismaPro directly with a host computer

- ▶ Only change the IP address of the PrismaPro if the host computer being used has a different network prefix than that of the PrismaPro.
- ▶ Change the IP address of the host computer if the host computer does not have the same network prefix and the same subnet mask as the PrismaPro.

Installing a single PrismaPro in an existing local network

- ▶ Change the standard IP address of the PrismaPro if it is not compatible with the network.

5.7.2 Connecting several PrismaPro devices

NOTICE

IP address conflicts when using multiple PrismaPro devices

Pfeiffer Vacuum supplies each PrismaPro with the same default IP address. Simultaneous connection of multiple PrismaPro devices with the same IP address leads to IP address conflicts in the network.

1. Change the IP addresses of the PrismaPro devices being connected.
2. Connect the PrismaPro devices to a network.



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.

PrismaPro devices are connected to the network and require individual IP addresses. The IP addresses are assigned by a network administrator.

Connecting multiple PrismaPro devices with a host computer

1. Set up a private local network to connect multiple PrismaPro devices to a single host computer.
2. Change the IP addresses of all PrismaPro devices manually.

3. Install the PrismaPro devices on either a router or an Ethernet switch.
4. Connect the router or Ethernet switch to the host computer via the LAN port of the router/Ethernet switch.

Installing multiple PrismaPro devices in an existing local network

1. Use an Ethernet switch rather than a router to install multiple PrismaPro devices in an existing local network.
2. Connect all PrismaPro devices to the Ethernet switch.
3. Connect the Ethernet switch to the local network.

5.8 Installing PV MassSpec

Access credentials



Scan the QR code or [click here](#) and download latest version of PV MassSpec software. Password: PrismaPro.

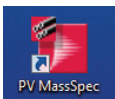



Fig. 18: Desktop shortcut

Procedure

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.

Following successful installation, a link PV MassSpec is created on the desktop.

6 Commissioning

6.1 Commissioning the device



Factory setting

Pfeiffer Vacuum configures complete systems optimally at the factory. Therefore, do not change anything without good reason.

Prerequisites

- System components correctly installed
- Vacuum- or system-related conditions satisfied
- Technical data observed
- Mains plug removed
- Required vacuum available
 - $< 10^{-4}$ hPa for QMA 250 F
 - $< 10^{-5}$ hPa for QMA 250 M

Procedure

1. Connect the wiring for the system components.
2. Establish a LAN connection to the PC (direct or via a network).
3. Set up the PC as specified in the software documentation.
4. Refer to the relevant operating instructions for other system components.

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 pack.
- ▶ 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. The storage of data or display of data in a trend graph is not possible with PrismaPro Web UI.

Use a complete software program such as PV MassSpec for the storage of data, the selected peak mode or trend graphs.



Only switch on or switch off the QME at the mains plug

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




Data transfer problem

If the yellow LED of the Ethernet connection remains unlit, a problem has occurred during data transfer. Check the cable and components in the connection path, as well as the correct PC configuration (software, firewall status etc.).

Procedure

As an alternative to operation with the PV MassSpec software, you can also operate the PrismaPro via the Web UI. Simple measurements, as well as leak detection can be performed via the Web UI. Moreover, adjustment and setting of diverse device parameters are also possible.

1. Insert the mains plug of the SP 250 power supply pack.
 - The LED <POWER>  on the front panel of the electronic unit lights up 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 at the Ethernet connection of the QME 250 indicates that data exchange is in progress.
4. Carry out the further steps of commissioning in PV MassSpec.

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 Use PV MassSpec

Detailed information on the use of PV MassSpec can be found in the Help file for the software and in these operating instructions.

8 Decommissioning



⚠ 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 pack.
- ▶ Never operate an open or defective device.
- ▶ Secure a defective device against accidental operation.
- ▶ Protect the device against moisture.

NOTICE

Impairment from contamination and damage

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

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




Only switch on or switch off the QME at the mains plug

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

Prerequisite

- PrismaPro cooled down

Decommissioning the PrismaPro

1. Disconnect the power supply.
 - The <POWER>  LED on the front panel of the electronic unit is off.
2. Disconnect the wiring for the system components.
3. Disconnect the communication cable.
4. Close the PV MassSpec software.
5. Disconnect the electronic unit from the analyzer.
6. Remove the analyzer from the vacuum system.
7. Fit the transport protection onto the analyzer.

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

Maintaining the analyzer QMA 250

The analyzer ages in normal use and does not require preventive or regular maintenance work.

- ▶ Carry out a visual inspection of the analyzer.
- ▶ Eliminate malfunctions and faults resulting from a contaminated ion source or from a contaminated analyzer using the degas function of the ion source or by baking out the analyzer.
- ▶ Check whether you can achieve better results with the settings from the test report before you perform wide-ranging maintenance work.
 - Inadequate sensitivity, malfunctions, and faults may also be due to incorrectly set ion source parameters.
- ▶ Contact [Pfeiffer Vacuum Service](#).

Maintaining the electronic unit QME 250

The QME 250 electronic unit does not normally require any repairs or maintenance.

- ▶ Contact [Pfeiffer Vacuum Service](#).

9.2 Test report

The test report lists the ion source parameters which have achieved good results during the final inspection at the factory.

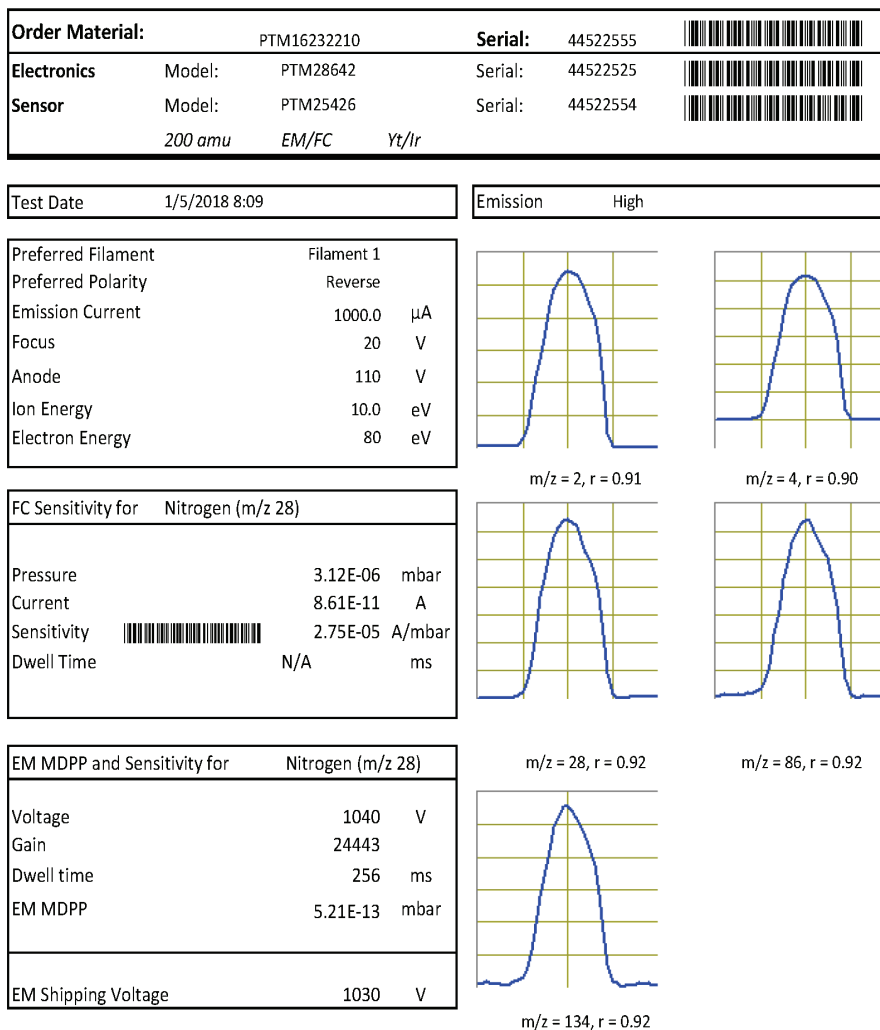


Fig. 19: Excerpt of an exemplary a test report

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 Maintaining the analyzer QMA 250

NOTICE
<p>Filament damage from incorrect handling</p> <p>Filaments are highly sensitive, pre-assembled units. You can easily damage filaments by incorrect handling.</p> <ul style="list-style-type: none"> ▶ 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.

NOTICE**Impairment from contamination and damage**

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

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

**Visual inspection before replacing the filament unit**

Inspect and assess the complete ion source before replacing the filament unit. Pfeiffer Vacuum recommends replacing the complete ion source in the event of damage, significant deposits or soiling as well as signs of contamination (e.g. discoloration).

9.3.1 Visually inspect the QMA 250 analyzer**Prerequisite**

- PrismaPro deactivated

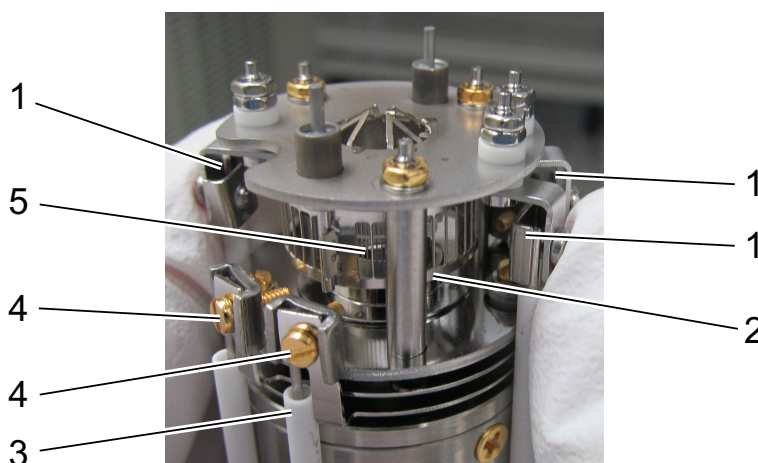


Fig. 20: Ion source with open ion source as an example

- | | |
|---------------------------------------------------------------------------------|-------------------------------|
| 1 Filament unit connections (3×) | 4 Ion source connections (3×) |
| 2 Deflector cage | 5 Anode cage (internal) |
| 3 Ceramic insulators of the filament wiring and ion source wiring ⁶⁾ | |

6) The ceramic insulators of the filament wiring are longer than the ceramic insulators of the ion source wiring.

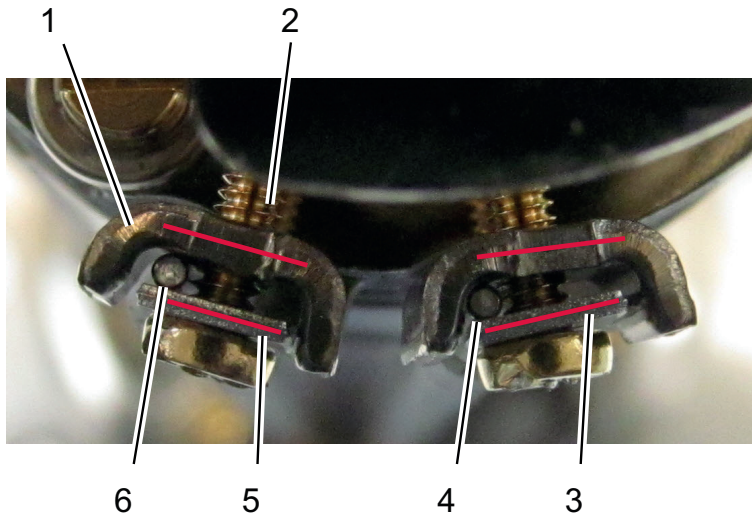


Fig. 21: Connections of the filament and the ion source with clamps

- | | |
|---------------------------------|-----------------------------|
| 1 U-clamp | 4 Well fitted connection |
| 2 Screw | 5 Clamp parallel to U-clamp |
| 3 Clamp not parallel to U-clamp | 6 Poorly fitted connection |

Good connection	Poor connection
<ul style="list-style-type: none"> • Wire in corner of U-clamp • U-clamp not parallel to clamp 	<ul style="list-style-type: none"> • Wire too close to screw • U-clamp parallel to clamp. This can result in a poor connection, and in turn lead to an increase in resistance. The wire can become loose due to temperature cycles, causing an intermittent connection.

Tbl. 12: Connections of the filament and the ion source

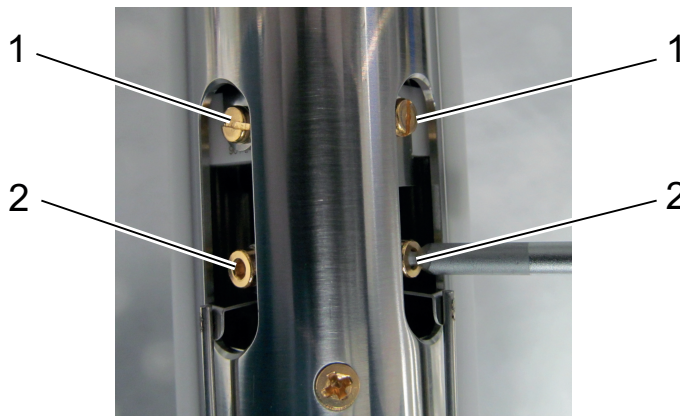


Fig. 22: High-frequency connections of the quadrupole mass filter

- | | |
|----------------------------------------|------------------------------|
| 1 Screws of the quadrupole mass filter | 2 High-frequency connections |
|----------------------------------------|------------------------------|

Procedure

1. Inspect the filament connections for secure fastening of the clamps (short circuit).
2. Inspect the filament connections for oxidized areas.
3. Inspect the ion source connections for secure fastening of the clamps (short circuit).
4. Inspect the ion source connections for oxidized areas.
5. Inspect the ceramic insulators of the filament connections and ion source connections for damage.
 - The ceramic insulators isolate the wires from the jacket tube of the analyzer.
6. Check the anode cage for deformation or contamination.
 - Contamination may not be immediately evident and can only be identified as a result of poor performance.

7. Check the connections of the deflector cage for deformation or contamination.
 - Contamination may not be immediately evident and can only be identified as a result of poor performance.
8. Check the electrical connections of the quadrupole mass filter for correct connection.
9. Check the high-frequency connections for correct connection.

9.3.2 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 excessive temperatures

Switching on the electron multiplier at high temperatures will lead to permanent damage.

- ▶ Do not switch on the electron multiplier at analyzer temperatures > 150 °C.

Prerequisites

- Vacuum system with heater for baking out the analyzer
- Temperature which can be attained with the heater > 120 °C.
- High vacuum > 1×10^{-5} hPa

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

Tbl. 13: Maximum bakeout temperatures

Baking out the analyzer

1. Attempt to restore the normal performance by baking out the analyzer under a high vacuum for several hours - at best overnight.
2. Check the filaments and the ion source if the desired result is not accomplished by baking out the analyzer.
3. Contact [Pfeiffer Vacuum Service](#) if you cannot resolve the existing problem by doing so.

9.4 Replace filament unit



Visual inspection before replacing the filament unit

Inspect and assess the complete ion source before replacing the filament unit. Pfeiffer Vacuum recommends replacing the complete ion source in the event of damage, significant deposits or soiling as well as 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.
- ▶ Make sure that the connection flanges are free of grease.
- ▶ Remove protective caps and protective covers from flanges and connections only when necessary.
- ▶ Remove the analyzer's transport protection only when necessary.
- ▶ Carry out all work in a well lit area.

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.

9.4.1 Replacing the filament unit of the 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.

Prerequisite

- PrismaPro deactivated

Required tools

- Socket key, **WAF 3.2**
- Flat screwdriver, **3 mm**
- Torque wrench
- Flat pliers

Required aids

- Mounting aid for the analyzer

Spare parts required

- Filament unit for open ion source with tungsten filaments or Y_2O_3 -coated iridium filaments
- If necessary, set of parts PT 163 544 for the replacement of screws, nuts or clamps

**Spring washer on filament unit**

The spring washer on the filament unit ensures the flexible contact between the deflector cage and ground (GND) of the QMA. The spring washer must have contact with the fixing screw without the two parts being bolted together.

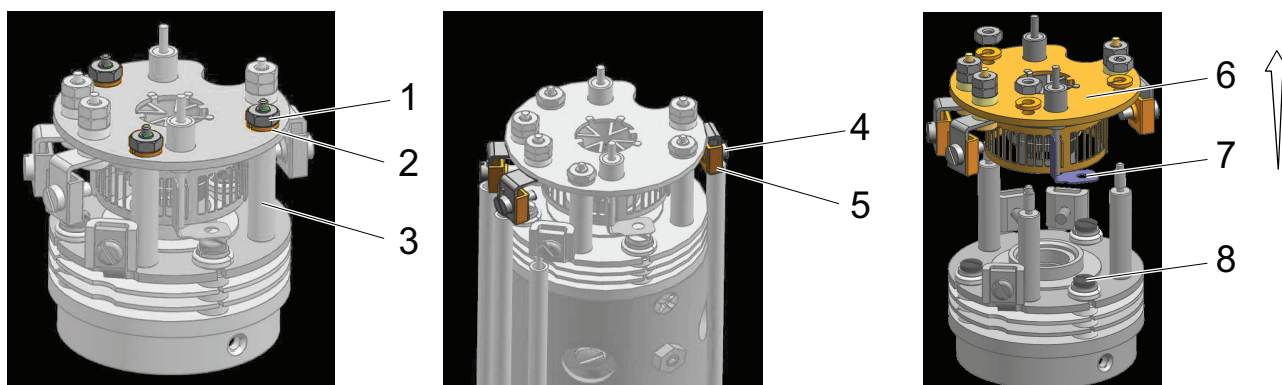


Fig. 23: Disassembling the filament unit of the open ion source

- | | |
|-------------------------------------------------------------|--------------------------------------|
| 1 Nut (3×)
(M1.6, hexagon, stainless steel, gold-plated) | 5 Clamp (3×)
(M1.6, for filament) |
| 2 Lock washer (3×) | 6 Filament unit |
| 3 Brace (3×) | 7 Spring washer |
| 4 Screw (3×)
(M1.6×4, flat head) | 8 Fixing screw |

Disassembling the filament unit

1. Place the analyzer in the mounting aid.
2. Remove the nuts and lock washers from the braces.
3. Hold the clamps with the flat pliers.
4. Loosen the screws of the clamps without unscrewing the screws too far.
 - The rear clamp will fall off if the screws are unscrewed too far.
5. Carefully pull the filament connections away from the filament unit.
6. Carefully pull the filament unit away from the ion source.

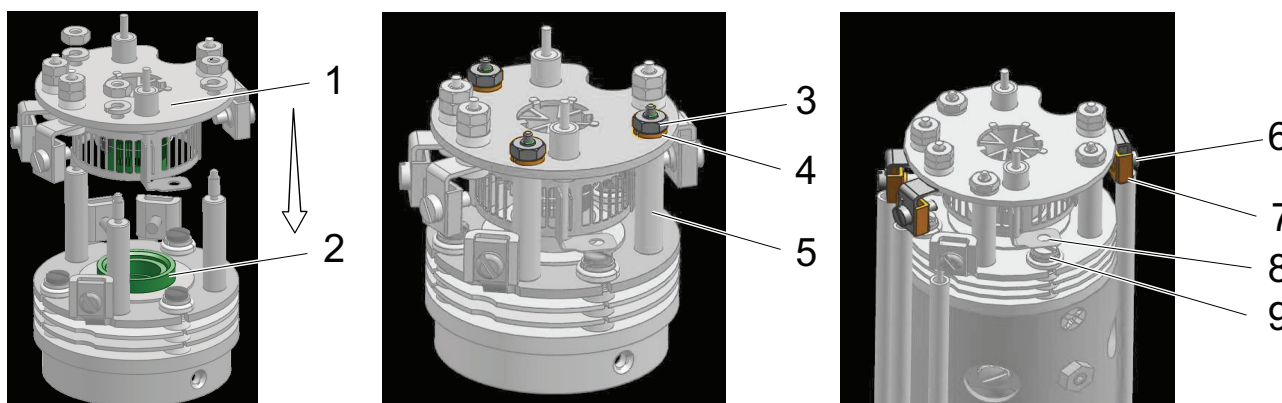


Fig. 24: Installing the filament unit of the open ion source

- | | |
|-------------------------------------------------------------|--------------------------------------|
| 1 Filament unit | 6 Screw (3×)
(M1.6×4, flat head) |
| 2 Counterbore | 7 Clamp (3×)
(M1.6, for filament) |
| 3 Nut (3×)
(M1.6, hexagon, stainless steel, gold-plated) | 8 Spring washer |
| 4 Lock washer (3×) | 9 Fixing screw |
| 5 Brace (3×) | |

Installing the filament unit

1. Place the analyzer in the mounting aid.
2. Carefully remove the filament unit from the transport lock.
3. Fit the new filament unit onto the spacers so that the anode of the filament unit is aligned with the counterbore.
4. Secure the filament unit to the spacers with new nuts and lock washers.
5. Tighten the nuts.
 - Tightening torque: **0.15 Nm**
6. Insert the filament connections into the clamps.

7. Tighten the screws.
 - Tightening torque: **0.15 Nm**
8. Make sure that the spring washer and the fixing screw have good contact.
 - Do not bolt the spring washer and the fixing screw together.
9. Measure the resistance of each filament.

Setting parameters in the operating software to 0 (zero)

- ▶ Set the pressure cut-off meter of the ion source to 0 (zero) in uCon with the command U204.
 - Alternatively, enter "/mmssp/sensorIonSource/tPTripCount/set?0" in the web browser and confirm with Enter.

9.4.2 Replacing the filament unit of the crossbeam ion source



Renew filaments of both filament holders

Pfeiffer Vacuum recommends always renewing both filament holders with filaments.

Prerequisite

- PrismaPro deactivated

Required tools

- Socket key, **WAF 3.2**
- Flat screwdriver, **3 mm**
- Torque wrench
- Flat pliers

Required aid

- Mounting aid for the analyzer

Required spare parts

- Filament unit for crossbeam ion source with tungsten filaments or Y₂O₃-coated iridium filaments
- If necessary, set of parts PT 163 543 for the replacement of screws, nuts or clamps

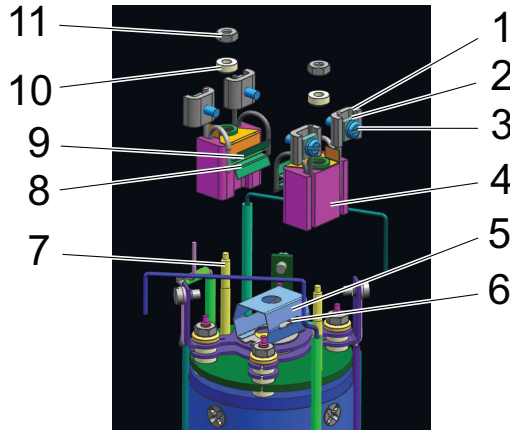
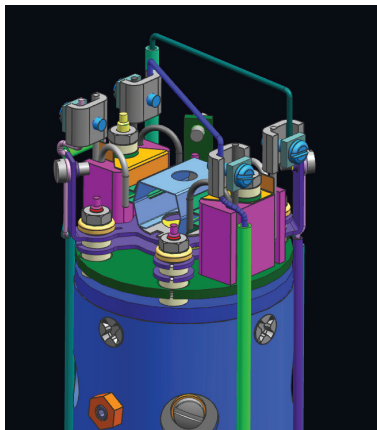


Fig. 25: Filament unit of the crossbeam ion source

- | | |
|--------------------------------------------------------------|-------------------------------------------------|
| 1 Clamp (4×) | 7 Stud bolt (2×) |
| 2 Nut (4×)
(rectangular) | 8 Wehnelt plate (2×) |
| 3 Screw (4×)
(M1.6×5, slot, stainless steel, gold-plated) | 9 Filament (2×) |
| 4 Filament holder with filament (2×) | 10 Ceramic insulator (2×) |
| 5 Formation area | 11 Nut (2×)
(M1.6, hexagon, stainless steel) |
| 6 Lateral openings of the formation area | |

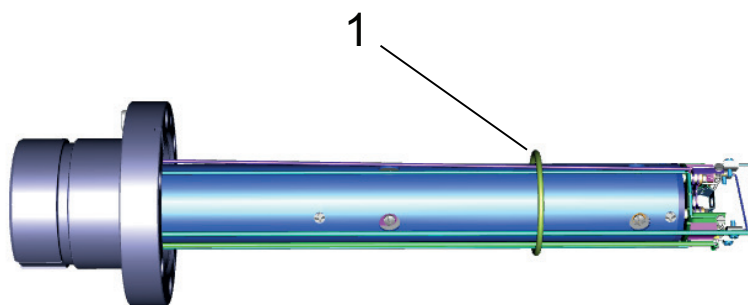


Fig. 26: Support spring on the analyzer with crossbeam ion source

- 1 Support spring

Disassembling the filament unit

1. Place the analyzer in the mounting aid.
2. Remove the support spring.
3. Hold the clamps with the flat pliers.
4. Loosen the screws and nuts of the clamps without unscrewing the screws too far.
 - The rear clamp will fall off if the screws are unscrewed too far.
5. Carefully remove the filament connections from the filament holder clamps.
6. Loosen and remove the nuts.
7. Carefully pull both filament holder and ceramic isolators away from the ion source.

Installing the filament unit

1. Place the analyzer in the mounting aid.
2. Carefully remove the new filament holder from the transport packaging.
3. Place the new filament holder onto the stud bolts of the ion source.
4. Insert the ceramic insulators, the side with the shoulder facing down towards the filament holder, into the mounting hole.
5. Tighten the nuts.
 - Tightening torque: **0.15 Nm**
6. Make sure that Wehnelt plates and filaments are positioned correctly.
 - When correctly installed, the Wehnelt plates and filaments sit parallel to and at the same height as the lateral openings of the formation area.
7. Insert the filament connections into the clamps.
8. Hold the clamps with the flat pliers.
9. Tighten the screws and nuts.
 - Tightening torque: **0.15 Nm**
10. Secure the support spring.
11. Measure the resistance of each filament.

Setting parameters in the operating software to 0 (zero)

- ▶ Set the pressure cut-off meter of the ion source to 0 (zero) in uCon with the command U204.
 - Alternatively, enter "/mmsp/sensorIonSource/tPTripCount/set?0" in the web browser and confirm with Enter.

9.4.3 Replacing the filament unit of the grid ion source

Prerequisite

- PrismaPro deactivated

Required tools

- Socket key, **WAF 3.2**
- Flat screwdriver, **3 mm**
- Torque wrench
- Flat pliers

Required aid

- Mounting aid for the analyzer

Required spare parts

- Filament unit for grid ion source with tungsten filaments
- If necessary, set of parts PT 163 534 for the replacement of screws, nuts or clamps

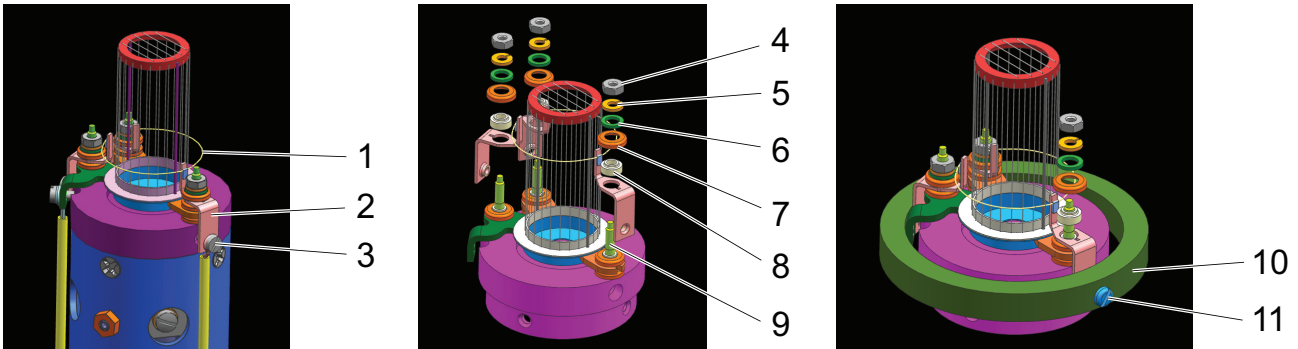


Fig. 27: Filament unit of the grid ion source

- | | |
|------------------------------------------------|----------------------------|
| 1 Filament unit | 7 Hood (3×) |
| 2 Connection of filament unit (3×) | 8 Ceramic insulator (3×) |
| 3 Screw (3×)
(M1.6, flat head) | 9 Stud bolt (3×) |
| 4 Nut (3×)
(M1.6, hexagon, stainless steel) | 10 Support ring |
| 5 Circlip (3×) | 11 Support ring screw (3×) |
| 6 Washer (3×) | |

Disassembling the filament unit

1. Place the analyzer in the mounting aid.
2. Hold the filament unit connections holder with the flat pliers.
3. Loosen the screws of the filament unit.
4. Carefully remove the ion source from the quadrupole rod system.
5. Loosen the nuts.
6. Remove nuts, circlips, washers, hoods, and ceramic isolators.
7. Carefully pull the filament unit away from the ion source.

Installing the filament unit

1. Place the analyzer in the mounting aid.
2. Carefully remove the new filament unit with attached support ring from the transport packaging.
3. Place the new filament unit onto the stud bolts of the ion source.
4. Install the ceramic insulators, hoods, washers and circlips.
5. Tighten the nuts.
 - Tightening torque: **0.15 Nm**
6. Loosen the support ring bolts and remove the support ring.
7. Carefully install the ion source onto the quadrupole rod system.
8. Feed the screws through the eyelets of the wiring.
9. Hold the filament unit connections with the flat pliers.
10. Tighten the screws in the connectors of the filament unit.
 - Tightening torque: **0.15 Nm**
11. Measure the resistance of each filament.

Setting parameters in the operating software to 0 (zero)

- ▶ Set the pressure cut-off meter of the ion source to 0 (zero) in uCon with the command U204.
 - Alternatively, enter `"/mmsp/sensorIonSource/tPTripCount/set?0"` in the web browser and confirm with Enter.

9.5 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.
- ▶ Make sure that the connection flanges are free of grease.
- ▶ Remove protective caps and protective covers from flanges and connections only when necessary.
- ▶ Remove the analyzer's transport protection only when necessary.
- ▶ Carry out all work in a well lit area.

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.

9.5.1 Replacing the open ion source

NOTICE

Property damage caused by falling ceramic insulators

The fixing screws of the ion source only have 4 turns of thread and can quite easily fall into the quadrupole mass filter as the ion source is being disassembled. When turning the analyzer upside down to take out the parts, loose ceramic insulators from the ion source wiring fall out and break or splinter.

- ▶ Hold the ceramic insulators of the ion source wiring securely in place when turning the analyzer upside down.

Prerequisite

- PrismaPro deactivated

Required tools

- Flat screwdriver, **1.5 mm**
- Flat screwdriver, **3 mm**
- Crosshead screwdriver, **Philips #1**
- Torque wrench
- Flat pliers

Required aid

- Mounting aid for the analyzer

Required spare parts

- Open ion source with tungsten filaments or Y₂O₃-coated iridium filament
- If necessary, set of parts PT 163 544 for the replacement of screws, nuts or clamps

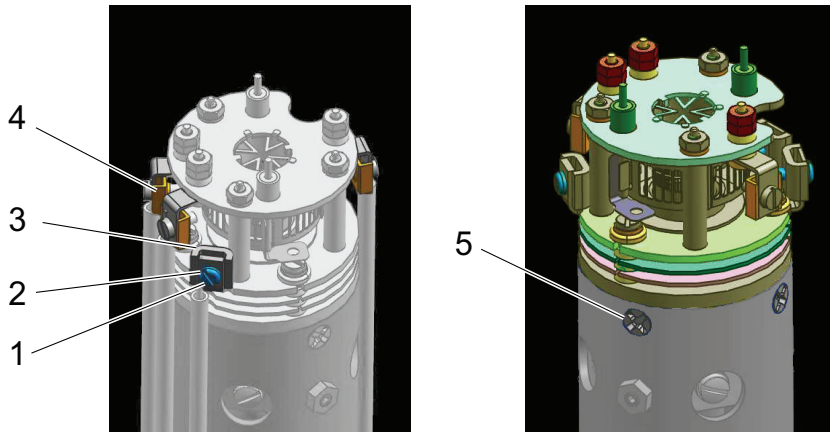


Fig. 28: Replacing the open ion source

- | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> 1 Screw (3×)
(M1.6×5, slot, stainless steel, gold-plated) 2 Nut (3×)
(rectangular) 3 Clamp for the ion source supply (3×) | <ul style="list-style-type: none"> 4 Clamp for the filament unit (3×) 5 Fixing screw of the ion source (3×)
(M2×3, crosshead, stainless steel, gold-plated) |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Disassembling the ion source

1. Place the analyzer in the mounting aid.
2. Hold the clamps for the filament unit and the clamps for the ion source supply with the flat pliers.
3. Loosen the screws and nuts of the clamps without unscrewing the screws too far.
 - The rear clamp will fall off if the screws are unscrewed too far.
4. Carefully bend the wiring away from the ion source using the flat pliers.
5. Loosen and remove the fixing screws of the ion source which secure the ion source to the quadrupole mass filter.
6. Carefully lift the ion source from the quadrupole rod system.
7. Inspect the ceramic insulators of the ion source wiring for damage.

Installing the ion source

1. Place the analyzer in the mounting aid.
2. Carefully remove the ion source from the transport packaging.
3. Carefully place the ion source onto the quadrupole rod system.
4. Fasten the fixing screws of the ion source which secure the ion source to the quadrupole mass filter.
 - Tightening torque: **0.40 Nm**
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 screws and nuts of the clamps.
 - Tightening torque: **0.15 Nm**
8. Check the wiring of filament and ion source.
9. Check the filaments and the ion source by way of resistance measurement.

Setting parameters in the operating software to 0 (zero)

- ▶ Set the pressure cut-off meter of the ion source to 0 (zero) in uCon with the command U204.
 - Alternatively, enter "/mmsp/sensorIonSource/tPTripCount/set?0" in the web browser and confirm with Enter.

9.5.2 Replacing the cross beam ion source

NOTICE

Property damage caused by falling ceramic insulators

The fixing screws of the ion source only have 4 turns of thread and can quite easily fall into the quadrupole mass filter as the ion source is being disassembled. When turning the analyzer upside down to take out the parts, loose ceramic insulators from the ion source wiring fall out and break or splinter.

- ▶ Hold the ceramic insulators of the ion source wiring securely in place when turning the analyzer upside down.

Prerequisite

- PrismaPro deactivated

Required tools

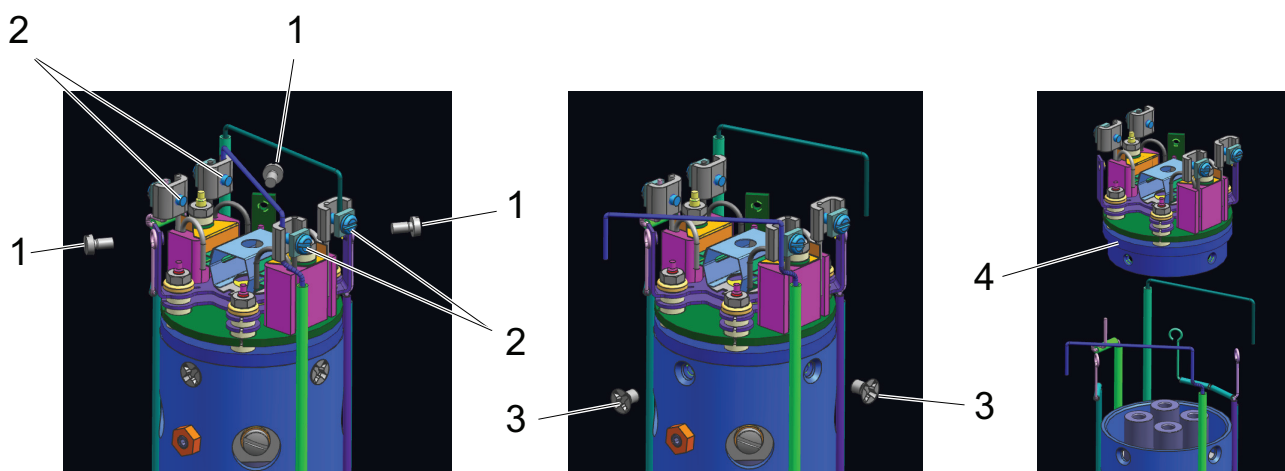
- Flat screwdriver, 1.5 mm
- Flat screwdriver, 3 mm
- Crosshead screwdriver, **Philips #1**
- Torque wrench
- Flat pliers

Required aid

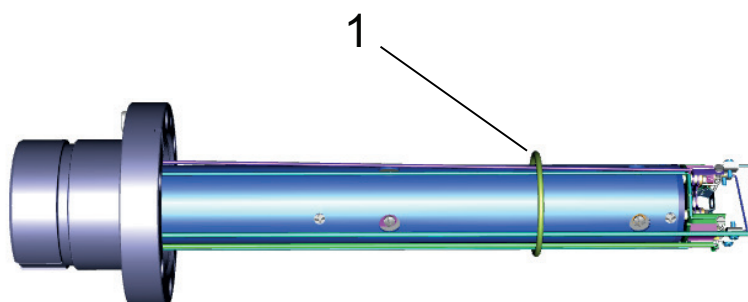
- Mounting aid for the analyzer

Required spare parts

- Crossbeam ion source with tungsten filaments or Y_2O_3 -coated iridium filaments
- If necessary, set of parts PT 163 543 for the replacement of screws, nuts or clamps

**Fig. 29: Replacing the cross beam ion source**

- | | |
|-------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| 1 Screw of ion source wiring (3×)
(M1.6×3, flat head) | 3 Fixing screw of the ion source (3×)
(M2×3, crosshead, stainless steel, gold-plated) |
| 2 Screw of filament unit (4×)
(M1.6×5, slot, stainless steel, gold-plated) | 4 Cross beam ion source |

**Fig. 30: Support spring on the analyzer with crossbeam ion source**

- 1 Support spring

Disassembling the ion source

1. Place the analyzer in the mounting aid.
2. Remove the support spring.
3. Hold the clamps and connections with the flat pliers.
4. Loosen and remove the screws of the filament unit and ion source wiring.
5. Carefully rotate the wiring away from the filament unit and ion source.
6. Loosen and remove the fixing screws of the ion source.
7. Carefully pull the ion source away from the quadrupole rod system.
8. Inspect the ceramic insulators of the ion source wiring for damage.

Installing the ion source

1. Place the analyzer in the mounting aid.
2. Carefully remove the ion source from the transport packaging.
3. Carefully place the ion source onto the quadrupole rod system.
4. Fasten the fixing screws of the ion source.
 - Tightening torque: **0.40 Nm**
5. Attach the wiring to the filament unit and the ion source.
6. Hold the clamps and connections with the flat pliers.
7. Fasten the screws of the filament unit and the ion source wiring.
 - Tightening torque: **0.15 Nm**
8. Secure the support spring.
9. Check the wiring of filament and ion source.
10. Check the filaments and the ion source by way of resistance measurement.

Setting parameters in the operating software to 0 (zero)

- ▶ Set the pressure cut-off meter of the ion source to 0 (zero) in uCon with the command U204.
 - Alternatively, enter "/mmsp/sensorIonSource/tPTripCount/set?0" in the web browser and confirm with Enter.

9.5.3 Replacing the grid ion source**NOTICE****Property damage caused by falling ceramic insulators**

The fixing screws of the ion source only have 4 turns of thread and can quite easily fall into the quadrupole mass filter as the ion source is being disassembled. When turning the analyzer upside down to take out the parts, loose ceramic insulators from the ion source wiring fall out and break or splinter.

- ▶ Hold the ceramic insulators of the ion source wiring securely in place when turning the analyzer upside down.

Prerequisite

- PrismaPro deactivated

Required tools

- Flat screwdriver, **1.5 mm**
- Flat screwdriver, **3 mm**
- Crosshead screwdriver, **Philips #1**
- Torque wrench
- Flat pliers

Required aid

- Mounting aid for the analyzer

Required spare parts

- Grid ion source with tungsten filaments
- If necessary, set of parts PT 163 534 for the replacement of screws, nuts or clamps

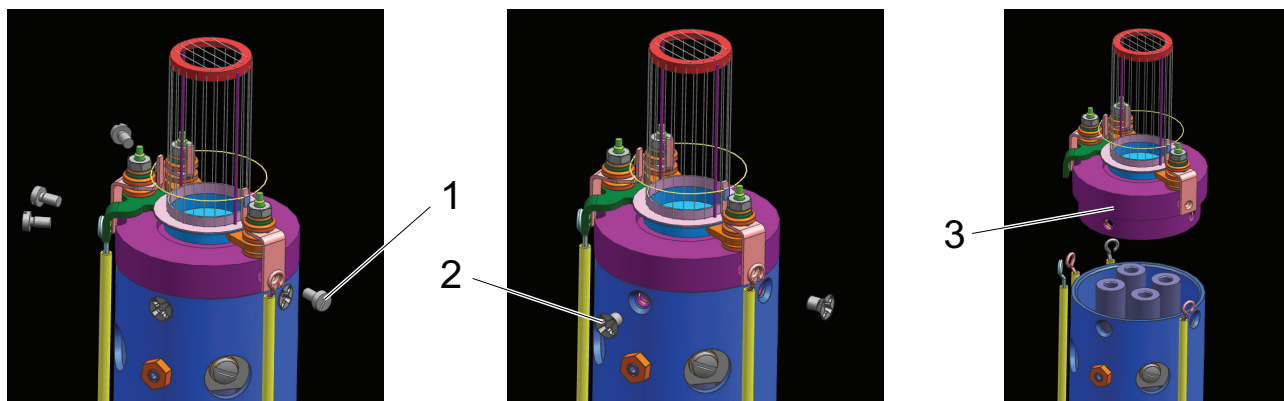


Fig. 31: Replacing the grid ion source

- | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| <ol style="list-style-type: none"> 1 Screw of wiring (4×)
(M1.6, flat head) 2 Fixing screw of the ion source (3×)
(M2×3, crosshead, stainless steel, gold-plated) | <ol style="list-style-type: none"> 3 Grid ion source |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|

Disassembling the ion source

1. Place the analyzer in the mounting aid.
2. Hold connections with the flat pliers.
3. Loosen and remove the screws of the wiring.
4. Loosen and remove the fixing screws of the ion source.
5. Carefully pull the ion source away from the quadrupole rod system.
6. Inspect the ceramic insulators of the ion source wiring for damage.

Installing the ion source

1. Place the analyzer in the mounting aid.
2. Carefully remove the ion source from the transport packaging.
3. Place the new ion source onto the quadrupole rod system.
4. Fasten the fixing screws of the ion source.
 - Tightening torque: **0.40 Nm**
5. Feed the screws of the wiring through the eyelets of the wiring.
6. Hold the ion source connections with the flat pliers.
7. Tighten the screws of the wiring in the connections of the ion source.
 - Tightening torque: **0.15 Nm**
8. Check the wiring of filament and ion source.
9. Check the filaments and the ion source by way of resistance measurement.

Setting parameters in the operating software to 0 (zero)

- ▶ Set the pressure cut-off meter of the ion source to 0 (zero) in uCon with the command U204.
 - Alternatively, enter "/mmsp/sensorIonSource/tPTripCount/set?0" in the web browser and confirm with Enter.

9.6 Calibrating high frequency and the mass scale

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



Backup copy of the hardware configuration file

Create a backup copy of the hardware configuration file for the analyzer on the test computer, using the PV MassSpec hardware configuration, before carrying out the settings. If necessary, the original settings can be restored from the backup copy.

9.6.1 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 ±0.15	0.5 ±0.15	0.5 ±0.15
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		-	-	-

Tbl. 14: Mass calibration

9.6.2 Attaining a stable operating temperature for PrismaPro

Prerequisites

- Heater off
- EM⁷⁾ off
- Emission on
- Parameter Scan: 0 – Max. u
- Parameter Dwell: 32 ms
- Parameter ppAMU:
 - 10 (QMA with mass range up to 100 u)
 - 5 (QMA with mass range up to 200 u)
 - 1 (QMA with mass range up to 300 u)

Required software

- Web UI

Procedure

- ▶ Allow PrismaPro to run for at least 1 hour before performing the settings or calibrations.

9.6.3 Selecting the gas mixture for the mass calibration

Procedure

1. Use various gas mixtures for mass calibration depending on the mass range and the accuracy requirements.
2. For the calibration, define 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.

9.6.4 Setting high frequency for both polarities

When the PrismaPro is initially commissioned, after changing the analyzer or the electronic unit, or in case of aging or changes to the installation conditions, the HF stage of the PrismaPro must be retuned. The “Reset RF frequency” function scans the high-frequency range automatically and tunes the high-frequency range to the optimum high-frequency for the analyzer. The software performs the HF adjustment for the specified amount of time before returning to normal mode. During HF adjustment, the software does not acquire data. An HF warning “Hardware information: Hardware Warning = RF board” may be displayed. This is normal before the HF setting.



Power loss of the HF stage

If the device is generating excessive power loss due to poor tuning of the HF stage, you will not be able to turn on the emission. The HF stage is pre-adjusted with continuous scanning across the entire mass range of 0 u to max. u during the start-up time. Final HF adjustment is then performed following the start-up time.

7) for QMA 250 M only

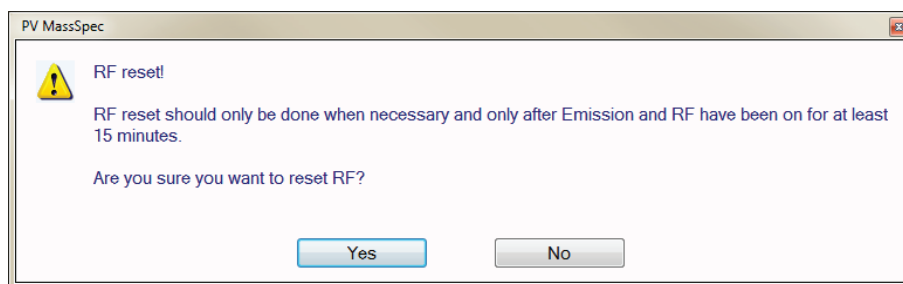


Fig. 32: Warning message with security prompt

Hardware		
Filament	2	
Optimization	Linearity	
Ionizer	Emission Current (uA): User 1=2000, User 2=2000 Electron Energy (eV): User 1=70, User 2=70 Anode (V): User 1=250, User 2=250 Focus (V): User 1=25, User 2=25 Ion Energy (meV): User 1=8000, User 2=8000 Sensitivity Mass Factor: User 1=1, User 2=1 Sensitivity: User 1=0.0012623, User 2=0.0012623	Set
Rod Polarity	Reverse	
RF Frequency (Hz)	3081000	
Multiplier Voltage (V)	800	
Fan On	Yes	

Fig. 33: New high frequency/reverse polarity

Prerequisite

- PrismaPro at a stable operating temperature

Required software

- PV MassSpec

Procedure

1. Start PV MassSpec.
2. In the "Main" window, select: Configuration > Sensor: Hardware Configuration
3. Set the polarity to **"Normal"**.
4. Select in the menu: Maintenance > Sensor Maintenance > Reset RF frequency
 - If the analyzer has not been active for at least 15 minutes, a warning message appears with a safety prompt.
5. Confirm safety prompt with "Yes".
6. Click on "RF Set".
7. In the "Main" window, select: Configuration > Sensor: Hardware Configuration
 - The new value for the high frequency appears, but it has not yet been saved.
8. Click on "OK" to save the new high-frequency value for the set polarity in the Hardware Configuration file of the analyzer.
 - If you do not save the high frequency, the HF warning "Hardware information: Hardware Warning = RF board" always appears when you turn the electronics unit off and on again.
9. Repeat this procedure for **"Reverse"** polarity, otherwise you are operating the analyzer with 2 different frequencies.
10. As required, reset the mass positions and resolution for both polarities after saving the high frequency.

The status in the "Main" window indicates "STOPPED" after completing the adjustment.

9.6.5 Perform mass calibration (TUNE)

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

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.

Add or delete masses in or from the calibration table

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

- ▶ Adjust the masses for the gas mixture with which you want to perform mass calibration by adding and deleting masses.
- ▶ Do not delete the masses 1 and 2.

9.6.6 Calibrating with a test gas mixture

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

Procedure

- ▶ Where applicable, use a test gas mixture from a gas supplier.

9.6.7 Calibration with process gases**Utilize process gas for mass calibration**

1. Where applicable utilize the process gas to be analyzed for mass calibration.
2. Define typical masses that are important for process analysis for calibration.

Calibration with low mass

1. Do not calibrate the masses 1 u and 2 u (H) if hydrogen is not present in the process.
2. Do not delete hydrogen from the calibration table.
3. Calibrate the mass 4 u (He) if using the PrismaPro for leak testing.
4. Spray helium into a leak you have created.
 - This provides the calibration for the low mass required.

Calibration with average mass

- ▶ If possible, use nitrogen (N) or another mass in this range, e.g., water (H₂O), oxygen (O), 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 higher masses, calibrate a mass between the average mass and 100 u for analyzers with mass range of 100 u.
3. If the process contains higher masses, calibrate a mass between 100 u and 200 u for analyzers with mass range of 200 u.
4. If the process contains higher masses, calibrate a further mass > 200 u for analyzers with mass range of 300 u.

9.6.8 Calibration of the helium leak detection**Calibration with helium**

1. Provide the helium required for calibration.
2. Route the helium into the vacuum chamber.
3. Calibrate the mass 4 u (He) for correct leak detection.
4. Calibrate the mass 4 u (He) if using the PrismaPro exclusively for leak testing.

Calibration with underground gases or with air

1. If you do not have any test gas mixtures or process gases available for the mass calibration, use the residual gas in the vacuum chamber or feed in small quantities of ambient air to carry out the mass calibration.
2. set the tune parameter to the default setting.
3. Delete all masses except for 1, 2 and 4 u from the calibration table.
4. Add masses 28, 40 or 44 u to the calibration table.
5. Calibrate the masses you added.
6. Delete the mass 4 u from the calibration table.
7. Calibrate the highest available mass in the system.
 - In some cases, this may be the mass 40 or 44 u.

10 Malfunctions

10.1 Troubleshooting

Procedure

1. Ensure that the insulation is intact on all cables and that there is no damage to the insulating material.
2. Check the fault chart with the symptoms to see if the problem is listed there, and how it can be rectified.
3. Check the following points to rectify communication problems.
 - 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. Check PV MassSpec-specific error messages in the help file for the software.
5. Contact [Pfeiffer Vacuum Service](#) if you cannot resolve the existing problem.

10.1.1 Remediating system and communication errors

Symptom / malfunction messages	Possible causes	Remedy
LED <POWER> does not light up.	No external current supply (24 V)	<ul style="list-style-type: none"> • Ensure that the mains voltage at the input of the SP 250 external power supply pack is between 100 and 240 V (AC). • Ensure that the output voltage at the SP 250 external power supply pack is between 20 and 30 V (DC). • Replace the SP 250 external power supply pack.
	Error in the electronic unit (QME)	<ul style="list-style-type: none"> • Contact Pfeiffer Vacuum Service.
LED <STAT> does not light up.	Emission off	-
	Filament defective	<ul style="list-style-type: none"> • Check the filament.
	QME has no connection to the analyzer	<ul style="list-style-type: none"> • Check the connection between QME and analyzer. • Ensure that the contacts are straight and are not bent or damaged.
	Vacuum conditions not met	<ul style="list-style-type: none"> • Check the vacuum conditions. • Ensure that the pressure is below the maximum operating pressure: $< 5 \times 10^{-4}$ hPa.
	Interlock prevents emission	<ul style="list-style-type: none"> • Check the interlock conditions for emission.
	Error in the electronic unit (QME)	<ul style="list-style-type: none"> • Contact Pfeiffer Vacuum Service.
LED < STAT> is flashing.	Error in the electronic unit (QME)	<ul style="list-style-type: none"> • Contact Pfeiffer Vacuum Service.
The yellow LED on the <LAN> connection is not lit/flashing.	Missing or wrong Ethernet cable	<ul style="list-style-type: none"> • Check the PC connection. • Check the connections of the Ethernet switch (if applicable).
	Ethernet cable defective	<ul style="list-style-type: none"> • Replace the Ethernet cable.
	Ethernet socket on the electronic unit (QME) defective	<ul style="list-style-type: none"> • Contact Pfeiffer Vacuum Service.
	Software PV MassSpec not set up correctly	<ul style="list-style-type: none"> • Check the settings in PV MassSpec.
	Software PV MassSpec is not running correctly.	<ul style="list-style-type: none"> • Reinstall PV MassSpec.

Symptom / malfunction messages	Possible causes	Remedy
No communication to the host computer	IP address of the PrismaPro is not compatible with the network	<ul style="list-style-type: none"> Change the IP address of the PrismaPro.
	PrismaPro communication connection (Port 80) is not open on the host computer	<ul style="list-style-type: none"> Open Port 80 on the host computer. Change the communication port of the PrismaPro.
	Faulty cable connection	<ul style="list-style-type: none"> Make sure that all cables are connected to the correct connections.
	Ethernet card of the host computer is faulty	<ul style="list-style-type: none"> Replace the Ethernet card of the host computer.
	Ethernet interface of the electronic unit (QME) is faulty	<ul style="list-style-type: none"> Contact Pfeiffer Vacuum Service.
Communication error (DSP) (DSP communication error)	Incorrect DSP response detected	<ul style="list-style-type: none"> Reset the electronic unit (QME) by switching off.
	Error in the electronic unit (QME)	<ul style="list-style-type: none"> Contact Pfeiffer Vacuum Service.
Communication error (DEC) (DEC communication error)	Incorrect DEC response detected	<ul style="list-style-type: none"> Reset the electronic unit (QME) by switching off.
	Error in the electronic unit (QME)	<ul style="list-style-type: none"> Contact Pfeiffer Vacuum Service.
DDS error	Error in the electronic unit (QME)	<ul style="list-style-type: none"> Contact Pfeiffer Vacuum Service.

Tbl. 15: System and communication errors

10.1.2 Remediating hardware errors

Symptom / malfunction messages	Possible causes	Remedy
Emission error at cold or warm start It is not possible to start/maintain the specified emission current (Emission error)	Insufficient vacuum	<ul style="list-style-type: none"> Ensure that the pressure is below the maximum operating pressure: $< 5 \times 10^{-4}$ hPa.
	Defective analyzer filament (open or short-circuited)	<ul style="list-style-type: none"> Check the ion source elements and analyzer elements for short-circuit and insulation. Ensure that the wiring screws are securely fastened. Replace the filament unit, the ion source or the analyzer.
	Electronic unit (QME) not attached to the analyzer correctly	<ul style="list-style-type: none"> Make sure that the electronic unit (QME) has been completely pushed onto the analyzer. Ensure that the contacts are straight and are not bent or damaged.
	Incorrect analyzer operating voltage	<ul style="list-style-type: none"> Check that all settings are correct. Use the settings from the test report for orientation.
	Error in the electronic unit (QME)	<ul style="list-style-type: none"> Contact Pfeiffer Vacuum Service.
Anode voltage error It is not possible to start/maintain the specified anode voltage (Anode error)	Analyzer defective, anode short-circuited	<ul style="list-style-type: none"> Check the ion source elements and analyzer elements for short-circuit and insulation. Ensure that the wiring screws are securely fastened. Ensure that the flange or the pipe features an inner diameter of ≥ 37 mm, preferably > 39 mm. Replace the analyzer.
	Error in the electronic unit (QME)	<ul style="list-style-type: none"> Contact Pfeiffer Vacuum Service.
Cathode voltage error It is not possible to start/maintain the specified cathode voltage (Cathode/EE error)	Analyzer defective, filament short-circuited	<ul style="list-style-type: none"> Check the ion source elements and analyzer elements for short-circuit and insulation. Ensure that the flange or the pipe features an inner diameter of ≥ 37 mm, preferably > 39 mm. Repair or replace the analyzer.
	Error in the electronic unit (QME)	<ul style="list-style-type: none"> Contact Pfeiffer Vacuum Service.

Symptom / malfunction messages	Possible causes	Remedy
High-frequency error (RF error)	Electronic unit (QME) not properly tuned to the analyzer	<ul style="list-style-type: none"> Contact Pfeiffer Vacuum Service.
	Analyzer defective, HF connections open or short-circuited	<ul style="list-style-type: none"> Check the HF connections for short-circuit and insulation. Ensure that the flange or the pipe features an inner diameter of ≥ 37 mm, preferably > 39 mm. Replace the analyzer.
	Error in the electronic unit (QME)	<ul style="list-style-type: none"> Contact Pfeiffer Vacuum Service.
Secondary electron multiplier error It is not possible to start/maintain the specified EM voltage (Electron multiplier error)	Analyzer defective, electron multiplier short-circuited	<ul style="list-style-type: none"> Check the analyzer connections for short-circuit. Check the HV contact electron multiplier HV at the feedthrough of the analyzer. Contact Pfeiffer Vacuum Service.
	Error in the electronic unit (QME)	<ul style="list-style-type: none"> Contact Pfeiffer Vacuum Service.
Temperature of the electronic unit (QME)	Ambient temperature of the PrismaPro > 50 °C	<ul style="list-style-type: none"> Check the ambient conditions. Ensure that the device is installed correctly. Make sure that there are no heat sources in the vicinity. Make sure that the ventilator installed is running. Check the hardware configuration: Fan on/off.
	Error in the electronic unit (QME)	<ul style="list-style-type: none"> Contact Pfeiffer Vacuum Service.
Overpressure (Total pressure error)	Total pressure too high	<ul style="list-style-type: none"> Reduce the pressure.
	Total pressure plate short-circuited or contaminated	<ul style="list-style-type: none"> Replace the ion source. Contact Pfeiffer Vacuum Service.
	Ion source contaminated	<ul style="list-style-type: none"> Replace the ion source. Contact Pfeiffer Vacuum Service.
Electrometer error (Electrometer error)	Current too high ($< -1 \times 10^{-6}$ A or $> 1 \times 10^{-6}$ A)	<ul style="list-style-type: none"> Reduce the pressure. Reduce the EM voltage. Check the feedthrough of the analyzer. Replace the analyzer. Contact Pfeiffer Vacuum Service.
	Error in the electronic unit (QME)	<ul style="list-style-type: none"> Contact Pfeiffer Vacuum Service.
Mass filter error (Mass filter error)	Poor calibration / occurrence of error during calibration	<ul style="list-style-type: none"> Recalibrate the device (tune). Contact Pfeiffer Vacuum Service.
	Peak position and/or resolution out of permissible range	<ul style="list-style-type: none"> Recalibrate the device (tune). Contact Pfeiffer Vacuum Service.
	Mass filter contaminated	<ul style="list-style-type: none"> Bake out the analyzer. Contact Pfeiffer Vacuum Service.
	Mass filter defective or damaged	<ul style="list-style-type: none"> Bake out the analyzer. Contact Pfeiffer Vacuum Service.
	Error in the electronic unit (QME)	<ul style="list-style-type: none"> Contact Pfeiffer Vacuum Service.
Ion source error (Ion source error)	Settings of the ion source faulty	<ul style="list-style-type: none"> Load the settings from the test report. Contact Pfeiffer Vacuum Service.
	Ion source contaminated	<ul style="list-style-type: none"> Replace the filament unit. Replace the ion source. Contact Pfeiffer Vacuum Service.
Detector error (Detector error)	Electron multiplier voltage set too high	<ul style="list-style-type: none"> Reduce the EM voltage.
	Detector not working properly	<ul style="list-style-type: none"> Contact Pfeiffer Vacuum Service.

Symptom / malfunction messages	Possible causes	Remedy
Filament potential error Filament voltage too high (filament open) Filament voltage too low (filament shorted) (Filament potential error)	Insufficient vacuum	<ul style="list-style-type: none"> Ensure that the pressure is below the maximum operating pressure: $< 5 \times 10^{-4}$ hPa.
	Analyzer filament defective (broken or short-circuited)	<ul style="list-style-type: none"> Check the ion source elements and analyzer elements for short-circuit and insulation. Ensure that the wiring screws are securely fastened. Ensure that the flange or the pipe features an inner diameter of ≥ 37 mm, preferably > 39 mm. Replace the filament unit, the ion source or the analyzer.
	Poor contact of wiring	<ul style="list-style-type: none"> Check the ion source elements and analyzer elements for short-circuit and insulation. Ensure that the wiring screws are securely fastened. Ensure that the flange or the pipe features an inner diameter of ≥ 37 mm, preferably > 39 mm. Replace the filament unit, the ion source or the analyzer.
Filament current error Filament current too high (filament shorted) Filament current too low (filament open) (Filament current error)	Insufficient vacuum	<ul style="list-style-type: none"> Ensure that the pressure is below the maximum operating pressure: $< 5 \times 10^{-4}$ hPa.
	Analyzer filament defective (broken or short-circuited)	<ul style="list-style-type: none"> Check the ion source elements and analyzer elements for short-circuit and insulation. Ensure that the wiring screws are securely fastened. Ensure that the flange or the pipe features an inner diameter of ≥ 37 mm, preferably > 39 mm. Replace the filament unit, the ion source or the analyzer.
	Poor contact of wiring	<ul style="list-style-type: none"> Check the ion source elements and analyzer elements for short-circuit and insulation. Ensure that the wiring screws are securely fastened. Ensure that the flange or the pipe features an inner diameter of ≥ 37 mm, preferably > 39 mm. Replace the filament unit, the ion source or the analyzer.
Focus error It is not possible to start/maintain the focus voltage. (Focus error)	Focus plate shorted	<ul style="list-style-type: none"> Check the ion source elements and analyzer elements for short-circuit and insulation. Ensure that the wiring screws are securely fastened. Ensure that the flange or the pipe features an inner diameter of ≥ 37 mm, preferably > 39 mm. Replace the IS 250.
	Focus voltage out of expected range	<ul style="list-style-type: none"> Check the ion source elements and analyzer elements for short-circuit and insulation. Ensure that the wiring screws are securely fastened. Ensure that the flange or the pipe features an inner diameter of ≥ 37 mm, preferably > 39 mm. Replace the IS 250.
Internal power supply failure	Error in the electronic unit (QME)	<ul style="list-style-type: none"> Contact Pfeiffer Vacuum Service.

Tbl. 16: Hardware errors

10.1.3 Remediating operating and measuring errors

Symptom / malfunction messages	Possible causes	Remedy
Peak detection error (Peak detection error)	No peak for the target mass	<ul style="list-style-type: none"> Load the settings from the test report. Contact Pfeiffer Vacuum Service.
	Peak for target mass too small/ broad	<ul style="list-style-type: none"> Load the settings from the test report. Contact Pfeiffer Vacuum Service.
	Peak out of detection	<ul style="list-style-type: none"> Load the settings from the test report. Contact Pfeiffer Vacuum Service.
	Range of target mass (e.g. peak shift > +/- 0.40 u of rated value)	<ul style="list-style-type: none"> Load the settings from the test report. Contact Pfeiffer Vacuum Service.
No spectra (No spectra)	Emission off	<ul style="list-style-type: none"> Switch on the emission.
	electron multiplier is switched on, although Faraday mode is selected	<ul style="list-style-type: none"> Switch the EM off.
	Pressure or signal too low for Faraday detector	<ul style="list-style-type: none"> Switch the EM on.
	Electron multiplier voltage too low	<ul style="list-style-type: none"> Increase the EM voltage.
	No sensitivity, analyzer contaminated	<ul style="list-style-type: none"> Refer to the operating and measuring error "Low sensitivity".
	Electronic unit (QME) not attached to the analyzer correctly	<ul style="list-style-type: none"> Make sure that the electronic unit (QME) has been completely pushed onto the analyzer . Ensure that the contacts are straight and are not bent or damaged.
	Mass calibration faulty	<ul style="list-style-type: none"> Set new mass positions and resolution (tuning).
	High-frequency error	<ul style="list-style-type: none"> Refer to the hardware error "HF error".
	Mass filter error	<ul style="list-style-type: none"> Refer to the hardware error "Mass filter error".
	EM defective	<ul style="list-style-type: none"> Contact Pfeiffer Vacuum Service.
	Error in the electronic unit (QME)	<ul style="list-style-type: none"> Contact Pfeiffer Vacuum Service.
	DSP communication error	<ul style="list-style-type: none"> Contact Pfeiffer Vacuum Service.
Low sensitivity (Low sensitivity)	Analyzer contaminated	<ul style="list-style-type: none"> Degas the ion source. Bake out the analyzer. Replace the filament unit and/or the ion source. Replace the analyzer. Contact Pfeiffer Vacuum Service.
	Mass calibration (resolution) faulty	<ul style="list-style-type: none"> Recalibrate the device (tune) Increase the peak width.
	Analyzer operating parameters set incorrectly	<ul style="list-style-type: none"> Contact Pfeiffer Vacuum Service.
	Mass filter defective or contaminated	<ul style="list-style-type: none"> Contact Pfeiffer Vacuum Service.
	Ion source or analyzer magnetized	<ul style="list-style-type: none"> Rectify the cause of the magnetic fields.
	Ion source or analyzer in close proximity to magnetic fields	<ul style="list-style-type: none"> Rectify the cause of the magnetic fields.
	Incorrect total pressure measurement with external gauges	<ul style="list-style-type: none"> Ensure correct calibration of the gauge being used for sensitivity calibration.
	System pressure too low	<ul style="list-style-type: none"> Increase the sample pressure, if possible.
	Error in the electronic unit (QME)	<ul style="list-style-type: none"> Contact Pfeiffer Vacuum Service.
	Gain of electron multiplier too low	<ul style="list-style-type: none"> Bake out the analyzer. Replace the analyzer. Contact Pfeiffer Vacuum Service.

Symptom / malfunction messages	Possible causes	Remedy
Poor peak shape (Poor peak shape)	Analyzer contaminated	<ul style="list-style-type: none"> • Degas the ion source. • Bake out the analyzer. • Replace the filament unit and/or the ion source. • Replace the analyzer. • Contact Pfeiffer Vacuum Service.
	System pressure too high	<ul style="list-style-type: none"> • Ensure that the pressure is below the maximum operating pressure: $< 5 \times 10^{-4}$ hPa.
	Ion source parameters faulty.	<ul style="list-style-type: none"> • Contact Pfeiffer Vacuum Service.
	Mass filter defective or contaminated	<ul style="list-style-type: none"> • Contact Pfeiffer Vacuum Service.
	Ion source or analyzer magnetized	<ul style="list-style-type: none"> • Rectify the cause of the magnetic fields.
	Ion source or analyzer in close proximity to magnetic fields	<ul style="list-style-type: none"> • Rectify the cause of the magnetic fields.
	Mass calibration necessary	<ul style="list-style-type: none"> • Carry out a mass calibration.
	Error in the electronic unit (QME)	<ul style="list-style-type: none"> • Contact Pfeiffer Vacuum Service.
High noise level (High noise level)	System grounding	<ul style="list-style-type: none"> • Make sure that the vacuum system is grounded.
	Scan speed is too quick for the amplification setting	<ul style="list-style-type: none"> • Increase the dwell time (Dwell). • Contact Pfeiffer Vacuum Service.
	Electronic unit (QME) not attached to the analyzer correctly	<ul style="list-style-type: none"> • Make sure that the electronic unit (QME) has been completely pushed onto the analyzer . • Ensure that the contacts are straight and are not bent or damaged.
	Electron multiplier defective or worn	<ul style="list-style-type: none"> • Check the gain of the electron multiplier. • Replace the analyzer. • Contact Pfeiffer Vacuum Service.
	Error in the electronic unit (QME)	<ul style="list-style-type: none"> • Contact Pfeiffer Vacuum Service.
	Low sensitivity	<ul style="list-style-type: none"> • Refer to the operating and measuring error "Low sensitivity".

Tbl. 17: Operating and measuring errors

10.1.4 Calling software error messages from PV MassSpec

Symptom / malfunction messages	Possible causes	Remedy
PV MassSpec error	You can find error messages and remedies in the help files for PV MassSpec.	

Tbl. 18: Software error messages from PV MassSpec

10.2 Contacts on QMA 250 and QME 250

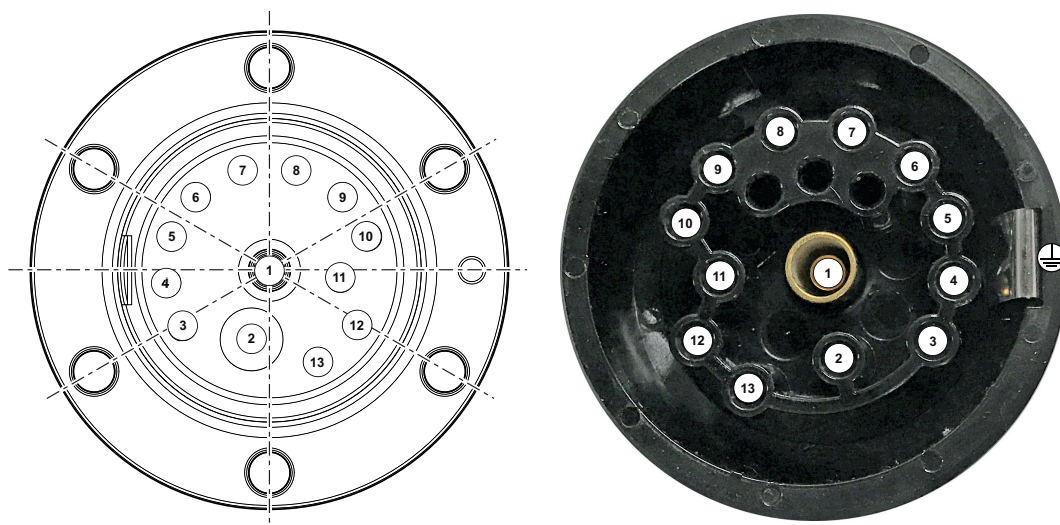


Fig. 34: Contacts on QMA 250 and QME 250

1 PP (partial pressure)	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	

10.3 Checking the QMA 250 analyzer

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. In case of a defective filament, the PrismaPro can still be used with the second intact filament. The previous use of the PrismaPro may, however, have influenced the performance of the second filament.

Prerequisites

- PrismaPro deactivated
- Analyzer QMA 250 and electronic unit QME 250 disconnected

Required aids

- Ohmmeter (< 0.2 to 30 M Ω)

Procedure

1. Measure the resistance of each filament.
 - The measurement can also be performed in a 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.

Measurement	Pins	Measured resistance	Result
Filament 1	3 and 10	0.2 to 0.8 Ω	Filament intact
		> 0.8 Ω	Filament defective
Filament 2	4 and 10	0.2 to 0.8 Ω	Filament intact
		> 0.8 Ω	Filament defective

(see chapter "Contacts on QMA 250 and QME 250", page 67)

Measurement	Pins	Measured resistance	Result
Pin to ground	all pins to GND (7 or 8)	> 30 MΩ ⁸⁾	Ion source intact
		< 30 MΩ	Ion source defective
Pin to Pin	All pins facing one another ⁹⁾	> 30 MΩ	Ion source intact
		< 30 MΩ	Ion source defective

(see chapter "Contacts on QMA 250 and QME 250", page 67)

Tbl. 19: Measurements for checking the analyzer

- 8) Although the measurements with the installed filament and ceramic shielding of the EM may be < 30 MΩ, it must be > 30 MΩ when the filament and ceramic shielding of the electron multiplier have been removed.
- 9) Exceptions: Resistance between filament 1 and 2 (**Pin 3 and 4**) and filament Common (**Pin 10**)

11 Shipping

WARNING

Risk of poisoning from contaminated products

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

- ▶ Comply with the instructions for safe distribution.



Decontamination subject to charge

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

Instructions for safe shipping

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

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:



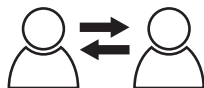
1. Download the up-to-date form templates.
 - [Explanations of service requests](#)
 - [Service requests](#)
 - [Contamination declaration](#)



- 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](#).

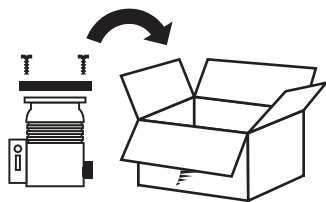


4. You will receive an acknowledgment from Pfeiffer Vacuum.

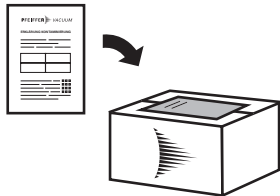
PFEIFFER VACUUM

Submission of contaminated products

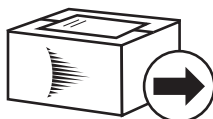
No microbiological, explosive, or radiologically contaminated products will be accepted. Where products are contaminated, or the contamination declaration is missing, Pfeiffer Vacuum will contact you before starting service work. Depending on the product and degree of pollution, **additional decontamination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



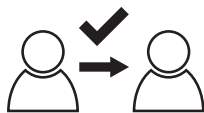
5. Prepare the product for transport in accordance with the provisions in the contamination declaration.
 - a) Neutralize the product with nitrogen or dry air.
 - b) Seal all openings with blind flanges, so that they are airtight.
 - c) Shrink-wrap the product in suitable protective foil.
 - d) Package 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 Spare parts Maintenance Level 1



Tuning the components

Defective system components, such as the QME 250 electronic unit or the QMA 250 analyzer can be replaced individually.

Replaced electronic units or analyzers must be calibrated with the existing components. Pfeiffer Vacuum recommends arranging for a [Pfeiffer Vacuum Service Center](#) to carry out this necessary calibration.

14.2.1 Electronic unit QME 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		
PT M28 661	QME 250 M1	1 – 100	Standard (without IO 250)	90° angled
PT M28 662	QME 250 M2	1 – 200		
PT M28 663	QME 250 M3	1 – 300		
PT M28 671	QME 250 M1	1 – 100	expanded (with IO 250)	
PT M28 672	QME 250 M2	1 – 200		
PT M28 673	QME 250 M3	1 – 300		

Tbl. 20: Electronic unit QME 250

14.2.2 Analyzer QMA 250

Part number	Short description	Mass range [u]	Detector	Ion source	Filament	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		CB		W
PT M25 414							Ir-Y ₂ O ₃
PT M25 415			Grid	Grid	W		Copper, silver-plated
PT M25 416							
PT M25 419							

Part number	Short description	Mass range [u]	Detector	Ion source	Filament	Wiring		
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		W			
PT M25 424					Ir-Y ₂ O ₃			
PT M25 425					CB		W	Copper, silver-plated
PT M25 426							Ir-Y ₂ O ₃	
PT M25 429					Grid		W	
PT M25 431	QMA 250 F3	1 – 300	Faraday	open	W	Nickel		
PT M25 432	QMA 250 M3		Faraday/EM		Ir-Y ₂ O ₃			
PT M25 433					W			
PT M25 434					Ir-Y ₂ O ₃			
PT M25 435					CB		W	Copper, silver-plated
PT M25 436							Ir-Y ₂ O ₃	
PT M25 439					Grid		W	

Tbl. 21: Analyzer QMA 250

14.2.3 Filament units

Part number	IS type	Filament material
PT 163 311	open	W
PT 163 312		Ir-Y ₂ O ₃
PT 163 331	CB	W
PT 163 332		Ir-Y ₂ O ₃
PT 163 341	Grid	W

Tbl. 22: Filament units

14.3 Spare parts Maintenance Level 2

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

Tbl. 23: Ion sources

14.4 Spare parts and small parts sets

14.4.1 Spare parts

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

Part number	Quantity (pieces)	Description	Use
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. 24: Spare parts

14.4.2 Set of small parts PT 163 544 for open ion source

Designation	Quantity (pieces)
Screw (M2×3, crosshead, stainless steel, gold-plated)	3
Lock washer (slotted, stainless steel)	6
Nut (M1.6, hexagon, stainless steel, gold-plated)	9
Clamp (M1.6, for filament)	3
Screw (M1.6×4, flat head)	3
Clamp (M1.6, for ion source)	3
Screw (M1.6×5, slot, stainless steel, gold-plated)	3

Tbl. 25: Set of small parts PT 163 544 for open ion source

14.4.3 Set of small parts PT 163 543 for crossbeam ion source

Designation	Quantity (pieces)
Screw (M2×3, crosshead, stainless steel, gold-plated)	3
Clamp (with M1.6 thread, U-shaped, for ion source)	4
Screw (M1.6×5, slot, stainless steel, gold-plated)	4
Ceramic insulator	2
Nut (M1.6, hexagon, stainless steel)	2
Nut (square, for connection)	4
Screw (M1.6x3, flathead, stainless steel, for ion source connections)	3

Tbl. 26: Set of small parts PT 163 543 for crossbeam ion source

14.4.4 Set of small parts PT 163 534 for grid ion source

Designation	Quantity (pieces)
Circlip (slotted, stainless steel)	3
Washer (ceramic)	3
Hood (ceramic)	9
Ceramic insulator	9
Screw (M1.6x3, flathead, stainless steel)	4
Nut (M1.6, hexagon, stainless steel)	3
Screw (M2×3, crosshead, stainless steel, gold-plated)	3

Tbl. 27: Set of small parts PT 163 534 for grid ion source

15 Technical data and dimensions

15.1 General

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

$$1 \text{ Pa} = 1 \text{ N/m}^2$$

Tbl. 28: Conversion table: Pressure units

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

Tbl. 29: Conversion table: Units for gas throughput

15.2 Technical data PrismaPro QMG 250 F



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 to 100 u	1 to 200 u	1 to 300 u
Connection flange	DN 40 CF-F		
Vacuum required (max. operating pressure)	$< 5 \times 10^{-4}$ hPa		
Maximum underground cross-sensitivity at 2 u	< 5 ppm	< 65 ppm	< 100 ppm
Detection limit			
QME 250 (straight)	4×10^{-13} hPa	5×10^{-13} hPa	7×10^{-13} hPa
QME 250 (angled)	1×10^{-12} hPa	2×10^{-12} hPa	4×10^{-12} hPa
Sensitivity			
Open ion source	$> 5 \times 10^{-4}$ A/hPa	$> 4 \times 10^{-4}$ A/hPa	$> 3 \times 10^{-4}$ A/hPa
Usage			
Installation location	Indoor, weatherproof		
Ambient conditions			
Protection degree	IP 30		
Relative humidity	≤ 98 % at operating temperature, non-condensing		
Temperatures			
Operating temperature (analyzer)	≤ 200 °C		

Parameter	QMG 250 F1	QMG 250 F2	QMG 250 F3
Operating temperature (QME)	5 to 50 °C		
Bakeout temperature (analyzer) (QME disassembled)	≤ 300 °C		
Temperature (transport / storage)	-25 to +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 to 240 V AC, 50/60 Hz		
Connection voltage (QME 250)	20 to 30 V DC, typically 24 V DC		
Rated (nominal) current	1.25 A max.		
Interfaces			
Operation, operating	Ethernet		
Standard control connection (AUX I/O)			
Power supply plug	D-Sub, 15-pin, female		
Relay output	1×, two-way contacts, max. 24 V DC, 0.5 A		
Analog inputs	1× 0 to +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)			
Power supply plug	HD D-Sub, 62-pin, female		
Analog outputs	8× 0 to +10 V, output resistance 100 Ω, I _{max.} = 10 mA, resolution 16 bit		
Analog inputs	8× -10 to +10 V, input resistance 50 kΩ, 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			
QMG 250 F analyzer	≤ 0.8 kg		
Electronic unit QME 250	≤ 1.53 kg		
SP 250 Power supply unit	≤ 0.15 kg		
Substances in contact with the media			
Filament	Tungsten (W) or Yttrium oxide-coated iridium (Ir-Y ₂ O ₃)		
Other substances	stainless steel, ceramic (Al ₂ O ₃), glass, gold		

Tbl. 30: Technical data PrismaPro QMG 250 F

15.3 Technical data PrismaPro QMG 250 M



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 to 100 u	1 to 200 u	1 to 300 u
Connection flange	DN 40 CF-F		

Parameter	QMG 250 M1	QMG 250 M2	QMG 250 M3
Vacuum required (max. operating pressure)	< 5×10^{-4} hPa		
Maximum underground cross-sensitivity at 2 u	< 5 ppm	< 65 ppm	< 100 ppm
Detection limit (EM) with QME 250 (straight)			
Open ion source	3.0×10^{-15} hPa	4.0×10^{-15} hPa	5.0×10^{-15} hPa
C/B ion source	3.0×10^{-13} hPa	6.0×10^{-13} hPa	1.0×10^{-12} hPa
Grid ion source	1.0×10^{-13} hPa	2.0×10^{-13} hPa	4.0×10^{-13} hPa
Detection limit (EM) with QME 250 (angled)			
Open ion source	1.0×10^{-14} hPa	2.0×10^{-14} hPa	4.0×10^{-14} hPa
C/B ion source	3.0×10^{-13} hPa	6.0×10^{-13} hPa	1.2×10^{-12} hPa
Grid ion source	1.0×10^{-13} hPa	2.0×10^{-13} hPa	4.0×10^{-13} hPa
Sensitivity with QME 250 (straight) ¹⁰⁾			
Open ion source (Faraday)	> 5×10^{-4} A/hPa	> 4×10^{-4} A/hPa	> 3×10^{-4} A/hPa
C/B ion source (Faraday)	> 2×10^{-5} A/hPa	> 1×10^{-5} A/hPa	> 5×10^{-6} A/hPa
Grid ion source (Faraday)	> 1×10^{-4} A/hPa	> 5×10^{-5} A/hPa	> 3×10^{-5} A/hPa
Sensitivity with QME 250 (angled) ¹¹⁾			
Open ion source (Faraday)	> 5×10^{-4} A/hPa	> 4×10^{-4} A/hPa	> 3×10^{-4} A/hPa
C/B ion source (Faraday)	> 2×10^{-5} A/hPa	> 1×10^{-5} A/hPa	> 5×10^{-6} A/hPa
Grid ion source (Faraday)	> 1×10^{-4} A/hPa	> 5×10^{-5} A/hPa	> 3×10^{-5} A/hPa
Usage			
Installation location	Indoor, weatherproof		
Ambient conditions			
Protection degree	IP 30		
Relative humidity	≤ 98 % at operating temperature, non-condensing		
Temperatures			
Operating temperature (analyzer)	≤ 150 °C		
Operating temperature (QME)	5 to 50 °C		
Bakeout temperature (analyzer) (QME disassembled)	≤ 300 °C		
Temperature (transport / storage)	-25 to +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 to 240 V AC, 50/60 Hz		
Connection voltage (QME 250)	20 to 30 V DC, typically 24 V DC		
Rated (nominal) current	1.25 A max.		
Interfaces			
Operation, operating	Ethernet		
Standard control connection (AUX I/O)			
Power supply plug	D-Sub, 15-pin, female		
Relay output	1×, two-way contacts, max. 24 V DC, 0.5 A		
Analog inputs	1× 0 to +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)			

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

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

Parameter	QMG 250 M1	QMG 250 M2	QMG 250 M3
Power supply plug	HD D-Sub, 62-pin, female		
Analog outputs	8× 0 to +10 V, output resistance 100 Ω, $I_{\max.} = 10$ mA, resolution 16 bit		
Analog inputs	8× -10 to +10 V, input resistance 50 kΩ, 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		
Substances in contact with the media			
Filament	Tungsten (W) or Yttrium oxide-coated iridium (Ir-Y ₂ O ₃)		
Other substances	stainless steel, ceramic (Al ₂ O ₃), glass, gold		

Tbl. 31: Technical data PrismaPro QMG 250 M

15.4 Dimensions

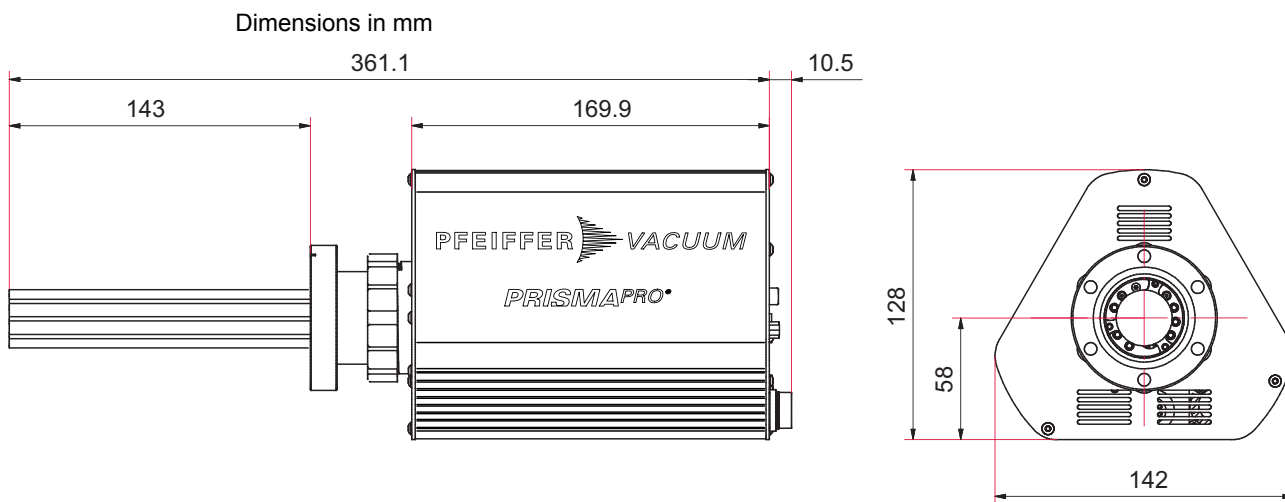


Fig. 35: Dimensions QMG 250 F / open IS / straight QME 250

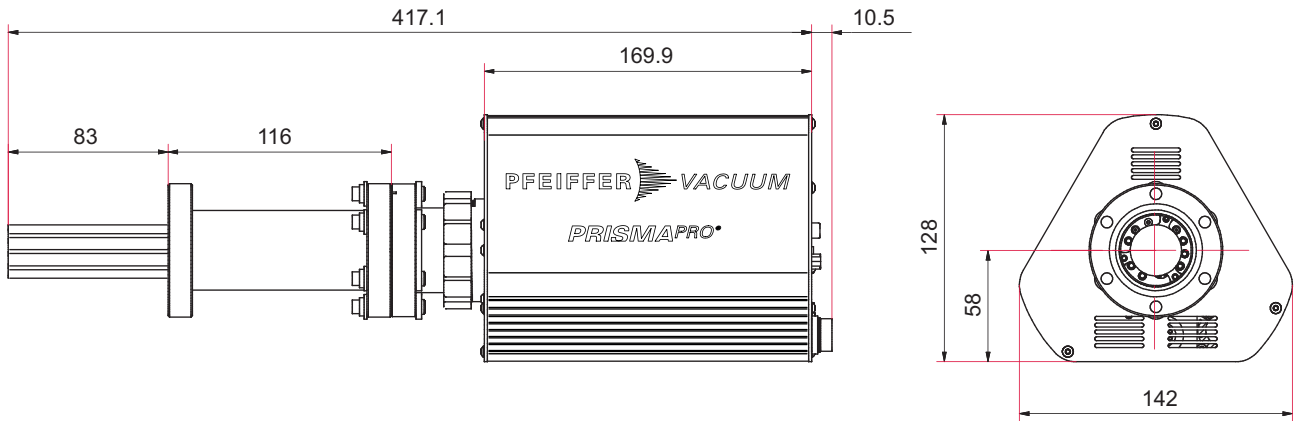


Fig. 36: Dimensions QMG 250 M / open IS / straight QME 250

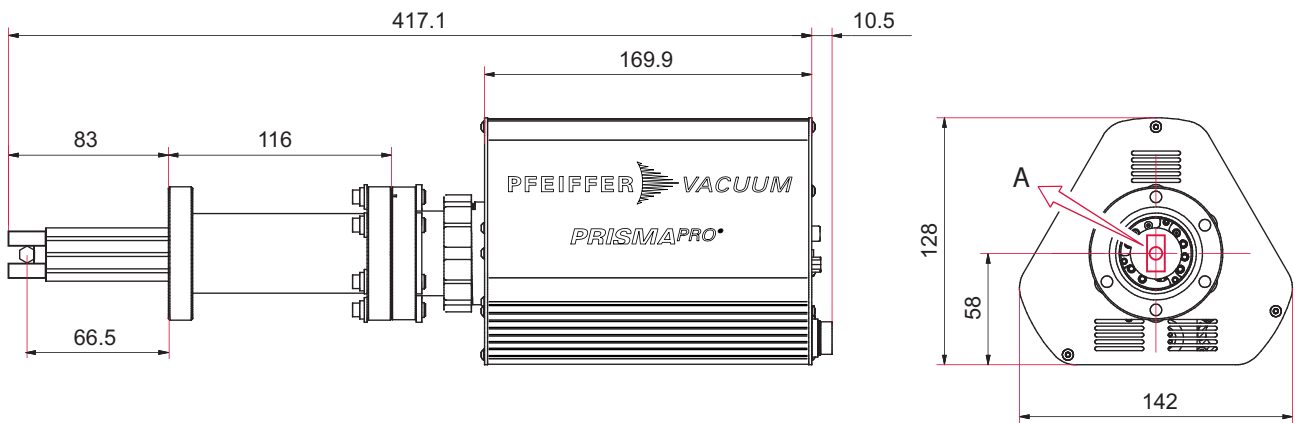


Fig. 37: Dimensions QMG 250 M / crossbeam IS / straight QME 250

A Formation room orientation

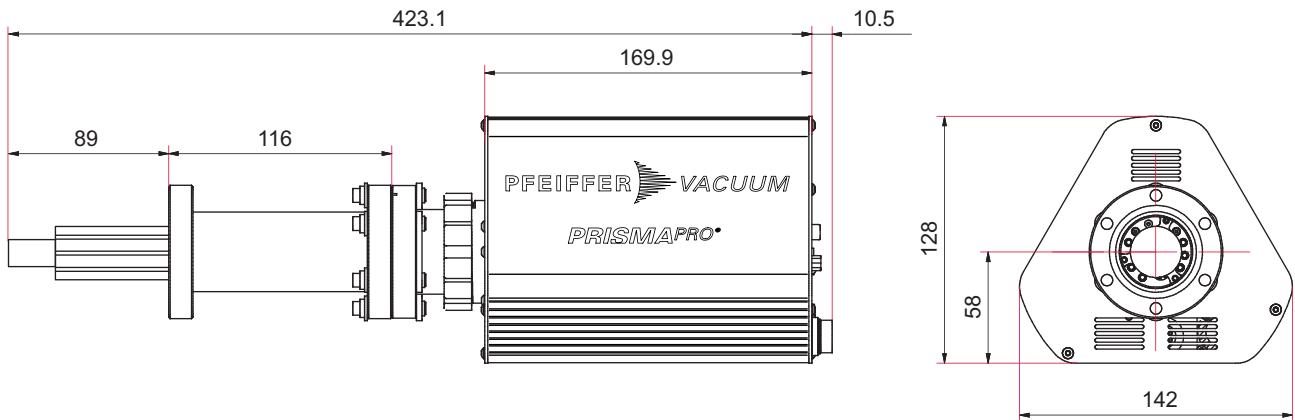


Fig. 38: Dimensions QMG 250 M / grid IS / straight QME 250

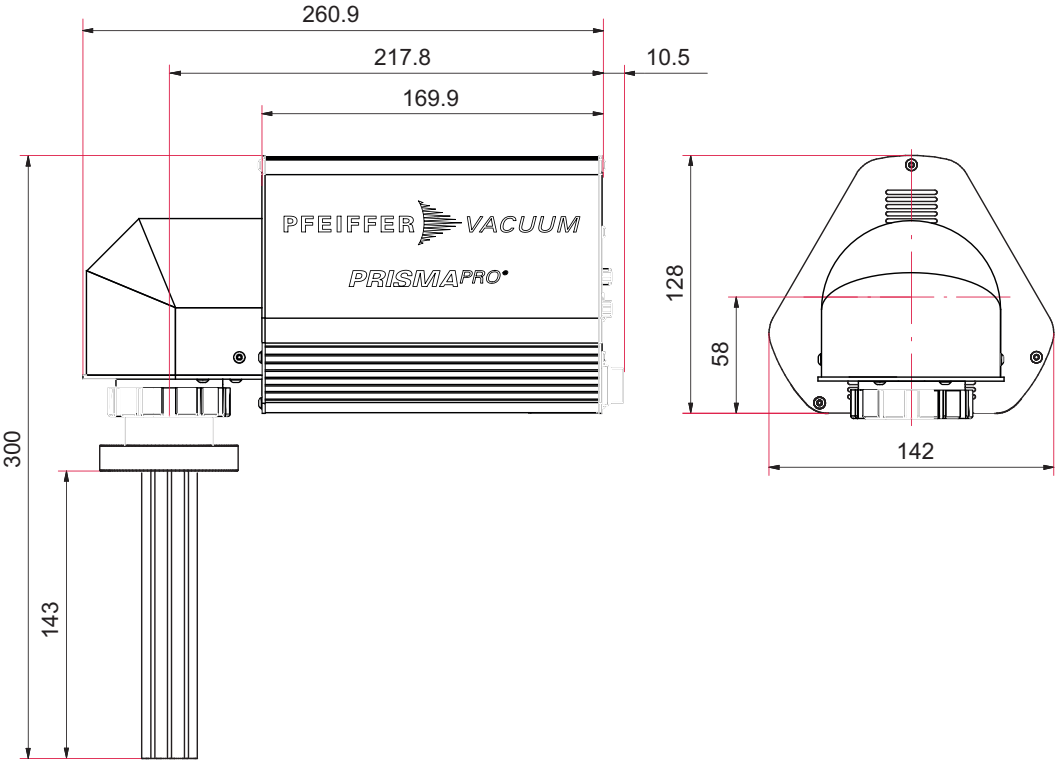


Fig. 39: Dimensions QMG 250 F / open IS / 90° QME 250

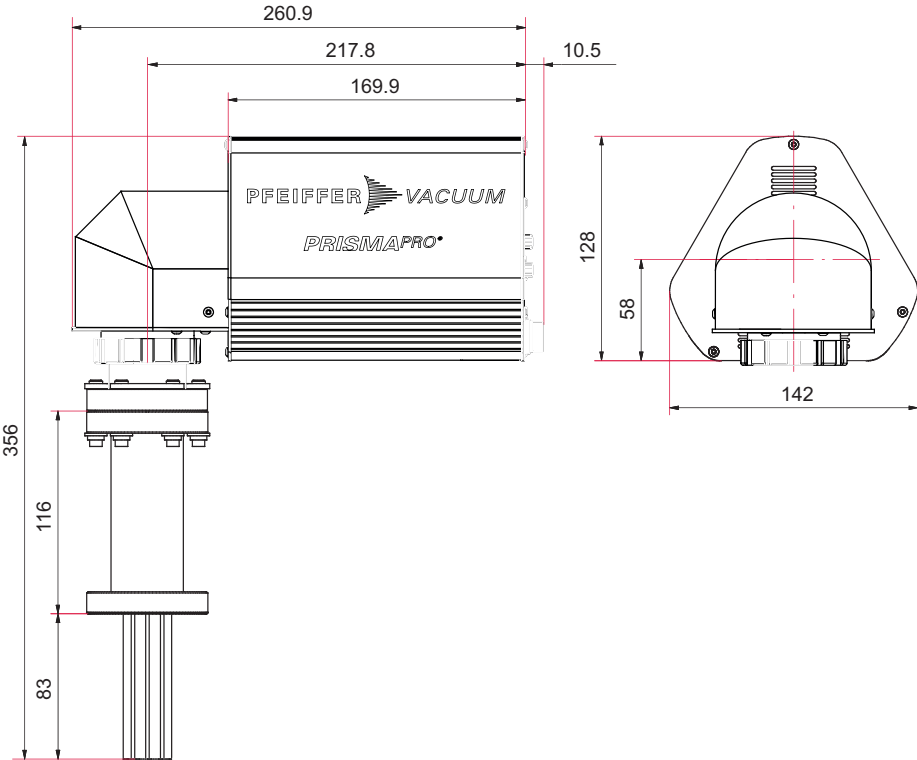


Fig. 40: Dimensions QMG 250 M / open IS / 90° QME 250

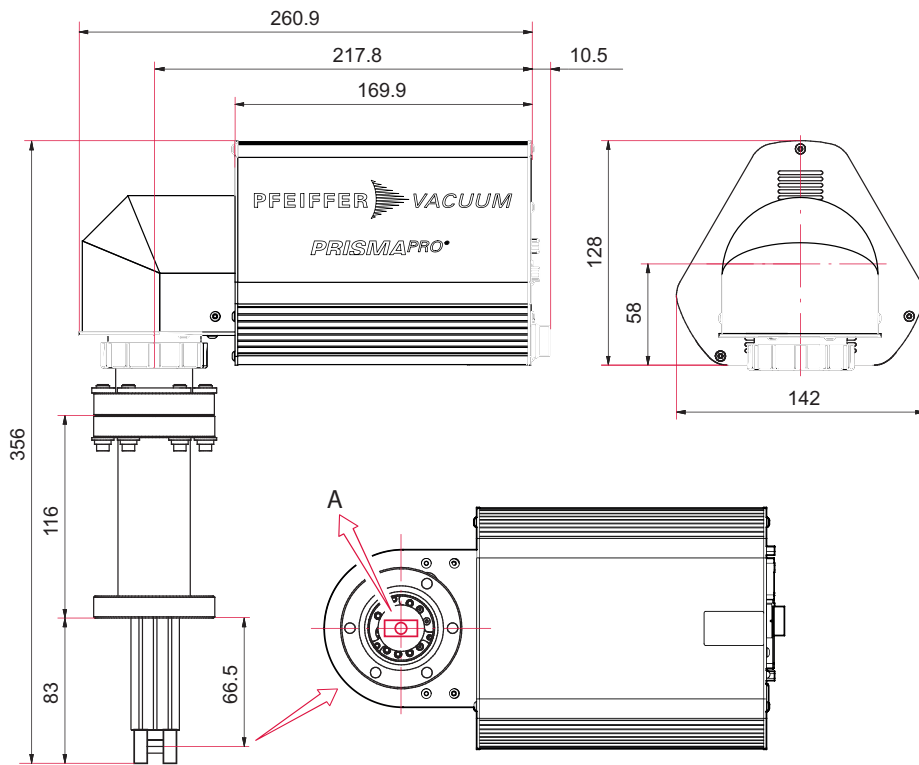


Fig. 41: Dimensions QMG 250 M / crossbeam IS / 90° QME 250

A Formation room orientation

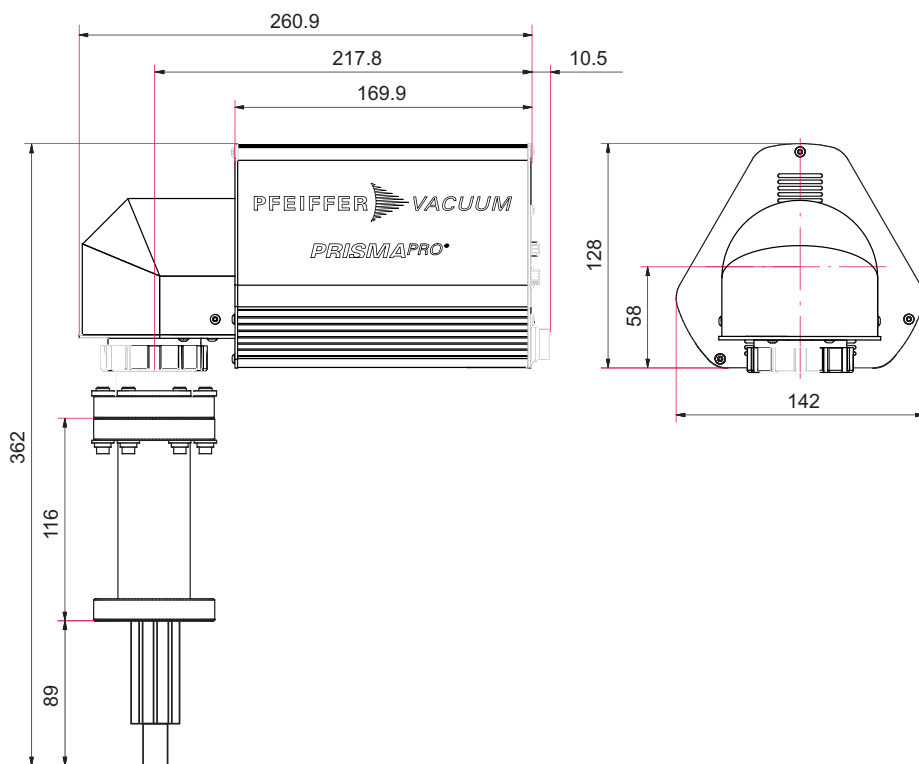
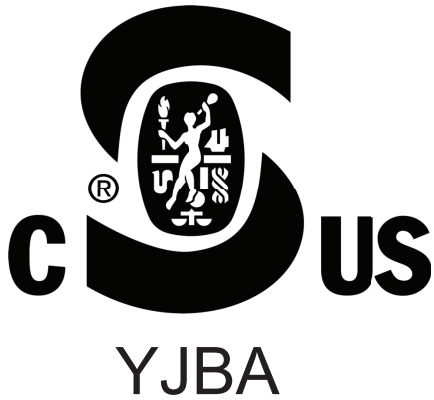


Fig. 42: Dimensions QMG 250 M / grid IS / 90° QME 250



- 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

Declaration for product(s) of the type:

Compact mass spectrometer

QMG 250 PrismaPro®

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

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, 2020-03-03





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