A PASSION FOR PERFECTION

PFEIFFER VACUUM

High Pressure Analyser

HPA 220

Operating Instructions

EN

Translation of the original instructions

DA0100BEN (2012_05)

Table of Contents

1 About this manual

1.1 Validity

This manual is a customer document of Pfeiffer Vacuum. The operating manual describes the functions of the named product and provides the most important information for the safe use of the device. The description is written in accordance with the valid EU Directives. The information in this operating manual refers to the product's current development status. The document shall remain valid provided that the customer does not make any changes to the product.

This document applies to products with article numbers:

PT M5x 1xx and **PT M5x 2xx**

The article number is found on the rating plate.

Up-to-date operating manuals can also be downloaded from www.pfeiffer-vacuum.de.

Related documents

HPA 220	Operating manual
Declaration of Conformity	A component of this manual
Accessories operating manual (order-specific)	see chap. Accessories*

*also available at www.pfeiffer-vacuum.de

1.2 Conventions

Safety instructions

Safety instructions in Pfeiffer Vacuum operating manuals are the result of the risk evaluations and danger analyses that were performed and that are based on international certification standards according to UL, CSA, ANSI Z-535, Semi-S1, ISO 3864 and DIN 4844. The following danger levels and information notices are observed in this document:

DANGER

Immediate danger

Death or serious injuries may occur.

WARNING

Potential danger

Injury or severe property damage may occur.

CAUTION

Potential danger

Injury or property damage may occur.

NOTE

Requirement or notice

Prompt for activity or information on features that may cause damage to the product if they are disregarded.

Symbol definitions

Prohibition of an action or activity in connection with a source of danger, the disregarding of which may result in serious accidents.

Warning about the danger represented by the symbol.

A certain action or activity in the use of a source of danger is required, the disregarding of which may result in serious accidents.

Important information on the product, handling or a relevant part of the documentation to which special attention should be given.

Instruction in the text

➔ Instruction: An action is required.

Abbreviations used

BRU	Base rack unit
HPA	High pressure analyser
IO	Input output
VCU	Valve control unit
MVP	Diaphragm vacuum pump

Symbols used

The symbol →🕮 [X] is used for references to further documents listed under the Literature section.

Trademarks

PrismaPlus™	Pfeiffer Vacuum GmbH
QUADERA™	INFICON AG

2 Safety

2.1 Safety precautions

NOTE

Duty to inform

Every person involved in the installation, operation or maintenance of the system must read and observe the safety-relevant parts of this operating manual.

➔ The user is obliged to make all operating personnel aware of dangers emanating from the medium being pumped or from the system as a whole.

NOTE

Installation and operation of accessories

Pfeiffer Vacuum Units can be equipped with a series of adapted accessories. The installation, operation and maintenance of connected devices are described in detail in the operating manuals of the individual components.

➔ For information on the order numbers of components, see chapter “Accessories and spare parts”, page 49.

➔ Use only genuine accessories.

- Use only genuine spare parts (see chapter **10. Accessories and spare parts; page 49**)
- Do not expose any body parts to the vacuum.
- Observe safety and accident prevention regulations.
- Regularly check compliance with all safety measures.
- Do not carry out any unauthorised modifications or conversions to the system.

DANGER

Danger due to strong magnetic fields

There is a strong magnet inside the PKR vacuum gauge head Vacuum gauge. Magnetic fields can interfere with cardiac pacemakers, for example, or impair their function.

➔ Maintain a safety clearance of at least 10 cm between cardiac pacemaker and magnet.

➔ Make sure that the warning labels on the vacuum gauge head Vacuum gaugeare not covered during installation.

2.2 Protective equipment

The wearing of personal protective equipment is required in certain situations. Users and employers are obliged to provide operating personnel with the appropriate equipment.

DANGER

Risk to health from harmful substances during maintenance or installation

Vacuum pumps, components and operating fluid may be contaminated by toxic, reactive, or radioactive substances due to processing.

➔ Use appropriate protective equipment for maintenance and repair work or when reinstalling the system.

CAUTION

Risk of injury from hot surfaces

The vacuum chamber and adjacent metal parts may heat up considerably when baking out and vacuum chamber heating.

➔ Do not touch the unit when baking out and when using vacuum chamber heating.

➔ Allow pump to cool down before starting maintenance and repair work.

➔ Wear protective gloves according to EN 420, if necessary.

WARNING

Increased noise emission

Increased noise emission may occur within a limited area surrounding the vacuum pump.

➔ Provide sound insulation

➔ Wear hearing protection

2.3 Proper use

The High pressure analyser HPA 220 is used in the analysis of non-flammable gases and gas mixtures with process pressures of less than 10 mbar. The actual pressure range depends on the screens attached.

NOTE

CE Conformity

The manufacturer's Declaration of Conformity is void if the user modifies the original product or additional equipment is installed!

- Installation, commissioning, operating and maintenance regulations must be observed.
- Other accessories than those described in this manual must not be used without the agreement of Pfeiffer Vacuum.

2.4 Improper use

Improper use of the equipment automatically invalidates all warranty and liability claims. Improper use refers to the use of the system for any purpose other than the ones described above, in particular:

- operation in potentially explosive areas.
- the analysis of flammable gases.
- the use of operating fluids not specified by Pfeiffer Vacuum.
- connection to pumps or equipment which are not suitable for this purpose according to their operating manual;
- connection to units that have live parts that may be touched.
- use of the units in radioactive areas.

2.5 Guidelines

QME/QMA	EN 61010-1:2001 EN 611326-1: 1997+ A1:1998+ A2:2001+A3:2003
BRU	Machinery 2006/42/EC (Appendix II, no. 1A) EMC Directive 2004/108/EC Directive for electrical equipment 2006/95/EC

3 Transport and storage

3.1 Transport

➔ Reuse the HPA 220 transport container. The unit should be transported or shipped in the original packaging.

➔ Remove protective caps from the high vacuum side and backing side just before connecting.

➔ Keep the original protective caps.

➔ Always transport the unit in the upright position.

3.2 Storage

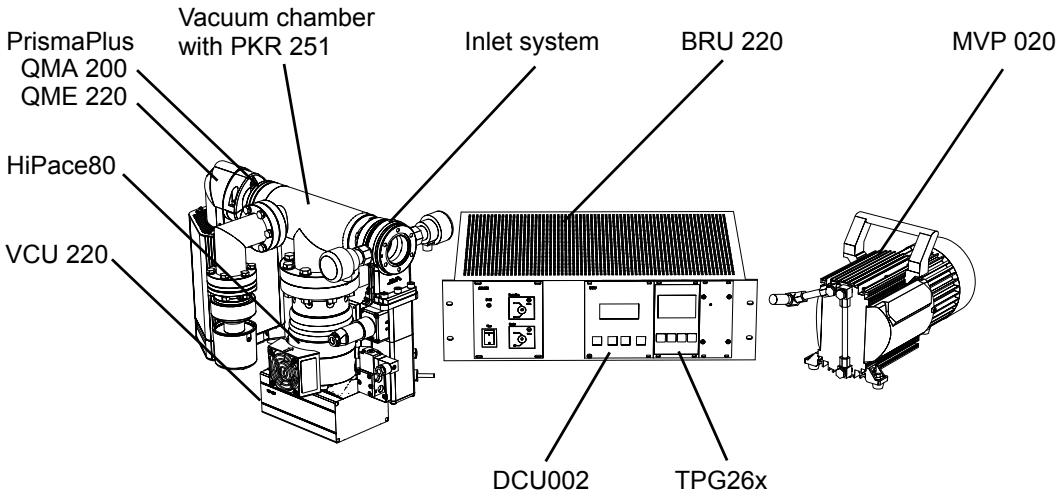
➔ Close flange openings with the original protective caps.

➔ Close other connections with appropriate protective caps.

➔ Store the system indoors only at temperatures between +5°C to +40°C.

➔ For rooms with humid or aggressive atmospheres: Seal the system in an airtight plastic bag with drying agents enclosed.

4 Product description



Selection of inlet systems and options for HPA 220

Feature	HPA 220					Operating manual
Inlet system	HPI 040 H					250986 NA
		HPI 040 P				250986 NA
			Double gate valve, manual			271691 NB
				Double gate valve electropneum.		271691 NB
					UDV 040	BP 5003 BN
Connection flange	DN 40 CF-F	DN 40 CF-F	DN 40 CF-F	DN 40 CF-F	VCR 1/4"	
PrismaPlus	1-100 amu 1-200 amu 1-300 amu	1-100 amu 1-200 amu 1-300 amu	1-100 amu 1-200 amu 1-300 amu	1-100 amu 1-200 amu 1-300 amu	1-100 amu 1-200 amu 1-300 amu	BG 5214 BN
Pump system	HiPace 80 MVP 020-3	HiPace 80 MVP 020-3	HiPace 80 MVP 020-3	HiPace 80 MVP 020-3	HiPace 80 MVP 020-3	PT 0278 BN PK 0208 BN
Vacuum chamber	yes	yes	yes	yes	yes	
PKR 251	yes	yes	yes	yes	yes	BG 5119 BN
BRU 220	yes	yes	yes	yes	yes	DA 0100 BN
VCU 220	no	yes	no	yes	no	DA 0100 BN
Total pressure measurement	optional TPG 261	optional TPG 262	optional TPG 261	optional TPG 261	optional TPG 261	BG 5195 BN BG 5196 BN
Pumping station control	TurboViewer optional DCU 002	TurboViewer optional DCU 002	TurboViewer optional DCU 002	TurboViewer optional DCU 002	TurboViewer optional DCU 002	PT 0250 BN

4.1 Product identification

Product features

To ensure reliable identification of the product, always keep all of the information on the rating plate to hand when communicating with Pfeiffer Vacuum.

Scope of delivery

Order number	PT M5x xcd	c					d			
		1	2	3	4	5	0+4	1+5	2+6	3+7
PrismaPlus	QME 220 M	•	•	•	•	•	•	•	•	•
	QMA 200 M	•	•	•	•	•	•	•	•	•
Vacuum chamber with PKR 251		•	•	•	•	•	•	•	•	•
Pump system	HiPace80	•	•	•	•	•	•	•	•	•
	MVP020	•	•	•	•	•	•	•	•	•
System controller, base rack unit BRU 220		•	•	•	•	•	•	•	•	•
Inlet system	HPI 040H	•								
	HPI 040 P		•							
	Double gate valve, manual			•						
	Double gate valve electropneum,				•					
	UDV 040					•				
Valve controller, valve control unit VCU 220			•		•					
Options	TPG 26x							•		•
	DCU002								•	•

4.2 Function

High pressure analyser HPA 220High Pressure Analyser HPA 220, quadrupole mass spectrometer with turbo pump and gas inlet system for the gas analysis of non-flammable gases in the pressure range 10^{-9} mbar (configuration-dependent).
The system can be operated manually via the BRU 220 and the Quadera software as well as via corresponding inputs from a higher-level system control.

4.3 Field of application

The HPA 220 must be installed and operated the following ambient conditions only:

DANGER

Explosion hazard

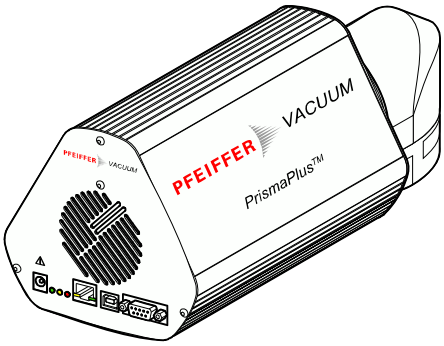
The HPA 220 is not intended for use in potentially explosive areas.

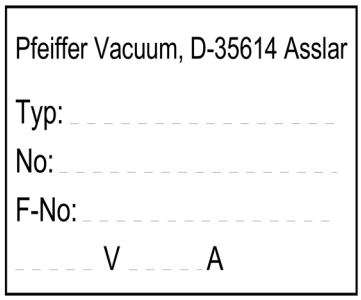
➔ Immediately switch off the HPA 220 in a potentially explosive atmosphere.

Utilisation	indoors
Max. height	2000m NN
Protection class	IP 30
Temperatures	
– Storage/transport	+5°C...+40°C
– Operation	0°C...+40°C
Relative humidity	max. 80% to 31°C, decreasing linearly to 50% at 40°C

4.4 System overview

Quadrupole electronics QME 220 with 90° connection





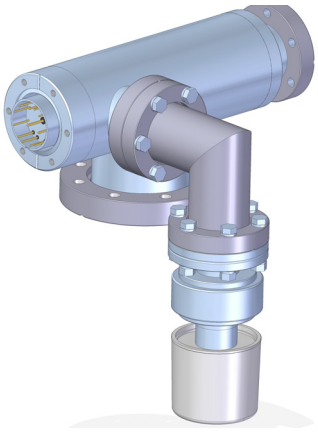
With the mass range according to option:

PT M51 xxx	1-100 amu
PT M52 xxx	1-200 amu
PT M53 xxx	1-300 amu

Analyser QMA 200 with pressure vacuum gauge in the HPA 200 vacuum chamber

With the ion source according to option:

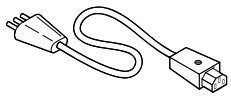
PT M5x 1xx	open ion source, Y filament
PT M5x 2xx	open ion source, W filament



Base rack unit BRU 220

(Figure shows the unit with all additional options; see section Additional components, page 16and the following.)

Mains cable



Connection cable set

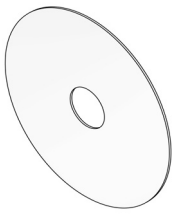
Standard cable (with all options included)

Cable	Art. no. (3m)	Art. no. (10m)	Cable markings
Interface cable M12	PM 061 283-T	PM 061 285-T	DCU
Connection cable BRU/TC	PM 061 512-T	PM 061 514-T	Turbo pump
Connection cable BRU/MVP	PM 061 441-T	PM 061 443 T	MVP
Adapter cable MVP (0.5 m)	PM 061 433-X		MVP I/O
Adapter cable PKR (0.6 m)	PT 448 249-T		Gauge
Mains cable	P 4564 309 Zx		---
Connection cable BRU/QME	PT 165 060-T	PT 165 061-T	PrismaPlus
Extension cable M8	PM 061 783-T	PM 061 785-T	Switch point, MVP I/O, valves 24V DC
Interlock plug BRU/user	PT 165 050		User

Cable set optional components:

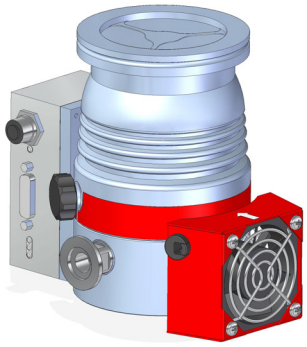
Option	Cable	Art. no. (3m)	Art. no. (10m)	Cable markings
PT M5x x2x PT M5x x4x	Connection cable VCU/PP	PT 165 070-T		Digital I/O
PT M5x x2x	Connection cable VCU/HPI	PT 165 073-T		Valves
PT M5x x4x	Connection cable VCU/DZS	PT 165 072-T		Valves
PT M5x xx6 PT M5x xx7	Interface cable M12	-	PM 061 285-T	DCU
PT M5x xx1 PT M5x xx3	Connection cable TPG/VCU	PT 165 062-T	-	Valves 24 VDC
PT M5x xx5 PT M5x xx7	Connection cable TPG/VCU	-	PT 165 063-T	TPG
PT M5x x2x PT M5x x4x	Interlock plug VCU/external	PT 165 051		External

Quadera software →🕮 [1]

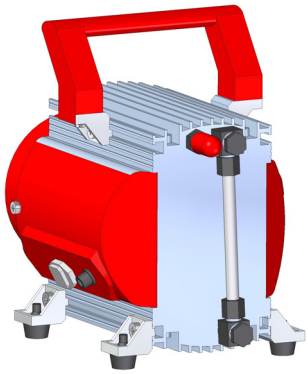


USB converter and TurboViewer software Only for the version without DCU 002 →🕮 [14]

Pump system Consisting of:
Turbomolecular pump HiPace 80 venting valve →🕮 [6] , air colling, optionally with sealing gas valves.

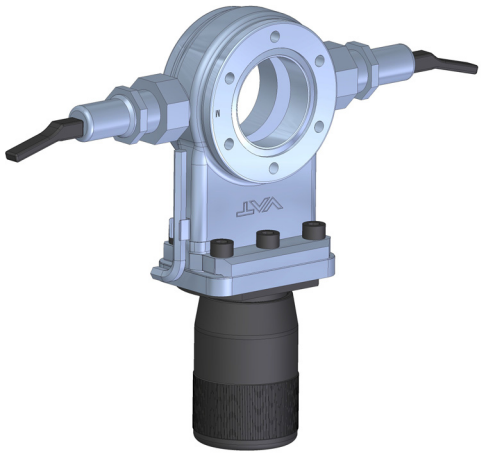


Diaphragm pump MVP 020 →🕮 [5]

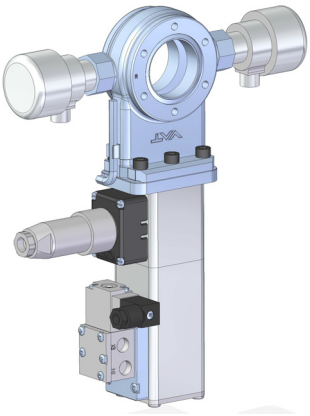


Inlet valve variants

HPI 040 H, manually operated - for option PT5x x1x

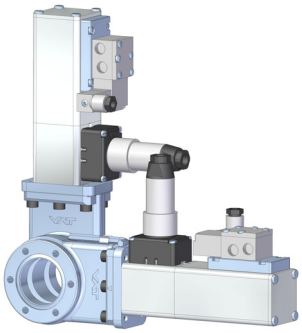


HPI 040 P, electropneumatically operated - for option PT M5x x2x

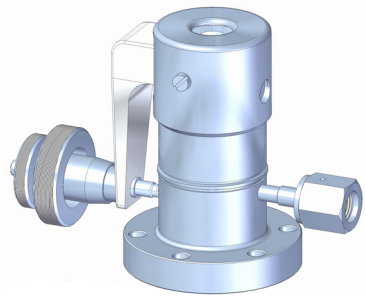


Double gate valve, manually operated - for option PT M5x x3x

Double gate valve, electropneumatically operated - for option PT M5x x4x



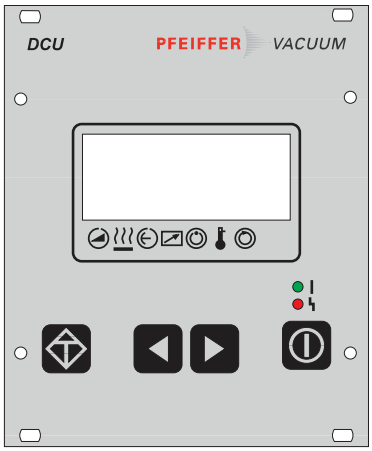
UDV 040, manually operated - for option PT M5x x5x



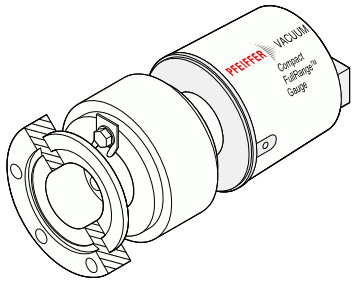
VCU 220 - only for option PT M5x x2x and PT M5x x4x

Additional components

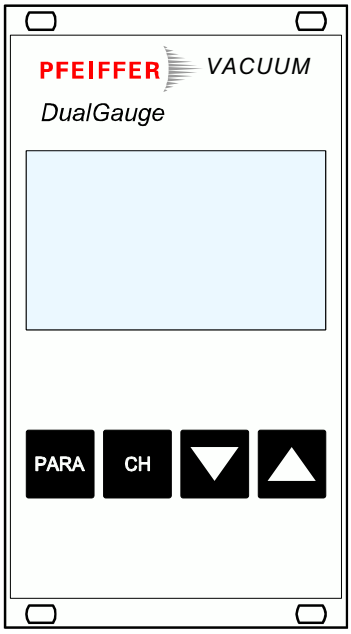
Display and control unit DCU 002 integrated into BRU (PM 061 348-T) →🕮 [7]



Total pressure vacuum gauge from the “ActiveLine” series →🕮 [9]

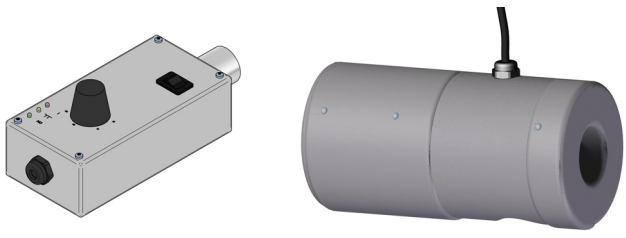


TPG 261 or TPG 262 integrated (only for PT M5x x2x) into BRU 220.
A total pressure vacuum gauge from the ActiveLine family with connection cable must be provided separately, depending on the working pressure range. →🕮 [13]



Heating option

Heating unit composed of controller and heating jacket (Pfeiffer Vacuum GmbH; PT 165 000-T [230V] or PT165 001-T [115V])



5 Technical data

5.1 HPA 220

			HPA 220		
Mass range	amu		1...100	1...200	1...300
Detection limit, min	mbar	Faraday	$5x10^{-12}$	$5x10^{-11}$	$2x10^{-11}$
		C-SEM	$1x10^{-14}$	$1x10^{-14}$	$4x10^{-14}$
Sensitivity to Ar	A/mbar	Faraday	$5x10^{-4}$	$3x10^{-4}$	$1.5x10^{-4}$
			200	200	100
Interference from neighbouring mass 40/41	ppm		10	20	50
Operating temperature, analyser	°C		0...+150°C		
Bake-out temperature, analyser without QME	°C		max. +200°C		
Analyser			QMA 220 M		
Filament material			two yttrium oxide coated iridium filaments for option PT M5x1xx two tungsten filaments for option PT M5x2xx		
Rod system: material/ diameter/length	mm		Stainless steel/6/100		
Detector			C-SEM/Faraday		
Mass spectrometer electronics			QME 220 M		
Software			Quadera		
Turbopump			HiPace 80		
Diaphragm pump			MVP 020-3		
Total pressure vacuum gauge			PKR 251		
System control			BRU 220		
Interfaces:					
– Connection system/PC			Ethernet		
– Analogue outputs, freely selectable			4x 0...+10V		
– Analogue inputs, freely selectable			5x -10...+10V		
– Digital outputs, freely selectable			13x 24VDC		
– Digital output, Ready			Contact, 60 VDC/30W		
– Digital inputs[1], freely selectable			up to 4x24 VDC		
– Digital inputs, specified			24 VDC, interlocks for system, valves and heating		
Mounting orientation			any[2]		

		HPA 220
Weight (analyser unit with TMP, PKR and PrismaPlus; without valve interface)	kg	11.8

Valve interface		HPI 040		Double gate valve		UDV 040
Actuation		electropneum.	manual	electropneum.	manual	manual
Compressed air	*bar*	5...7	-	5...7	-	-
Compressed air connection		1/8" female thread		1/8" female thread		
Screen diameter	*mm*	0.03[3]/0.1/0.3	0.03[3]/0.1/0.3	0.1	0.1	adjustable
Process pressure, max.[5]	*mbar*	8	8	20	20	50
Valve control		VCU 220	-	VCU 220	-	-
Weight, valve interface	*kg*	3.5	2.5	4.0	3.0	1.4
Weight, VCU	*kg*	0.66	-	0.66	-	-
Connection flange		DN 40 CF-F	DN 40 CF-F	DN 40 CF-F	DN 40 CF-F	Cajon VCR 1/4"

1

Configuration-dependent

2

NOTE

We recommend propping up the entire system under HiPace 80 or under VCU 220 (depending on option).

3

0.03 screen included

4

actually achievable process pressure depends on the screen diameter

5

depends on selected screen

Other specifications for QME/QMA 220 →📖 [2]

5.2 QME 220

	QME 220
Measurement system	
– Measurement channels	128
– Measuring modes	Analogue scan, bargraph scan, MID, MCD
– Measuring cycles	Mono/multichannel 1... 9999 cycles or repeat
– Measuring speed	
– Analogue scan+bargraph peak	20 ms/u...60ms/u
– Scan bargraph stair	2ms/u...60s/60u
– MID-dwell	2ms...60s
– Electrometer amplifier	$1x10^{-5}$...$1x10^{-12}$ A (f.s.), fixed and autorange
– Signal filter	FIR filter
Power supply	24VDC/2.0A, SP220
Interfaces	
– Operation, control	Ethernet
– Extension	Input/output module IO 220
Inputs outputs	
– Analogue	see IO 220 →📖 [2]
– Digital	see IO 220 →📖 [2]
Weight	2.2 kg

5.3 Input/output module IO 220

	IO 220
Analogue inputs	
– Connection (“analogue I/O”)	X7, 15 pole D-Sub socket
– Number of channels	5
– Input configuration	differential
– Input voltage range	nominal ± 10V, max. ± 14 V to GND
– Input resistance	50 K ohm
– Resolution	14-bit
Analogue outputs	
– Connection	X7, 15 pole D-Sub socket
– Number of channels	4
– Output configuration	Single-ended
– Output voltage range	0...+10V
– Output current	<100µA
– Output resistance	200 ohm
– Ground potential	over 33 ohm to GND (I_{max}=50mA)
– Resolution	12-bit
Digital inputs	
– Connection (“DIGITAL I/O”)	X2, 25 pole D-Sub plug
– Number of channels	1...4 depending on option* +ext. protection**
– Input voltage	<+5V (low) nominal +24V (high), max. +28V
– Input current	1.9mA
– Supply voltage for potential-free contacts	+24V over 1.2K ohm (I_{max} 10mA)
– Ground potential for external supply	over 100 ohm to GND (I_{max} 50mA)
EXTERNAL_PROTECTION	
– Electrical data	as for digital inputs
– Function	control function** depends on EXT_PROT mode
Digital outputs	
– Connection (“DIGITAL I/O”)	X2, 25 pole D-Sub plug
– Number of channels	16/13 depending on option*
– Output voltage	nominal +24 V, max. +28 V
– Saturation voltage (low)	≤ +0.9V
– Output current (sink)	All 16 channels are used: ≤60 mA/channel 4 channels used: ≤250 mA/channel***
Vacuum gauge connection (analogue)	occupied by PKR 251 →🕮 [2]

* The actual number of DO/DI depends on the gas inlet system used. All 16 DO are available for manual operation, 13 for electropneumatic operation (the DO 14-16 are used for controlling). All DI are available for manual operation. Only DI4 is available for option PT M5x x2x. DI3/ DI4 are available for option PT M5x x4x. Please also refer to section “VCU 220”, page 25

** Function table for input EXT-PROT →🕮 [2]

*** The 16 channels are divided into two groups:
Group A: odd channel numbers 1 ... 15
Group B: even channel numbers 2 ... 16
For thermal reasons, the channels used must be distributed equally to both groups, i.e. always 2 channels from group A and 2 channels from group B →🕮 [2]

5.4 Base rack unit (BRU 220)

	BRU
Input voltage	115...260 V AC
Mains frequency	50/60 Hz
Power input	5A
Output voltage	24 (±2%) V DC
Max. output current	12.5 A
Weight	5.5 kg
Connections	User Switch-point Valves 24 V DC Heater Diaphragm pump Turbo pump PrismaPlus Main

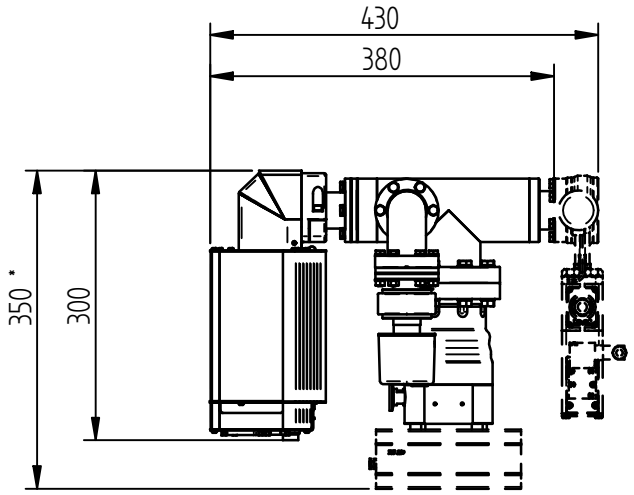
5.5 Valve control unit (VCU 220)

	VCU
Output voltage	24 V DC
Input current	max. 1A
Weight	0.7 kg
Connections	External Valves Prisma Plus Digital I/O 24 V DC

Table 5.6: Technical data for VRU

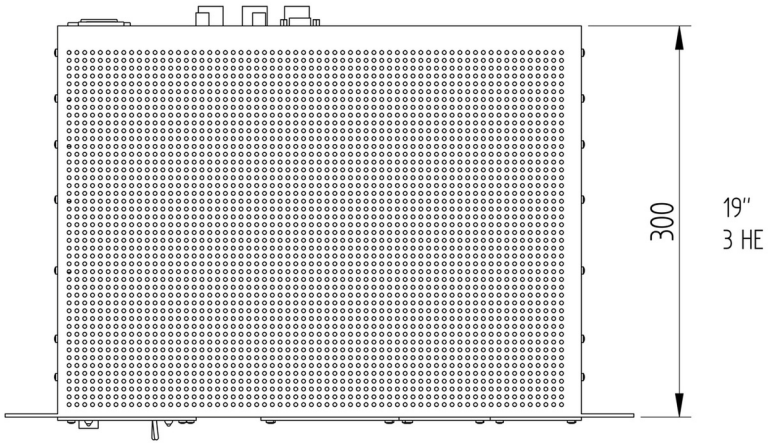
5.7 Dimensions

HHPA 220



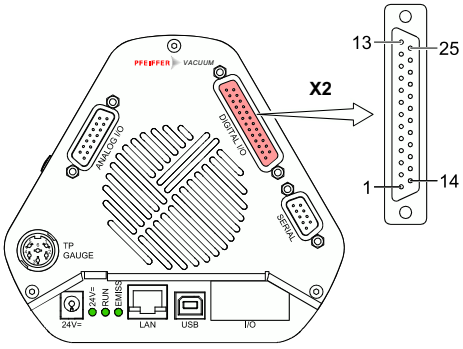
* only for options with electropneumatic valve control

BRU



5.8 Connection plug arrangement

IO 220 digital I/O



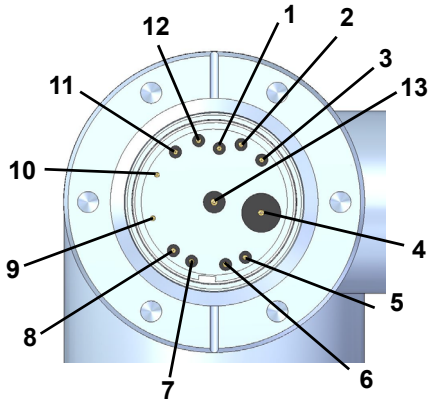
NOTE
This output is not available for option PT M5x x2x and option PT M5x x4x Please refer to section “VCU 220”, page 25

Output “X2” can be used without restrictions for options PT M5x x0x, PT M5x x1x, PT M5x x3x and PT M5x x5x. The pin arrangement for the PrismaPlus™ →📖 [2] applies.

QME 220/IO 220 others

For information on all other inputs and outputs, see the operating manual for the PrismaPlus™ →📖 [2] .

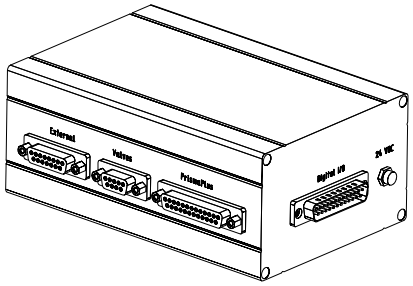
QMA

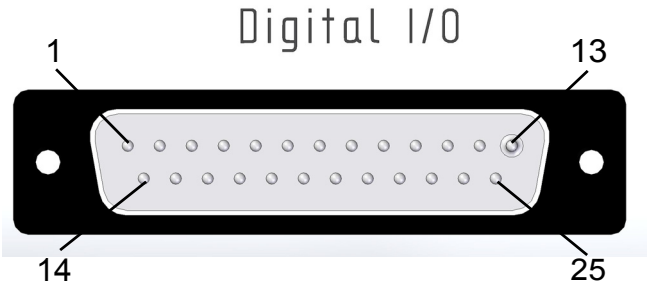


Pin	Description
1	Reserve
2	Extr.
3	Focus
4	HV-
5	Filament 1
6	Filament 2
7	Anode
8	RF -
9	GND
10	GND
11	RF +
12	Common filament
13	EP

DANGER
Live elements Danger to life from electric shock ➔ The electrical connection must be made by trained and authorised electricians only. ➔ Ensure the system is adequately earthed.

VCU 220





The “Digital I/O” port has, with few exceptions, all inputs and outputs of port “X2” of the IO 220 module. The I/O channels of the IO 220 are thus available to a limited extent.

CAUTION

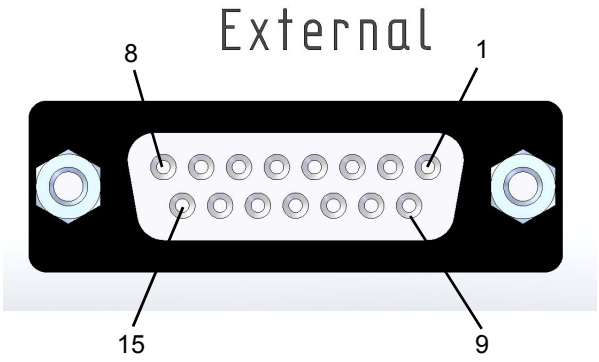
Destruction of the gas inlet system

When using the digital outputs DO1-DO3 in a way that deviates from the specifications for the PrismaPlus™ →📖 [2] , pin “DO-V+” (pin10) must not be externally connected to +24V. This connection has already been made internally via the VCU 220!

➔ Connect external units/loads between the desired digital output/s and “DO_0V” (pin 9).

➔ The maximum current of all digital outputs must not exceed 900mA!

Pin	Description	25 pole D-Sub
1	Digital output, channel 1	
2	Digital output, channel 2	
3	Digital output, channel 3	
4	Digital output, channel 4	
5	Digital output, channel 5	
6	Digital output, channel 6	
7	Digital output, channel 7	
8	Digital output, channel 8	
9	Ground for digital outputs (DO_0V)	
10	unavailable	
11	Digital input, channel 1	
12	Digital input channel 4 (not available for option PT M5x x2x and PT M5x x4x)	
13	not assigned	
14	Digital output, channel 9	
15	Digital output, channel 10	
16	Digital output, channel 11	
17	Digital output, channel 12	
18	Digital output, channel 13	
19	GND	
20	GND	
21	GND	
22	+24V for digital inputs	
23	Ground (0V) for digital inputs	
24	not assigned	
25	unavailable	



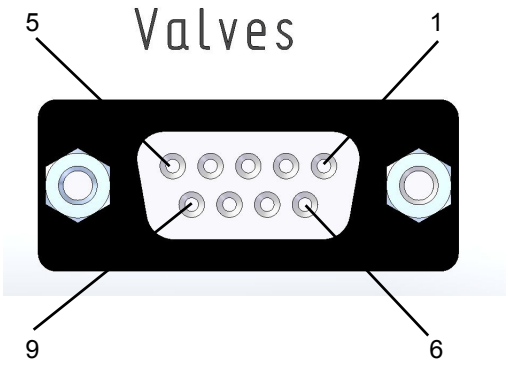
The control input “External” is available for integrating the HPA 220 into existing control concepts (e.g. PLC).

Using an external relay or open collector circuits, the pins of the input can be bridged in order to activate or deactivate the corresponding valves. The bridging occurs between 24V DC and the corresponding pin.

Pin	Description	15 pole D-Sub
1	GND	
2	GND	
3	GND	
4	GND	
5	GND	
6	V1	
7	V2	
8	V3	
9	GND	
10	GND	
11	GND	
12	GND	
13	24V DC	
14	24V DC	
15	24V DC	

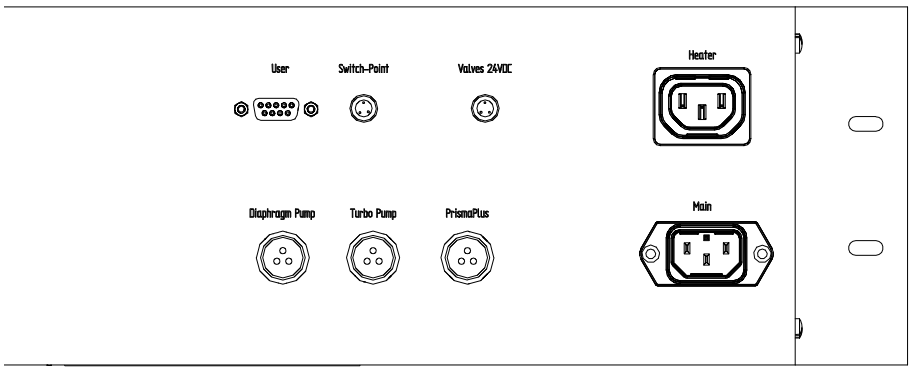
NOTE

If you do not use any external control, the supplied “External” plug must be plugged into the corresponding socket of the Valve Control Unit.
This Sub-D plug has internal bridges to enable the valve control. Otherwise the valves are not opened.



Pin	Description	9 pole D-Sub
1	V1	
2	V2	
3	V3	
4	GND	
5	GND	
6	GND	
7	GND	
8	GND	
9	GND	

BRU 220

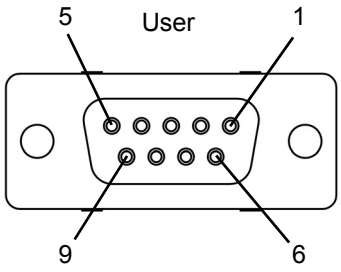


Rear view BRU 220

The base rack unit offers the opportunity to integrate the HPA 220 into an existing control (e.g. a PLC). It is connected to the D-Sub plug “User”. The heating, equipment and valve interlock can be connected. The entire system, the valve control and the heating jacket can be interlocked via the bridging of pins at this input (see chapter “Schematic representation of the BRU”, page 53). The interlock is activated via single bridging between the corresponding pin on “User” and 24V DC.

In addition to the external interlocking option, the status signal “Ready” is available on the “User” plug. This can be used for external displays. When the turbo pump HiPace 80 reaches 80% of its set rotation speed, the two contacts of the “Ready” signal are connected via an internal relay (see chapter “Schematic representation of the BRU”, page 53).

The maximum voltage for external displays that can be connected via the “Ready” signal is 60V; the maximum current should not exceed 1A.



Pin	Description	9 pole D-Sub
1	Ready	
2	Ready	
3	24V DC	
4	24V DC	
5	24V DC	
6	GND	
7	Valve interlock	
8	Equipment interlock	
9	Heating interlock	

NOTE

All interlocks must be activated in order to put the HPA 220 into operation. Use the HPA 220 without external devices/controllers; plug the supplied “User” plug into the appropriate socket. This Sub-D plug has internal bridges for all three interlocks.

6 Gas inlet systems

The HPA 220 is delivered with different gas inlet systems, depending on option. They can be operated either manually or electropneumatically, depending on the version.

PT M5x x1x	HPI040 H, manual
PT M5x x2x	HPI040P, electropneumatic
PT M5x x3x	Double bellow-sealed gate valve, manual
PT M5x x4x	Double bellow-sealed gate valve, electropneumatic
PT M5x x5x	UDV 040

6.1 HPI 040 H, manually operated

Function

see chapter 6.2 HPI 040 P, electropneumatically operated; Function; page 30

Control, operation

WARNING

Risk of filament destruction and analyser contamination

If the valve is opened when there is insufficient vacuum, gas flows into the vacuum chamber, which can result in oxidation and destruction of the hot cathode.

➔ Make sure there is sufficient vacuum in the process chamber before opening the valve.

Also refer to →🕮 [11].

Valve control

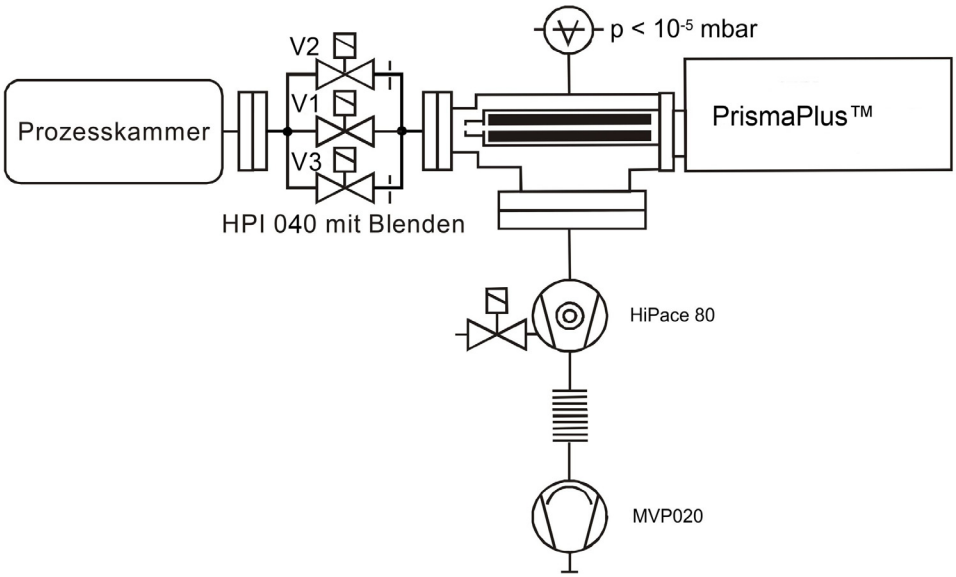
does not apply because manually controlled

6.2 HPI 040 P, electropneumatically operated

Function

The valve interface consists of 3 valves.

V1 is a bellows-sealed gate valve with high conductivity and a nominal connection diameter of 40 mm. This valve is opened for residual gas analysis and for leak testing at high vacuum conditions in the process plant. Valves V2 and V3 are designed as screens. The conductance values of the screens are designed to cover a pressure range from 1 … 10^{-3} mbar. A screen with a 0.03 mm diameter can be used optionally in V2 for pressures of 1 to 5 mbar.



Valve control

Valves V1, V2 and V3 are controlled using the Valve Control Unit. It is actuated by the PrismaPlus™. The Quadera software opens and closes the valves by switching the corresponding digital outputs.

Output assignment: (see also section “IO 220 digital I/O”, page 23 or “VCU 220”, page 25)

DO 14	V3
DO 15	V2
DO 16	V1

The digital outputs in the Quadera software can either be set via the measurement project “IO220.qmt” (→🕮 [1]) or via the Quadera add-in “HPA_SPM_Valve_Control” supplied.

Information regarding installation of the add-in can be found in the “Readme.txt” file on the enclosed installation CD of the add-in.

To run the add-in, start the add-in manager (→🕮 [1]) and select “HPA_SPM_Valve_Control”.

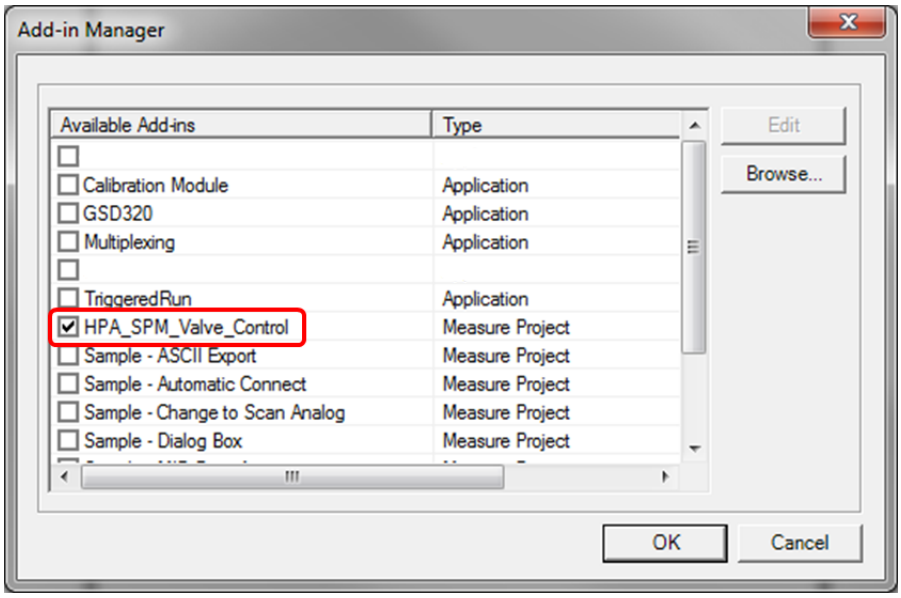


Fig.: Add-in manager of the Quadera software (figure may vary depending on add-ins installed)

After startup, a query window for selecting either manual or external control appears.

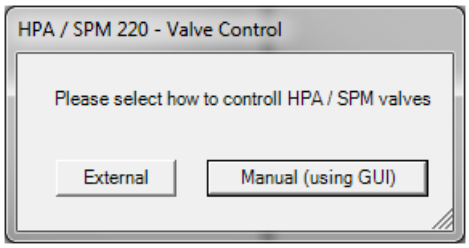


Fig.: Selection window for manual/external control

If you select “External”, the relays of the VCU change all valves over to external control via the “External” connector assembly. (see “VCU 220”, page 25)

If you select “Manual (using GUI)”, the valves can be opened or closed individually in the next window via the corresponding control buttons.

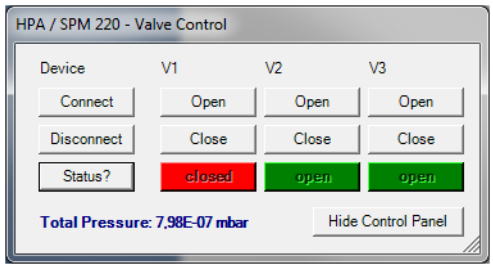


Fig.: Manual valve control

Internally, the add-in also monitors the total pressure in the HPA vacuum chamber and closes valve V1 at a pressure of >1x10^{-4} mbar.

The add-in remains active in the background even after closing the valve control window. To make the control window visible again, start the macro “Show_Valve_Control”

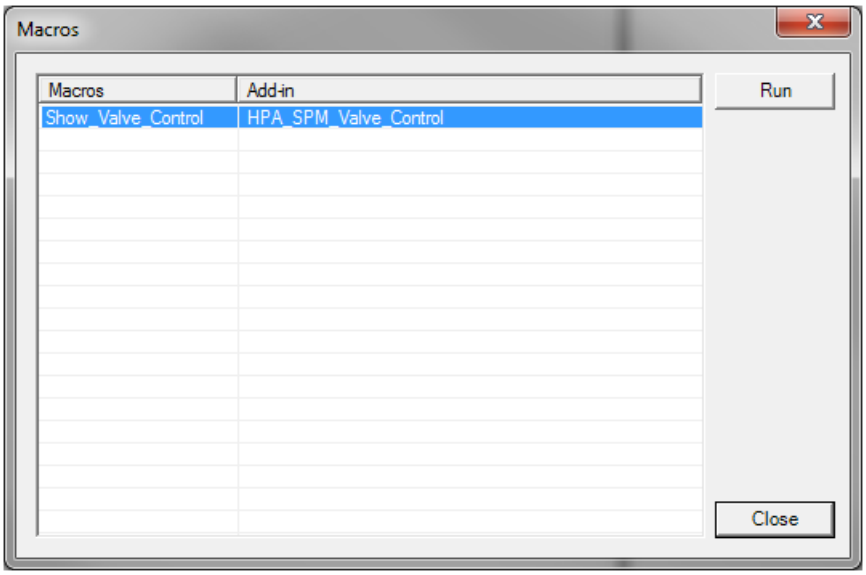


Fig.: Macro management in Quadera software

Information on starting a macro: →🕮 [1]

6.3 Double gate valve operated manually

Function

see chapter 6.4 Double gate valve, electropneumatically operated; Function; page 33

Control, operation

WARNING

Risk of filament destruction and analyser contamination

If the valve is opened when there is insufficient vacuum, gas flows into the vacuum chamber, which can result in oxidation and destruction of the hot cathode.

➔ Make sure there is sufficient vacuum in the process chamber before opening the valve.

Also refer to the operating manual for the SVV 040.

Valve control

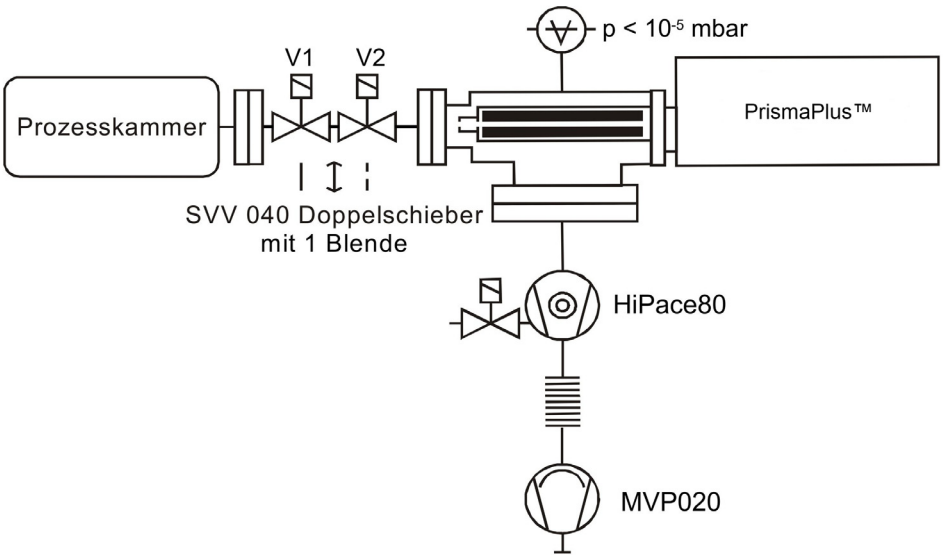
does not apply because manually controlled

6.4 Double gate valve, electropneumatically operated

Function

The valve interface consists of 2 valves.

V1 is a bellows-sealed gate valve with high conductivity and a connection nominal diameter of 40 mm. This valve is opened for residual gas analysis and for leak testing at the high vacuum conditions in the process plant. Valve V2 is designed as a screen. The conductance values of the screen are designed to cover a pressure range from 1 … 10^{-3} mbar. A screen with a 0.03 mm diameter can be used optionally in V2 for pressures of 1 to 5 mbar. The pressure range (10…10^{-7} mbar) depends on the screen installed.



Valve control

Valves V1, V2 and V3 are controlled using the Valve Control Unit. It is actuated by the PrismaPlus™. The Quadera software opens and closes the valves by switching the corresponding digital outputs. (see 6.2 HPI 040 P, electropneumatically operated; Valve control; page 31)

Output assignment: (see also section “IO 220 digital I/O”, page 23 or “VCU 220”, page 25)

DO 14	V2
DO 16	V1

If a DO is set to “active”, the corresponding valve opens.

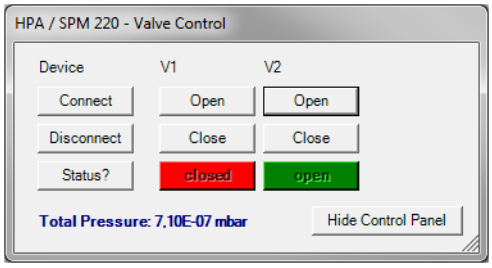
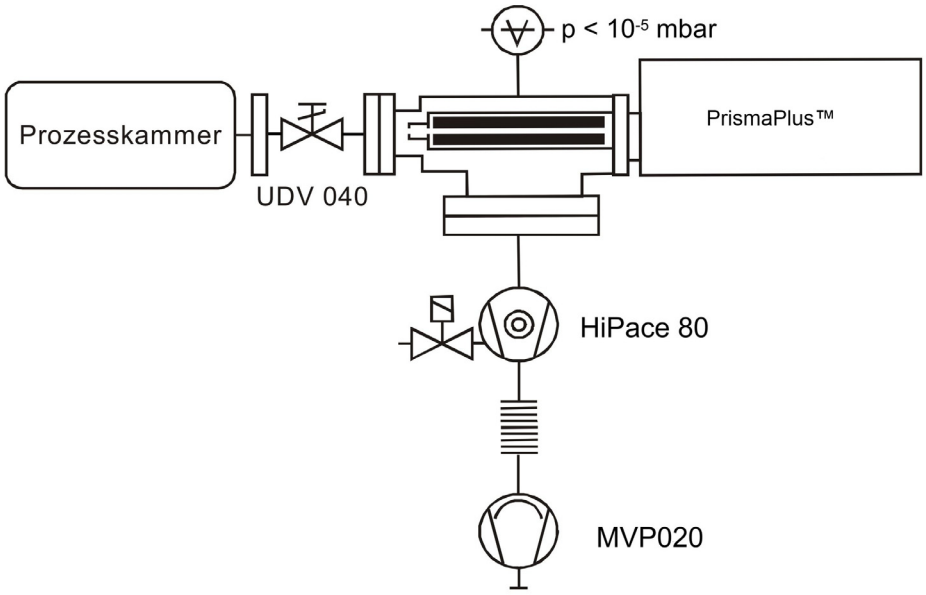


Fig.: Manual valve control

6.5 Gas inlet valve UDV 040

Function

The UDV is a manually operated valve.
It covers a wide pressure range of 10^{-3} … 50 mbar. →📖 [10]



Operation

The UDV is slowly opened by hand until the pressure in the analysing vacuum chamber reaches max. 10^{-5} mbar.

WARNING

Risk of filament destruction and analyser contamination

If the valve is opened when there is insufficient vacuum, gas flows into the vacuum chamber, which can result in oxidation and destruction of the hot cathode.

➔ Make sure there is sufficient vacuum in the process chamber before opening the valve.

Valve control

does not apply for manual control

7 Commissioning

DANGER

Damaged product

The commissioning of a damaged product can be extremely dangerous.

➔ In case of visible damage, protect the product against inadvertent operation.

NOTE

Caution: Vacuum components

Dirt and damage impair the function of the vacuum components.

➔ When handling vacuum components, observe the rules on cleanliness and protection against damage.

7.1 Commissioning QME

DANGER

Dangerous voltages of up to 330 VDC occur at the electrode system of the QMA 200 when in operation.

Under unfavorable conditions, other installation parts in the vacuum space (e.g. vacuum gauges) may be stressed by this voltage. If, as a result, such parts should become dangerous to touch (consider also cables and connected devices!), they must be positioned or protected so that no contact, no flashover and no charge carrier flow can occur.

If it is possible to come into contact with QMA 200 when the vacuum system is open, additional protection should be provided, for example:

- Mechanical protection against contact.
- Forced disconnection of the “Prisma Plus” cable from the mains voltage when the system is opened.

DANGER

Risk of damage to electronics and unreliable measurement results

The electrode system of the QME must not not be exposed to external voltage (due to contact, flashover, plasma, ion or electron beams, etc.).

➔ Take appropriate safety measures, such as improved arrangement, shielding, grounding, etc.

DANGER

Dangerous contact voltages

Voltages on the QMA are extremely dangerous.

➔ Using all 6 screws, the analyser flange must be bolted together electroconductively with the properly grounded vacuum apparatus.

WARNING

If the mounting flange is not earthed, the flange of the QME (ground terminal screw M4) must be connected to the protective earth by means of a separate ground wire.

➔ Use yellow-green or bare copper wire for this ground wire:

- 2.5mm^2 if mechanically protected (according to DIN VDE 1120 T540)
- 4.0mm^2 if unprotected.

WARNING

Risk of filament contamination

Due to leaks or incorrect installation of the QMA, incoming gases may cause the analyser to become coated.

➔ The QME must be installed correctly in accordance with vacuum technology standards, i.e. the identifiable gases must have unimpeded access to the analyser.

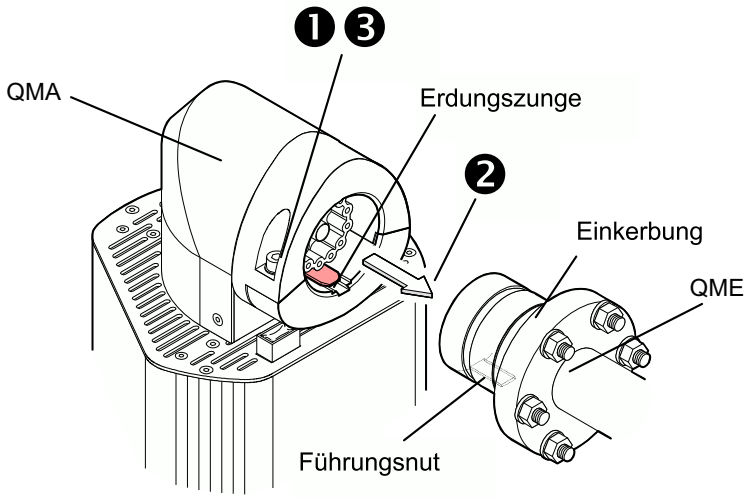
Mechanical installation

DANGER

Dangerous contact voltages

The QME is grounded exclusively via the flange of the QMA.

➔ The QMA must only be attached to a properly installed QME.



❶ Loosen the two screws on the black plastic part of the QMA using a 4mm Allen key until the movable part has 2...3mm of play.

❷ Carefully insert theQME onto the already mountedQMA until reaching the incised mark. Please observe the correct positioning on the QME by means of the grounding tongue and guiding groove on the QMA. Avoid using excessive force in the process.

❸ Securely tighten the two Allen head screws. These screws are used to fasten the QME mechanically as well as for electrical safety, as they ensure the earth contact.

Electrical connection

DANGER

Caution: Mains voltage

Incorrectly grounded products can be hazardous in case of malfunction.

➔ Connect product in accordance with local regulations and ensure it is properly grounded!

WARNING

All electrical connections must be strain-relieved.

➔ Route control cables at a sufficient distance from sources of interference.

NOTE

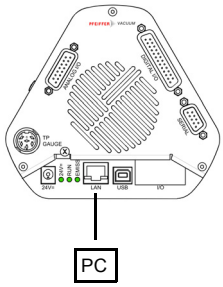
For reasons of electromagnetic compatibility, it is strongly recommended to have one central grounding point for all devices that are coupled together (pumping station, HPA 220, computers, recording instruments, etc.). The use of a power strip – or even better – a common mains distributor with a mains switch, is an easy way to comply with this.

Connecting a PC

➔ Open the supplied Quadera software package.

➔ Remove the enclosed cables.

➔ Connect the PrismaPlus to the PC.



Installing software

➔ Turn on the PC and install the supplied Quadera software.

7.2 Commissioning HPA 220

Mechanical installation

The HPA 220 is designed to be mounted directly onto a CF40 flange (Cajon VCR 1/4" for UDV 040). Please make sure that no other mechanical forces other than its own weight are acting on the unit.

Ensure the proper routing for all the cables and lines.

NOTE
We recommend propping up the entire system under HiPace 80 or under the VCU 220 (depending on option). Ensure the unit has a secure footing.

Compressed air is required for all options with electropneumatically operated valves. There is a 1/8" threaded connector for the connection to the compressed air system on every valve. Connect this before commissioning.

When installing the base rack unit, make sure there is good visibility of and accessibility to the manual control elements.

Electrical connection

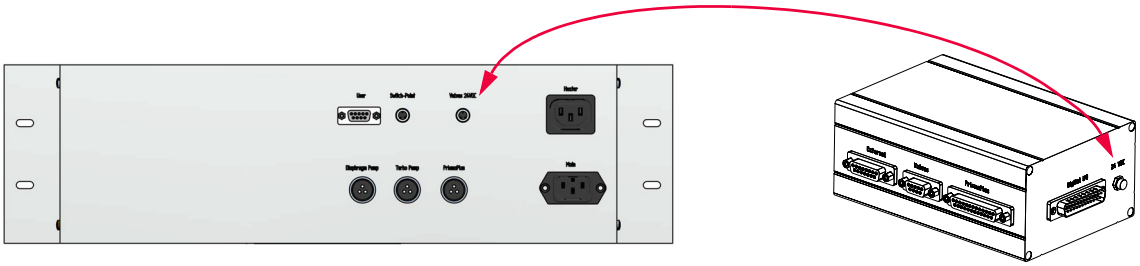
DANGER
Caution: Mains voltage! Incorrectly grounded products can be hazardous in case of malfunction. Only reach into the system after having disconnecting the power supply. ➔ Connect product in accordance with local regulations and ensure it is properly grounded!

WARNING
All electrical connections must be strain-relieved. ➔ When routing control cables, keep them separate from sources of interference.

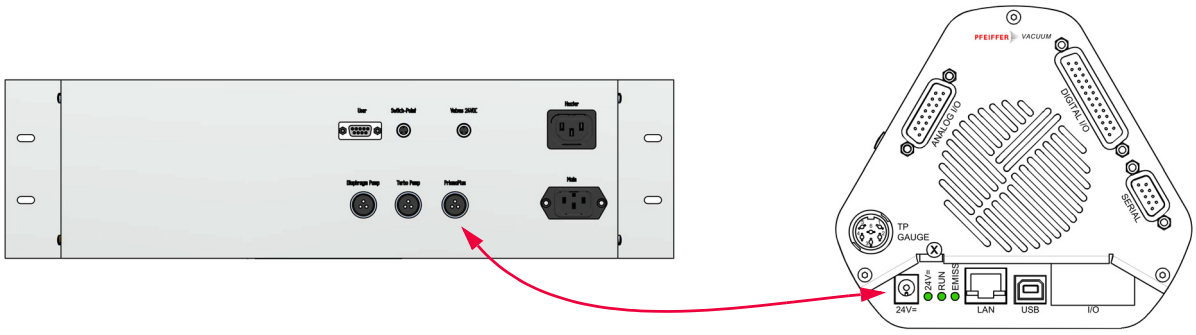
Connect all the plugs of the base rack unit, the PrismaPlus™, the controller of the HiPace 80 turbopump, as well as those on the MVP 020 diaphragm pump with the supplied cables, according to the labelling. Only at the end and with the unit switched off (“Main” switch) should the BRU 220 be connected to the mains voltage using the supplied rubber cable.

Follow the steps below:

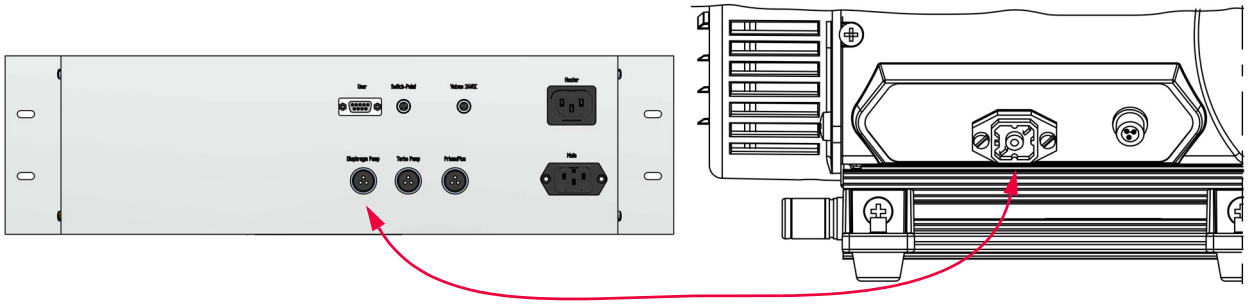
- Connect the output “Valves 24V DC” on the BRU to the input “24V DC” on the HPA valve control unit. Use the cable marked “Valves 24V DC”.



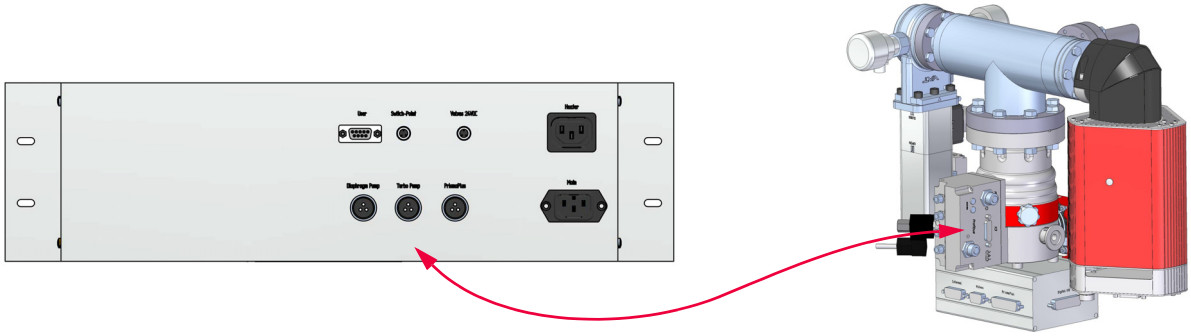
- Connect the output “PrismaPlus” on the BRU to the 24V input on the PrismaPlus™. Use the cable marked “PrismaPlus”.



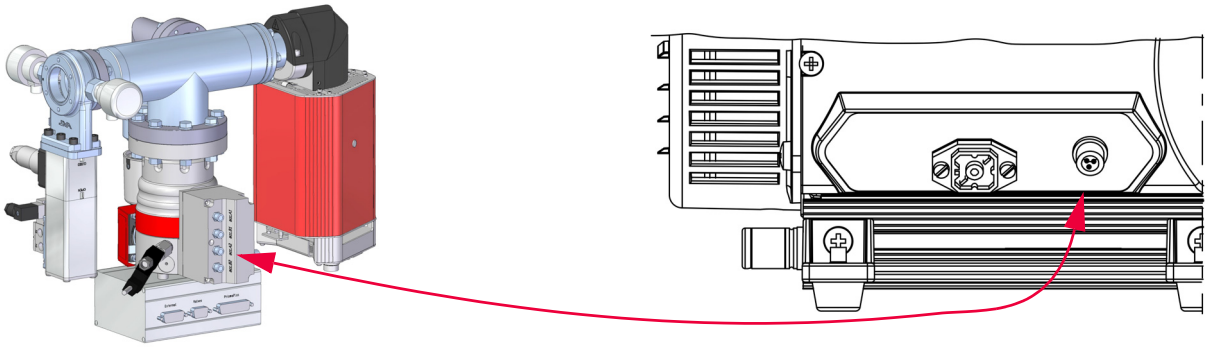
- Connect the output “Diaphragm Pump” on the BRU to the mains input on the MVP. Use the cable marked “MVP”.



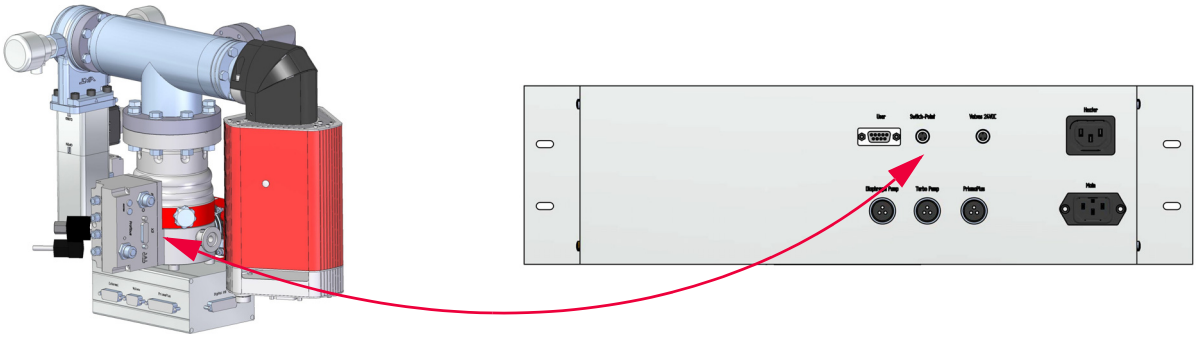
- Connect the output “Turbo Pump” on the BRU (with the 15-pole D-Sub plug) to the control of the turbopump controller. Use the cable marked “Turbo Pump”.



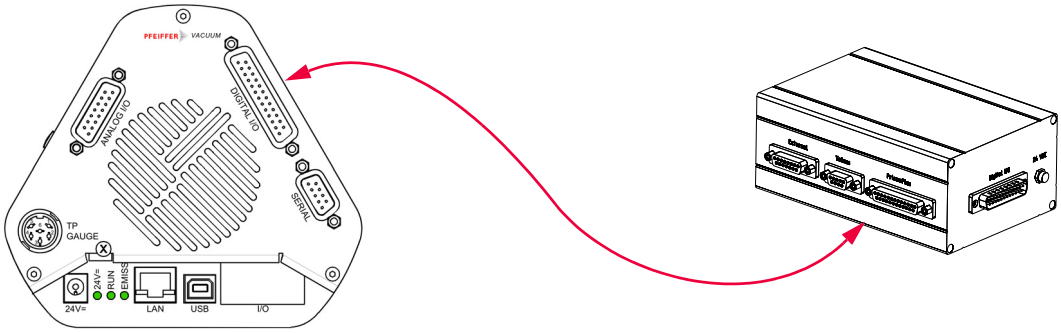
- Connect the output “A2” on the turbopump controller to the control input of the MVP. Use the cable marked “MVP I/O”.



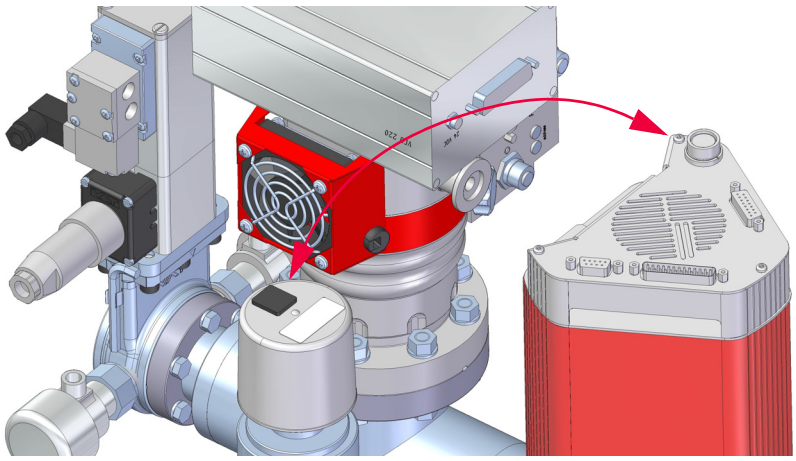
- Connect the output “DO1” of the turbopump controller on top of the D-Sub plug to the input “Switch Point” on the BRU. Use the cable marked “Switch Point”.



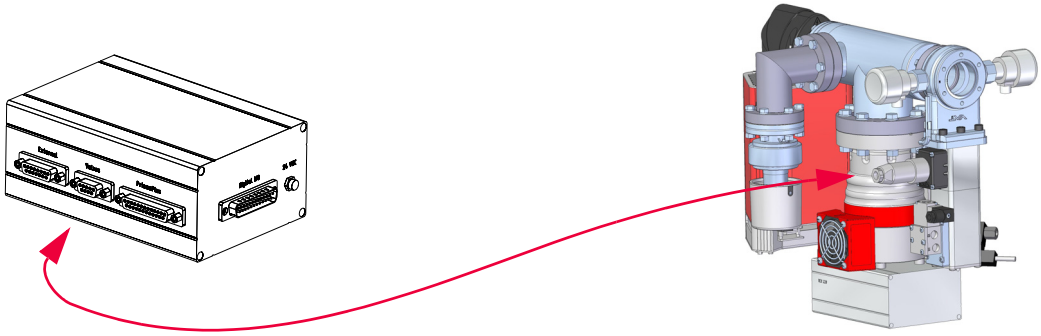
- Connect the “Digital I/O” terminal on the PrismaPlus™ with the input “Prisma Plus” on the VCU. Use the cable marked “Digital I/O”.



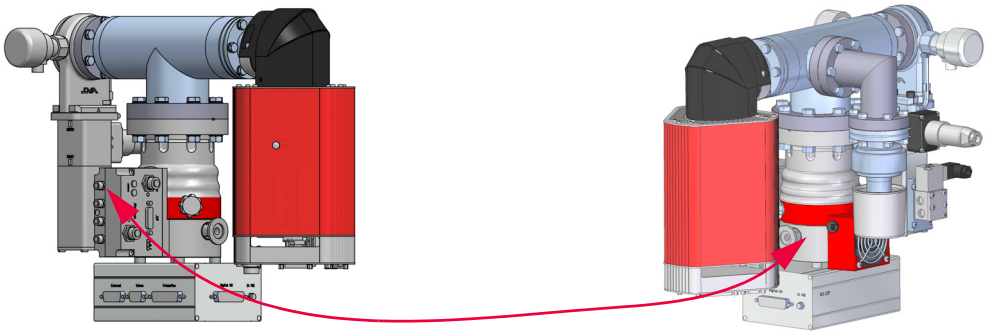
- Connect the pressure vacuum gauge to the PrismaPlus™. Use the cable marked “Gauge”.



- Connect the output “Valve” on the valve control unit to the valves.
  V1-V3 for PT M5x x2x (HPI electropneumatic) or
  V1 and V2 for PT M5x x2x (double bellow-sealed gate valve, electropneumatic)

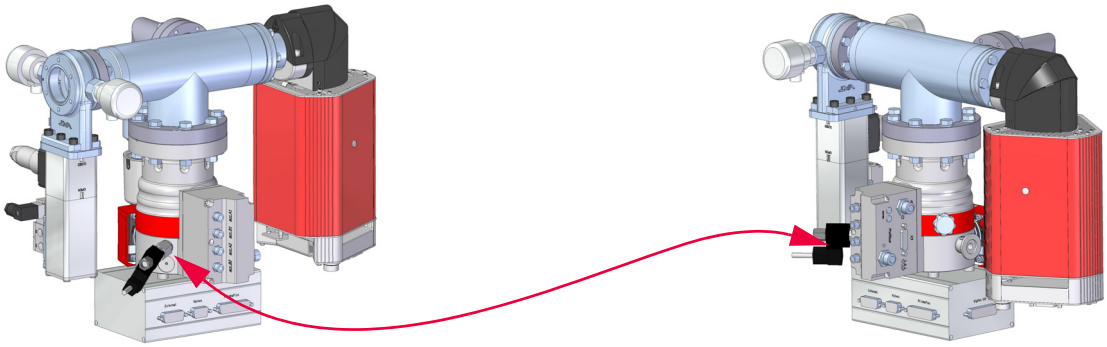


- Connect the plug A1 with the fan on the side of the turbopump. Use the cable marked “Fan”.

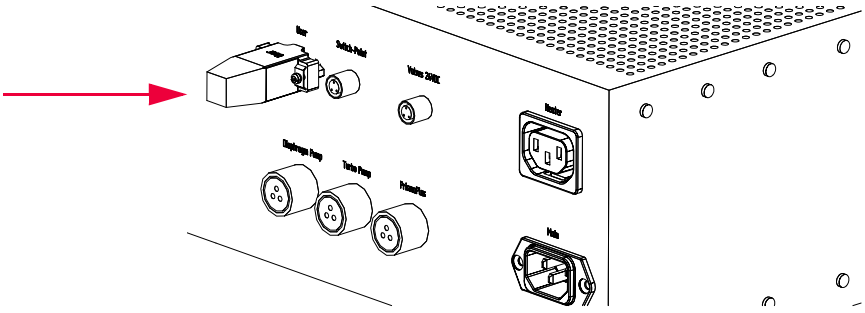


- Connect the venting valve on the side of the turbopump with the plug “B1”. It is located on the turbopump controller. Use the cable marked “venting valve”.

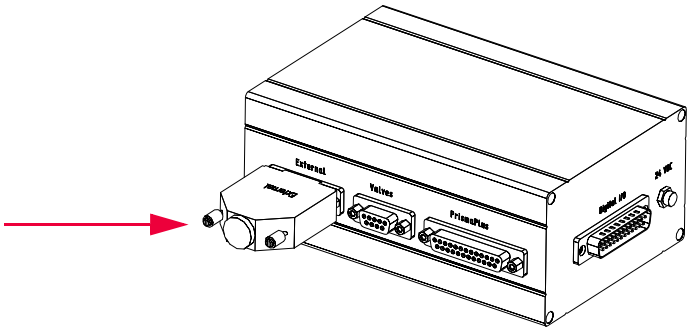
- Connect the sealing gas valve on the side of the turbopump with the plug “B1”. It is located on the turbopump controller. Use the cable marked “venting valve”.



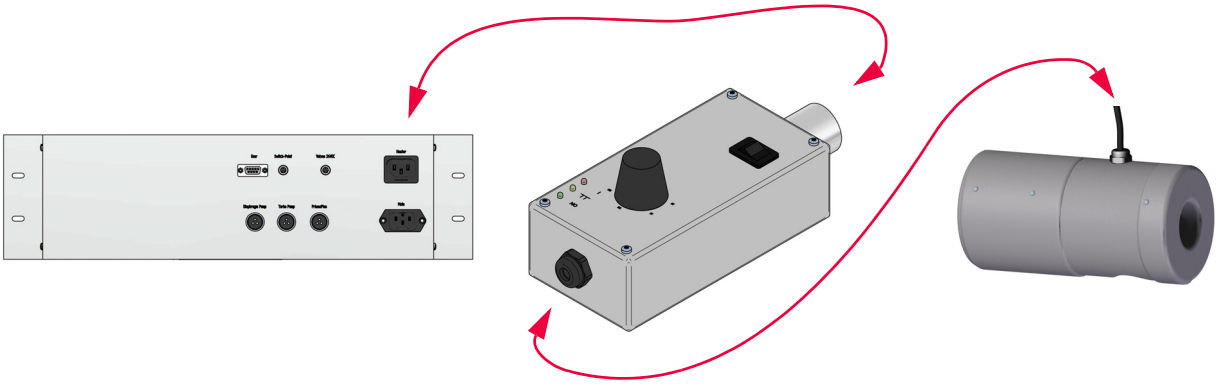
- Use the HPA 220 without external devices/controllers; plug the supplied “User” plug into the appropriate socket on the base rack unit.



- Use the valve control unit without external devices/controllers; plug the supplied “External” plug into the appropriate socket on the valve control unit.



- For options with heating, connect these to the output “Heater” on the BRU. Also connect the current supply of the heating jacket to the control unit.



8 Operation

WARNING

Always observe the limit values and ambient conditions specified in the technical data.

DANGER

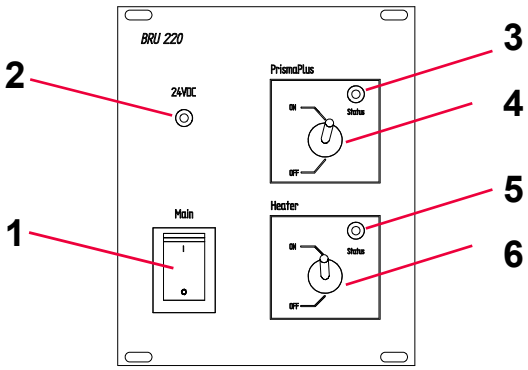
Caution: mains voltage!

If a defect occurs, the complete unit may still be energised.

➔ The mains plug must only be plugged into a shockproof socket (with earthing contact).

➔ Use only a fitting three-pole mains cable with a proper protective earthing connection. The protective effect must not be nullified by an extension cable without an earthed conductor.

8.1 Indicator and control elements BRU 220



Item	Description
1	On/off switch for the whole system
2	24 VDC supply voltage display for pumps and PrismaPlus™ ready
3	PrismaPlus™ status is on when switch is ON and turbopump at final rotation speed
4	PrismaPlus™ on/off switch
5	Heating status is on when switch is ON and turbopump at final rotation speed
6	Heating on/off switch

8.2 HPA 220

➔ Insert the mains plug

➔ The HPA 220 is turned on via the master switch on the front side of the base rack unit.

The diaphragm pump starts automatically and evacuates the vacuum chamber. The turbopump also starts automatically.

Once 80% of the set rotation speed is reached, the relay K1 is activated (compare Schematic representation of the BRU, page 53). As of this point, the PrismaPlus™ and the heating can be switched on. The corresponding switches are located on the front side of the base rack unit.

The LED indicators above the respective switches show the current initial condition of the respective unit.

Optional:

If you do not want the turbopump to start automatically when the base rack unit is switched on, you can set this directly on the turbopump. For this purpose, connect the pump (using the supplied RS485-USB adapter cable) to a PC. Use the TurboViewer software to permit extensive changes to be made to the pump. Please refer to the TurboViewer manual for more information.

Option “DCU” allows all the turbopump settings to be made on the front panel of the DCU, which is integrated into the BRU 220. →🕮 [7]

8.3 Valve control

Valves are controlled electropneumatically or manually, depending on the option. For the electropneumatic variant, the valves are controlled via the digital outputs of the PrismaPlus™ and via the valve control unit. Operation is carried out via Quadera software in this case. The control of the valves can also be set to “external control” via the user interface. This means that the unit can be integrated into a higher-level control (e.g. PLC). Option TPG allows control in external mode via the supplied 15-pole control cable (order no. PT 165 062-T) and the TPG. Threshold values for opening/closing valves V1-V3 or V1-V2 can be set directly on the TPG in this case. →🕮 [13]

8.4 Measurement

Measurement is carried out by the PrismaPlus™ using the Quadera software. For more detailed information, please read the operating manual supplied with the Quadera software. →🕮 [1]

8.5 Diaphragm pump in interval mode

To increase the service life of the diaphragms it is possible, for periods in which no measuring is taking place, to operate the diaphragm pump in interval mode with the inlet closed. The turbopump will thus automatically switch the diaphragm pump on and off via its TC 110 RS electronics. The diaphragm pump should run continuously during a measurement.
To switch on interval mode, the parameter 025 - OpMode BKP - must be set to '1' via TurboViewer or DCU 002.

8.6 Conditioning of the vacuum system

Baking out of the vacuum chamber (using optional heating jacket) allows a significant reduction in the system background and thus an improvement in detection sensitivity for condensable gases. The C-SEM should be switched off and the inlet system closed during baking out. The ion source should continue to operate, using a low emission current (< 0.3 mA). If the gas load is low, the diaphragm pump can be operated in interval mode during baking out (see 8.5 "Diaphragm pump in interval mode").

8.7 Switching off

➔ If not yet carried out, switch the PrismaPlus filament off via the Quadera software. Disconnect it from the unit and close Quadera →🕮 [1]

➔ Switch off the heating and the PrismaPlus™ using the appropriate switches on the front of the base rack unit.

➔ Switch the unit off using the master switch. To protect the filaments, we recommend switching off the unit 15 minutes after having switched off the PrismaPlus™.

➔ If the valves are still not closed, they will be closed at this point.
The turbopump shuts down automatically after the master switch has been switched off.
As soon as the rotational speed falls below 50%, the venting valve automatically opens and the ventilation process starts.*

*

This setting corresponds to the status on delivery. You can change performance of the automatic ventilation by changing the turbopump settings via the TurboViewer or DCU. (→🕮 [6]; →🕮 [7]; →🕮 [12])

9 Maintenance / Servicing

Pfeiffer Vacuum offers first-class service!

- Operating fluid and bearing replacement on-site by our FieldService
- Maintenance / repair in the nearby ServiceCenter or ServicePoint
- Fast replacement through as-new exchange products
- Advice on the quickest and most economical solution

In-depth information, addresses and forms at: www.pfeiffer-vacuum.de (service).

Maintenance and repair in the Pfeiffer Vacuum ServiceCenter

The following steps are necessary for quick and frictionless handling:

➔ Download the service request and contamination declaration.[1)]

➔ Fill out the service request and send it by fax or e-mail to your Pfeiffer Vacuum Service address.

➔ Enclose confirmation of the service request by Pfeiffer Vacuum and include it in your shipment.

➔ Fill out the contamination declaration and include it in your shipment (required!).

➔ Remove all accessories.

➔ Leave the electronic drive unit on the pump.

➔ Close flange openings with the original protective caps.

➔ If possible, send pump/unit in the original packaging.

Returning contaminated pumps/units

No units will be accepted if they are contaminated with microbiological, explosive or radioactive substances. “Hazardous substances” are substances and compounds in accordance with the Hazardous Goods Directive (current version). If pumps are contaminated or the contamination declaration is missing, Pfeiffer Vacuum performs decontamination at the shipper's expense.

➔ Neutralise the pump by flushing it with nitrogen or dry air.

➔ Close all openings airtight.

➔ Seal the pump/unit in suitable protective film.

➔ Return the pump/unit only in a suitable and sturdy transport container and in compliance with applicable transport conditions.

Exchange unit

The factory operating parameters are always preset for exchange units. If you use modified parameters for your application, you will have to set these again.

Service orders

All service orders are carried out exclusively according to our repair conditions for vacuum units and components.

[1)] Forms at www.pfeiffer-vacuum.com

9.1 QME

The dust filter on the air inlet must be cleaned as soon as a clearly visible coating has accumulated. Use a vacuum cleaner to remove the dust from the filter. The QME can stay connected to the QMA for this work.

A slightly damp cloth normally suffices for cleaning the exterior. Do not use any harsh or abrasive cleaning agents.

Cleaning

WARNING

Possible malfunction in operational reliability

In the event of contamination, the functioning of the entire system may not be ensured.

➔ Make sure not to forget the cleaning, even if the unit is installed in a way that makes it difficult to perceive contamination.

NOTE

Use only a slightly damp cloth for cleaning the unit housing. Make sure that no liquid gets into the product. Dry thoroughly before restarting operation.

Replacing the baffle strainer

Replace the baffle strainer if it looks decomposed or if it can no longer be cleaned according to the above instructions.

➔ To do so, proceed as described in the PrismaPlus™ manual. →🕮 [2]

Tuning the RF generator “TUNE”

The RF circuit should be balanced for initial decommissioning, when replacing the analyser (particularly from Faraday to Channeltron) or when the corresponding malfunction message appears on the screen.

Proper balance helps provide the best accuracy in the entire mass range. An annual inspection is therefore recommended.

➔ To do so, proceed as described in the PrismaPlus™ manual. →🕮 [2]

Optimising ion source sensitivity

The sensitivity of the ion source should be optimised for initial decommissioning or after replacing a cathode.

➔ Select the corresponding function in QUADERA: →🕮 [1]

➔ Follow the software's instructions.

➔ Save the data.

QME/QMA replacement

If the QME or the QMA have to be replaced, proceed as for the initial decommissioning.

➔ To do so, proceed as described in the PrismaPlus™ manual. →🕮 [2]

9.2 Replacing HiPace 80 operating fluid reservoir

WARNING

Poisoning hazard through contact with harmful substances

The operating fluid reservoir and parts of the pump may contain toxic substances from the pumped media.

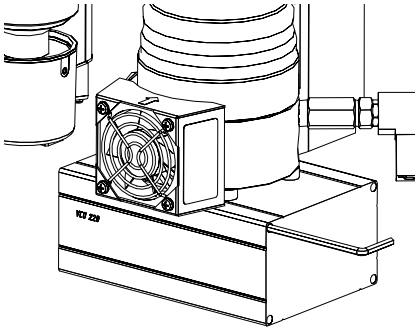
➔ Dispose of operating fluid reservoir in accordance with the applicable regulations. Safety data sheets on request at www.pfeiffer-vacuum.de

➔ Prevent health hazards or environmental damage due to contamination by means of appropriate safety precautions.

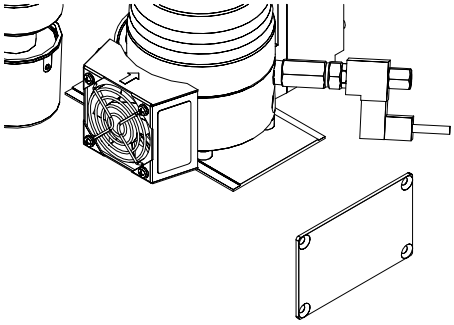
➔ Decontaminate affected parts before carrying out maintenance work.

Dismantle the QMA. To do so, proceed as described in chapter 5.1. Mechanical installation , page 37.

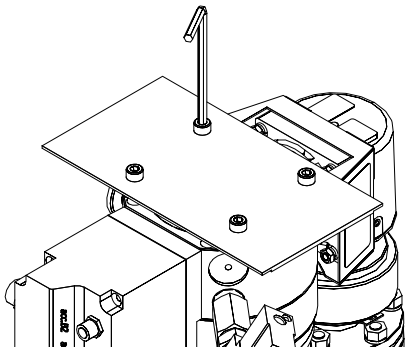
➔ Loosen the 4 screws on the VCU 220 and remove the cover plate



➔ Pull the base of the VCU 220 away backwards.



➔ Unscrew the 4 Allen screws that connect the cover plate of the VCU 220 to the HiPace 80 and remove the cover plate.



➔ Then proceed as described in → [6] .

10 Accessories and spare parts

10.1 Accessories and spare parts PrismaPlus™

→🕮 [2]

10.2 Accessories and spare parts for HiPace 80

→🕮 [6]

10.3 Connection cable

Item	Designation	Length	Article no.
1	Interface cable M12	3m	PM 061-283-T
2	Connection cable BRU/TC	3m	PM 061 512-T
3	Connection cable BRU/MVP	3m	PM 061 441-T
4	Adapter cable MVP	0.5m	PM 061 433-X
5	Adapter cable PKR	0.5m	PT 448 249-T
6	Interlock plug BRU/user	-	PT 165 050
7	Connection cable BRU/QME	3m	PT 165 060-T
8	Extension cable M8	3m	PT 061 783-T
9	Interlock plug VCU/external	-	PT 165 051
10	Connection cable VCU/PP		PT165 070-T
11	Interface cable M12	10m	PM 061 285-T
12	Connection cable TPS/TC	10m	PM 061 514-T
13	Connection cable TPS/MVP	10m	PM 061 443-T
14	Connection hose for MVP	1m	P 0988 088
15	Extension cable BRU/QME	10m	PT 165 061-T
16	Extension cable M8	10m	PM 061 785-T
17	Connection cable VCU/HPI	-	PT 165 073-T
18	Connection cable VCU/DZS	-	PT 165 072-T
19	Connection cable TPG/VCU	3m	PT 165 062-T
20	Connection cable TPG/VCU	10m	PT 165 063-T

10.4 HPA accessories

Item	Designation	Article no.
1	Sealing gas valve for HiPace 80	PM Z01 310
2	Customer-specific VSTA programming	On request
3	Heating jacket for vacuum chamber [230V]	PT 165 000-T
4	Heating jacket for vacuum chamber [115V]	PT 165 001-T
5	DCU 002	PM 061 348-T
6	USB/RS485 converter	PM 061 207-T
7	TurboViewer	PM 061 740
8	TPG 261 TPG 261, indicator and control unit for one ActiveLine vacuum gauge	PT G28 030
9	TPG 262 indicator and control unit for two ActiveLine vacuum gauges	PT G28 280

11 Decommissioning

11.1 Shutting down for longer periods

WARNING

Contamination of parts and operating fluid by pumped media is possible!

Poisoning hazard through contact with harmful substances.

➔ In the case of contamination, carry out appropriate safety precautions in order to prevent danger to health through dangerous substances.

➔ Decontaminate affected parts before carrying out maintenance work.

If the system should be shut down for longer than one year:

➔ If necessary, remove the HPA 220 from the system.

➔ Remove the turbopump from the vacuum chamber.

➔ Vent the vacuum chamber including mounted analyzer and vacuum gauge with a dry protective gas and close it with a blank flange.

➔ Replace the turbopump's operating fluid reservoir.

➔ Store the system indoors only at temperatures between +5°C to +40°C.

➔ For rooms with humid or aggressive atmospheres: Seal the system in an airtight plastic bag with drying agents enclosed.

11.2 Recommissioning

CAUTION

Recommissioning

The useful life the turbo pump operating fluid without operation is max. 4 years. Before restarting after a shut-down of **4 years or longer** carry out the following work:

➔ Replace operating fluid reservoirs.

➔ Replace bearings.

➔ Follow the maintenance instructions and inform Pfeiffer Vacuum.

➔ Check the complete system for contamination and moisture.

➔ Clean the complete system externally with a lint-free cloth and a little industrial alcohol.

➔ If necessary, have the Pfeiffer Vacuum Service clean the turbopump completely.

➔ Remove all blank flanges.

➔ Install and commission in accordance with manual.

12 Disposal

DANGER

Caution: Contaminated parts

Contaminated parts can result in damage your health.

Find out about any possible contamination before beginning work. When handling contaminated parts, observe the relevant regulations and comply with the appropriate safety measures.

CAUTION

Caution: Environmentally hazardous substances

Electronic components must be specially disposed of.

Dispose of environmentally hazardous substances in accordance with local regulations.

CAUTION

Caution: Environmentally hazardous substances

Products, operating fluid, etc., may have to be specially disposed of.

Dispose of environmentally hazardous substances in accordance with local regulations.

Subdividing the components

After disassembling the product, the components must be subdivided into the following disposal categories:

Contaminated components	Contaminated components (radioactive, toxic, caustic, or microbiological, etc.) must be decontaminated according to local regulations, and separated and disposed of according to their material type.
Uncontaminated components	These components must be separated according to their material type and recycled.

13 Malfunctions

If malfunctions occur on the High Pressure Analyser HPA220, you will find possible causes and troubleshooting instructions in the following table.

13.1 Troubleshooting

Problem	Possible cause	Remedy
With the unit switched on, the LED 24 VDC does not light up; no function possible	Current supply interrupted	Check mains cable
	BRU 220 device fuse has responded	Check and replace fuse
	Incorrect operating voltage	Apply correct operating voltage Observe the ratings on the type plate.
	Power supply pack TPS 3 is defective	Replace power supply pack, contact Pfeiffer Vacuum Service.

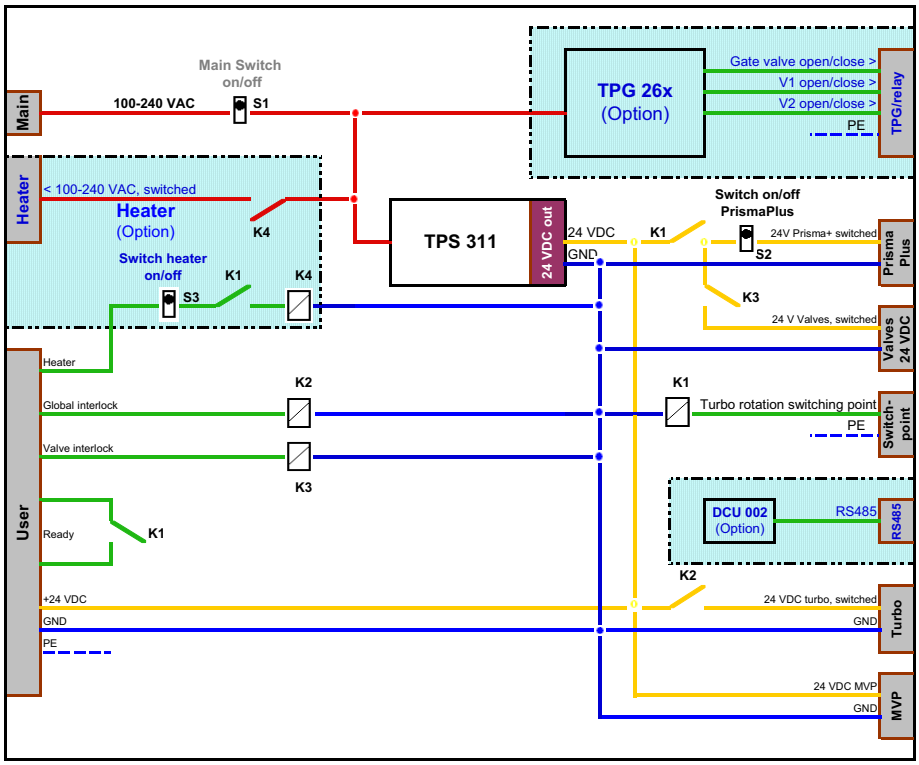
Problem	Possible cause	Remedy
Pumping system will not start up	Pumping station is not switched on	Switch on pumping station using TurbineViewer or DCU 002.
	Mating plug “User” on BRU 220 not plugged in or incorrectly wired	Check mating plug Check the wiring
	Cabling faulty	Check the connection cable, see section 7.2 “Commissioning SPM” 7.2 "Commissioning HPA 220"
Pumping system does not reach final rotation speed or final pressure	Inlet valve is open	Close inlet valve
	Condensate in the backing pump	Open gas ball valve on the MVP 020-3
	Gas ballast valve open	Close gas ball valve on the MVP 020-3
	Leakage	Check system for leak
PrismaPlus™ PrismaPlus™ cannot be switched on (status LED remains off)	Turbopump is still not at final rotational speed	Wait for run-up
	Pumping system not reaching final pressure	See problem description “Pump system neither reaching final speed nor pressure”
Electropneumatic valves are not switching	Settings in “Valve Control” program are incorrect	Check settings in “Valve Control” program
	Mating plug “User” on BRU 220 not plugged in or incorrectly wired	Check mating plug Check the wiring
	Switch-point on total pressure controller TPG 26x incorrectly set	Set the switch-point correctly
	Compressed air is missing or too low	Check compressed air supply
Heating cannot be switched on (status LED remains off)	Turbopump is still not at final rotational speed	Wait for run-up
	Pumping system not reaching final rotational speed	See problem description “Pump system neither reaching final speed nor pressure”

Please refer to the relevant operating manuals for information about malfunctions on individual components.
For any further question you may have, please contact Pfeiffer Vacuum Service.

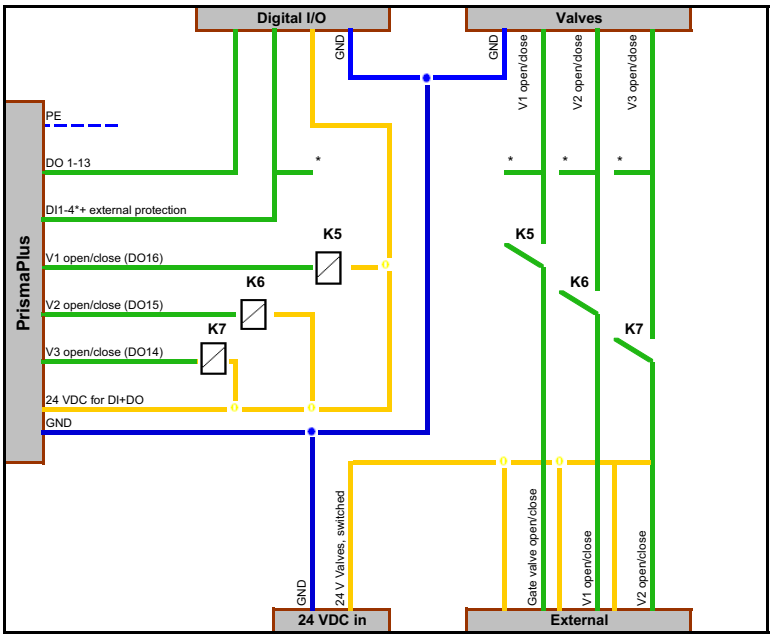
14 Appendix

14.1 Block diagrams

Schematic representation of the BRU



Schematic representation of the VCU



*dependining on option DI1/DI2/DI3 may by connected to V1/V2/V3

24 VDC
GND
signals

14.2 Literature

[1] www.pfeiffer-vacuum.com
Quadera Help (includes CD-R)
Pfeiffer Vacuum GmbH, D-35614 Asslar, Germany

[2] www.pfeiffer-vacuum.com
Operating manual
Compact mass spectrometer Prisma Plus QMG220
BG5214BEN
Pfeiffer Vacuum GmbH, D-35614 Asslar, Germany

[3] www.pfeiffer-vacuum.com
Communication manual
Prisma™ QMS 200
BG5215BEN
Pfeiffer Vacuum GmbH, D-35614 Asslar, Germany

[4] www.pfeiffer-vacuum.com
Additional information for turbopumps with TC 600 and TC 750
Electronic drive unit TC 600/TC750
PT0204BEN
Pfeiffer Vacuum GmbH, D-35614 Asslar, Germany

[5] www.pfeiffer-vacuum.com
Operating manual
Diaphragm pump MVP 020
PK0217BEN
Pfeiffer Vacuum GmbH, D-35614 Asslar, Germany

[6] www.pfeiffer-vacuum.com
Operating manual
HiPace 80
PT0208BEN
Pfeiffer Vacuum GmbH, D-35614 Asslar, Germany

[7] www.pfeiffer-vacuum.com
Operating manual
Indicator and control unit DCU 002/110/180/310/400
PT0250BEN
Pfeiffer Vacuum GmbH, D-35614 Asslar, Germany

[8] www.pfeiffer-vacuum.com
Operating manual
Venting valve TSF 012
PT0228BEN
Pfeiffer Vacuum GmbH, D-35614 Asslar, Germany

[9] www.pfeiffer-vacuum.com
Operating manual
Compact full range gauge PKR 251
BG5155BEN
http://www.pfeiffer-vacuum.de/produkte/messgeraete/activeline/container.action

[10] www.pfeiffer-vacuum.com
Operating manual
All-metal control valve UDV 040
BP5003BEN
Pfeiffer Vacuum GmbH, D-35614 Asslar, Germany

[11] www.vatvalve.com
Operating manual
Mini UHV vane
RGA valve
250986DA
VAT Vakuumventile AG, CH-9469 Haag, Switzerland

[12] www.vatvalve.com
Operating manual
RGA-valve line of sight
Rotated 90 °
Series 010, DN 40
250987DA
VAT Vakuumventile AG, CH-9469 Haag, Switzerland

[13] www.pfeiffer-vacuum.com
Operating manual
Single gauge TPG 261
Single-channel measuring and control unit
BG5195BEN
Pfeiffer Vacuum GmbH, D-35614 Asslar, Germany

[14] www.pfeiffer-vacuum.com
USB RS 485 Converter
PM 061 207-T
Pfeiffer Vacuum GmbH, D-35614 Asslar, Germany

Declaration on contamination of vacuum units and components

Download form at www.pfeiffer-vacuum.com

Declaration of Conformity

according to EC Directive:

- **Machinery 2006/42/EC (Appendix II, no. 1 A)**
- **EMC Directive 2004/108/EC**
- **Directive for electrical equipment 2006/95/EC**

We hereby declare that the product cited below satisfies all relevant provisions of EC Machinery Directive **2006/42/EC**.

In addition, the product cited below satisfies all relevant provisions of EC Directive “Electromagnetic Compatibility” **2004/108/EC**.

In addition, the product satisfies, within certain voltage limits, all relevant provisions of the EU Directive for electrical equipment **2006/95/EC**.

The agent responsible for compiling the technical documentation is Dr. Falk Braunschweig, Pfeiffer Vacuum GmbH, Berliner Straße 43, 35614 Aßlar, Germany.

High pressure analyser

HPA 220

Guidelines, harmonised standards, and national standards and specifications which have been applied:

EN ISO 12100-1
EN ISO 12100-2
EN1012-2
EN61010-1
EN 61326-1

Signatures:

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Berliner Straße 43
35614 Asslar
Germany

(M. Bender)
Managing Director

(Dr. M. Wiemer)
Managing Director

CE/2011

PFEIFFER VACUUM

A PASSION FOR PERFECTION

PFEIFFER VACUUM

Leading. Dependable.
Customer Friendly

Pfeiffer Vacuum stands for innovative and custom vacuum solutions worldwide. For German engineering art, competent advice and reliable services.

Ever since the invention of the turbopump, we´ve been setting standards in our industry. And this claim to leadership will continue to drive us in the future.

You are looking for a perfect vacuum solution? Please contact us:

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