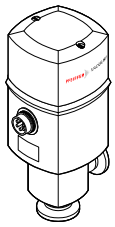
PFEIFFER VACUUM

Operating Instructions
Incl. Manufacturer's Declaration

Control Valve
EVR 116

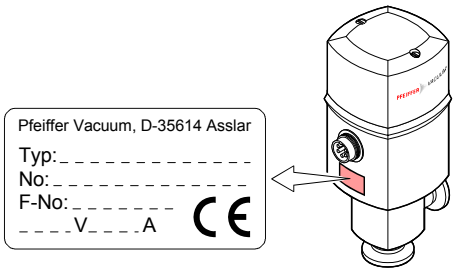


CE

BP 805 056 BE / D (2004-10)

Product Identification

In all communications with Pfeiffer Vacuum, please specify the information on the product nameplate. For convenient reference copy that information into the nameplate replica below.



Validity

This document applies to products with the part number PFI39931.

The part number (No) can be taken from the product nameplate.

We reserve the right to make technical changes without prior notice.

All dimensions im mm.

Intended Use

The EVR 116 Control Valve is used together with a control unit (e.g. Pfeiffer Vacuum RVC 300 control unit) for controlling the pressure in a vacuum system, either with a variable gas flow (up-stream contol) or with a variable conductance (down-stream control).

It must not be used with liquid gases.

Functional Principle

The Control Valve with integrated motor drive electronics, which transforms the control signal into a defined valve position, can be controlled

- with analog voltage,
- via integrated interface or
- via optional RS232 interface.

Safety

Symbols Used

DANGER

Information on preventing any kind of physical injury.

WARNING

Information on preventing extensive equipment and environmental damage.

Caution

Information on correct handling or use. Disregard can lead to malfunctions or minor equipment damage.

Personnel Qualifications

Skilled personnel

All work described in this document may only be carried out by persons who have suitable technical training and the necessary experience or who have been instructed by the end-user of the product.

General Safety Instructions

- Adhere to the applicable regulations and take the necessary precautions for the process media used.

  Consider possible reactions between the materials and the process media.
- Adhere to the applicable regulations and take the necessary precautions for all work you are going to do and consider the safety instructions in this document.
- Before beginning to work, find out whether any vacuum components are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

Communicate the safety instructions to all other users.

Liability and Warranty

Pfeiffer Vacuum assumes no liability and the warranty becomes null and void if end-user or third parties

- disregard the information in this document
- use the product in a non-conforming manner
- make any kind of interventions (modifications, alterations etc.) on the product
- use the product with accessories and options not listed in the corresponding product documentation.

The end-user assumes the responsibility in conjunction with the process media used.

Technical Data

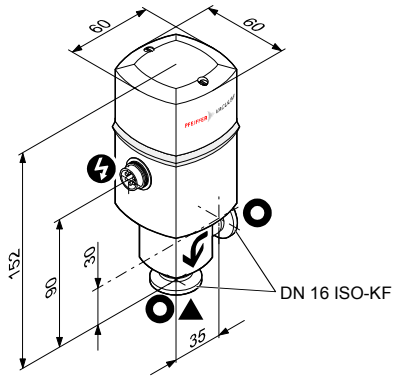
Connection flange	DN 16 ISO-KF
Mounting orientation	any
Gas flow direction [1]	→ "Dimensions"
Tightness	$1x10^{-9}$ mbar l/s
Pressure range	$1x10^{-8}$ mbar … 2.5 bar (absolut)
Flow rate [2]	
with filter on inlet side	$5x10^{-6}$ … 1250 mbar l/s
with filter on inlet and vacuum side	$5x10^{-6}$ … 1000 mbar l/s
Dead volume	0.03 cm^3
Supply	
Operating voltage	24 VDC (±10%)
Power consumption	12 VA
Current consumption [3]	500 mA, 20 … 30 mA rest current
Control	
RVC 300	→ separate document
Control voltage	0 … +10 VDC (→ "Electrical Connection")
Protection type	IP 40
Stroke (needle)	11.5 mm
Closing / opening time	3 / 4 s
Integrated sensors	valve open valve closed valve needle in movement
Ambient temperature	5 … 40 °C
Materials	
Valve housing	stainless steel 1.4435
Valve needle	stainless steel 1.4301
Filter	stainless steel 1.4404
Seals	FPM
Dosing sleeve	fluorplastomer
Weight	0.5 kg

[1] The recommended mounting orientation is with the valve seat in direction to the vacuum chamber

[2] For air with Δp = 1 bar

[3] Pre-fusing 630 mAT recommended

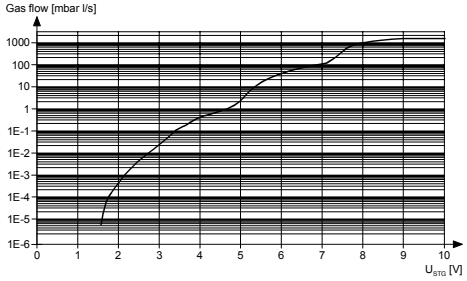
Dimensions [mm]



Electrical connection
Protective lid
Gas flow direction
Valve seat site

Gas flow diagram

The gas flow curve corresponds to a mean value for air with a pressure difference of 1 bar.



Installation

Vacuum Connection

DANGER

Caution: overpressure in the vacuum system >1 bar

Injury caused by released parts and harm caused by escaping process gases can result if clamps are opened while the vacuum system is pressurized.

Do not open any clamps while the vacuum system is pressurized. Use the type clamps which are suited to overpressure.

Caution

Caution: dirt sensitive area

Touching the product or parts thereof with one's bare hands increases the desorption rate.

Always wear clean, lint-free gloves and use clean tools when working in this area.

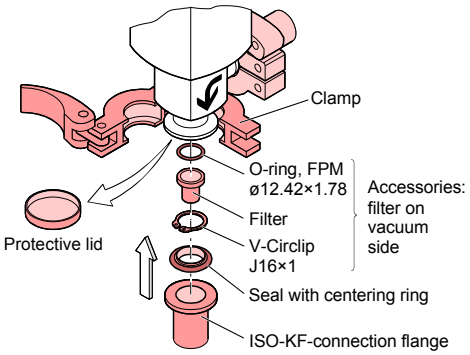
Caution

Caution: vacuum component

Dirt and damages impair the function of the vacuum component.

When handling vacuum components, take appropriate measures to ensure cleanliness and prevent damages.

Remove the protective lids and install the product by means of the small flange fittings.

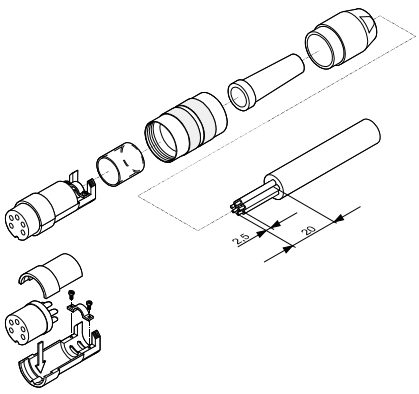


Keep the protective lids.

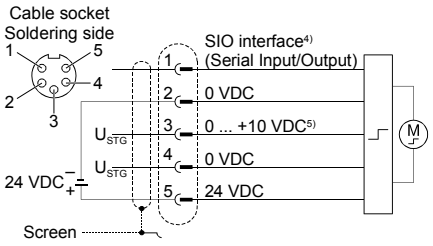
Electrical Connection

Before connecting or disconnecting the product, turn off the control system.

❶ Prepare the connector (the connector is enclosed).



❷ Solder the connection cable according to the diagram.



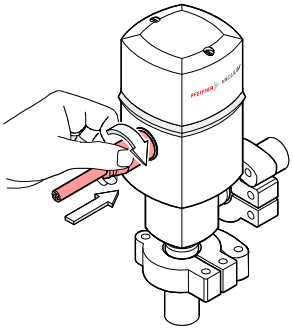
U_{STG} = Control voltage

4) For further information → "Interface"

5) Be careful to correctly connect the poles

❸ Assemble the connector.

❹ Plug in the connector and secure it with the union nut.



Operation

The product is ready for operation as soon as it has been installed.

Caution

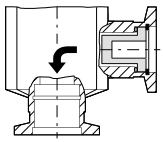
Caution: power failure

In the event of a power failure the EVR 116 stops and remains in its momentary valve position.

If the EVR 116 is used together with a Pfeiffer Vacuum RVC 300 control unit the valve is closed by the internal capacitor of the EVR 116 in the event of a power failure.

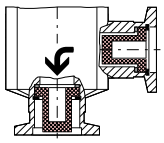
Gas flow

with filter on the inlet side (standard)



Flow rate for air: ≤1250 mbar l/s

with filter on the inlet and the vacuum side (accessory)



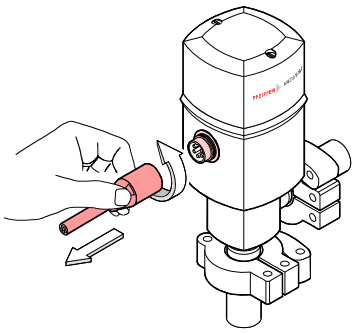
Flow rate for air: ≤1000 mbar l/s

Deinstallation

Electrical Connection

Before connecting or disconnecting the product, turn off the control system.

Loosen the connector and unplug it.



Vacuum Connection

DANGER

Caution: contaminated parts

Contaminated parts can be detrimental to health and environment.

Before beginning to work, find out whether any parts are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

Caution

Caution: dirt sensitive area

Touching the product or parts thereof with one's bare hands increases the desorption rate.

Always wear clean, lint-free gloves and use clean tools when working in this area.

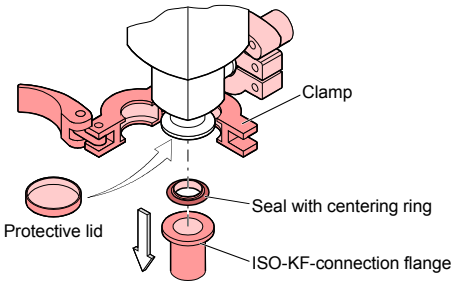
Caution

Caution: vacuum component

Dirt and damages impair the function of the vacuum component.

When handling vacuum components, take appropriate measures to ensure cleanliness and prevent damages.

Vent the vacuum system and disassemble the small flange connection. Place the protective lids.



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(2004-10)

Original: German BG 805 056 BD / D (2004-10)

Maintenance

DANGER

Caution: contaminated parts

Contaminated parts can be detrimental to health and environment.

Before beginning to work, find out whether any parts are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

Caution

Caution: vacuum component

Dirt and damages impair the function of the vacuum component.

When handling vacuum components, take appropriate measures to ensure cleanliness and prevent damages.

Caution

Caution: manipulations inside the unit

For technical reasons, manipulations inside the unit are inadmissible.

Please contact your local Pfeiffer Vacuum service center.

Pfeiffer Vacuum assumes no liability and the warranty becomes null and void if any service work is carried out, which is not described in these Operating Instructions.

Cleaning the filter

DANGER

Caution: cleaning agents

Cleaning agents can be detrimental to health and environment.

Adhere to the relevant regulations and take the necessary precautions when handling and disposing of cleaning agents. Consider possible reactions with the product materials.

DANGER

Caution: cleaning with compressed air

Flying particles can cause eye injuries.

Wear protective glasses.

DANGER

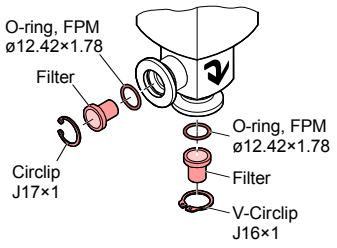
Caution: compressed air

Unprofessionally handling compressed air can cause physical injuries.

Adhere to the relevant regulations and take the necessary precautions when handling compressed air.

Precondition: product deinstalled

❶ Dismantle the filter(s).



❷ If necessary, clean the built-in filter(s) by putting it (them) in alcohol to soak.

❸ Dry the filter(s) with compressed air.

Repair

We recommend returning the product to your local Pfeiffer Vacuum service center for repair.

Pfeiffer Vacuum assumes no liability and the warranty becomes null and void if any repair work is carried out by end-users or third parties.

Spare Parts and Accessories

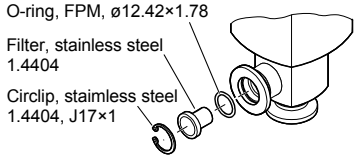
Depending on the process, we recommend incorporating an additional filter on the vacuum side in order to prevent the valve needle from getting dirty.

When ordering spare parts or accessories, always indicate:

- all information on the product nameplate
- description and ordering number according to the spare parts or accessories list.

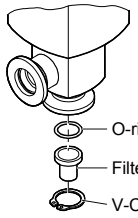
Spare parts

Description	Ordering number
1 Filter, complete consisting of: O-ring, FPM, ø12.42×1.78 Filter, stainless steel 1.4404 Circlip, stainless steel 1.4404, J17×1	PT420463-T



Accessories

Description	Ordering number
1 Filter complete consisting of: O-ring, FPM, ø12.42×1.78 Filter, stainless steel 1.4404 V-Circlip, J16×1	PT420463-T



Maximum gas flow depending on filters used (→ "Operation").

Interface

Data transmission

Transmission rate		300 Baud
Data bits		7
Stop bits		2
Voltage level:	Logical 0	>7 V
	Logical 1	<3 V

Communication

Each transmission from the controller to the valve is initiated with one ASCII character from "g" to "z" (67_h to $7A_h$) and terminated with "CR/LF" ($0D_h$, $0A_h$).

Numeric transmission data are represented as HEX 2 or 3 position hexadecimal values.

For transmission to the valve 0 … 9 and a … f are used, for transmission to the controller 0 … 9 and A … F.

For two digit numbers a +/– sign can additionally be specified.

Syntax

The following symbols are used:

$ placeholder for HEX digit (0 … 9, a … f or A … F)

? at the beginning of a response means incorrect entry.

Operating Mode (VMODE)

Analog mode (VMODE = 01)

In analog mode the valve position is defined by the analog voltage between terminals 3 and 4.

The valve switches to analog mode ≈5 s after the operating voltage has been applied. The mode can be changed at any time via the serial interface.

With U_{STG} <0.5 V the valve is closed, with a voltage of 9 V it is completely open.

Digital mode (VMODE = 02)

In digital mode the valve position is defined via the interface (with the set commands, → "Command Language").

Command	Response	Description
h$$	H$$	Writes $$ in VMODE Possible modes: h01; Analog mode (set automatically ≈5 s after the operating voltage has been applied) h02; Digital mode

Command Language

Set commands

Command	Response	Description
x	X	Closes valve and switches immediately to VMODE = 02
y	Y	Opens valve and switches immediately to VMODE = 02
z	Z	Stops valve movement (only possible with VMODE = 02)
i	I	Opens valve with reduced speed (until "open" or command z)
j	J	Closes valve with reduced speed (until "closed" or command z)
g$$$	G$$$	Go to absolute position $$$ x2 Examples: g100 (close)⇒ Response G100 (= Absolute position 0200_h) gd34 (open)⇒ Response GD34 (= Absolute position $1A68_h$)
g+$$	G+$$	Increase absolute position by $$ Example: g+10 ⇒ Response G+10 (= open by 16 increments)
g-$$	G-$$	Decrease absolute position by $$ Example: g-01 ⇒ Response G-01 (= close by 1 increment)

Inquiry commands

Command	Response	Description
h?	H$$	Output the VMODE
p?	$$$$	Actual position (Normal range 0200H to 1A68H)
s?	S$$$	Status information (12 Bit)
t?	T$$$	Temperature in valve (12 Bit)
v?	V$$$	Version number (=V115)

Data format of the status information

The result of the status inquiry is a 3-position HEX number that represents the following data sequence:

S$$$

{D3, D2, D1, D0}
- D3 Logical state of the light barrier "close" (OK3)
- D2 Logical state of the light barrier "open" (OK2)
- D1 Logical state of the light barrier "rotation" (OK1)
- D0 Parameters are at the default values

{D7, D6, D5, D4}
- D7 Temperature error (max. temperature exceedet), triggers "close" and power off ("t?" < T53_h$)
- D6 Temperature warning ("t?" < T60_h$)
- D5 Operating voltage too low
- D4 Operating voltage warning

{D11, D10, D9, D8}
- D11 Reserve
- D10 Blocking of movement has occurred
- D9 Initialization completed
- D8 Status message from INT-timer

Temperature

The result of the temperature inquiry is a 3-position HEX number of which only the last two digits are relevant. The lower this number the higher the temperature is at the measuring point.

The EVR 116 is switched off when this value is < 53_h.

T$$$

- {D7, D6, D5, D4} {D3, D2, D1, D0}
  Valve temperature
  The lower this number the higher the temperature.
  A value < T53_h$, triggers an error.
  A value < T60_h$, triggers a warning .
- Not relevant

Returning the Product

WARNING

Caution: forwarding contaminated products

Contaminated products (e.g. radioactive, toxic, caustic or microbiological hazard) can be detrimental to health and environment.

Products returned to Pfeiffer Vacuum for maintenance, repair, and disposal should preferably be free of harmful substances. Adhere to the forwarding regulations of all involved countries and forwarding companies and enclose a completed declaration of contamination.

Products that are not clearly declared as "free of harmful substances" are decontaminated at the expense of the customer.

Products not accompanied by a duly completed declaration of contamination are returned to the sender at his own expense.

Disposal

DANGER

Caution: contaminated parts

Contaminated parts can be detrimental to health and environment.

Before beginning to work, find out whether any parts are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

Separating the components

After disassembling the product, separate its components according to the following criteria:

- Contaminated components
  Contaminated components (radioactive, toxic, caustic, or biological hazard etc.) must be decontaminated in accordance with the relevant national regulations, separated according to their materials, and disposed of.
- Other components
  Such components must be separated according to their materials and recycled.

Declaration of Contamination

The service, repair, and/or disposal of vacuum equipment and components will only be carried out if a correctly completed declaration has been submitted. Non-completion will result in delay.
This declaration may only be completed (in block letters) and signed by authorized and qualified staff.

1 Description of product
Type _____
Part number _____
Serial number _____

2 Reason for return
_____
_____
_____

3 Operating fluid(s) used
(Must be drained before shipping.)
_____
_____

4 Used in copper process
no ❑ yes ❑ → Seal product in plastic bag and mark it with a corresponding label.

5 Process related contamination of product:

toxic	no ❑ 1)	yes ❑
corrosive	no ❑ 1)	yes ❑
biological hazard	no ❑	yes ❑ 2)
explosive	no ❑	yes ❑ 2)
radioactive	no ❑	yes ❑ 2)
other harmful substances	no ❑ 1)	yes ❑

1) or not containing any amount of hazardous residues that exceed the permissible exposure limits

2) Products thus contaminated will not be accepted without written evidence of decontamination.

The product is free of any substances which are damaging to health. yes ❑

6 Harmful substances, gases and/or by-products

Please list all substances, gases, and by-products which the product may have come into contact with:

Trade/product name manufacturer	Chemical name (or symbol)

Precautions associated with substance	Action if human contact

7 Legally binding declaration:

We hereby declare that the information on this form is complete and accurate and that we will assume any further costs that may arise. The contaminated product will be dispatched in accordance with the applicable regulations.

Organization/company _____
Address _____
Post code, place _____
Phone _____ Fax _____
Email _____
Name _____
Company stamp

This form can be downloaded from our website.

Copies: Original for addressee
1 copy for accompanying documents
1 copy for file of sender

Manufacturer's Declaration

as defined by the Directive relating to machinery 98/37/EC, Appendix IIb

We, Pfeiffer Vacuum, hereby declare that putting the incomplete equipment mentioned below into operation is not permitted until evidence is given that the system into which that incomplete equipment shall be installed is in accordance with the provisions of the EC Directive relating to machinery.

We also declare that the equipment mentioned below complies with the provisions of the Directive relating to electrical equipment designed for use within certain voltage limits 73/23/EEC and the Directive relating to electromagnetic compatibility 89/336/EEC.

Control Valve
EVR 116

Part number

PFI39931

Standards

Harmonized and international/national standards and specifications:

- EN 292-1/2 (Safety of machinery)
- EN 294 (Safety distances to prevent danger zones being reached by the upper limbs)
- EN 50081-1 (Electromagnetic compatibility: generic emission standard)
- EN 50082-2 (Electromagnetic compatibility: generic immunity standard)
- EN 61010-1 (Safety requirements for electrical equipment for measurement, control and laboratory use)

Signatures

Pfeiffer Vacuum GmbH, Asslar

18 August 2004

Wolfgang Dondorf
Managing director

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