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GA 06.422/2.02

Angle Valve

electromagnetically actuated
with automatic voltage
adaptation 85 … 248 VAC

DN 16 … 40 ISO-KF

Catalog numbers

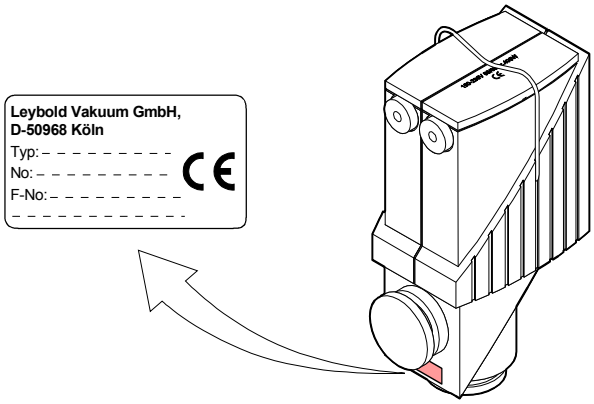
287 65
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Operating Manual

Product identification

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



Validity

This document applies to products with the following catalog numbers:

Aluminum housing with FPM seals	Stainless steel housing with FPM seals	Stainless steel housing with EPDM seals	
287 65	288 65	–	DN 16 ISO–KF
287 66	288 66	–	DN 25 ISO–KF
287 67	288 67	288 68	DN 40 ISO–KF

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

If not indicated otherwise in the legends, the illustrations in this document correspond to the valve with the nominal diameter DN 25 ISO-KF. They apply to valves with other nominal diameters by analogy.

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

Intended Use

The electromagnetically actuated bellows sealed angle valves are used as shut-off or venting devices in vacuum applications.

Functional Principle

The angle valves are opened electromagnetically and closed by means of a prestressed pressure spring. They close, or remain closed, on power loss.

Trade Marks

The following trade marks and firms are the property of their respective owners:

Loctite® Loctite Corporation
Torx® Camcar/Textron, Inc.

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1 Description

1.1 Operating modes

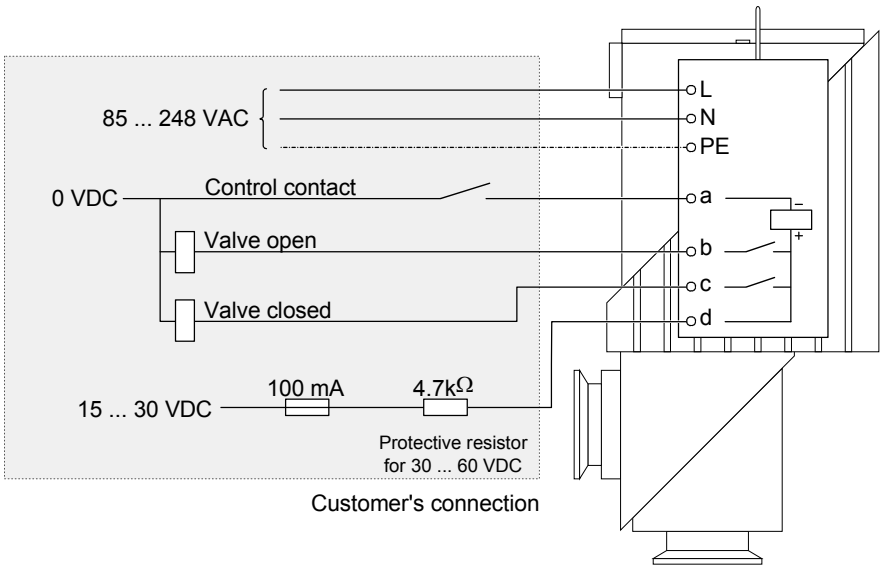
The angle valve has two operating modes:

- REMOTE mode
  Drive via control voltage 15 … 30 VDC.
- LOCAL mode
  Drive via supply voltage 85 … 248 VAC.

The operating mode is selected by setting a switch (→ 🗎 12).

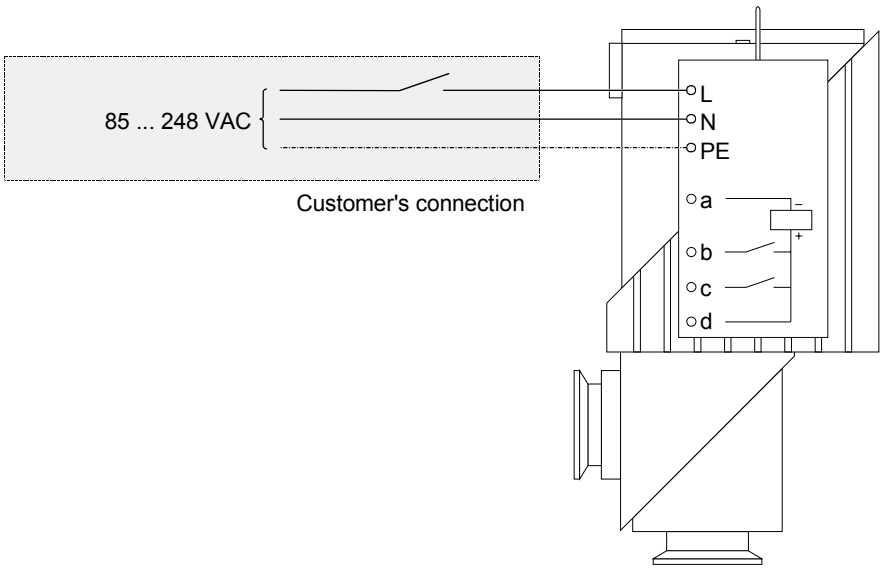
REMOTE mode

In the REMOTE mode, the supply voltage of 85 … 248 VAC is constantly fed. The angle valve is opened and closed via the control contact (0 VDC).

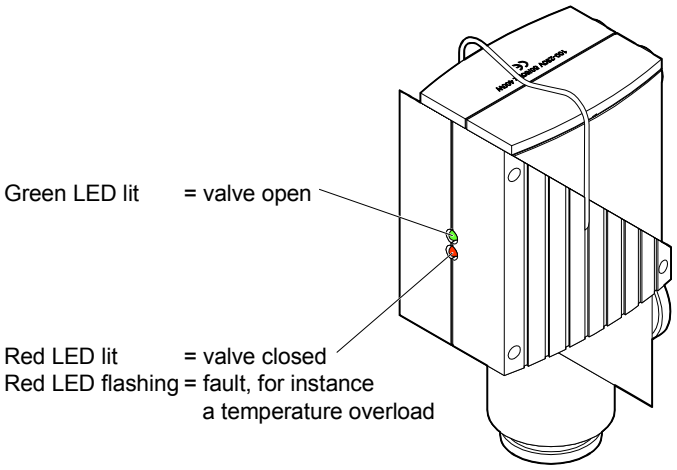


LOCAL mode

The angle valve is opened and closed directly via the supply voltage.

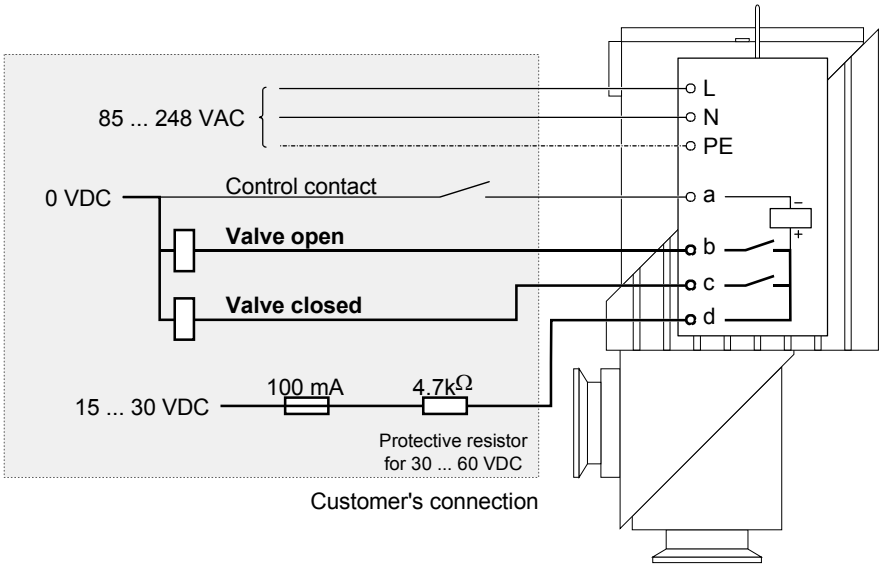


1.2 Indication of Positions and Faults



1.3 Position Indicator (in REMOTE mode only)

The integrated position indicator allows for polling the valve positions. In the event of a fault, the signal "valve closed" is constantly fed.



2 Safety

2.1 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.

20 Dimensions in mm

→ See page ...

2.2 General Safety Instructions

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

  Consider possible reactions of the process media due to the heat generated by the product (→ 9).
- 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.

2.3 Liability and Warranty

Leybold Vakuum assumes no liability and the warranty becomes null and void if end-users or third parties

- disregard the information in this document
- use the product in a non-conforming manner
- make any kind of changes (modifications, alterations etc.) to 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.

Notes

3 Technical Data

Connection flange	DN 16 ISO-KF	DN 25 ISO-KF	DN 40 ISO-KF
Actuation	opening: electromagnetically closing: by pressure spring		
Supply voltage Frequency Power consumption	85 … 248 VAC 50 / 60 Hz 400 W (max. upon switching on)		
Pickup-/Holding power	405/8.1 W	416/8.3 W	367/7.5 W
Control voltage Power consumption	15 … 30 VDC [1] 3 … 5 mA		
Position indicator switching voltage [2] switching current [3]	 15 … 30 VDC 100 mA		
Type of protection Protection class	IP 54 according to DIN 40 050 II		
Cable diameter feeder line control cable	 5 … 7 mm 5 … 7 mm		
Installation angle	any		
Flow direction	any		
Cycle life [4]	2 million		
Switching frequency at 40 °C [5] at 50 °C [5]	 30 / min 20 / min		
Opening time Closing time Dead time [6]	100 ms 240 ms 50 ms	120 ms 240 ms 170 ms	230 ms 700 ms 500 ms
Pressure range	1×10^{-8} mbar … 1.3 bar (absolute)		
Bursting pressure	3 bar (overpressure)		
Pressure difference Δp in closing direction in opening direction	 1.3 bar 1.3 bar		
Opens to a pressure difference Δp	1.3 bar		
Ambient temperature	0 … 50 °C		
Tightness	1×10^{-9} mbar l/s		

[1] 30 … 60 VDC with serial resistor (R_V = 4.7 kΩ, installation → 🗎 14)

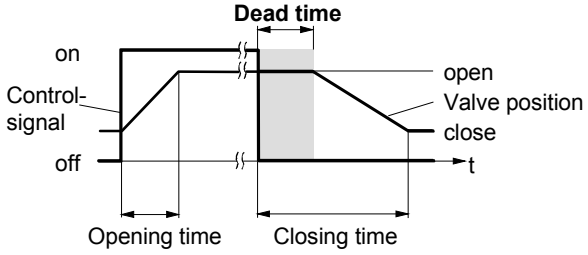
[2] Corresponds to the control voltage

[3] Must be protected with a quick-acting 100 mA fuse provided by the end-user

[4] Cycles without expendable parts (seals) and under clean operating conditions

[5] Ambient temperature

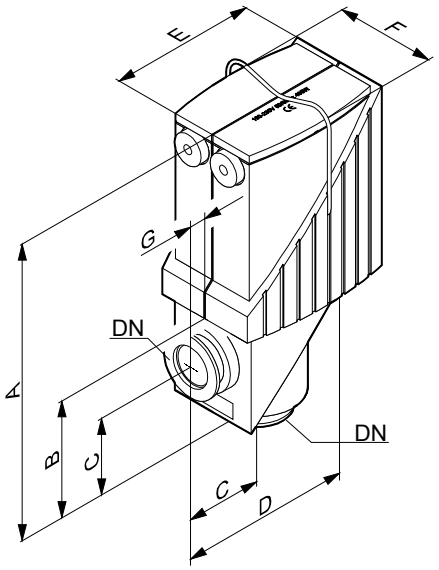
[6]



Connection flange	DN 16 ISO-KF	DN 25 ISO-KF	DN 40 ISO-KF
Conductance [7]	4 l/s	16 l/s	40 l/s
Materials			
housing	aluminum (3.2374) or stainless steel (1.4301)		
inside section	1.4301 and 1.4541		
seals			
287 65-67	FPM		
288 65-67	FPM		
288 68	EPDM		
shell	PAGV 30		
Weight			
aluminum housing	1.3 kg	2.2 kg	4 kg
stainless steel housing	1.5 kg	2.9 kg	5.4 kg

[7] For air with molecular flow

Dimensions in mm



DN	A	B	C	D	E	F	G
DN 16 ISO–KF	160	58	40	96	84.5	59	7.5
DN 25 ISO–KF	194	76	50	111	96.5	75	10
DN 40 ISO–KF	230	98	65	138	119.5	96	13.5

4 Installation

4.1 Vacuum Connection

Skilled personnel

The vacuum connection may only be established by persons who have suitable technical training and the necessary experience or who have been instructed by the end-user of the product.

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: 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: dirt sensitive area

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

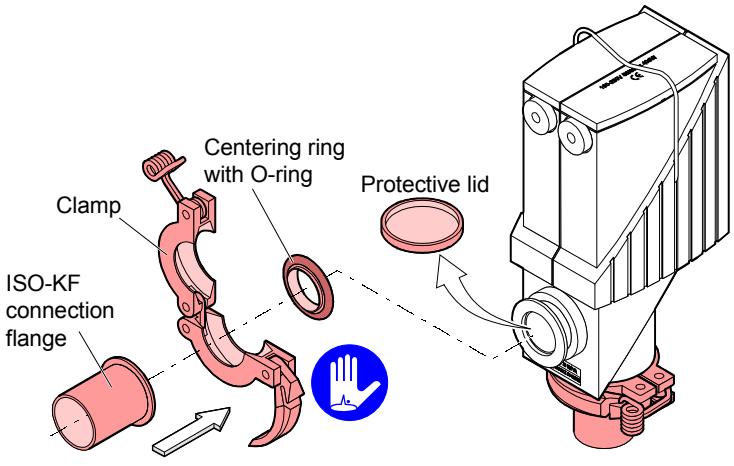
Always wear clean, lint-free gloves and use clean tools when working in this area.

Keep the protective lids.

Procedure

Remove the protective lids and install the valve to the vacuum system by means of the small flange fittings.

Any installation angle and flow direction may be chosen.



4.2 Electrical Connection

Skilled personnel

The electrical connection, in accordance with the VDE 0100 guidelines, may be made only by a licensed electrician, qualified as per VDE 0105. The line cables shall be isolated from the line supply during all electrical work.

DANGER

Caution: mains voltage

Products that are not professionally connected to ground can be hazardous in the event of a malfunction.

Connect the product according to the local regulations and ground it correctly.

Caution

Caution: electrostatic fields

If the valve is installed in the vicinity of switched or electronically controlled heavy electric loads, such as furnaces, heaters, motors or RF generators, disturbances may occur.

Install a mains filter in the supply line of the valve.

Caution

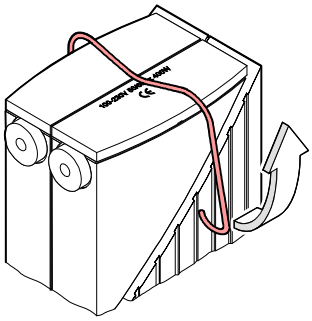
Caution: high voltage tests

The valve is factory tested according to the DIN EN 60 204 standard. Additional high voltage tests may destroy the valve.

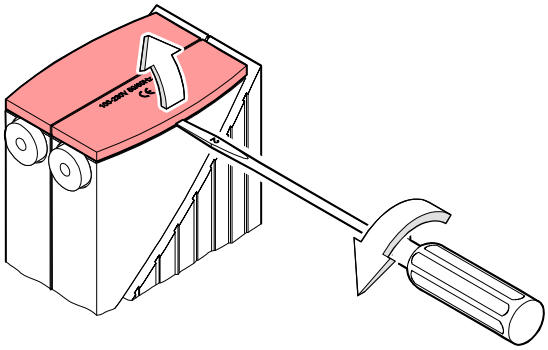
Do not carry out any further high voltage tests.

4.2.1 Removing the Cover

❶ Remove the clamp.

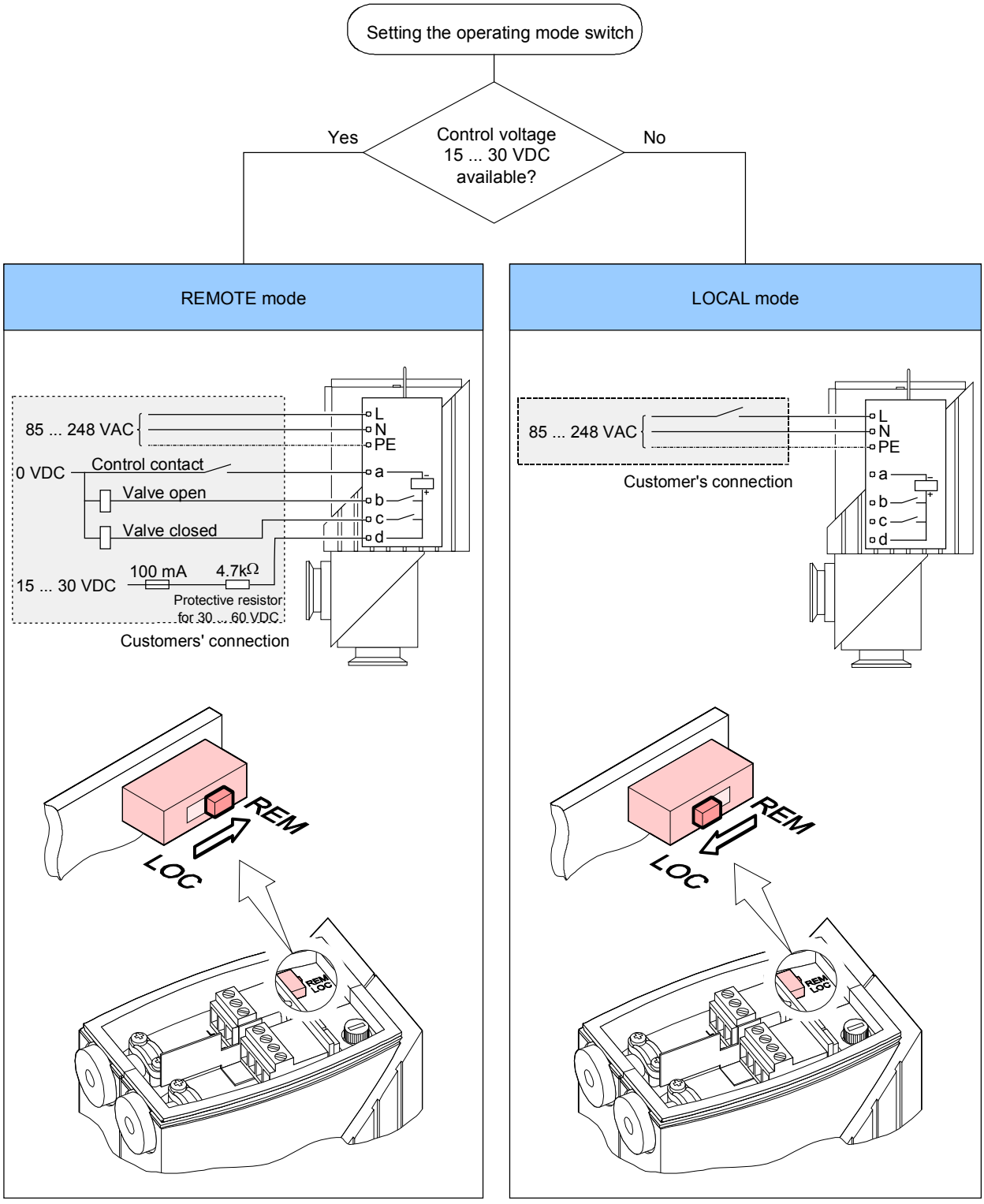


❷ Remove the cover.



4.2.2 Setting the Operating Mode Selection Switch

The operating mode must be selected before the electrical connection is established. If a 15 … 30 VDC control voltage is available, choose REMOTE.



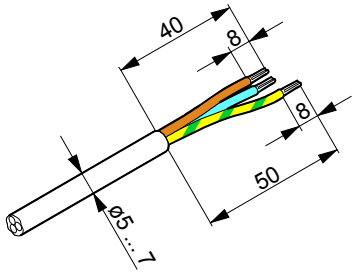
4.2.3 Connecting the Feeder Line

❶ Prepare the feeder line.

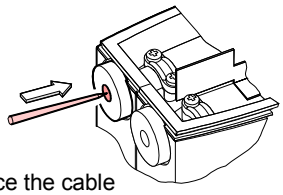
Caution

The cable must meet the following specifications:

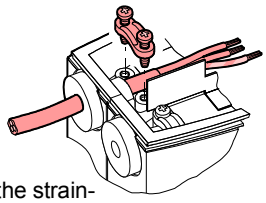
- flexible
- conductor cross-section 1 mm^2
- 3-pole with protective conductor (P+N+PE)
- 5 … 7 mm diameter
  (for the cable feedthrough to meet the IP 54 specifications)



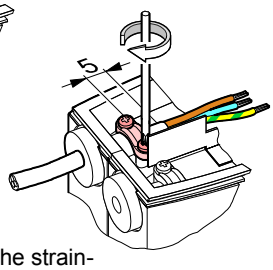
❷ Connect the feeder line.



Pierce the cable feedthrough.

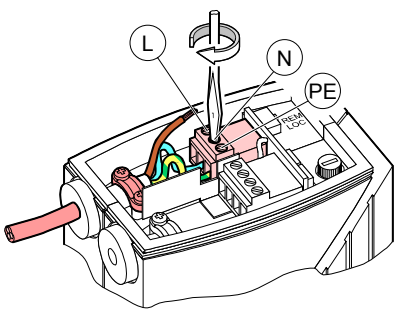


Loosen the strain-relief clamp and introduce the cable.



Fasten the strain-relief clamp.

❸ Connect the conductors.



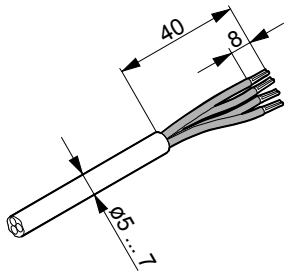
4.2.4 Connecting the Control Cable (for REMOTE Mode Only)

❶ Prepare the control cable.

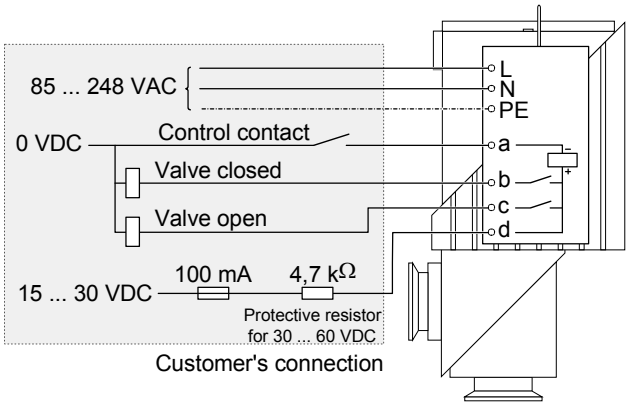
Caution

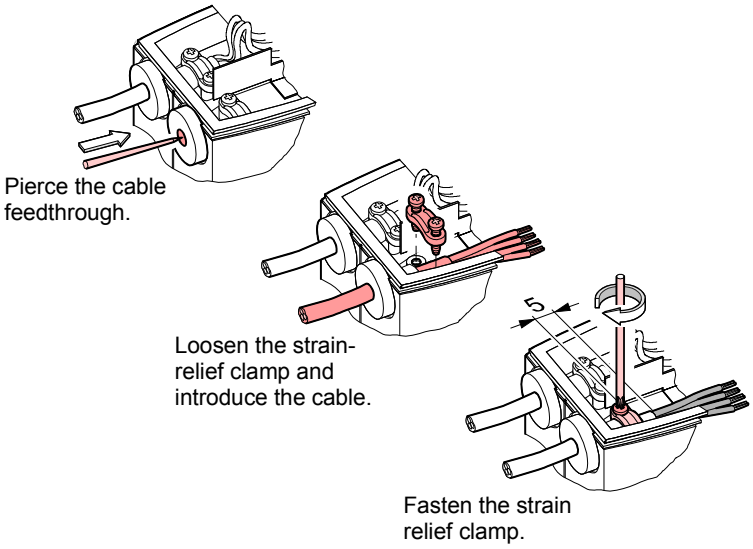
The cable must meet the following specifications:

- flexible, 4 poles
- conductor cross-section 0.75 mm^2
- 5 … 7 mm diameter
  (for the cable feedthrough to meet the IP 54 specifications)

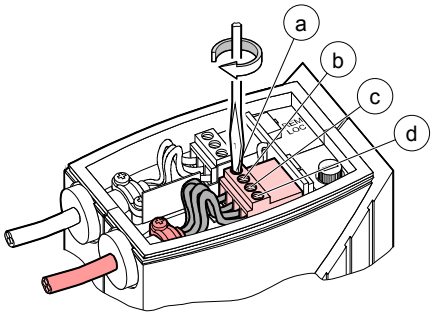


❷ Connect the control cable.





❸ Connect the conductors.

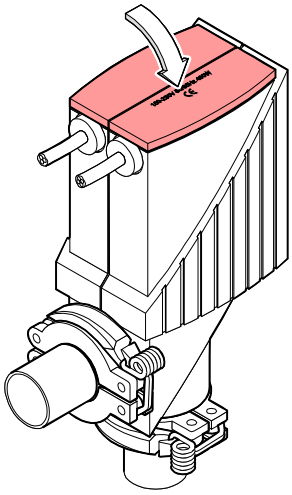


4.2.5 Mounting the Cover

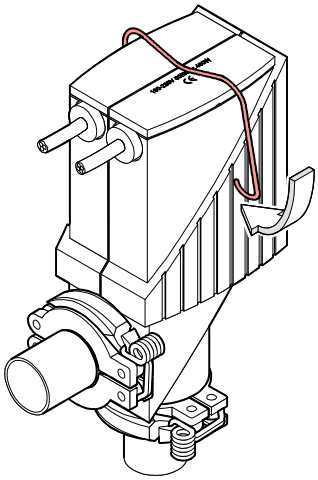
❶ Mount the cover.

Caution

Be careful not to squeeze any cable leads.



❷ Mount the clamp again.



5 Operation

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

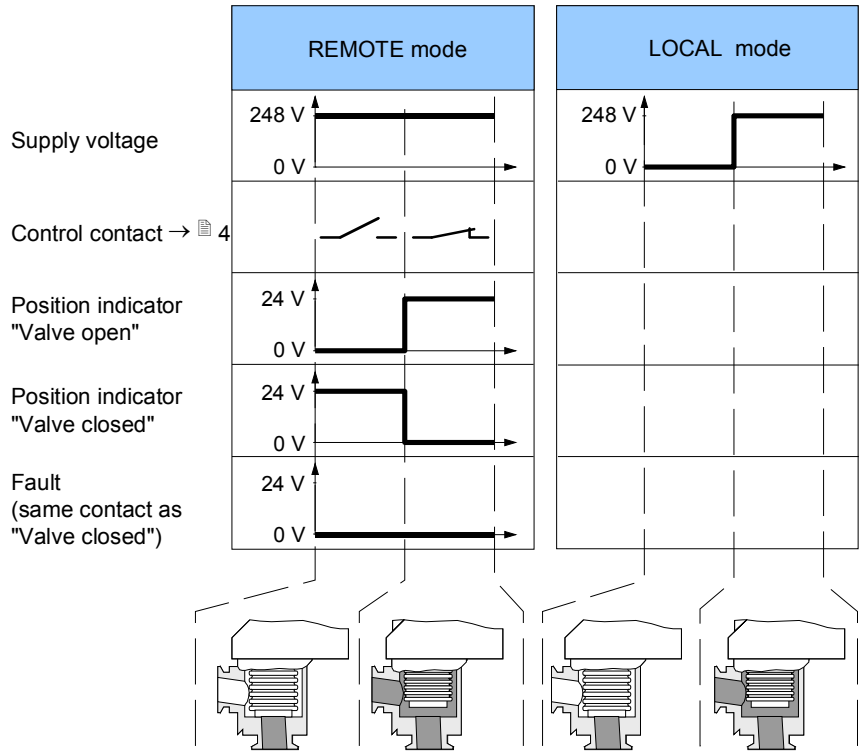
DANGER

Caution: bursting pressure

Overpressures >3 bar (e.g. in the event of an explosion) can cause the inside section and housing to burst. This could result in injuries caused by catapulted parts and health damages due to leaking process gases.

Protect the entire vacuum system against overpressures >3 bar.

5.1 Signaling Behavior



5.2 Indication of Positions and Faults

	REMOTE mode	LOCAL mode
Valve closed	red LED lit	both LEDs dark
Valve opening	both LEDs dark	red LED lights up briefly
Valve open	green LED lit	green LED lit
Fault	red LED flashing	red LED flashing

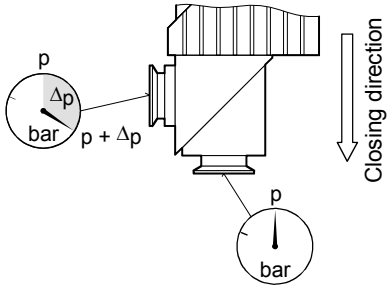
Pressure range

1×10^{-8} mbar … 1.3 bar (absolute)

Pressure difference Δp in closing direction

Caution

Caution: pressure difference Δp



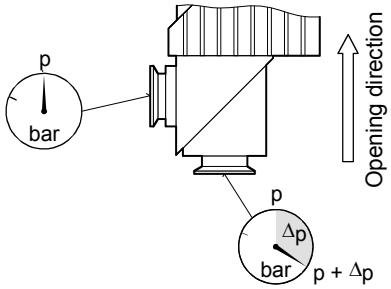
At Δp >1.3 bar the valve may no longer be tight.

Avoid pressure differences Δp >1.3 bar.

Pressure difference Δp in opening direction

Caution

Caution: pressure difference Δp



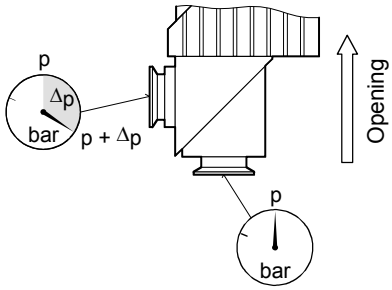
At Δp >1.3 bar the valve is opened.

Avoid pressure differences Δp >1.3 bar.

Opening against a pressure difference Δp

Caution

Caution: pressure difference Δp



At Δp >1.3 bar the valve cannot open.

Avoid pressure differences Δp >1.3 bar.

6 Deinstallation

6.1 Electrical Connection

Skilled personnel

The electrical connection, in accordance with the VDE 0100 guidelines, may be made only by a licensed electrician, qualified as per VDE 0105. The line cables shall be isolated from the line supply during all electrical work.

DANGER

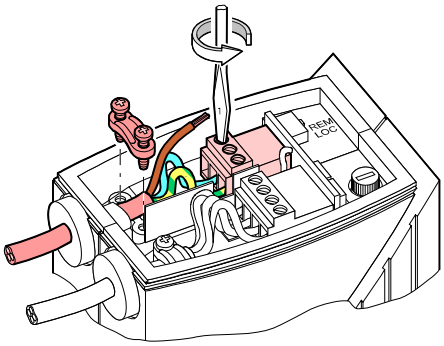
Caution: mains voltage

Touching live parts is hazardous.

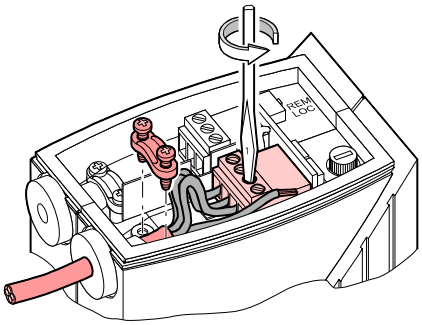
Switch all mains and control voltage sources off and secure them against inadvertent power-on before performing any electrical work on the product.

Procedure

1. Remove the cover (→ 🗎 11).
2. Disconnect the feeder line.



3. Disconnect the control cable (for REMOTE mode only).



4. Mount the cover (→ 🗎 15).

6.2 Vacuum Connection

Skilled personnel

The vacuum connection may only be disassembled by persons who have suitable technical training and the necessary experience or who have been instructed by the end-user of the product.

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

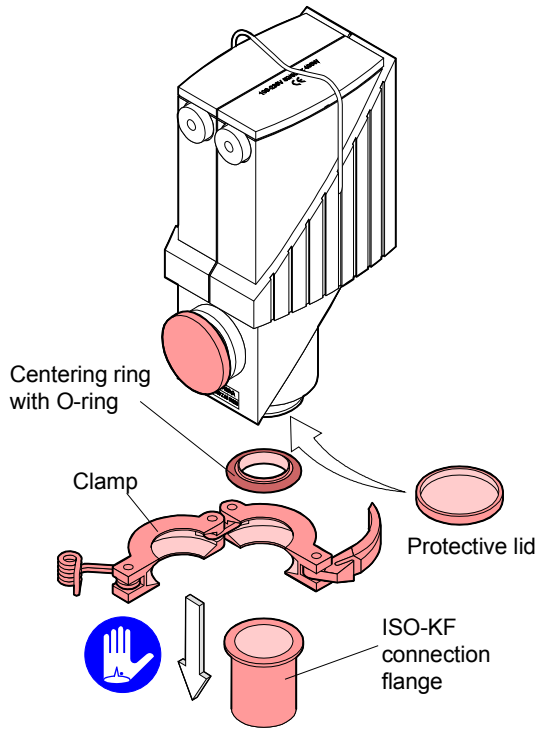
Caution: dirt sensitive area

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

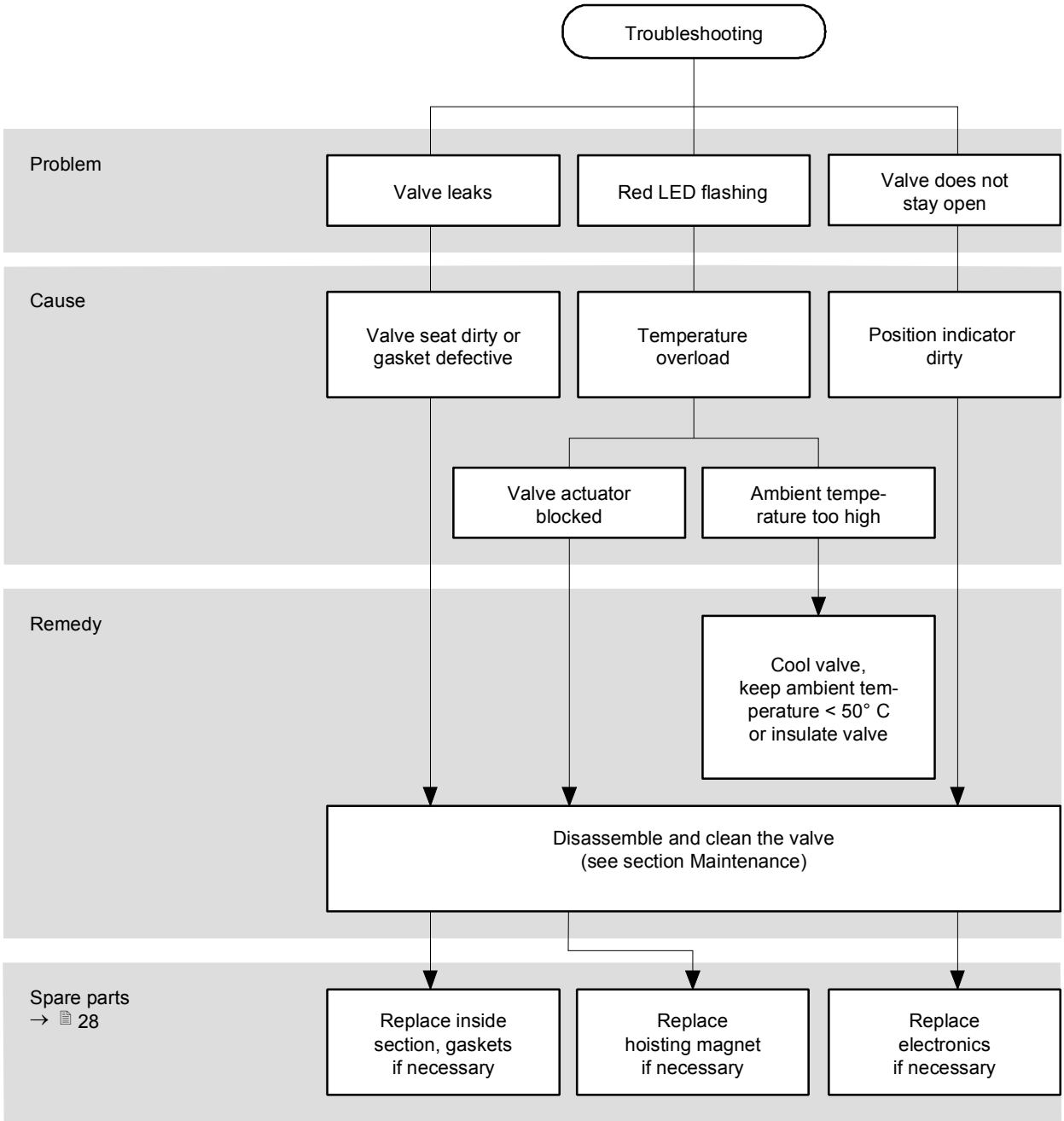
Always wear clean, lint-free gloves and use clean tools when working in this area.

Procedure

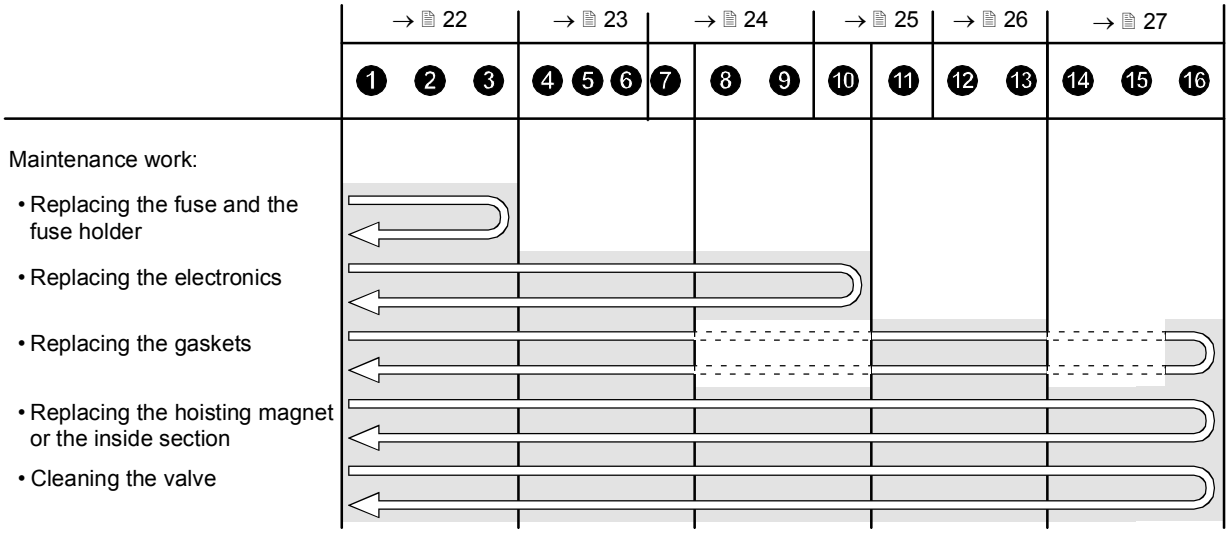
Vent the vacuum system and disassemble the small flange connection. Place the protective lids.



7 Troubleshooting



8 Maintenance



Under clean operating conditions, the product requires no maintenance during the rated cycle life.

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.

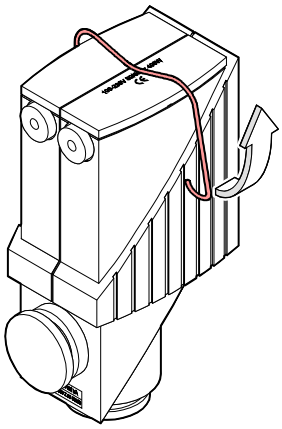
Always wear clean, lint-free gloves and use clean tools when working in this area.

Preconditions

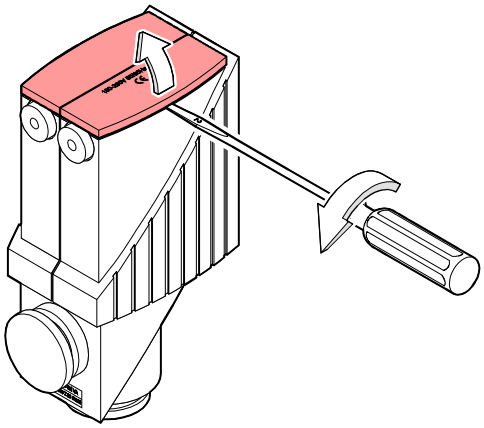
Angle valve removed from the vacuum system (→ 18).

Removing the cover

❶ Remove the clamp.

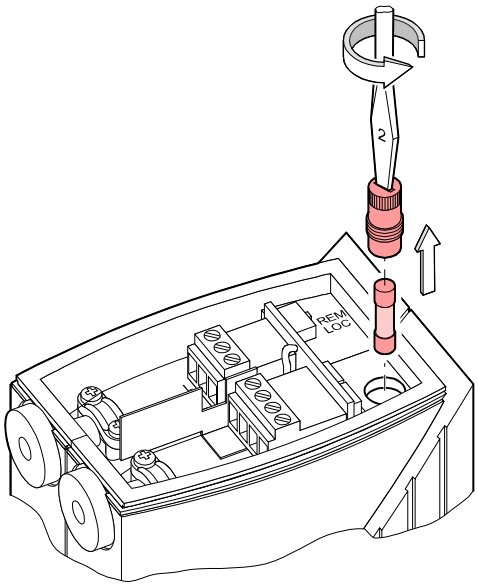


❷ Remove the cover.



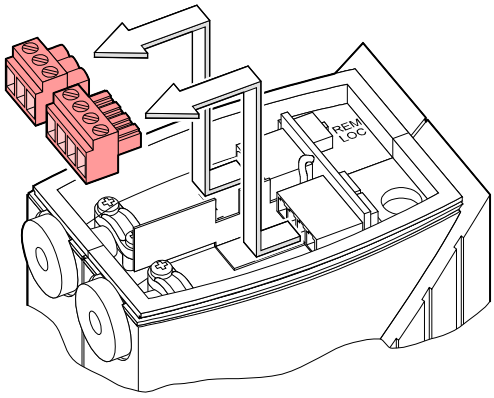
Removing the fuse holder together with the fuse

❸ Remove the fuse holder together with the fuse.

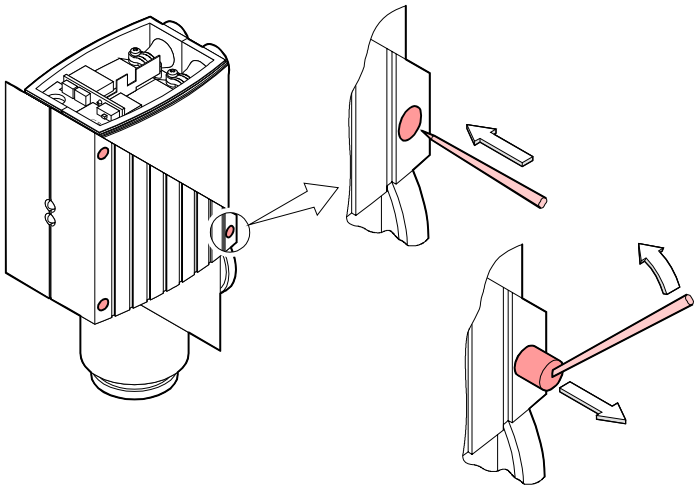


Removing the shell

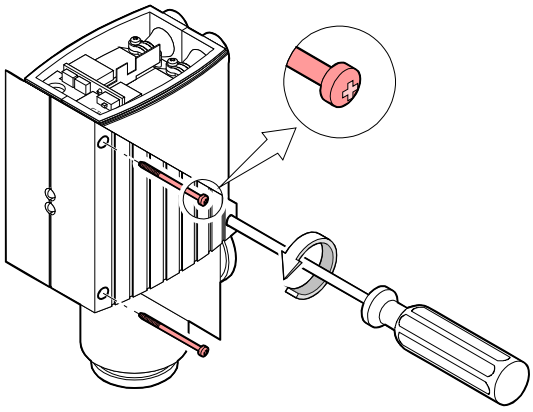
❹ Remove the connectors.



❺ Pierce the stopper with a pointed tool and pull it out.



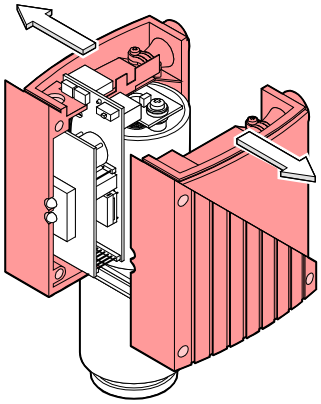
❻ Loosen and remove the shell screws.



❼ Remove the shell parts.

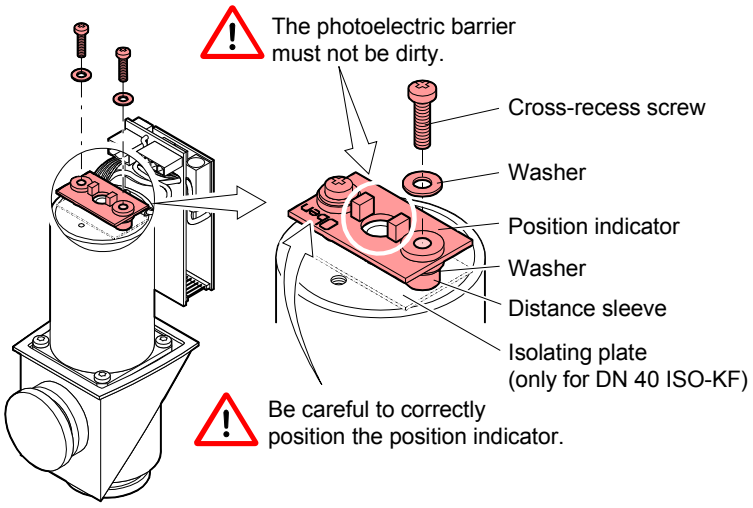
Caution

When reassembling the product: insert the electronics in the guide notch of the shell parts, be careful not to squeeze any cables.

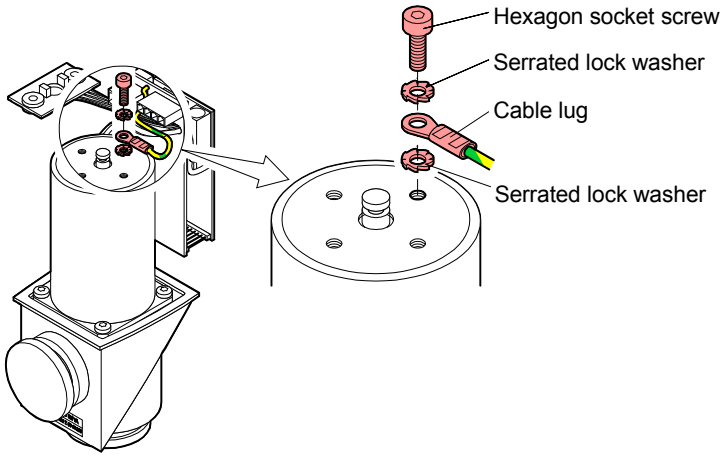


Disassembling the electronics

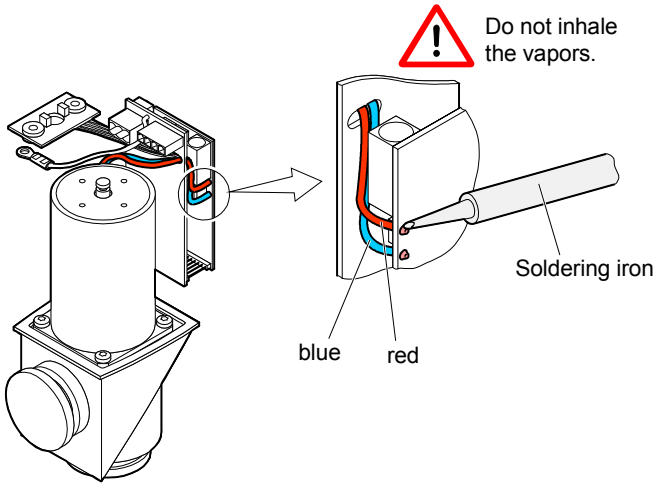
❽ Unscrew the position indicator.



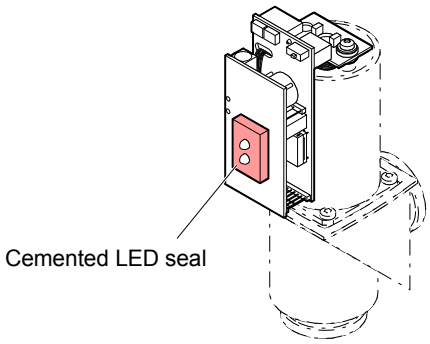
❾ Detach the the protective conductor (PE).



❿ Unsolder the red and the blue wire of the electronics.



⓫ Check the LED seal and replace it as required.



Removing the hoisting magnet together with the inside section

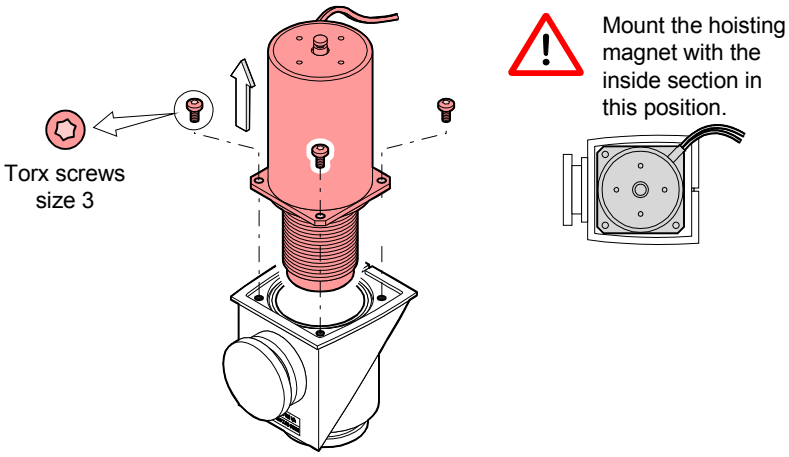
⓬ Remove the hoisting magnet together with the inside section.

DANGER

Caution: prestressed spring
Spring forces: DN 16 =35 N
DN 25 =60 N
DN 40 =105 N

Uncontrolled releasing of the spring can cause injuries.

When loosening the Torx screws, counterhold the hoisting magnet.

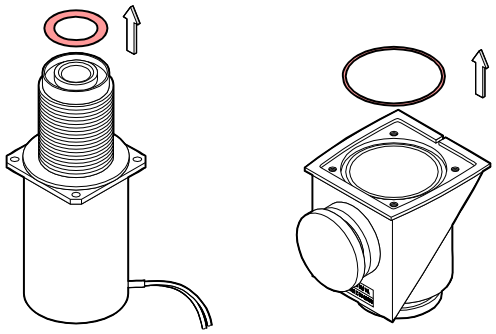


Removing the seals

⓭ Remove the seals from the hoisting magnet with the inside section as well as from the housing.

Caution

When reassembling the product: be careful to insert the O-rings level into the grooves without twisting them.

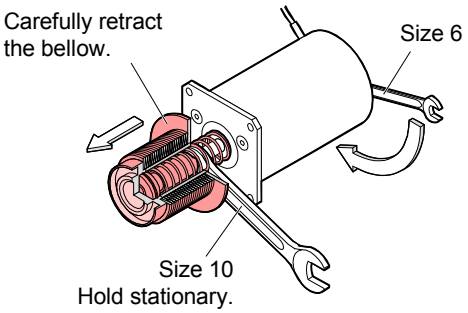


Separate the hoisting magnet from the inside section

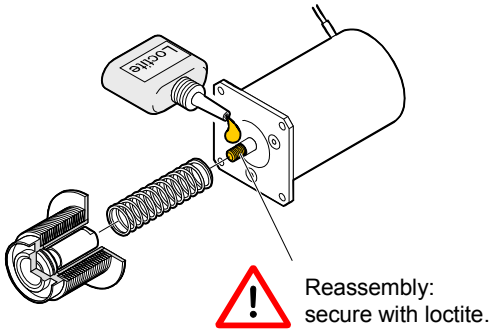
⓮ Loosen the inside section.

Caution

Since the inside section is secured with Loctite 241, it is difficult to loosen it.



⓯ Remove the inside section and the spring.



⓰ Clean the parts.

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 (→ 🗎 9).

- Carefully clean the parts with a grease solving, non-scouring cleaner.
- After cleaning the parts should preferably be rinsed with alcohol and subsequently heated to ≈50° C in an oven or with an industrial blower.
- Carefully clean the sealing surfaces with a lint-free cloth soaked with alcohol. Allow them to dry.
- Wipe the seals with a lint-free cloth slightly moistened with vacuum oil.

⓱ Proceed in reverse order to reassemble the product.

9 Spare Parts

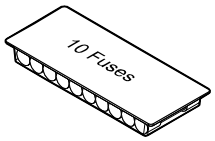
When ordering spare parts, always indicate:

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

Mounting the spare parts

→ 🗎 21.

Fuses



Ordering numbers

DN 16 ISO-KF: 288 83 (ø5 × 20, 2 A, super slow)
DN 25 ISO-KF: 288 83 (ø5 × 20, 2 A, super slow)
DN 40 ISO-KF: 288 84 (ø5 × 20, 2,5 A, super slow)

Fuses holder

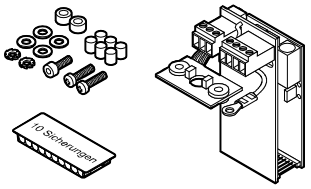


Ordering numbers

DN 16 ISO-KF: 288 74
DN 25 ISO-KF: 288 74
DN 40 ISO-KF: 288 74

Electronics

comprising electronics with position indicator, 10 fuses, distance sleeves, washers, serrated lock washers, screws, 6 stoppers



Ordering numbers

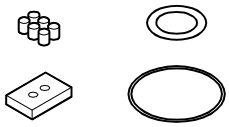
DN 16 ISO-KF: 288 94
DN 25 ISO-KF: 288 95
DN 40 ISO-KF: 288 96



Isolating plate
(only for DN 40 ISO-KF)

Gasket kit

comprising 2 gaskets, LED seal, 6 stoppers

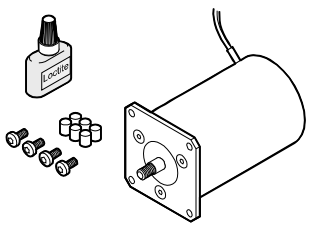


Ordering numbers

DN 16 ISO-KF: 289 75
DN 25 ISO-KF: 289 76
DN 40 ISO-KF: 289 77

Hoisting magnet

comprising hoisting magnet, screws, Loctite 241, 6 stoppers

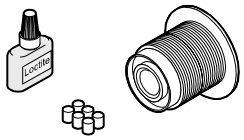


Ordering numbers

DN 16 ISO-KF: 288 97
DN 25 ISO-KF: 288 98
DN 40 ISO-KF: 288 99

Bellows assembly

comprising bellows complete, (without spring), Loctite 241, 6 stoppers



Ordering numbers

DN 16 ISO-KF: 288 88
DN 25 ISO-KF: 288 89
DN 40 ISO-KF: 288 90

10 Returning the Product



WARNING

Caution: forwarding contaminated products

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

Products returned to Leybold Vakuum should preferably be free of harmful substances. Adhere to the forwarding regulations of all involved countries and forwarding companies and enclose a duly 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.

11 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 ❑
caustic	no ❑ 1)	yes ❑
biological hazard	no ❑	yes ❑ 2)
explosive	no ❑	yes ❑ 2)
radioactive	no ❑	yes ❑ 2)
other harmful substances	no ❑ 1)	yes ❑



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

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	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 _____

Date and legally binding signature

_____

Company stamp

This form can be downloaded from our website.

Copies:
Original for addresee - 1 copy for accompanying documents - 1 copy for file of sender

Original: German GA 06.422/2.01 (0201)

ga06. 422/ 2. 02

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