

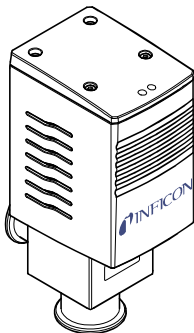
## Angle Valve

electromagnetically actuated with automatic voltage  
adaptation 90 ... 264 V

VAM016-A/X

VAM025-A/X

VAM040-A/X

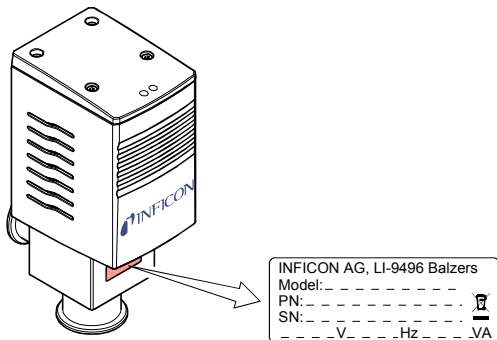


**Operating Manual**

Incl. Declaration of Incorporation

## Product Identification

In all communications with INFICON, please specify the information given on the product nameplate. For convenient reference copy that information into the space provided below.



## Validity

This document applies to products with the following part numbers:

253-500	(DN 16 ISO-KF, aluminum housing)
253-501	(DN 16 ISO-KF, stainless steel housing)
253-502	(DN 25 ISO-KF, aluminum housing)
253-503	(DN 25 ISO-KF, stainless steel housing)
253-504	(DN 40 ISO-KF, aluminum housing)
253-505	(DN 40 ISO-KF, stainless steel housing)

The part number (PN) 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 vacuum connection DN 40 ISO-KF. They apply to valves with other vacuum connections by analogy.

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

All dimensions in mm.

## 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.


## Scope of Delivery

- 1× valve
- 1× connector, 3-pin
- 1× connector, 4-pin
- 1× Operating Manual German
- 1× Operating Manual English

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For cross-references within this document, the symbol (→  XY) is used.

# 1 Description

## 1.1 Operating modes

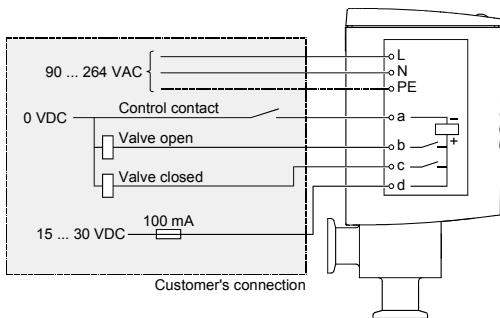
The angle valve has two operating modes:

- REMOTE mode  
Drive via control voltage 15 ... 30 VDC.
- LOCAL mode  
Drive via supply voltage 90 ... 264 VAC.

The operating mode is selected by setting a switch (→  18).

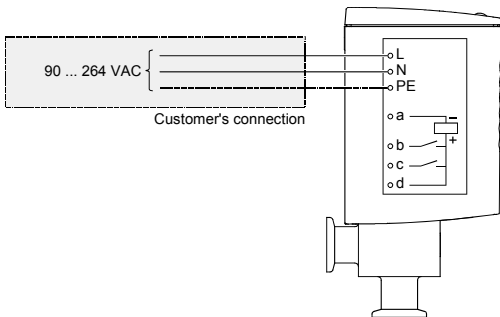
### REMOTE mode

In the REMOTE mode, the supply voltage of 90 ... 264 VAC is constantly fed. The angle valve is opened and closed via the control contact (0 VDC).



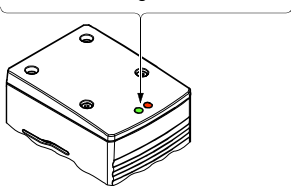
## LOCAL mode

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



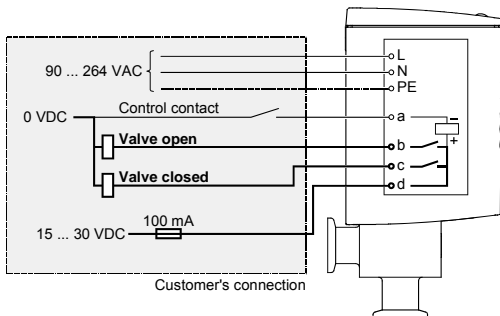
## 1.2 Indication of Positions and Faults

- Green LED lit = valve open
- Red LED lit = valve closed
- Red LED flashing = fault



### 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.



Notice


### 2.2 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.

## 2.3 General Safety Instructions

- Adhere to the applicable regulations and take the necessary precautions for the process media used.  
Consider possible reactions with the product materials (→  11).
- 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.

## 2.4 Liability and Warranty

INFICON assumes no liability and the warranty becomes null and void if the 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 not listed in the product documentation.

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

Failures due to contamination or wear and tear, as well as expendable parts (e.g. seals), are not covered by the warranty.

### 3 Technical Data

Vacuum connection	DN 16 ISO-KF	DN 25 ISO-KF	DN 40 ISO-KF
Actuation	opening: electromagnetically closing: by pressure spring		
Supply voltage <sup>1)</sup>	90 ... 264 VAC		
Frequency	47 ... 63 Hz		
Power consumption	400 W (max. upon switching on)		
Pickup-/Holding power	405 / 8.1 W	416 / 8.3 W	367 / 7.5 W
Control voltage	15 ... 30 VDC		
Power consumption	1.5 ... 5 mA		
Position indicator			
Switching voltage <sup>2)</sup>	15 ... 30 VDC		
Switching current <sup>3)</sup>	100 mA		
Cable diameter			
Feeder line	5 ... 7 mm		
Control cable	5 ... 7 mm		
Mounting orientation <sup>4)</sup>	any		
Flow direction	any		
Cycle life <sup>5)</sup>	2 million		
Switching frequency			
at 40 °C <sup>6)</sup>	30 / min		
at 50 °C <sup>6)</sup>	20 / min		

<sup>1)</sup> The feeder line must be fuse-protected with  $\leq 16$  A.

<sup>2)</sup> Corresponds to the control voltage.

<sup>3)</sup> Must be protected with a quick-acting 100 mA fuse provided by the end-user.

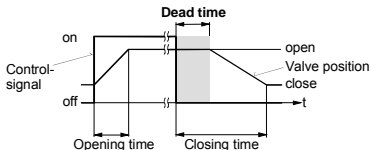
<sup>4)</sup> Recommended mounting orientation: valve seat toward vacuum chamber.

<sup>5)</sup> Cycles without expendable parts (seals) and under clean operating conditions.

If the valve is operated under harsh or dirty conditions, it should be cleaned / maintained before the specified service time to maintenance has been reached.

Vacuum connection	DN 16 ISO-KF	DN 25 ISO-KF	DN 40 ISO-KF
Opening time	100 ms	120 ms	230 ms
Closing time	220 ms	220 ms	650 ms
Dead time <sup>7)</sup>	40 ms	140 ms	450 ms
Tightness	1×10 <sup>-9</sup> mbar l/s		
Bursting pressure	3 bar (overpressure)		
Operating pressure	1×10 <sup>-8</sup> mbar ... 1.3 bar (absolute)		
Pressure difference $\Delta p$ in closing direction	1.3 bar		
in opening direction	1.3 bar		
Opens to a pressure difference $\Delta p$	1.3 bar		
Conductance <sup>8)</sup>	4 l/s	13 l/s	35 l/s
Ambient temperature	0 ... 50 °C		
Degree of protection	IP 54		
Materials			
Housing			
Aluminum	EN-AW 6060		
Stainless steel	1.4301		
Inside section	stainless steel		
Seals	FPM		
Shell	ABS, Lexan		
Weight			
Aluminum	1.1 kg	1.9 kg	4.3 kg
Stainless steel	1.2 kg	2.0 kg	4.4 kg

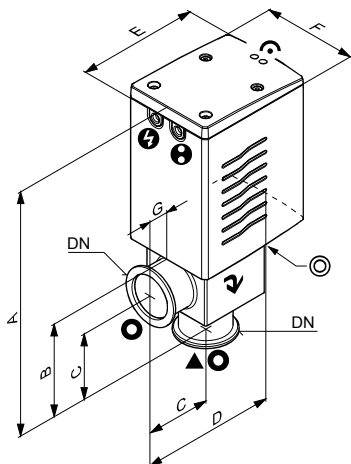
<sup>6)</sup> Ambient temperature.



<sup>7)</sup>

<sup>8)</sup> For air with molecular flow

## Dimensions [mm]




- |  |                               |  |                 |
|--|-------------------------------|--|-----------------|
|  | Visual position indicator     |  | Flow direction  |
|  | Leak detection opening        |  | Valve seat site |
|  | Electrical connection         |  | Protective lid  |
|  | Position indicator connection |  |                 |


Aluminum-housing	DN	A	B	C	D	E	F	G
	DN 16 ISO-KF	170.9	51.4	40	96	86	59	10
	DN 25 ISO-KF	193	64.9	50	112.7	97.3	70	15.4
	DN 40 ISO-KF	246	92.9	65	139	119.5	90	19.5
Stainless steel-housing	DN	A	B	C	D	E	F	G
	DN 16 ISO-KF	172.9	53.4	40	96	86	59	10
	DN 25 ISO-KF	196.4	68.3	50	112.7	97.3	70	15.4
	DN 40 ISO-KF	249	95.9	65	139	119.5	90	19.5

## 4 Installation

### 4.1 Vacuum Connection




**DANGER**




**DANGER:** 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**

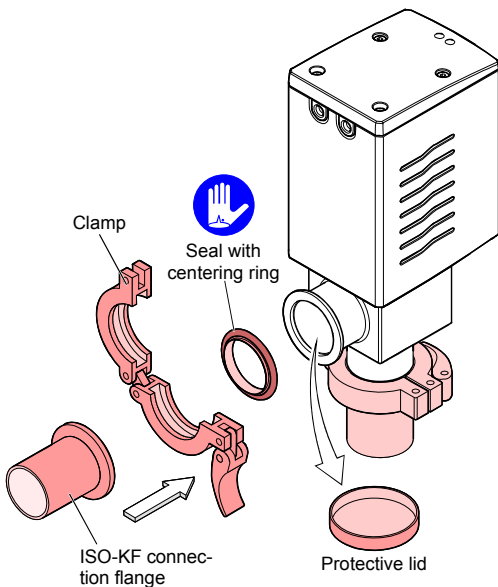


**Caution:** dirt sensitive area

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


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

Remove the protective lids and connect the product to the vacuum system.




Keep the protective lids.

## 4.2 Power Connection




**DANGER**




**DANGER: 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**

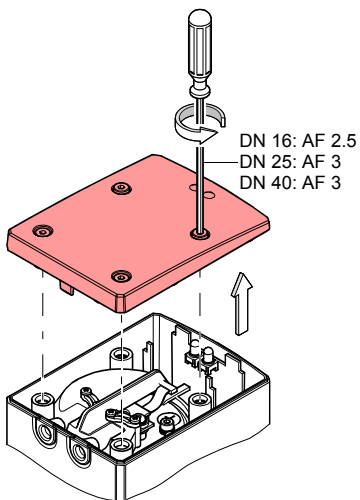


**Caution: high voltage tests**

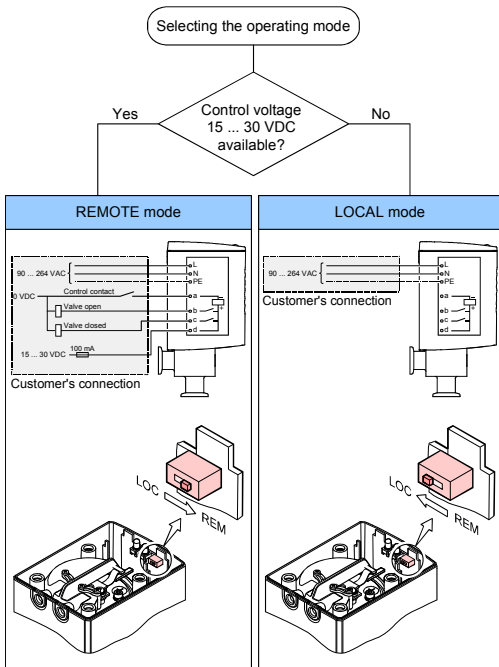
The valve is factory tested according to the EN 60 204 standard. Additional high voltage tests may destroy the valve.

Do not carry out any further high voltage tests.

- 1 Unscrew the hexagon socket head screws and remove the cover.




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



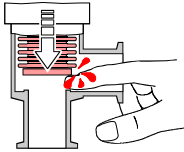
- 3** Prepare the connector for the feeder line, mount the cable tie ...

STOP
DANGER




**DANGER: moving parts**

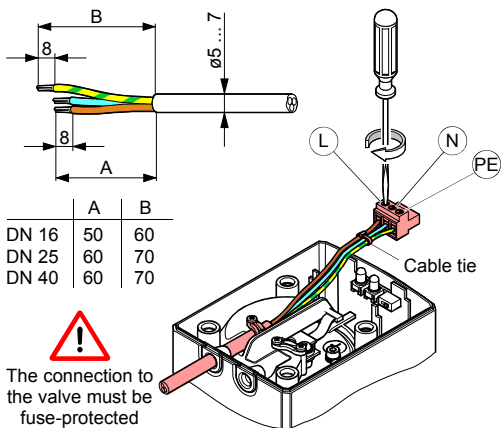
When the product is connected to the supply media, parts can start moving. Moving parts can catch parts of the body and cause injuries.




The connection to the power supply may only be established if

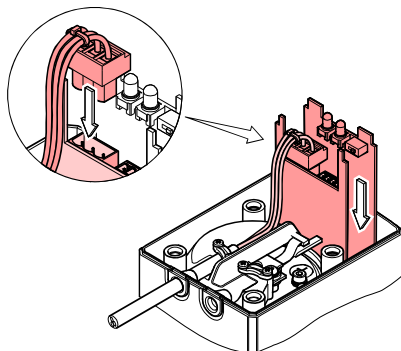
- the power supply is de-energized
- the product is installed in a vacuum system or
- the moving parts are protected to avoid accidental contact.

-  The cable must meet the following specifications:
- flexible
  - conductor cross-section  $\leq 1 \text{ mm}^2$
  - appropriate for 230 V basic insulation
  - 3-pin protective conductor (P+N+PE)
  - 5 ... 7 mm diameter  
(for the cable feedthroughs to meet the IP 54 specifications)




 The connection to the valve must be fuse-protected with  $\leq 16$  A.


... and plug in the connector.



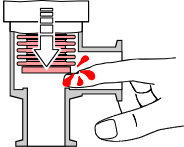
- 4 Prepare the connector for the control cable (for REMOTE mode only), mount the cable tie ...



**DANGER**



**DANGER: moving parts**  
 When the product is connected to the supply media, parts can start moving. Moving parts can catch parts of the body and cause injuries.



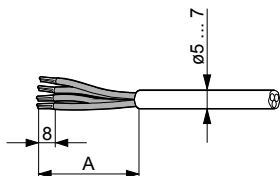
The connection to the control cable may only be established if

- the power supply/ control cable is de-energized
- the product is installed in a vacuum system or
- the moving parts are protected to avoid accidental contact.

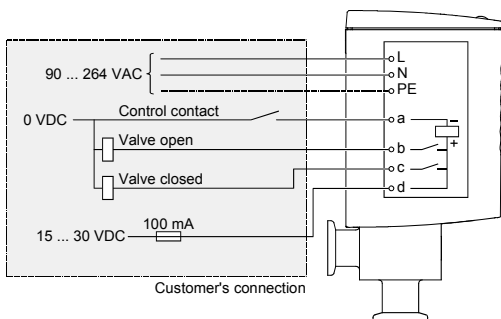


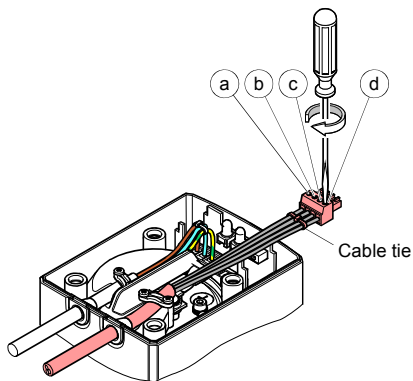
The cable must meet the following specifications:

- flexible
- conductor cross-section  $<0.75 \text{ mm}^2$
- appropriate for 230 V basic insulation
- 4-pin protective conductor
- 5 ... 7 mm diameter  
(for the cable feedthroughs to meet the IP 54 specifications)

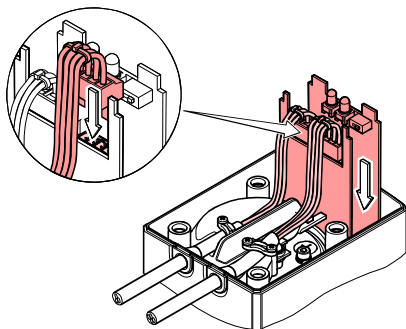


	A
DN 16	50
DN 25	60
DN 40	60

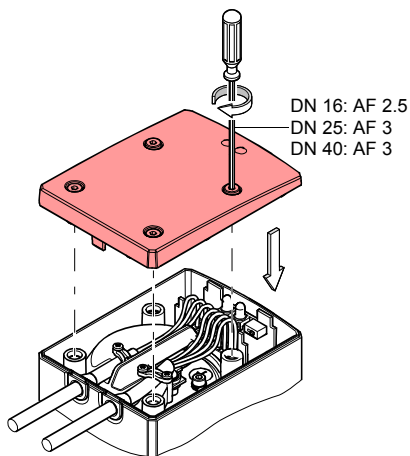




... and plug in the connector.











**5** Mount the cover.



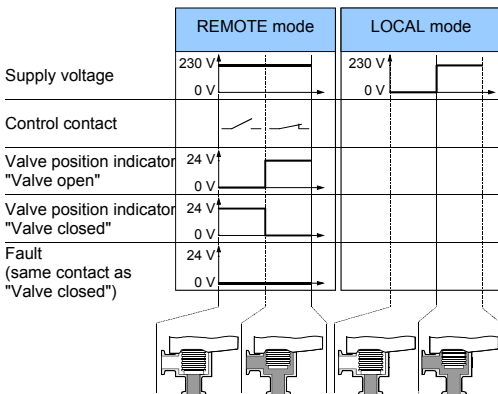
## 5 Operation

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

### 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

### Signaling behavior




## 6 Deinstallation


### Precondition

- Vacuum system vented.

### 6.1 Power Connection

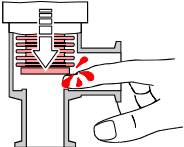


**DANGER**



**DANGER: moving parts**

When the product is disconnected from the supply media, parts can start moving. Moving parts can catch parts of the body and cause injuries.



The product may only be disconnected from the power supply if


- the product is installed in a vacuum system or
- the moving parts are protected to avoid accidental contact.

 **DANGER**

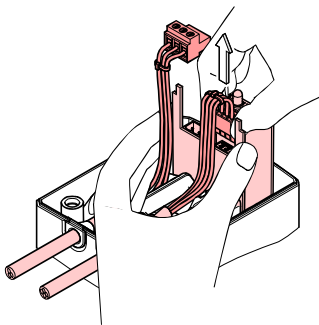


**DANGER:** mains voltage  
Touching live parts is hazardous.

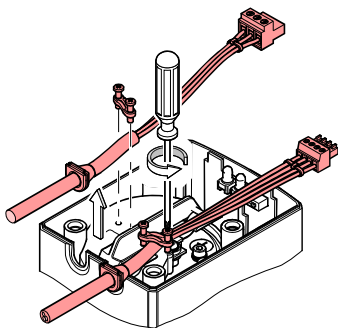
Switch all mains and control voltage sources off and secure them against inadvertent power-on before performing any electrical work on the product.

**1** Remove the cover (→  17).

**2** Disconnect the feeder line.




- 3** Deinstall the strain relief.




- 4** Mount the cover (→ 24).


## 6.2 Vacuum Connection




**DANGER**




**DANGER: 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.

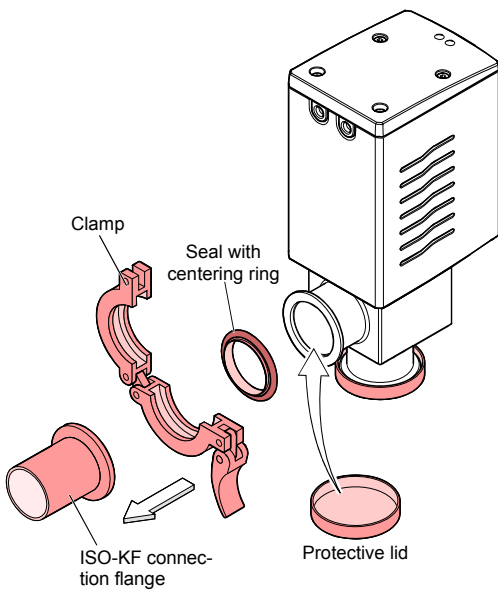


**Caution**



**Caution: dirt sensitive area**  
 Touching the product or parts thereof with bare hands increases the desorption rate.  
 Always wear clean, lint-free gloves and use clean tools when working in this area.

Remove the valve from the vacuum system and install the protective lids.



## 7 Maintenance / Repair



Failures due to contamination or wear and tear, as well as expendable parts (e.g. seals), are not covered by the warranty.

### DANGER



**DANGER:** 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 bare hands increases the desorption rate.

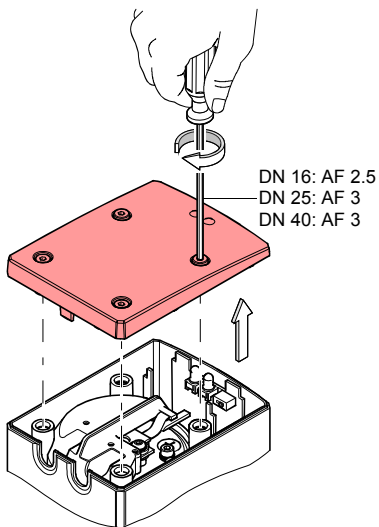
Always wear clean, lint-free gloves and use clean tools when working in this area.

## 7.1 Replacing/Cleaning the O-rings and Bellows

### Precondition

- The valve has been deinstalled (Deinstallation → 26)

- 1 Remove the cap screws and the cover.



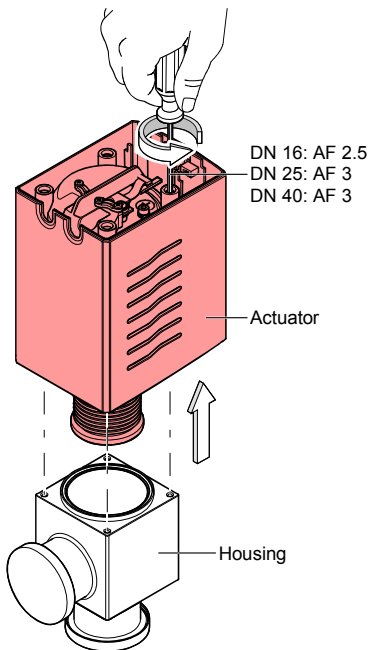
- 2** Remove the cap screws and the actuator from the housing.



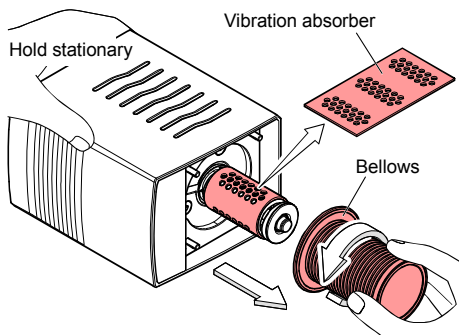
The actuator can be rotated by 90°.



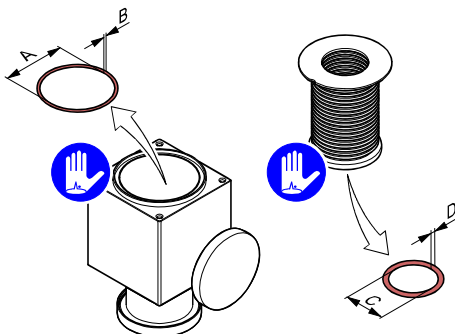
When reinstalling the actuator tighten the cap screws evenly and crosswise.



- 3** Unscrew the bellows (Spare Parts → 41).






- 4** Remove the seals (Spare Parts → 41).



O-Ring, FPM	$\varnothing A \times B$	$\varnothing C \times D$
DN 16 ISO-KF	$\varnothing 28.3 \times 1.78$	$\varnothing 17.04 \times 3.53$
DN 25 ISO-KF	$\varnothing 37.82 \times 1.78$	$\varnothing 24.99 \times 3.53$
DN 40 ISO-KF	$\varnothing 56.87 \times 1.78$	$\varnothing 40.87 \times 3.53$

- 5 Remove the protective lids and clean the parts.

	 <b>DANGER</b>
	<p><b>DANGER: cleaning agents</b></p> <p>Cleaning agents can be detrimental to health and environment.</p> <p>Adhere to the relevant regulations and take the necessary precautions when handling and disposing of cleaning agents. Consider possible reactions with the product materials (→  11).</p>

#### Procedure

- 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  $\approx 50^{\circ}$  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.
- 

- 6 Proceed in reverse order to reassemble the product.



Be careful to insert the O-rings level into the grooves without twisting them.

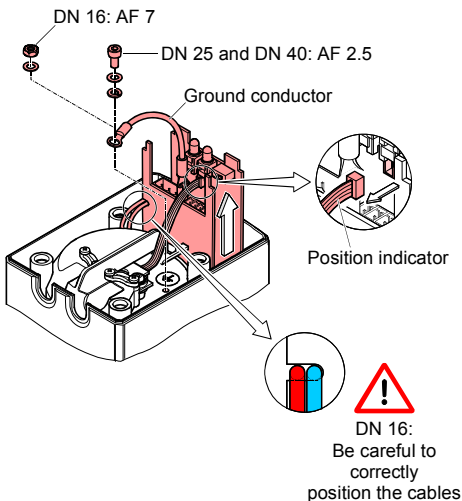
After reassembly, a few switching cycles should be performed in order for the O-rings to perfectly adapt to the sealing surfaces. Take the necessary precautions for this procedure.

## 7.2 Replacing the Electronics and the Stroke Solenoid

### Preconditions

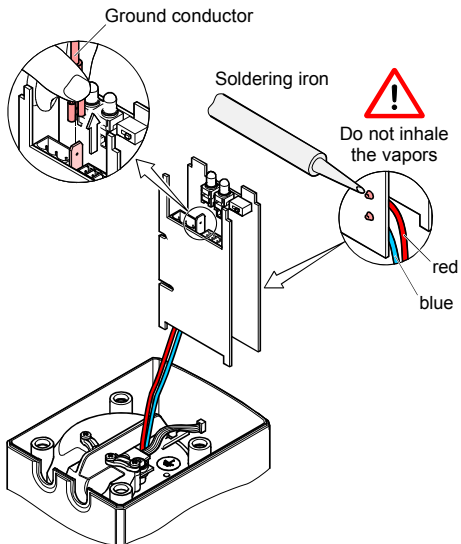
- Valve deinstalled (→ 26)
- Actuator removed from the housing (→ 32, ❶ und ❷)

- ❶ Remove the ground conductor and the position indicator.

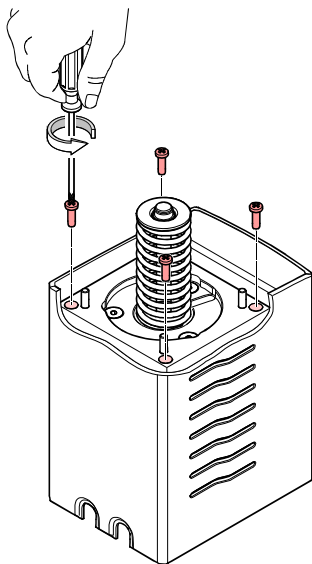


DN 40: Electronic circuit soldered acc. to the solder instruction.

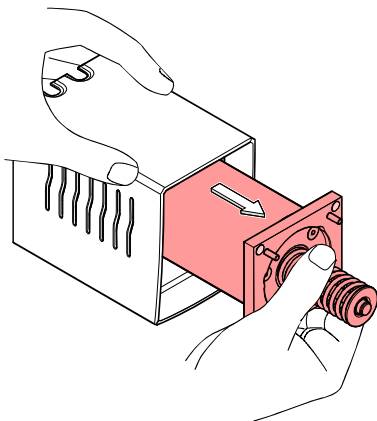
- 2** Remove the ground conductor, unsolder the red and the blue wire of the electronics (Spare Parts → 41).



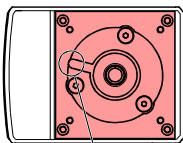
**3** Unscrew the screws ...



... and remove the stroke solenoid (Spare Parts → 41).

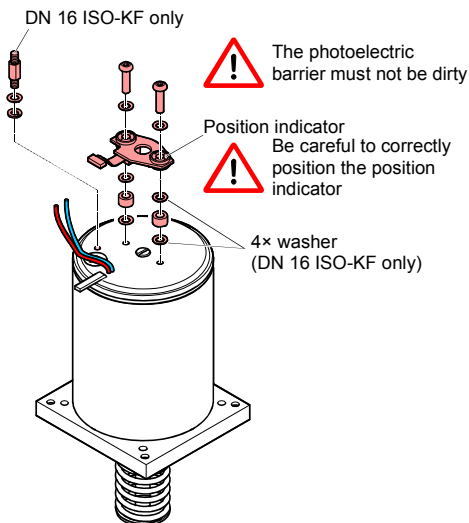


Mount the stroke solenoid in this position



Leak detection opening


- 4** Remove the position indicator.



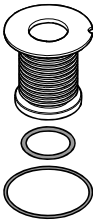
- 5** Proceed in reverse order to reassemble the electronics and the stroke solenoid.

## 8 Spare Parts

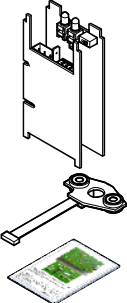
### Seal kit

	Ordering No.	
	DN 16 ISO-KF, comprising 1 O-ring, FPM75, $\varnothing 17.04 \times 3.53$ 1 O-ring, FPM75, $\varnothing 28.3 \times 1.78$	299-001
	DN 25 ISO-KF, comprising 1 O-ring, FPM75, $\varnothing 24.99 \times 3.53$ 1 O-ring, FPM75, $\varnothing 37.82 \times 1.78$	299-006
	DN 40 ISO-KF, comprising 1 O-ring, FPM75, $\varnothing 40.87 \times 3.53$ 1 O-ring, FPM75, $\varnothing 56.87 \times 1.78$	299-011

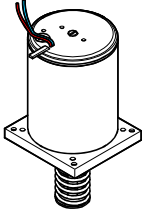
### Bellows cpl.

	Ordering No.	
	DN 16 ISO-KF, comprising 1 bellows 1 O-ring, FPM75, $\varnothing 17.04 \times 3.53$ 1 O-ring, FPM75, $\varnothing 28.3 \times 1.78$	299-002
	DN 25 ISO-KF, comprising 1 bellows 1 O-ring, FPM75, $\varnothing 24.99 \times 3.53$ 1 O-ring, FPM75, $\varnothing 37.82 \times 1.78$	299-007
	DN 40 ISO-KF, comprising 1 bellows 1 O-ring, FPM75, $\varnothing 40.87 \times 3.53$ 1 O-ring, FPM75, $\varnothing 56.87 \times 1.78$	299-012

### Electronics cpl.

		Ordering number
	Comprising 1 electronics 1 position indicator 1 soldering instruction	299-016

### Stroke solenoid cpl.

		Ordering number
	DN 16 ISO-KF 1 stroke solenoid with compression spring	299-017
	DN 25 ISO-KF 1 stroke solenoid with compression spring	299-018
	DN 40 ISO-KF 1 stroke solenoid with compression spring	299-019

## 9 Returning the Product



### WARNING



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

Products returned to INFICON 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.

## 10 Disposal

### DANGER



**DANGER:** 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.

### WARNING



**WARNING:** substances detrimental to the environment

Products or parts thereof (mechanical and electric components, operating fluids etc.) can be detrimental to the environment.

Dispose of such substances in accordance with the relevant local regulations.

### 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 Incorporation

as defined by the Directive relating to machinery 2006/42/EC, Appendix IIB

We, INFICON, hereby declare that the partly completed machinery mentioned below

- must not be put into operation until evidence is given that the final machinery into which that partly completed machinery shall be installed is in conformity with the provisions of the EC Directive relating to machinery
- fulfill the appropriate essential requirements in accordance with Annex I of the EC Directive relating to machinery
- comply with the provisions of the Directive relating to electromagnetic compatibility 2004/108/EC.

We also declare that the relevant technical documentation is compiled in accordance with part B of Annex VII and that the relevant technical documentation will be transmitted in response to a reasonable request by the national authorities in printed form or in electronic form (pdf).

### Products

Angle & Inline Valves

VAM016-A/X, VAM025-A/X, VAM040-A/X

### Standards

Harmonized and international/national standards and specifications:

- EN ISO 12100-1:2003 (Safety of machinery)
- EN ISO 12100-1:2003/A1:2009 (Safety of machinery)
- EN ISO 12100-2:2003 (Safety of machinery)
- EN ISO 12100-2:2003/A1:2009 (Safety of machinery)
- EN ISO 13857:2008 Safety distances to prevent hazard zones being reached by upper and lower limbs
- EN 61000-3-2:2006 (EMC: Limits for harmonic current emissions)
- EN 61000-6-2:2005 (EMC: generic immunity standard)

- EN 61000-6-3:2007 (EMC: generic emission standard)
- EN 61010-1:2001 (Safety requirements for electrical equipment for measurement, control and laboratory use)

### **Authorized representative for documentation**

INFICON AG, Director Technology, Alte Landstrasse 6,  
LI-9496 Balzers

### **Manufacturer / signatures**

INFICON AG, Alte Landstrasse 6, LI-9496 Balzers

17 March 2010



Dr. Urs Wälchli  
Managing Director

17 March 2010



Marco Kern  
Product Manager

## Notes

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