

O P E R A T I N G M A N U A L

Incl. Declaration of Conformity

sina75e1

VAP250-X

Part Number
250 - 800

Right Angle Valves with Electropneumatic Actuator



Contents

	Page
1 Description of the Valve	3
1.1 Application	3
1.2 General	3
1.3 Design and Function	3
1.4 Supplied Equipment	3
1.5 Technical Data	4
1.6 Accessories	7
2 Description of the Pilot Valves	9
2.1 Pilot Valves and Solenoid Coils	9
2.2 Selection of the Solenoid Coils	9
2.3 Technical Data of the Solenoid Coils	10
3 Installation Preparations	11
3.1 Compressed Air Supply	11
3.2 Fitting the Solenoid Coil	11
3.3 Compressed Air Connection	12
3.4 Opening and Closing the Valve Manually ...	12
3.5 Electrical Connection	14
3.6 Notes Concerning Operation	16
3.7 Operating Temperatures/ Degassing Temperatures	16
3.8 Operation	16
4 Maintenance	17
4.1 Right Angle Valve	17
4.2 Pilot Valve	17
4.3 Service	18
4.4 Disposal	18
EC Manufacturer's Declaration	19
Declaration of Contamination	20

Service

If equipment is returned indicate whether the equipment is free of substances damaging to health or whether it is contaminated.

If it is contaminated also indicate the nature of the hazard. INFICON must return any equipment without a "Declaration of Contamination" to the sender's address.



We strongly recommend that you read these Operating Instructions with care so as to ensure optimum operation of the equipment right from the start.

Warning Indicates procedures that must be strictly observed to prevent hazards to persons.



Caution Indicates procedures that must strictly be observed to prevent damage to, or destruction of the equipment.

Figures

The references to figures, e.g. (1/2) consist of the Fig. No. and the Item No. in that order.

We reserve the right to modify the design and the specified data. The illustrations are not binding.

1 Description of the Valve

1.1 Application

The ISO-K valve DN 250 is an isolating valve for pipes used in vacuum systems.

The valve is of the bellows-sealed type.

Depending on the vacuum pressure during a process, bellows-sealed valves are designed for pressures down to $1 \cdot 10^{-9}$ mbar.

Caution When planning to expose the valves to radioactive radiation, please contact us first.

All parts within the valve which come into contact with the medium passing through the valve must be protected against aggressive or corrosive gases and condensate.

Warning Even in the case of explosion-like pressure bursts the max. permissible operating pressure must not be exceeded. The entire system must be protected against explosions and detonations in a professional manner.



1.2 General

The DN 250 ISO-K valve is a right angle valve having ISO-K flanges of a nominal diameter of 250 mm and pneumatic actuation.

The double-action piston (2/5) transfers the occurring forces and thus the resulting motion via the piston rod (2/7) to the valve disc (2/9).

The pneumatic actuator of the piston is controlled by a 5/2-way pilot valve (2/4).

The pilot valves are described in Section 2. The required solenoid coils for the different supply voltages must also be selected on the basis of the information provided in this Section.

For vibration sensitive processes the upper limit stop of the valve piston and the lower limit stop of the valve plate at its seat is considerably dampened by elastic components.

1.3 Design and Function

The operation of this bellows-sealed valve does in no way involve and hydrocarbons since the piston rod is fully sealed off against the atmosphere by the bellows. A borehole (2/1) which is provided on the pneumatic actuator is used to equalise the pressure in the atmospheric section of the bellows and it also serves as a sniffer hole during helium leak testing.

Due to the screwed connections at the valve plate and the casing, the bellows and the entire inner section are easily accessible.

1.4 Supplied Equipment

The following parts are included with every DN 250 valve:

- Right angle valve, complete, with pilot valve, but without solenoid coil
- Casing equipped with protection caps DN 250 ISO-K
- **at bypass 1:**
DN 50 KF with protection caps
- **at bypass 2:**
DN 40 KF with protection caps
- **at bypass 3** (measurement connection):
DN 16 KF with protection caps
- Operating Manual

1.5 Technical Data

ISO-K right angle valve		DN 250 ISO-K
Bellows-sealed		x
Dimensions		see Fig. 1
DN, flange centering diameter		261
h, approx.	mm	650
a	mm	250
a ₁	mm	200
a ₂ , a ₄	mm	208
a ₃	mm	205
h ₁	mm	163
DN ₁ for bypass 1		50 KF
DN ₂ for bypass 2		40 KF
DN ₃ for measurement connection		16 KF
b	mm	69.5
c	mm	218
d	mm	250
e	mm	58
f	mm	363
Stroke	mm	62.5
Stroke/ DN Explanation: e.g. stroke =1/4 DN	mm	1/4
Mains connection	V	Various voltages, see SOLENOID COILS for PILOT VALVES (Chapter 2.2)
Mains fuses	A	3 x 6 A
Connecting cable		3 x 1 mm ² (2 x + protective ground conductor)
Pilot valve		For details see 2.1/2.2
Power consumption	W	DC: 4.5 W AC: hold 6VA / actuation 7,5 VA Standard voltage and explosion hazard protection
Approved area		
Torque for the knurled screw	Nm	min: 1 max: 1.5
Operating factor		100 % operating factor
Protection		IP 65 (DIN 40 050) for standard voltage
Temperature	°C	40
Conductance for molecular flow	l/s	2700
Materials		
Casing / disc		Stainless steel
Drive / compressed air cylinder		Aluminium / cast aluminium
Piston rod / bellows		Stainless steel
Disc / casing seal		FPM
Calve rod seal		FPM
Piston seal		FPM
Compressed air min. / max.	bar	4 / 8
Compressed air silencing		by 2 silencers

ISO-K right angle valve		DN 250 ISO-K
Required compressed air quality		1. dry 2. non-oiled, 3. filtered 4. oiled compressed air; the type of compressed air must be maintained once it has been selected except from dry to 2., 3. and 4.
Auxiliary manual operation		yes, at the pilot valve
Position of the valve when de-energised		closed
Emergency operation of pilot valve		solenoid valve with auxiliary manual operation
Compressed air hose for connection	mm	6x1
Position indicator: visual		Indicating knob on the pneumatic drive
Position indicator: electrical	option	2 end position indicators (non-contact via ring magnet under the piston) connection via plug (Fig. 6/2 and 7/2)
Voltage range AC/DC	V	min: 4.8 - max: 230
Max. load for the end position switches	A	1,5
Cylinder volume / stroke	l	2.1
Installation orientation		any
Actuation times:		
Opening time	s	6
Closing time	s	6
Max. stroke frequency	1·min ⁻¹	3
mtbf*) / number of actuations		1·10 ⁶
Max. degassing temperature	°C	80
Pressure difference at the disc	mbar	1000
Pressure difference when opening	mbar	1000
Leak rate: bellows-sealed casing to atmosphere	mbar·l·s ⁻¹	< 1·10 ⁻⁹
Weight	kg	66
Part number		250 - 800

*) mtbf = meantime between failure \cong service interval

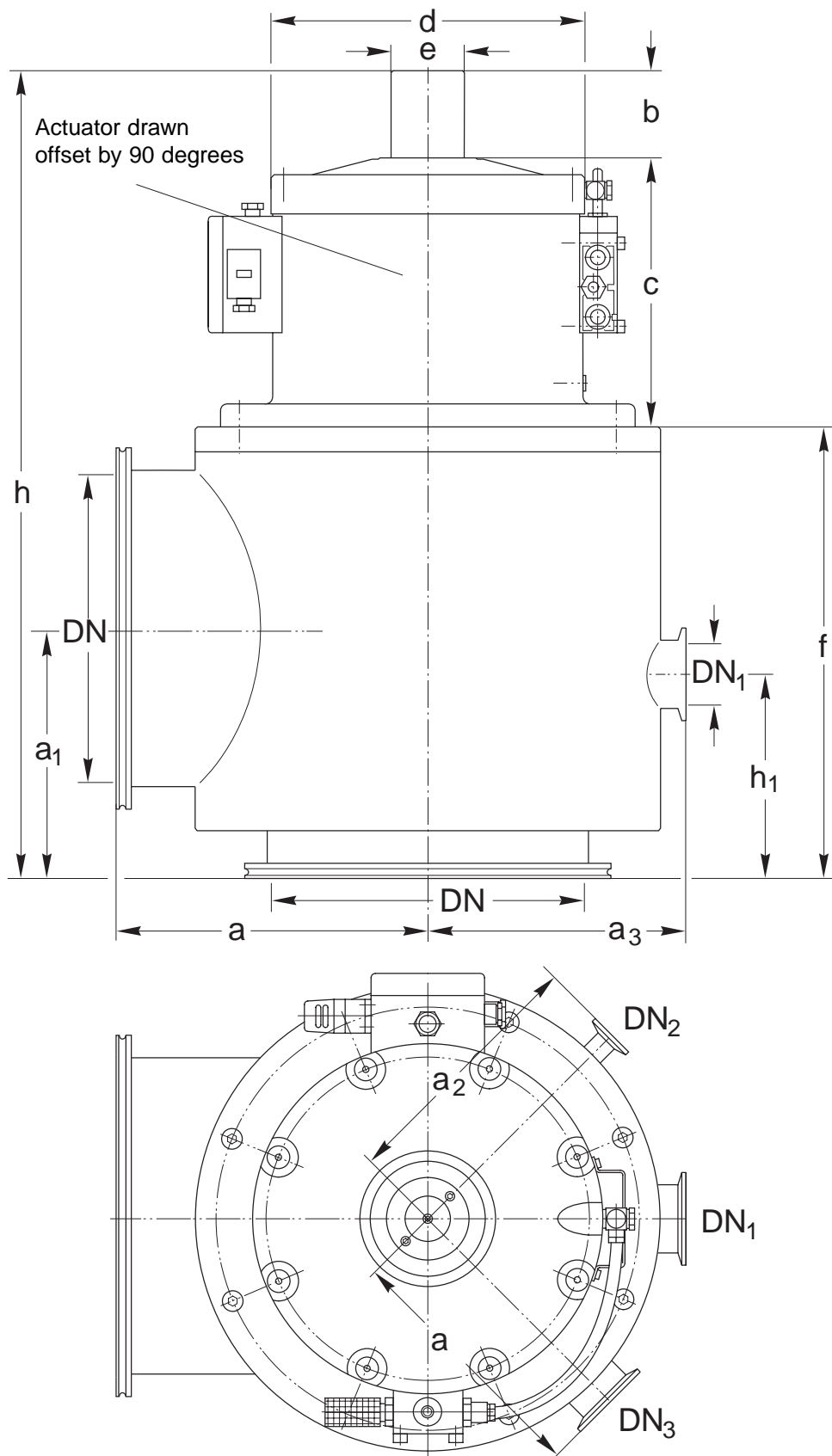
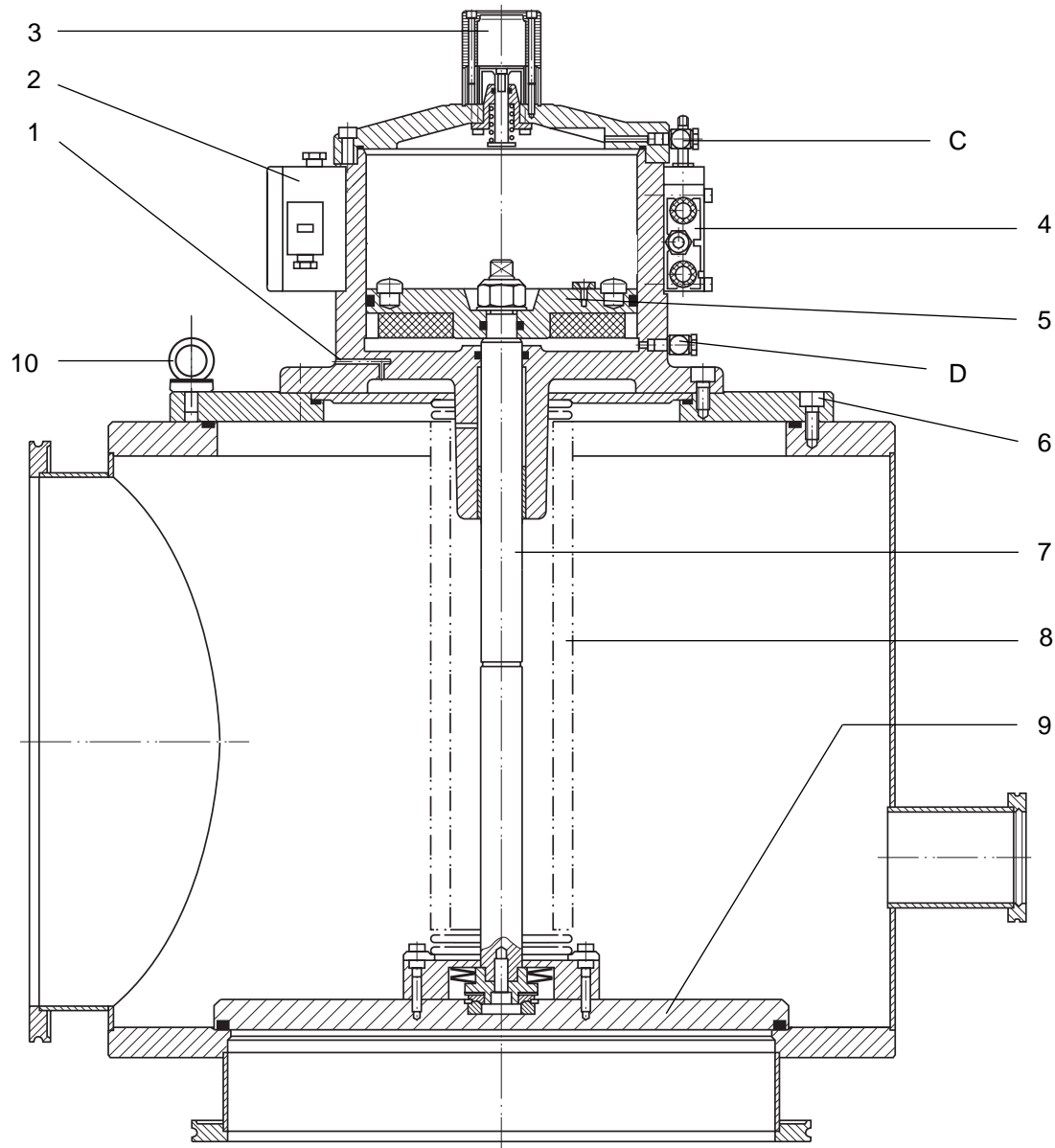


Fig. 1 Dimensional drawing

(for table of dimensions, see Section 1.5)

1.6 Accessories

ISO-K right angle valve			DN 250 ISO-K
Centering ring AL / FPM			212 - 255
Centering ring VA / FPM			212 - 285
Centering ring bypass AL / FPM			
	16	DN	211 - 059
	40	DN	211 - 063
	50	DN	211 - 064
Blank flange			
	16 AL	DN	211 - 177
	40 AL	DN	211 - 179
	50 AL	DN	211 - 180
Clamping screws (4x) galv. M 10x24			212 - 225
Casing seal			239 50 740
Dimensions			265 x 5
Clamping screws (4x) galv. M 16x24			212 - 226
Solenoid coils for pilot valve			see 2.2



Key to Fig. 2

- 1 Borehole for sniffer
 - 2 Electrical supply assy.
 - 3 Optical position indicator
 - 4 Pilot valve
 - 5 Piston
 - 6 Casing screws
 - 7 Piston rod
 - 8 Bellows
 - 9 Valve disc
 - 10 Crane eyes (2, diagonally arranged)
-
- C Compressed air connection "Close"
 - D Compressed air connection "Open"

Fig. 2 Fully assembled right angle valve, bellows-sealed

2 Description of the Pilot Valves

The pilot valves consist of a mechanical control section (4/10) and a solenoid actuator (5/1).

Control section and actuator are connected to each other at tube (4/9) by means of a knurled nut (4/2) and a corrugated washer (4/3).

Right angle valves are supplied with the mechanical section and the tube.

Owing to the selectable solenoid coil this unit can be employed universally in connection with different supply voltages and frequencies.

Each pilot valve is equipped with two silencers (4/13 and 4/15) for the purpose of noise reduction.

Caution The solenoid coil is not included with the right angle valve. The required coil must be ordered separately and must be fitted by the customer.

2.1 Pilot Valves and Solenoid Coils

The solenoid coils can be fitted to the pilot valves without affecting the pneumatic circuit in any way.

The following items are included with each solenoid coil:

- the actual solenoid coil (4/1),
- the knurled nut (4/2),
- the corrugated washer (4/3),
- the connection plug (3/1),
- and the seal (4/8).

2.2 Selection of the Solenoid Coils

The following table provides information on how to select the required solenoid coil for the pilot valves for ISO-K valves DN 250.

Solenoid coil 230 V / AC 50 / 60 Hz	PN 215 - 804
Solenoid coil 110 – 120 V / AC 50 / 60 Hz	PN 215 - 809
Solenoid coil 24 V / AC 50 / 60 Hz	PN 215 - 814
Solenoid coil 24 V DC	PN 215 - 819
Pilot valve without coil (as a spare part)	Ref. No. B 4150 556 EA

2.3 Technical Data of the Solenoid Coils

Design Data	DC	AC
Type	DC solenoid coil	AC solenoid coil
Voltage	24 V DC	24/110/230 V AC 50/60 Hz
Permissible voltage variations	± 10 %	± 10 % at rated frequency
Permissible frequency variations	-	± 10 % at rated frequency
Power consumption at rated voltage	4.5 W at 24 V	Actuation: 7.5 VA Holding: 6 VA
Operating factor	100 %	
Protection to DIN 40 050	IP 65	
Cable connection	Pg 9	
Insulation class to VDE 0580	F	
Protection to VDE 0170/0171	-	
Test mark	VDE	
Ambient temperature	-5 °C to + 40 °C	
Max. operating time	10 ms	
Weight	0.065 kg	0.055 kg
Torque for the knurled screw min./max.	100 Ncm / 150 Ncm	

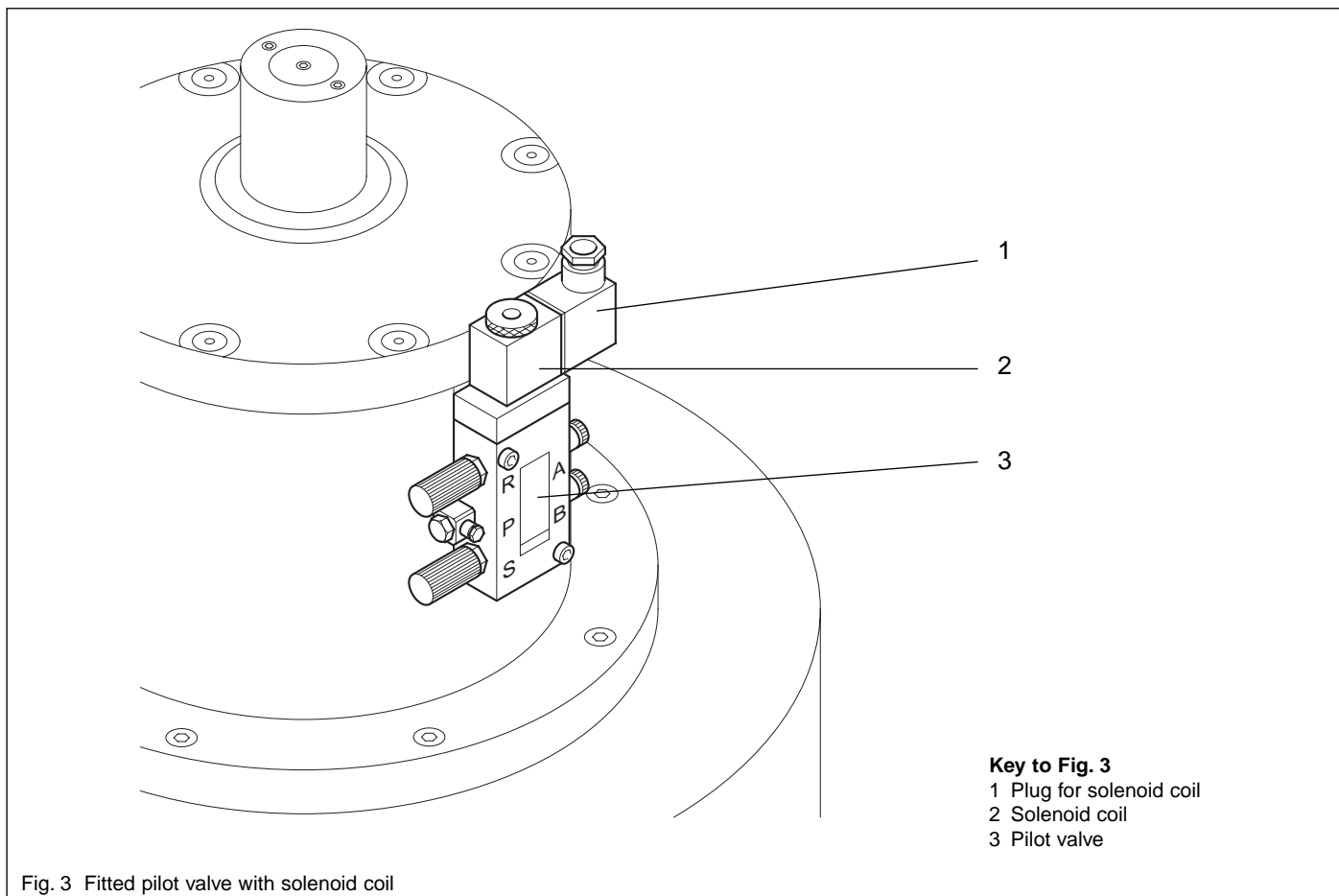


Fig. 3 Fitted pilot valve with solenoid coil

3 Installation Preparations

3.1 Compressed Air Supply

The operating range for the compressed air is 4 to 8 bar.

Warning The hose for the compressed air must be rated for at least 10 bar, and it must be connected in a professional manner.



You must ensure that the max. permissible operating pressure can not be exceeded.

The compressed air may contain traces of oil or it may be dry; if required filter the compressed air.

Caution Once you have decided to use a particular compressed air quality, you should keep to this quality.

You may only change from:

- dry compressed air to non-oiled compressed air,
- dry compressed air to filtered compressed air,
- dry compressed air to oiled compressed air.

Caution You must not change in any other direction.

3.2 Fitting the Solenoid Coil

The solenoid coil (4/1) is fitted to the tube on the pilot valve (4/9) by means of a knurled nut (4/2).

3.2.1 Fitting the Solenoid Coil

The solenoid coil (4/1) is pushed over the tube (4/9) of the pilot valve, the corrugated washer (4/3) is fitted and the knurled nut (4/2) is then tightened manually.

Caution The knurled nut should be tightened to a torque of 100 to 150 Ncm, so that the solenoid coil is still free to turn.
The tube must not be damaged while fitting the coil.

The plug insert (4/7) in the connection plug (4/6) may be turned by 90° if required.

Depending on the available space the solenoid coil (4/1) sitting on the tube may be turned by 360° and fitted.

Push the seal (4/8) over the contacts of the solenoid coil (4/1). The connection plug (3/1) which has already been fitted to the valve is plugged in at the solenoid coil and secured in place with securing screw (4/5).

Caution The plug which is included with the solenoid coil is **not** used when fitting the coil.

INFICON delivers solenoid coils for different voltages (see Section 2.2).

3.3 Compressed Air Connection

For the lines carrying compressed air we recommend the use of plastic pressure lines having an outside diameter of 6 mm and an inside diameter of 4 mm.

The compressed air connections from the pilot valve leading to the right angle valve have already been installed.

Caution The compressed air supply from the customer is connected to connection "P" (4/14) on the pilot valve.

For this connection the union nut of the quick-coupling for compressed air (4/14) is removed and pushed over the compressed air hose. The end of the hose is pushed over the hose nozzle and secured against slipping off by the union nut.

The union nut is only tightened manually.

When applying compressed air to connection "A", the right angle valve opens. When applying compressed air to connection "B", the right angle valve closes.

Warning The compressed air hoses are pressurised at times and they must be protected against damage of any kind.



If required the connections may be leak tested with soap solution when pressurised.

3.4 Opening and Closing the Valve Manually

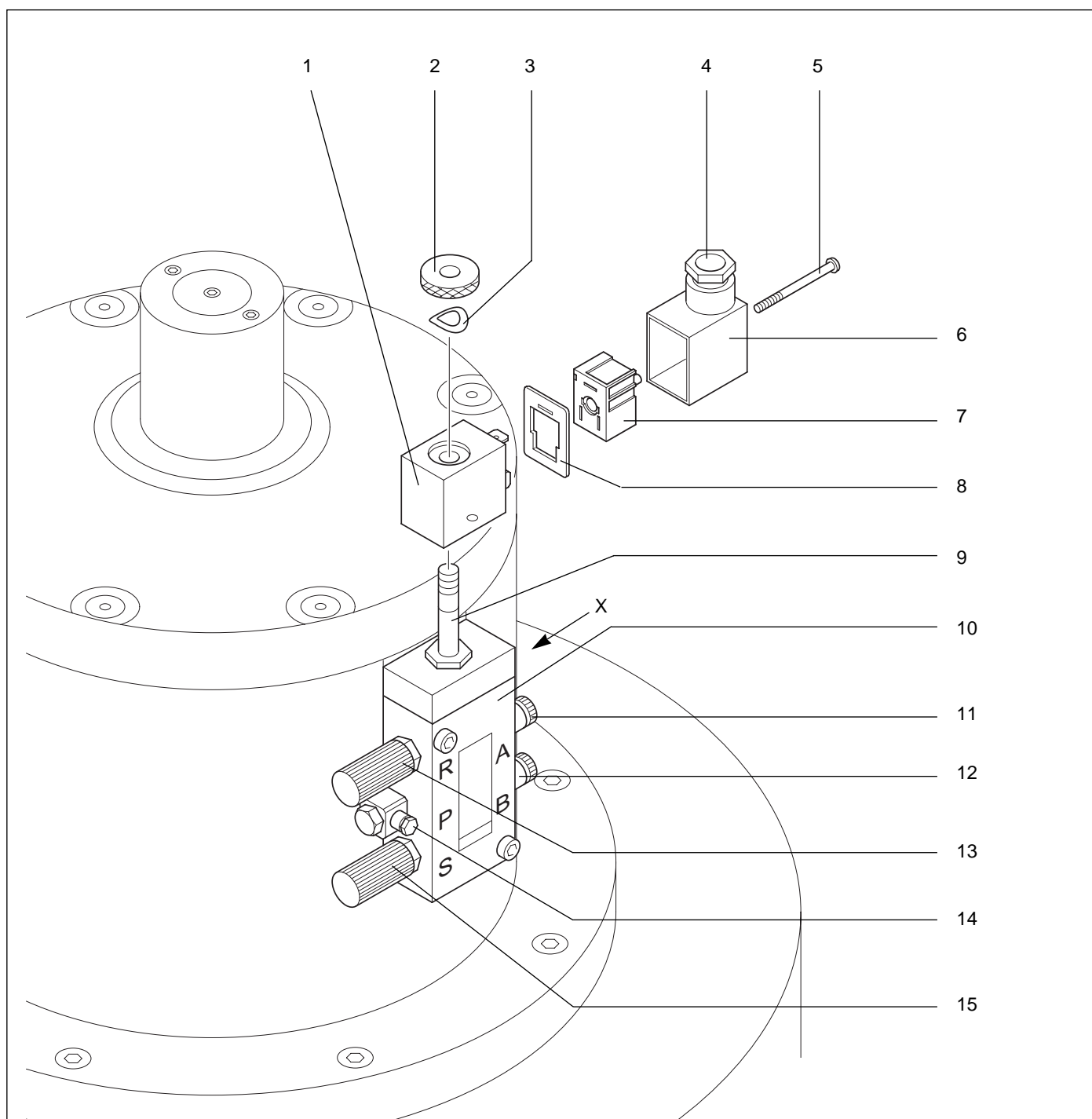
The pilot valve (4/10) is equipped with a screw (Fig. 4/ item x) for manual operation of the valve, should this be at all required.

With the aid of a screwdriver it is possible to turn this screw and manually operate the valve, provided compressed air is applied to the pilot valve.

There are two positions:

Position 0 = Normal position (for solenoid actuation). The valve is closed in this position.

Position 1 = The valve is open.



Key to Fig. 4

- 1 Solenoid coil
- 2 Knurled nut
- 3 Corrugated washer
- 4 PG connection
- 5 Fixing screw
- 6 Connector casing
- 7 Inside section of the plug
- 8 Seal
- 9 Tube
- 10 Pilot valve
- 11 Connection A / pneumatic actuator
- 12 Connection B / pneumatic actuator
- 13 Connection R / silencer
- 14 Connection P / compressed air
- 15 Connection S / silencer
- X = Screw / auxiliary manual operation

Fig. 4 Installation of the solenoid coil

3.5 Electrical Connection

Warning During all electrical work ensure that the power supply lines have reliably been switched off. The electrical connections may only be made by an electrician as defined by VDE 0105 in accordance with the VDE 0100 guidelines.



Before providing the electrical connections observe the maximum power ratings for any connected switches!

3.5.1 Power Supply Connection

Caution A 3 core mains cable (3 x 1 mm² / 2x + protective ground conductor) is recommended for the power supply connection.

The connection is made at the central power supply assembly (2/2 and Fig. 5) located at the compressed air cylinder.

Unscrew the four screws (5/3) and pull off the lid.

Lead the connection cable through the feedthrough (5/1) and connect as indicated in the wiring diagram (Fig. 6).

Provide a strain-relief by tightening the clamping screw (PG feedthrough) (5/1) and attach the lid.

3.5.2 Connection of the Stop Position Switches

The electrical signals from the stop position switches are available at plugs (5/2 and 6/2) for further processing.

Unlock the plug via its roll bar, unplug and disassemble.

The plug must be wired as shown in Fig. 6 and 6a.

Then reassemble the plug and attach it firmly once more.

The contacts are floating.

Caution The max. current rating is 1.5 A
 Switching capacity: DC = 24 W
 AC = 30 VA

3.5.3 Optical Position Indicator

The optical position indicator is located on top of the compressed air cylinder (2/3).

When the valve is open, a green indicator pin indicates the "OPEN" position.

Key to Fig. 5

- 1 Supply voltage / to be supplied by the customer
- 2 Connector for the stop position switches (to be supplied by the customer)
- 3 Screws for securing the lid, (4x)

- S1 Stop position switch / "OPEN" position
- S2 Stop position switch / "CLOSED" position

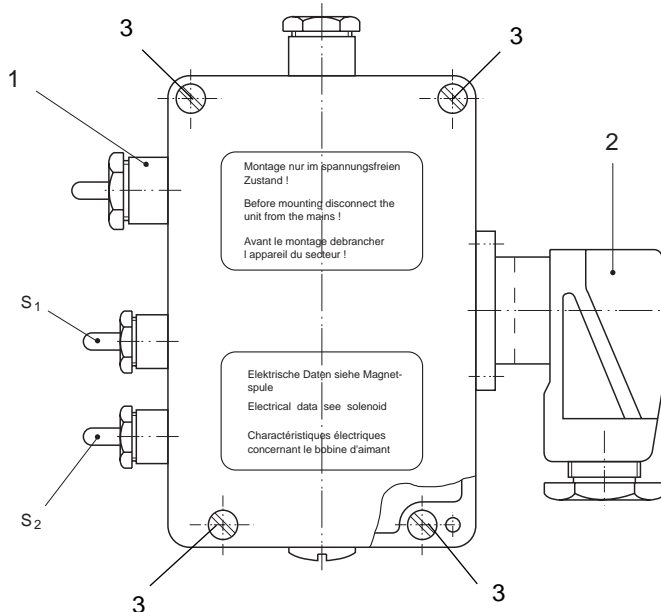
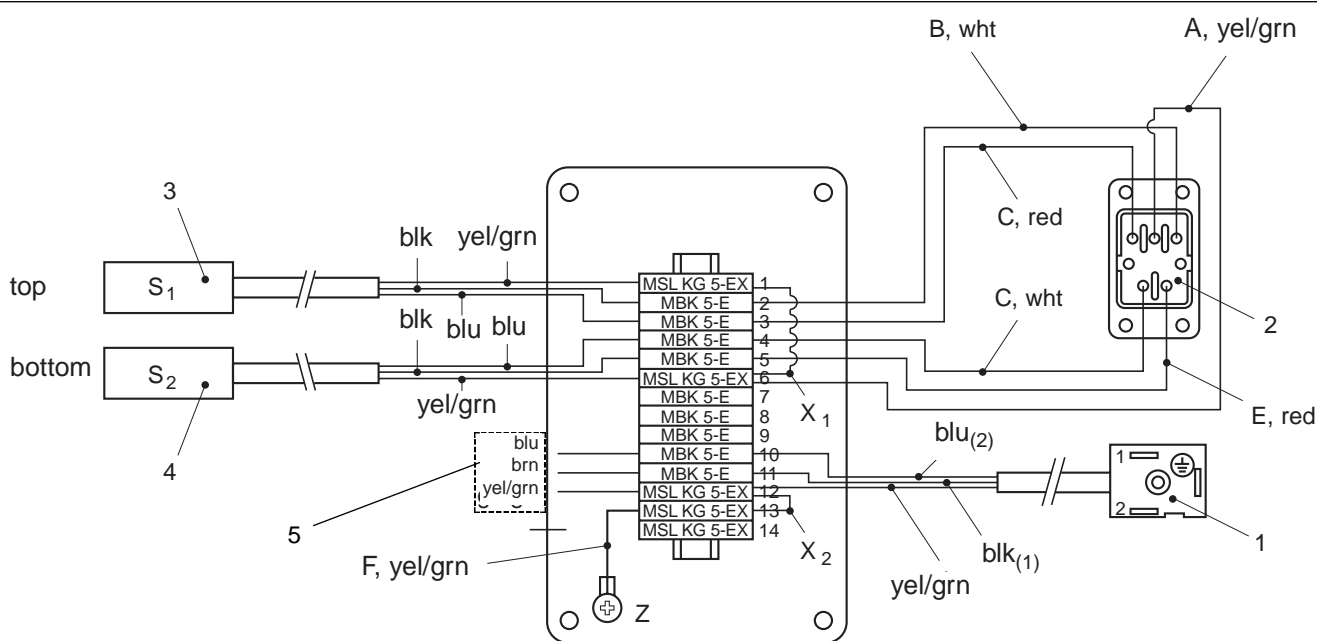


Fig. 5 Electrical supply subassembly



Key to Fig. 6

- 1 Plug for solenoid coil
- 2 Pin assignment / stop position switches
- 3 Stop position switch / "OPEN" position
- 4 Stop position switch / "CLOSED" position
- 5 Supply voltage / to be supplied by the customer

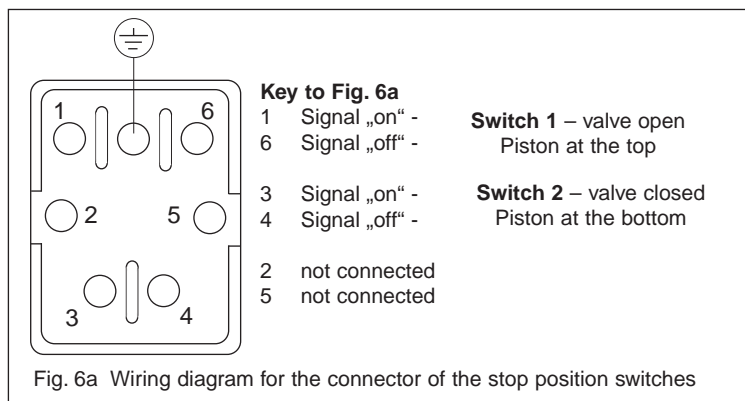


Fig. 6a Wiring diagram for the connector of the stop position switches

Fig. 6 Wiring diagram for the electrical supply subassembly

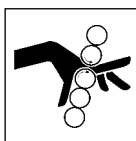
3.6 Notes Concerning Operation

Treat the sealing surfaces with care. It is recommended that the valve be only handled and moved with the protective caps in place.

Warning The valve must only be installed when no voltage is applied.



During operation of the valve you must ensure that no part of the body can come into contact with the space inside the valve, in particular when the valve is operated at the end of a line (open).



Remove the protection caps before installing the valve.

The sealing surfaces and the centering rings must be cleaned with a solvent (acetone or alcohol).

Caution Do not use any aggressive cleaning agents.

When receiving the valves they are in the closed position, i.e. the valve disc rests on the valve seat.

The valves are supplied with a pilot valve, but **without the solenoid coil**.

The solenoid coils may be selected depending on the supply voltage requirements in each case (see Section 2.2).

Installation of the solenoid coils is described in Section 3.2.

The electrical connection is described in Section 3.5.

In the event of a supply voltage failure or compressed air failure, the valve is closed automatically. Therefore these valves are of the “normally closed” type.

The pilot valve (4/10) is equipped with means for auxiliary manual operation (see Section 3.4). In the event of a supply voltage failure the valve may then be operated manually, provided compressed air is available at the pilot valve.

3.7 Operating Temperatures/ Degassing Temperatures

The ambient temperature range for the complete valve is $-5\text{ }^{\circ}\text{C}$ to $+40\text{ }^{\circ}\text{C}$.

The valve **without the pilot valve** and **without the solenoid coil** may be heated to $80\text{ }^{\circ}\text{C}$ max.

The temperature for the compressed air should also remain in the temperature range from $-5\text{ }^{\circ}\text{C}$ to $+40\text{ }^{\circ}\text{C}$.

3.8 Operation

Caution First check the available supply voltage against the ordering data for the pilot valve. Determine whether or not the supply voltage is actually present at the valve.

You must ensure that the pilot valve is supplied with compressed air and that this compressed air is of the quality as described in Section 3.1.

If these conditions are met, you may then open the valve via the pilot valve or activate it through the central control system.

The “OPEN” position of the valve is indicated by the green signal pin (optical position indicator – 2/3) at the compressed air cylinder.

4 Maintenance

4.1 Right Angle Valve

The right angle valves will not require any maintenance within the MTBF (see Section 1.5). All movable parts are lubricated with a special grease. After disassembly of the actuator the lubrication should be renewed (special grease, Ref. No. 214-232).

4.1.1 Cleaning of the Inner Space

Warning Before opening the valve, all electrical connections made to the valve must be disconnected. The compressed air connection must also be released.



In the case of substances which may represent a health hazard, determine the kind of hazard first and observe the applicable safety regulations. If the hazard still persists, the valve must be decontaminated before starting any maintenance work on the valve.

Unscrew screws (2/6).

Lift out the compressed air cylinder together with the complete inner section using a suitable lifting device attached to the crane eyes (2/10) provided for this purpose.

The inner space of the valve and the components may then be cleaned.

Caution All sealing surfaces, the bellows (2/8) as well as the piston rod (2/7) must be protected against damage. Use only commercially available cleaning agents. The sealing rings, also those in the compressed air cylinder, must only be exchanged by suitably qualified and trained personnel.

The Ref. No. for the casing seal is given in Section 1.6.

4.1.2 Electrical Connection of a Connection Plug for the Pilot Valve which has not already been Wired-Up

The DN 250 ISO-K right angle valve is supplied with a fully wired-up connection plug (3/1).

When wanting to install a connection plug which has not already been wired-up, proceed as follows:

After having loosened the screw (4/5) pull the connection plug off from the solenoid coil.

Use a small screwdriver to force the plug insert (4/7) out from the dent of the fixing screw.

The terminals (6/1) are marked as follows:

“1” and “2” = phase, the third connection is for the ground wire and marked with the ground symbol.

Lead the 3-core cable from the valve (3x1 mm²) through the feedthrough /PG feedthrough (4/4) and connect it to the terminals.

Fit the plug insert into the casing (4/6) until it snaps in. Provide the strain-relief for the cable at the feedthrough/PG feedthrough by tightening the clamping screw (4/4).

Attach the complete connection plug and secure it in place by tightening screw (4/5).

Don't forget seal (4/8).

4.2 Pilot Valve

The pilot valves do not require any maintenance.

However, during regular maintenance work, torque of the knurled nut (4/2) and the seating of the connection plug should be checked.

The time between two service intervals (MTBF) exceeds the time for the right angle valves as stated in Section 1.5.

4.3 Service

Warning

Shipment of contaminated products



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



Products returned 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 (see Annex).

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.

4.4 Disposal

Warning

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

Substance 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.



EC Manufacturer's Declaration

We – INFICON – herewith declare that operation of the incomplete machine defined below, is not permissible until it has been determined that the machine into which this incomplete machine is to be installed, meets the regulations of the EC Directive on Machinery.

Applied harmonised standards:

- EN 292
- DIN EN 60 204

Designation of the products: VAP250-X

Types: Right angle valves with
electropneumatic actuator
Nominal widths: DN 250

PN: 250 - 800

Applied international standards:

- ISO 4414
- ISO 1609

Applied national standards and technical specifications:

- DIN 28 400
- DIN 28 403
- DIN 28 404
- DIN 2501
- DIN 24 558

Balzers, May 6, 2002



Hans-Christoph Gehlhar, Product Manager

Balzers, May 6, 2002



Dr. Georg Sele, Technical Support Manager;
Quality Representative

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 _____

Article Number _____


Serial Number _____

2 Reason for return

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

4 Process related contamination of product:

toxic	no <input type="checkbox"/> 1)	yes <input type="checkbox"/>
caustic	no <input type="checkbox"/> 1)	yes <input type="checkbox"/>
biological hazard	no <input type="checkbox"/>	yes <input type="checkbox"/> 2)
explosive	no <input type="checkbox"/>	yes <input type="checkbox"/> 2)
radioactive	no <input type="checkbox"/>	yes <input type="checkbox"/> 2)
other harmful substances	no <input type="checkbox"/> 1)	yes <input type="checkbox"/>



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

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

5 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

6 Legally binding declaration:

I/we hereby declare that the information on this form is complete and accurate and that I/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 addressee - 1 copy for accompanying documents - 1 copy for file of sender



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