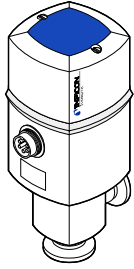


# Control Valve VDE016-X

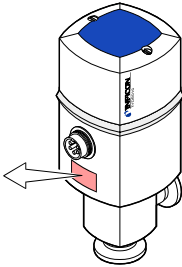


Operating Manual  
Incl. Manufacturer's Declaration  
sina35e1-d (2004-10)

## Product Identification

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

INFICON AG, LI-9496 Balzers  
Model: \_\_\_\_\_  
PN: \_\_\_\_\_  
SN: \_\_\_\_\_  
\_\_\_\_\_ V \_\_\_\_\_ A



## Validity

This document applies to products with the part number 250-505.

The part number (PN) can be taken from the product nameplate.

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

All dimensions in mm.

## Intended Use

The VDE016-X Control Valve is used together with the VCC500 Controller for controlling the pressure in a vacuum system, either with a variable gas flow (up-stream control) or with a variable conductance (down-stream control).

It must not be used with liquid gases.

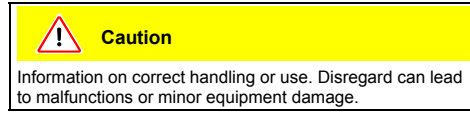
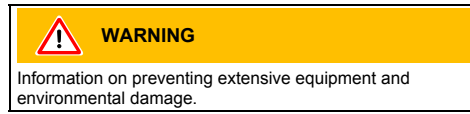
## Functional Principle

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

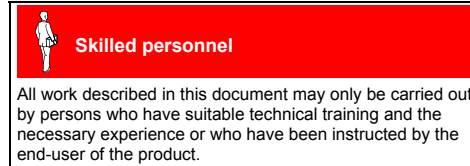
- with analog voltage,
- via integrated interface or
- via optional RS232 interface.

## Safety

### Symbols Used



### Personnel Qualifications



### 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

INFICON 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

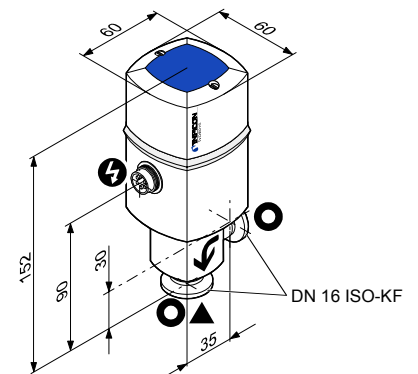
Connection flange	DN 16 ISO-KF
Mounting orientation	any
Gas flow direction <sup>1)</sup>	→ "Dimensions"
Tightness	1x10 <sup>-9</sup> mbar l/s
Pressure range	1x10 <sup>-8</sup> mbar ... 2.5 bar (absolut)
Flow rate <sup>2)</sup>	5x10 <sup>-6</sup> ... 1250 mbar l/s
with filter on inlet side	
with filter on inlet and vacuum side	5x10 <sup>-6</sup> ... 1000 mbar l/s
Dead volume	0.03 cm <sup>3</sup>
Supply	
Operating voltage	24 VDC (±10%)
Power consumption	12 VA
Current consumption <sup>3)</sup>	500 mA, 20 ... 30 mA rest current
Control	
VCC500	→ 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

<sup>1)</sup> The recommended mounting orientation is with the valve seat in direction to the vacuum chamber

<sup>2)</sup> For air with  $\Delta p = 1$  bar

<sup>3)</sup> Pre-fusing 630 mA recommended

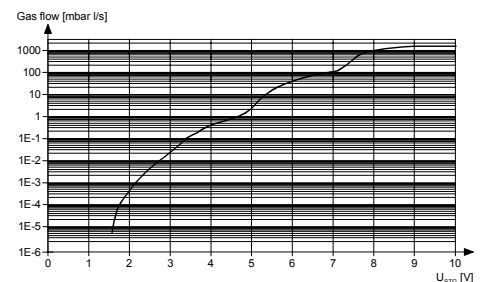
### Dimensions [mm]



- 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

**STOP 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**

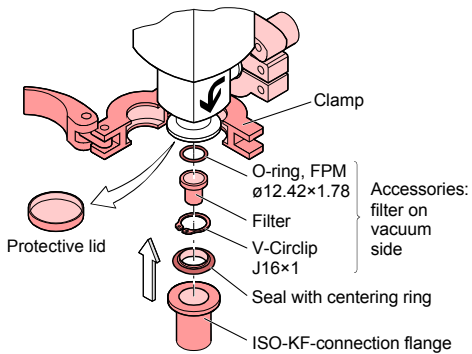


Caution: vacuum component

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.

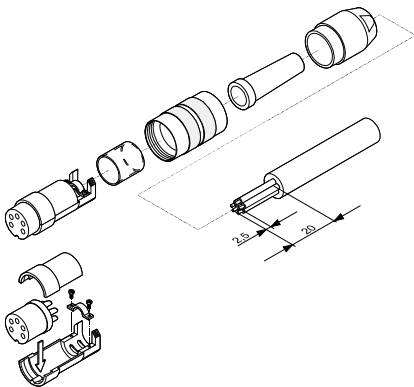
### Electrical Connection



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

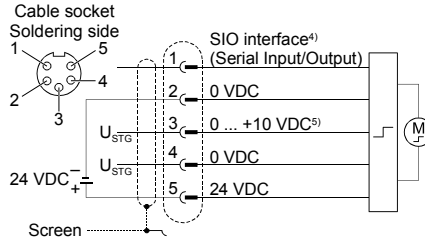
**1**

Prepare the connector (the connector is enclosed).



**2**

Solder the connection cable according to the diagram.



$U_{STG}$  = Control voltage

<sup>4)</sup> For further information → "Interface"

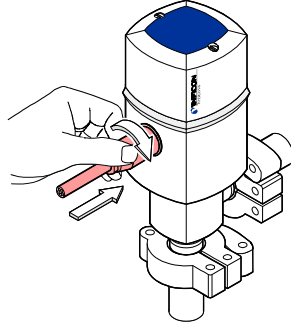
<sup>5)</sup> Be careful to correctly connect the poles

**3**

Assemble the connector.

**4**

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**



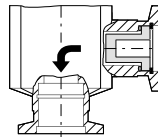
Caution: power failure

In the event of a power failure the VDE016-X stops and remains in its momentary valve position.

If the VDE016-X is used together with a INFICON VCC500 controller, the valve is closed by the internal capacitor of the VDE016-X in the event of a power failure.

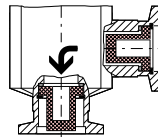
### Gas flow

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

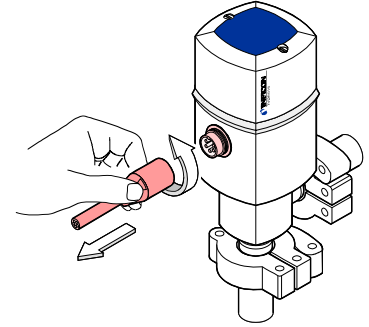
## Deinstallation

### Electrical Connection



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

Loosen the connector and unplug it.



### Vacuum Connection

**STOP 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**

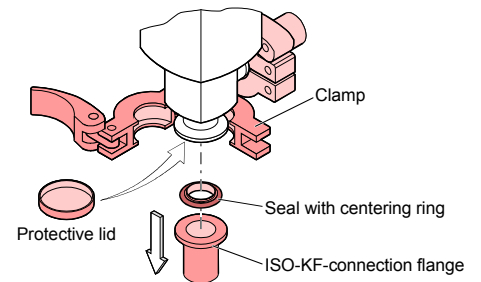


Caution: vacuum component

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.



sin na335e1-d

(2004-10)

Original: German sina335d1-d (2004-10)

## Maintenance

### STOP 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 INFICON service center.

INFICON assumes no liability and the warranty becomes null and void if any service work is carried out, which is not described in this Operating Manual.

### Cleaning the filter

### STOP 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.

### STOP DANGER



Caution: cleaning with compressed air  
Flying particles can cause eye injuries.  
Wear protective glasses.

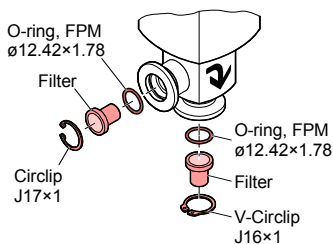
### STOP DANGER



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

- 1 Dismantle the filter(s).



- 2 If necessary, clean the built-in filter(s) by putting it (them) in alcohol to soak.
- 3 Dry the filter(s) with compressed air.

## Repair

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

INFICON 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:	215-463
O-ring, FPM, ø12.42x1.78	
Filter, stainless steel 1.4404	
Circlip, stainless steel 1.4404, J17x1	

### Accessories

Description	Ordering number
1 Filter complete consisting of:	215-463
O-ring, FPM, ø12.42x1.78	
Filter, stainless steel 1.4404	
V-Circlip, J16x1	

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<sub>h</sub> to 7A<sub>h</sub>) and terminated with "CR/LF" (0D<sub>h</sub>, 0A<sub>h</sub>).

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<sub>STG</sub> <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, see 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 <sub>h</sub> ) gd34 (open) ⇒ Response GD34 (= Absolute position 1A68 <sub>h</sub> )
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:

SS\$\$	Description
{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 exceeded), triggers "close" and power off ("t?" < T\$53 <sub>h</sub> )
	D6 Temperature warning ("t?" < T\$60 <sub>h</sub> )
	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 VDE016-X is switched off when this value is < 53<sub>n</sub>.

T\$\$\$

{D7, D6, D5, D4} {D3, D2, D1, D0}  
Valve temperature  
The lower this number the higher the temperature.  
A value < T\$53<sub>n</sub>, triggers an error.  
A value < T\$60<sub>n</sub>, 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 INFICON 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.

- Description of product**  
 Type \_\_\_\_\_  
 Part number \_\_\_\_\_  
 Serial number \_\_\_\_\_
- Reason for return**  
 \_\_\_\_\_  
 \_\_\_\_\_
- Operating fluid(s) used**  
 (Must be drained before shipping.)  
 \_\_\_\_\_
- Used in copper process**  
 no  yes  → Seal product in plastic bag and mark it with a corresponding label.
- Process related contamination of product:**

toxic	no <input type="checkbox"/> 1)	yes <input type="checkbox"/>	
corrosive	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"/>	

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
- 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
- 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, INFICON, 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 VDE016-X

Part number  
250-505

### 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

INFICON AG, Balzers

28 July 2004

28 July 2004

*Remo Klaiber*

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*G. Sele*

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