

## Solenoid valves for gas VAS, double solenoid valves VCS

### TECHNICAL INFORMATION

- Suitable for a max. inlet pressure of 500 mbar (7 psig)
- Easy installation into a system
- Compact design saves space
- No extra valve required owing to integrated flow adjustment
- Check indication by blue LED
- Proof of closure switch with integrated visual position indicator
- Suitable for high-duty cycling
- Suitable for hydrogen



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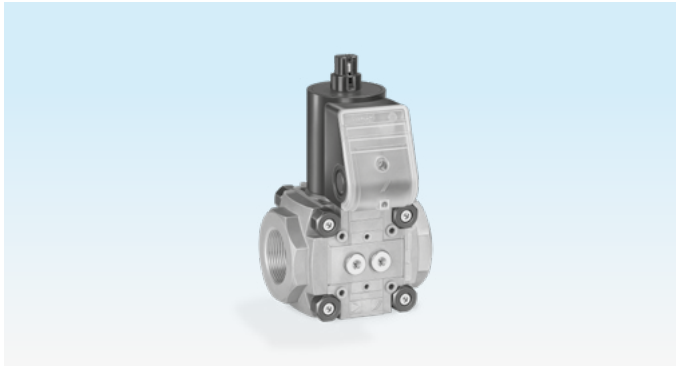
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## 1 Application



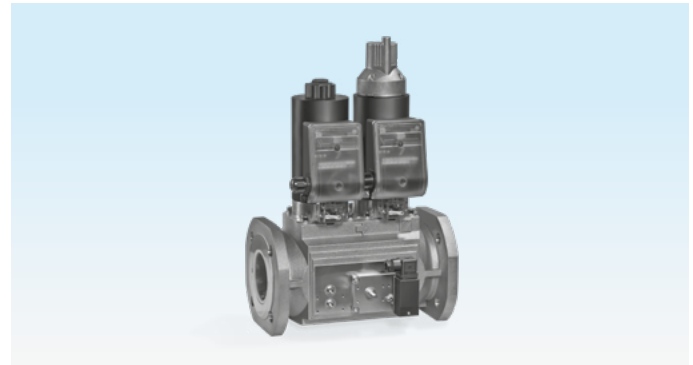
*VAS..R, quick opening*



*VCS..R with damping unit*



*VAS..F, quick opening*



*VCS..F with proof of closure switch and pressure switch*

The modular design principle allows the individual components of the VAS, VCS Series to be easily assembled: e.g. quick opening, slow opening, with proof of closure switch and visual position indicator, slow opening with attached pressure switch.

## 1 Application

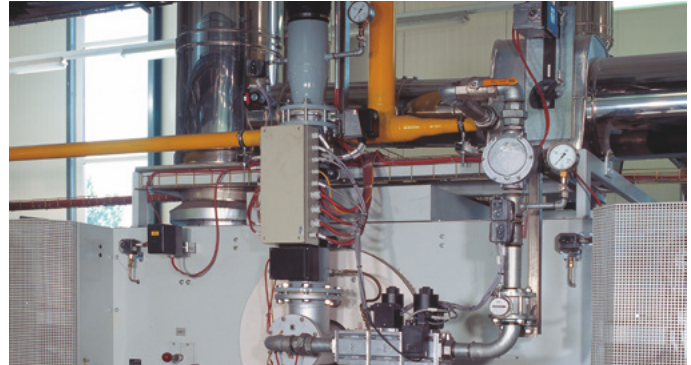
Solenoid valves for gas VAS and double solenoid valves VCS for safeguarding and controlling the air and gas supply to gas burners and gas appliances. For use in gas control and safety systems in all sectors of the iron, steel, glass and ceramics industries, as well as in commercial heat generation, such as the packaging, paper and foodstuffs industries.



*Ceramics industry*



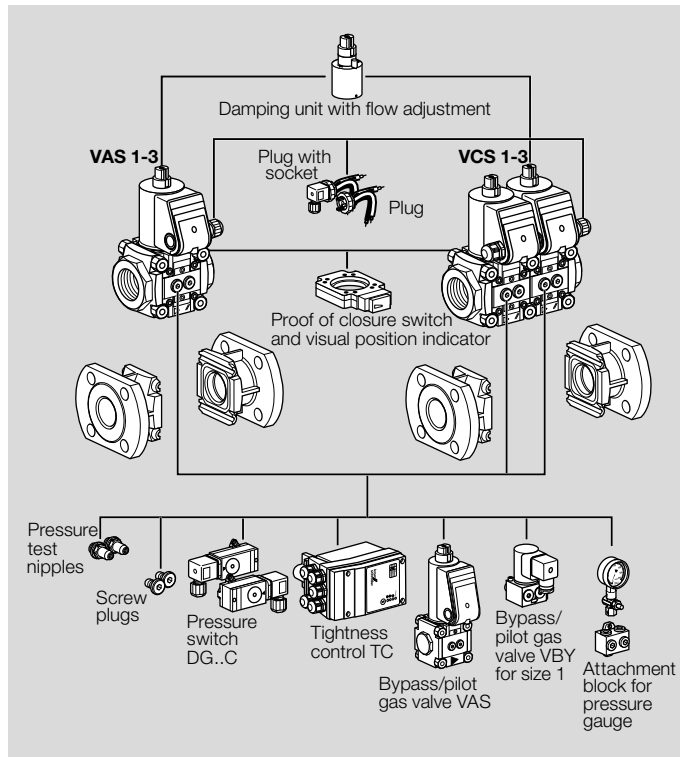
*Aluminium industry: curing oven for wheel rims*



*Foodstuffs industry: baking oven*

## 1.1 Configuring solenoid valves for gas VAS 1–3 or double solenoid valves VCS 1–3

Threaded flange for pipe connections (Rp or NPT) from DN 10 to 65, flanged connection (ISO or ANSI) for sizes 2 and 3 for pipe connections DN 40 and 50.

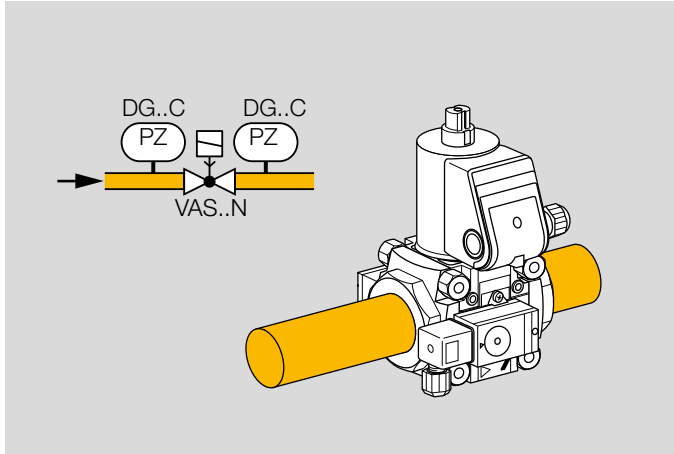


Modularly configurable with:

- Damping unit
- Proof of closure switch
- Plug (with or without socket)
- Pressure test nipples
- Screw plugs
- Pressure switch DG..C for inlet and/or outlet pressure
- Tightness control TC
- Bypass/pilot gas valve
- Attachment block for the connection of a pressure gauge, for example

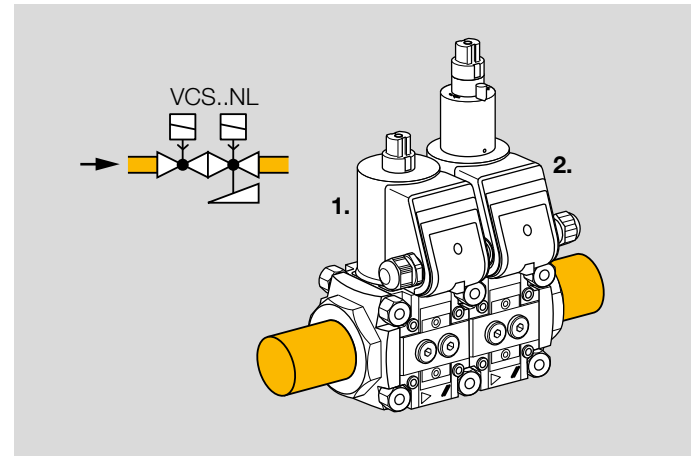
## 1.2 Application examples for VAS 1–3, VCS 1–3

Gas solenoid valve with inlet and outlet pressure switch



VAS..N, quick opening, pressure switch DG..C for inlet pressure  $p_U$  and outlet pressure  $p_D$

Double solenoid valve VCS with damping unit VCS..NL

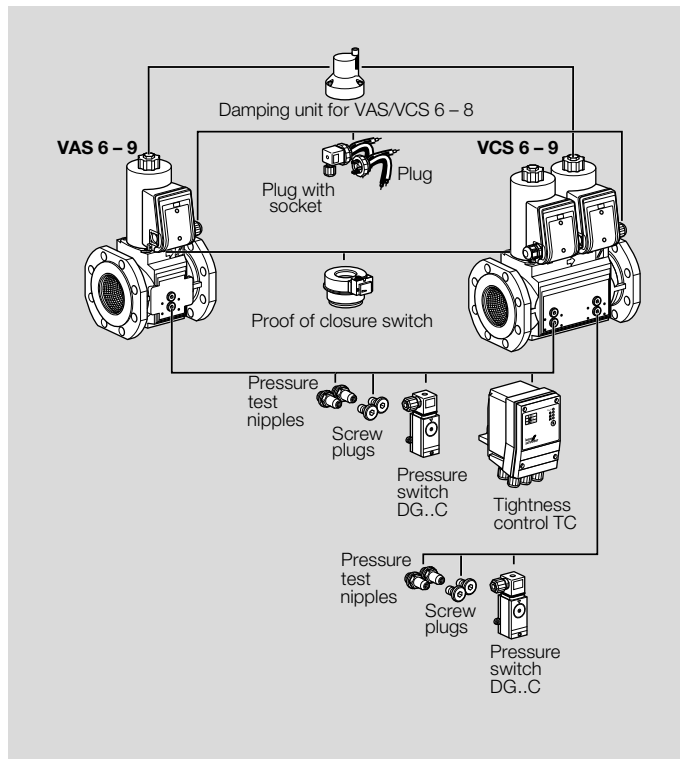


1<sup>st</sup> valve quick opening, quick closing, with flow adjustment  
2<sup>nd</sup> valve slow opening, quick closing



## 1.3 Configuring solenoid valves for gas VAS 6–9 or double solenoid valves VCS 6–9 (Basic)

Gas solenoid valve and double solenoid valve with flanged connection (ISO or ANSI) for pipe connections from DN 65 to 125.



Modularly configurable with:

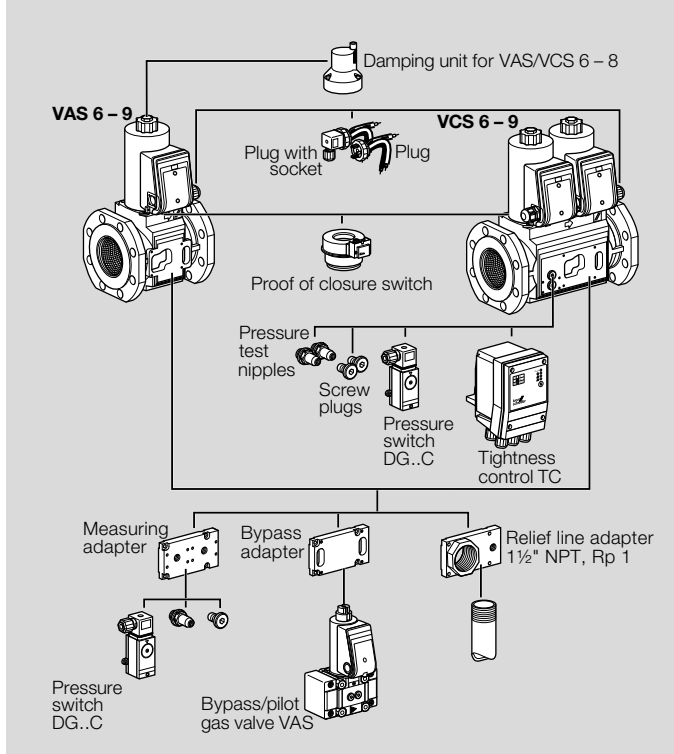
- Damping unit for VAS/VCS 6–8
- Proof of closure switch
- Plug
- Plug with socket

VCS 6–9 with threaded connections for:

- Screw plugs
- Pressure test nipples
- Tightness control TC
- Pressure switch DG..C for inlet/interspace pressure

## 1.4 Configuring solenoid valves for gas VAS 6–9 or double solenoid valves VCS 6–9 with adapter plate connection (Extended)

Gas solenoid valve and double solenoid valve with flanged connection (ISO or ANSI) for pipe connections from DN 65 to 125.



Modularly configurable with:

- Damping unit for VAS/VCS 6–8
- Proof of closure switch
- Plug
- Plug with socket

With adapter plates, expandable with:

- Pressure switch DG..C (VAS 6–9: for inlet/outlet pressure, VCS 6–9: for interspace/outlet pressure)
- Pressure test nipple
- Screw plug
- Bypass or pilot gas valve VAS

### VCS 6–9

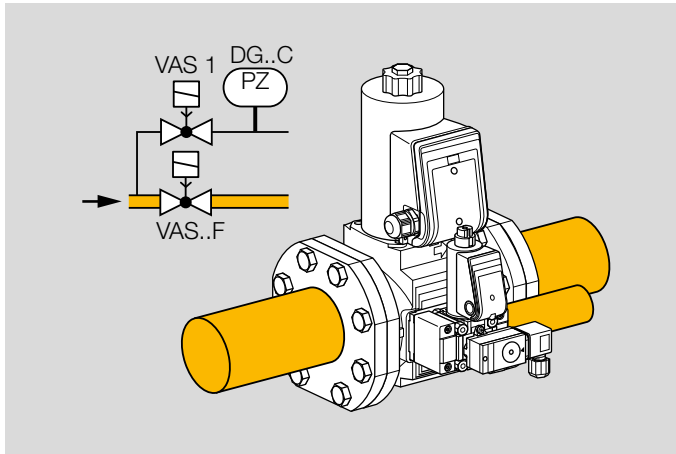
With two threaded connections for:

- Screw plugs
- Pressure test nipples
- Pressure switch DG..C for inlet/interspace pressure
- Tightness control TC

Expandable with relief line adapter (1½ NPT, Rp 1) for relief line.

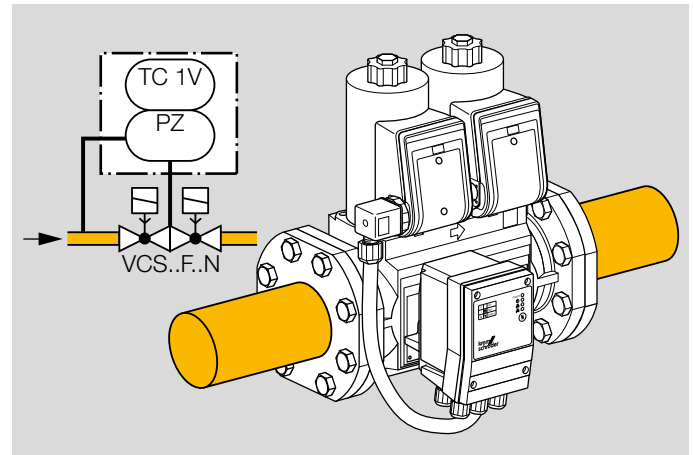
## 1.5 Application examples for VAS 6–9, VCS 6–9

Gas solenoid valve with pilot gas valve and pressure switch



*VAS..F..N: quick opening, quick closing, VAS 1 as pilot gas valve with pressure switch DG..C*

Double solenoid valve with tightness control



*VCS..F..N: quick opening, quick closing valves, tightness control TC 1V*

## 2 Certification

### 2.1 Certificate download

Certificates – see [www.docuthek.com](http://www.docuthek.com)

### 2.2 Declaration of conformity



We, the manufacturer, hereby declare that the products VAS/VCS 1–3 with product ID No. CE-0063BO1580 comply with the requirements of the listed Directives and Standards.

Directives:

- 2014/35/EU – LVD
- 2014/30/EU – EMC
- 2011/65/EU – RoHS II
- 2015/863/EU – RoHS III

Regulation:

- (EU) 2016/426 – GAR

Standards:

- EN 161:2011+A3:2013

The relevant product corresponds to the tested type sample.

The production is subject to the surveillance procedure pursuant to Regulation (EU) 2016/426 Annex III paragraph 3.

Elster GmbH

### 2.3 SIL and PL



See page 62 (11 Safety-specific characteristic values for SIL and PL).

### 2.4 UKCA certified



Gas Appliances (Product Safety and Metrology etc. (Amendment etc.) (EU Exit) Regulations 2019)

BS EN 161:2011+A3:2013

BS EN 13611:2015

### 2.5 FM listed

Approval does not apply for 100 V AC and 200 V AC.



Factory Mutual (FM) Research Class: 7400 and 7411 Safety overpressure slam shut valves. Designed for applications pursuant to NFPA 85 and NFPA 86.

### 2.6 ANSI/CSA approved

Approval does not apply for 100 V AC and 200 V AC.



Canadian Standards Association – ANSI Z21.21 and CSA 6.5

### 2.7 VAS 1–3 (120 V AC): UL listed



Underwriters Laboratories – UL 429 “Electrically operated valves”.

### 2.8 AGA listed

Approval does not apply for 100 V AC and 200 V AC.



Australian Gas Association, Approval No.: 3968.

### 2.9 Eurasian Customs Union



The products VAS, VCS meet the technical specifications of the Eurasian Customs Union.

### 2.10 REACH Regulation

The device contains substances of very high concern which are listed in the Candidate List of the European REACH Regulation No. 1907/2006. See Reach list HTS at [www.docuthek.com](http://www.docuthek.com).

### 2.11 China RoHS

Directive on the restriction of the use of hazardous substances (RoHS) in China. Scan of the Disclosure Table China RoHS2, see certificates at [www.docuthek.com](http://www.docuthek.com).

## 3 Function

The gas solenoid valve VAS is closed when it is disconnected from the power supply.

Opening: connect the system to the electrical power supply (alternating voltage will be rectified). The blue LED lights up. The coil's magnetic field pulls the armature with the attached valve discs upwards. The gas solenoid valve VAS opens. The double valve seat means that the forces from the inlet pressure are divided almost equally between the two valve seats.

Closing: disconnect the VAS from the electrical power supply. The blue LED goes out. The armature is pressed into its initial position by the closing spring. The gas solenoid valve closes within 1 s.

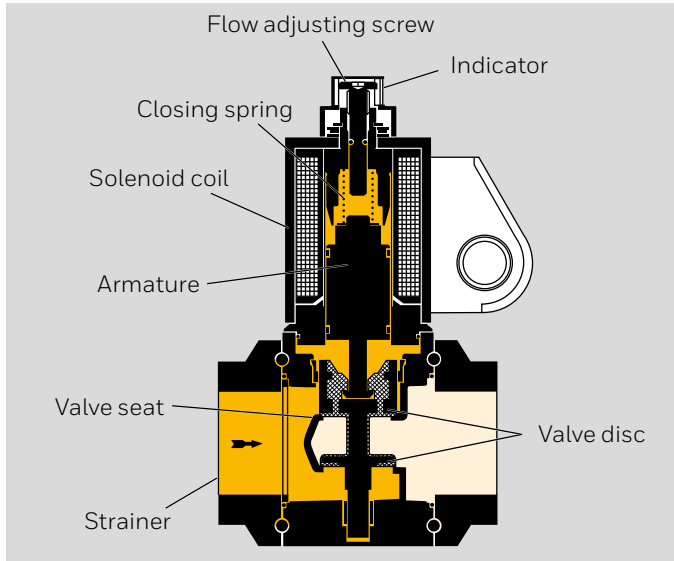
The strainer in the inlet of the gas solenoid valve prevents deposits of dirt particles on the valve seats. The pressure loss through the strainer is very low.

### **VAS 1-8..N, VAS 1-3..L**

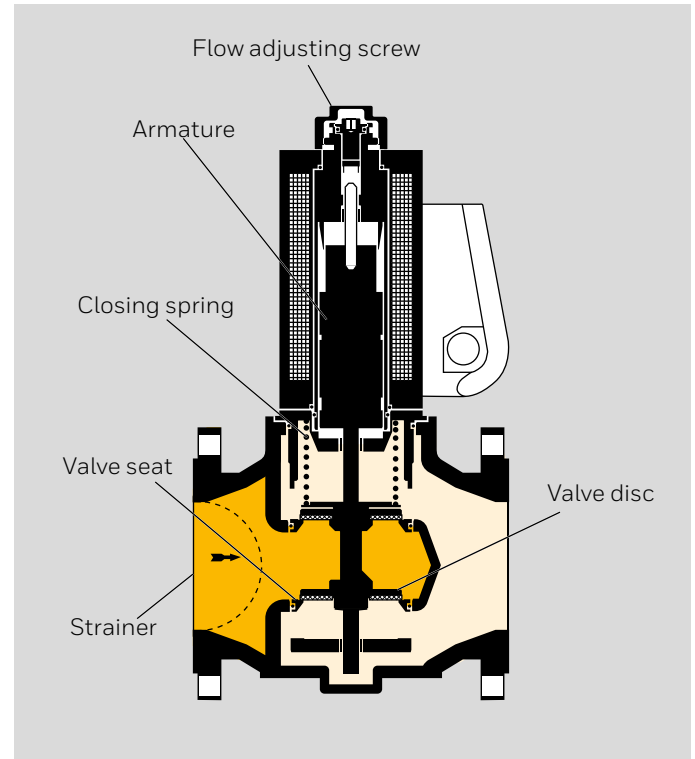
The flow rate can be varied by a flow adjusting screw on the actuator within a range from 20 to 100%. On VAS 1-3, the setting can be monitored on an indicator.

### 3.1 Solenoid valve for gas VAS..N, quick opening

The solenoid valve for gas VAS..N opens within 0.5 s.

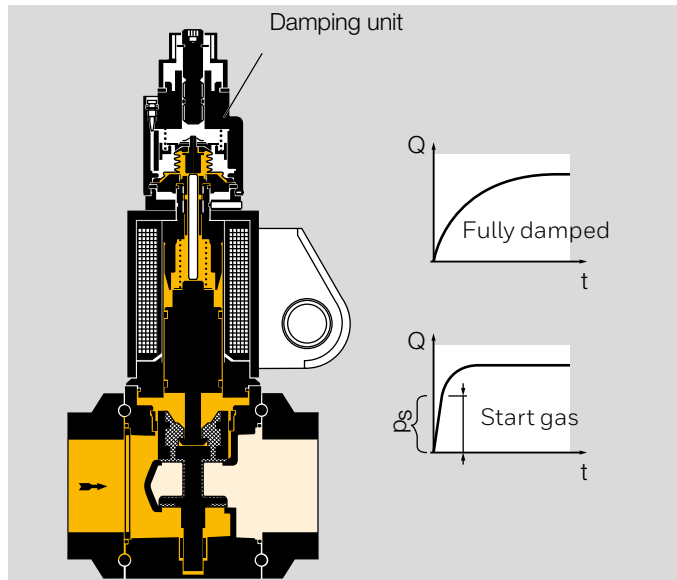


VAS 1-3..N



VAS 6-9..N

### 3.2 Solenoid valve for gas VAS..L, slow-opening



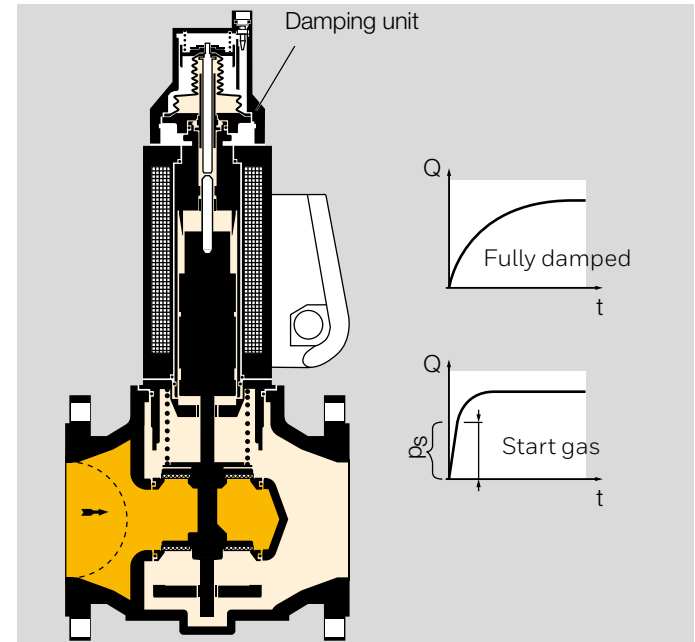
VAS 1-3..L

The gas solenoid valve VAS..L opens within 10 s to 80% of the maximum flow rate (factory default setting). For further information on the damping speed, see page 34 (6.4.1 Note on settings).

Start gas rate adjustment: the gas solenoid valve opens with a quick initial lift and then continues slowly until it is fully open. The start gas rate can be set. This setting is required, for example if a tightness control TC is to be used.

By turning the damping unit, the start gas rate can be set between 0 and 70%:

Turning it clockwise will decrease the start gas rate and turning it anticlockwise will increase the start gas rate.



VAS 6-8..L



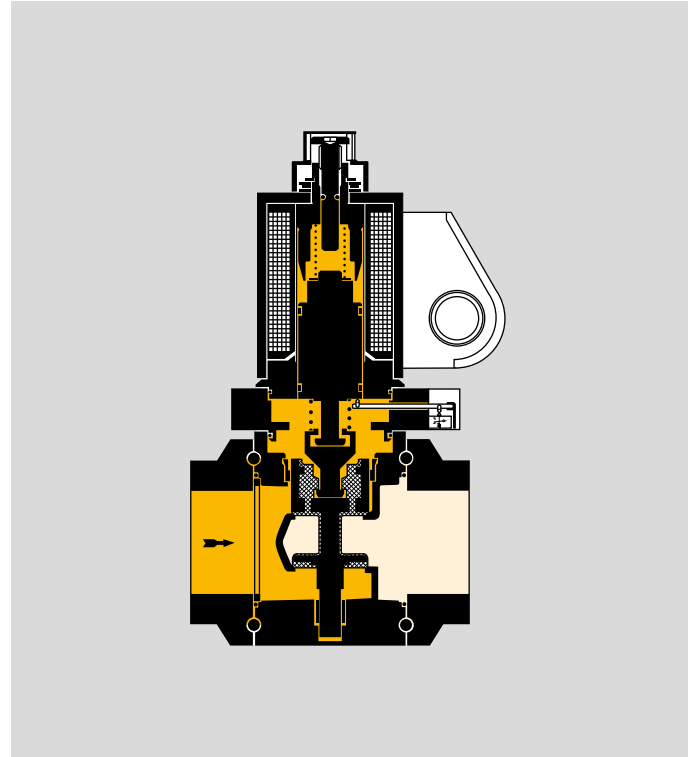
## 3.3 Solenoid valve for gas VAS..S/VAS..G, proof of closure switch with visual position indicator

Opening: when the gas solenoid valve is opened, the proof of closure switch is operated first. The visual position indicator is activated. The “open” signal is marked in red. Only then does the double valve seat open to release the volume of gas (overtravel principle).

Closing: the gas solenoid valve VAS is disconnected from the electrical power supply and the closing spring presses the double valve disc on to the valve seat. Then the proof of closure switch is actuated. The visual position indicator is white for “closed”.

The actuator cannot be rotated on a gas solenoid valve with a proof of closure switch and a visual position indicator.

NOTE: NFPA 86 – safety shut-off valve VAS..S must be fitted with an overtravel switch with a visual position indicator, and the burner-side pressure regulator with gas solenoid valve VAx..S must be fitted with a proof of closure switch with a visual position indicator. One gas solenoid valve must be verifiably closed. The closed position can be verified using the proof of closure switch of the gas solenoid valve VAS..S/VAS..G.

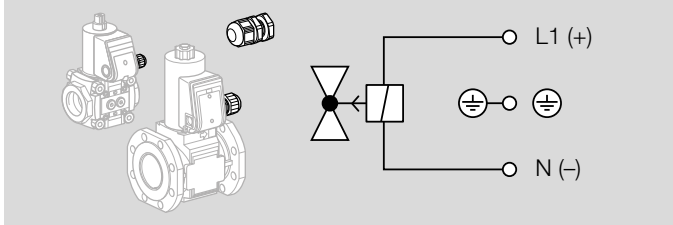


### 3.4 Connection diagram

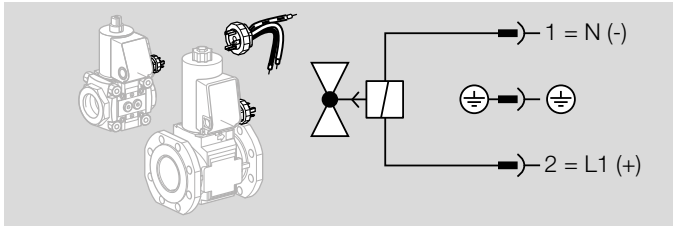
Wiring to EN 60204-1.

Further connection options, see Operating instructions VAS 1–3, VCS 1–3 or Operating instructions VAS 6–9, VCS 6–9 at [www.docuthek.com](http://www.docuthek.com).

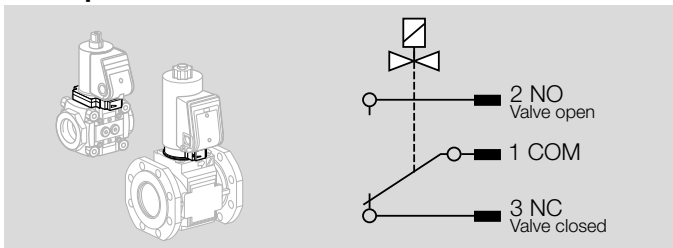
#### 3.4.1 VAS with M20 cable gland



#### 3.4.2 VAS with plug

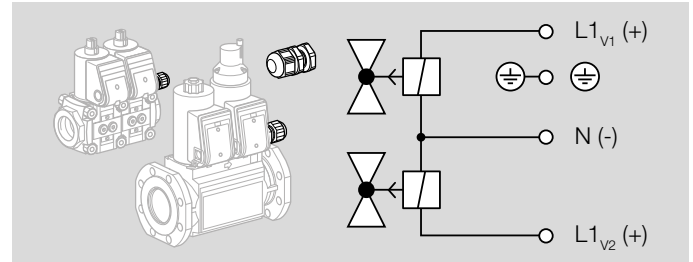


#### 3.4.3 VAS..S/VAS..G, proof of closure switch with visual position indicator

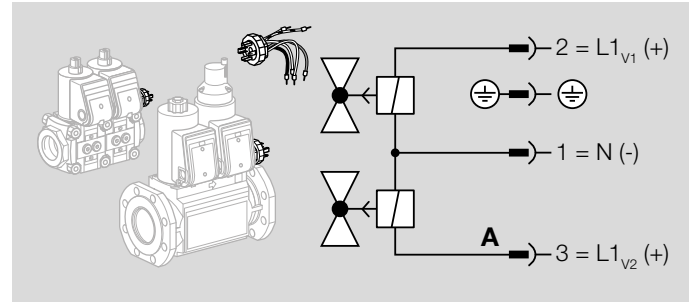


The designed lifetime of the proof of closure switch cannot be reached with frequent cycling operation, see page 49 (8 Technical data).

#### 3.4.4 VCS with M20 cable gland



#### 3.4.5 VCS with plug

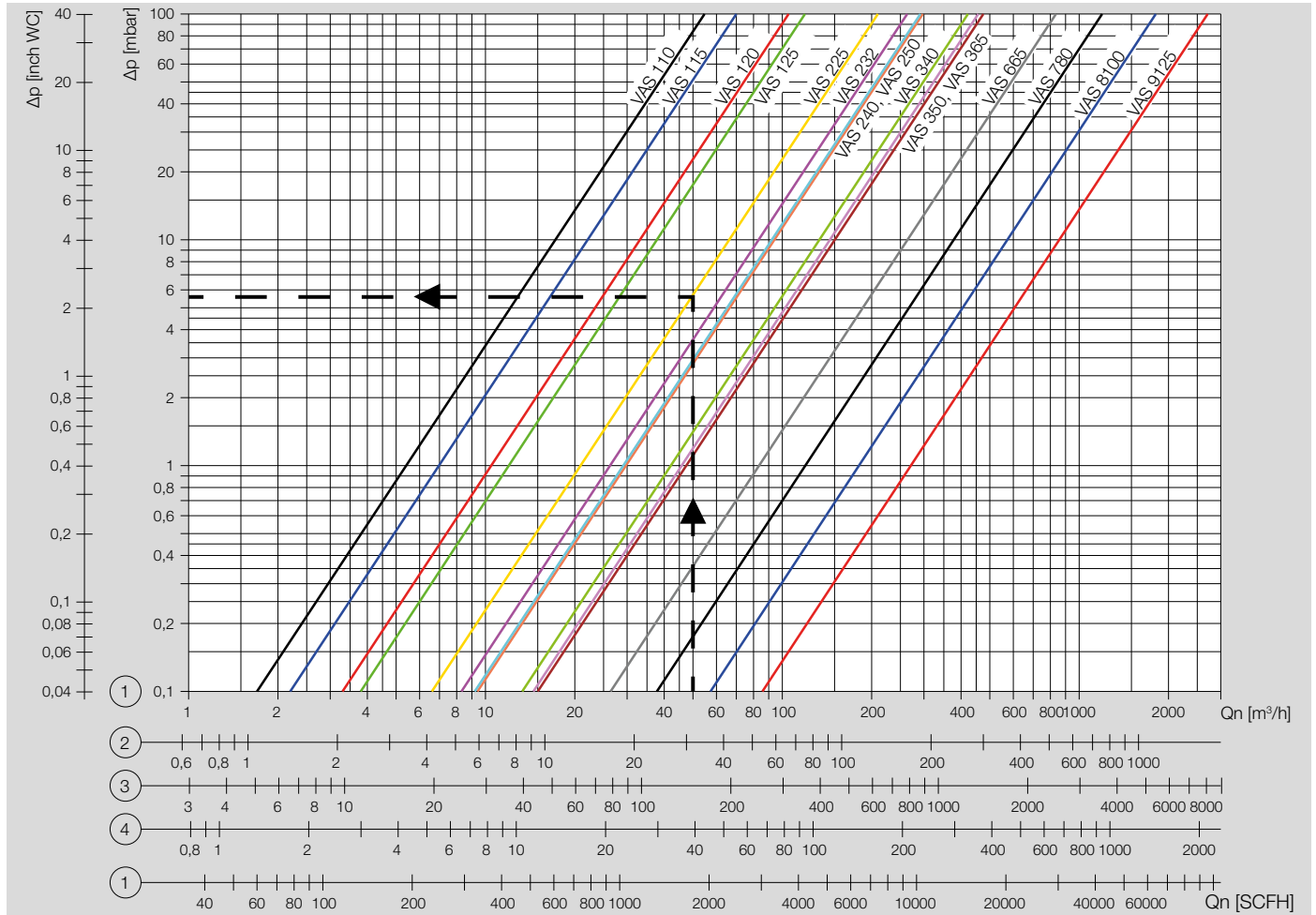


## **4 Flow rate**

### **4.1 Calculating the nominal size**

A web app for calculating the nominal size is available at [www.adlatus.org](http://www.adlatus.org).

### 4.2 VAS



1 = natural gas ( $\rho = 0.80 \text{ kg/m}^3$ )  
 2 = propane ( $\rho = 2.01 \text{ kg/m}^3$ )

3 = hydrogen ( $\rho = 0.09 \text{ kg/m}^3$ )  
 4 = air ( $\rho = 1.29 \text{ kg/m}^3$ )

## 4 Flow rate

---

The characteristic flow rate curves have been measured with the specified flanges and a fitted strainer.

When determining the pressure loss, operating cubic metres must be entered. Then the pressure loss  $\Delta p$  read must be multiplied by the absolute pressure in bar (positive pressure + 1) to account for the change in the medium's density.

### **Example**

inlet pressure  $p_u$  (positive pressure) = 0.3 bar,

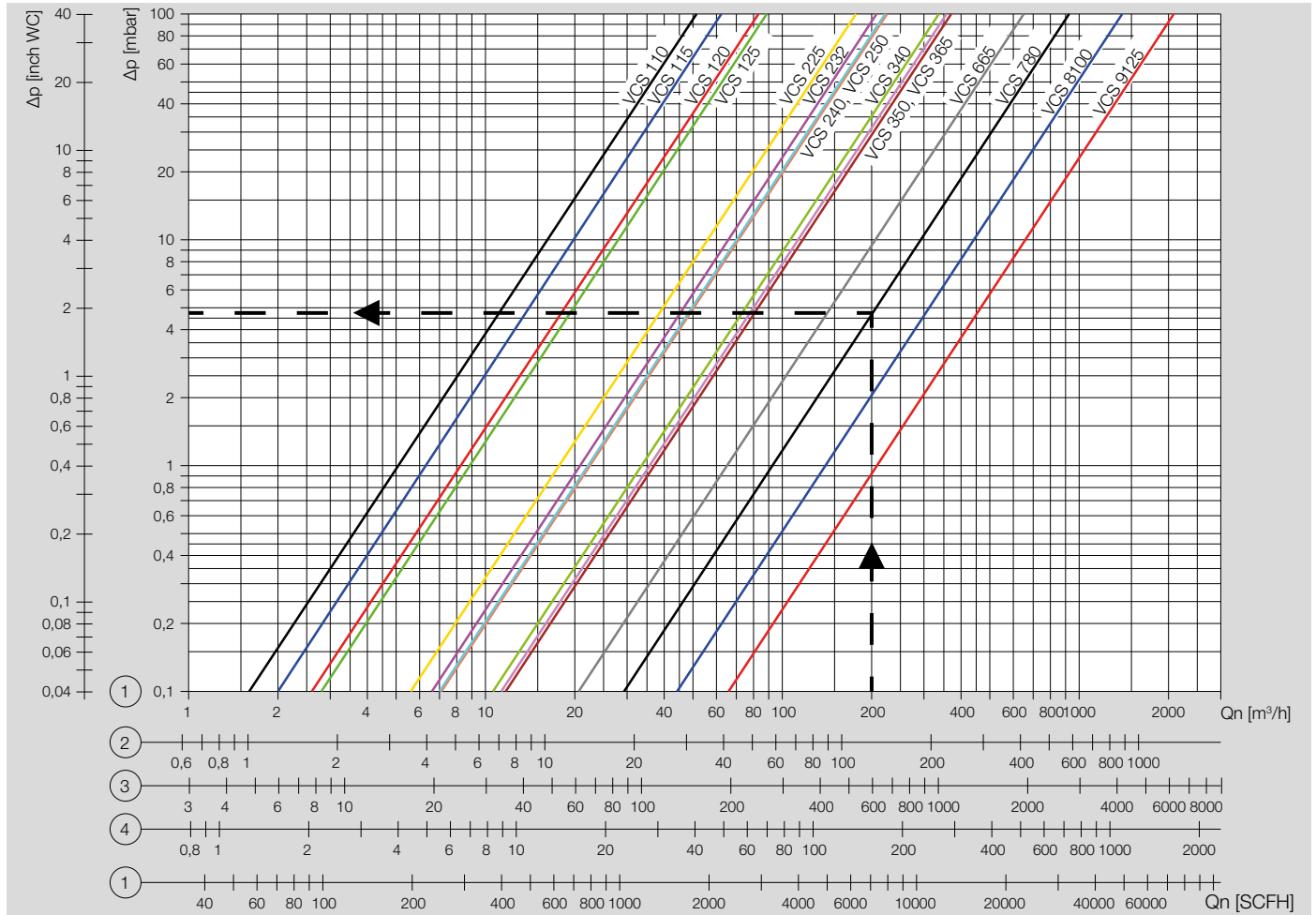
gas type: natural gas,

operating flow rate  $Q = 50 \text{ m}^3/\text{h}$  (b),

$\Delta p$  from diagram = 5.5 mbar,

$\Delta p = 5.5 \text{ mbar} \times (1 + 0.3) = 7.2 \text{ mbar}$  on the solenoid valve VAS 225

### 4.3 VCS



1 = natural gas ( $\rho = 0.80 \text{ kg/m}^3$ )  
 2 = propane ( $\rho = 2.01 \text{ kg/m}^3$ )

3 = hydrogen ( $\rho = 0.09 \text{ kg/m}^3$ )  
 4 = air ( $\rho = 1.29 \text{ kg/m}^3$ )

## 4 Flow rate

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The characteristic flow rate curves have been measured with the specified flanges and a fitted strainer.

When determining the pressure loss, operating cubic metres must be entered. Then the pressure loss  $\Delta p$  read must be multiplied by the absolute pressure in bar (positive pressure + 1) to account for the change in the medium's density.

### Example

inlet pressure  $p_u$  (positive pressure) = 0.3 bar,

gas type: natural gas,

operating flow rate  $Q = 200 \text{ m}^3/\text{h}$  (b),

$\Delta p$  from diagram = 4.7 mbar,

$\Delta p = 4.7 \text{ mbar} \times (1 + 0.3) = 6.1 \text{ mbar}$  on the solenoid valve VCS 780

## 5 Selection

### 5.1 ProFi

A web app selecting the correct product is available at [www.adlatus.org](http://www.adlatus.org).



## 5.2 Selection table for VAS 1–3

Option	VAS 1	VAS 2	VAS 3
DN	–, 10, 15, 25	–, 25, 32, 40, 50	40, 50, 65
Pipe connection	–, R, N	–, R, N, F <sup>5)</sup>	–, R, N, F <sup>5)</sup>
Opening properties	/N, /L	/N, /L	/N, /L
Mains voltage	W, Q, K, P, Y	W, Q, K, P, Y	W, Q, K, P, Y
Feedback <sup>1) 3)</sup>	S, G	S, G	S, G
Viewing side <sup>3)</sup>	R, L	R, L	R, L
Electrical connection <sup>4)</sup>	M20, plug, plug with socket	M20, plug, plug with socket	M20, plug, plug with socket
Accessories, right <sup>3)</sup>	Screw plug, test nipple, DG 17–300 <sup>2)</sup> , VBY <sup>1)</sup> , VAS 1	Screw plug, test nipple, DG 17–300 <sup>2)</sup> , VAS 1	Screw plug, test nipple, DG 17–300 <sup>2)</sup> , VAS 1 <sup>1)</sup>
Accessories, left <sup>3)</sup>	Screw plug, test nipple, DG 17–300 <sup>2)</sup> , VBY <sup>1)</sup> , VAS 1	Screw plug, test nipple, DG 17–300 <sup>2)</sup> , VAS 1	Screw plug, test nipple, DG 17–300 <sup>2)</sup> , VAS 1 <sup>1)</sup>

1) Proof of closure switch and bypass/pilot gas valve cannot be fitted together on the same side.

2) Specify the test point for inlet pressure  $p_U$  or outlet pressure  $p_d$ .

3) Viewed from the right/left: looking into the valve body in the direction of flow, see order example.

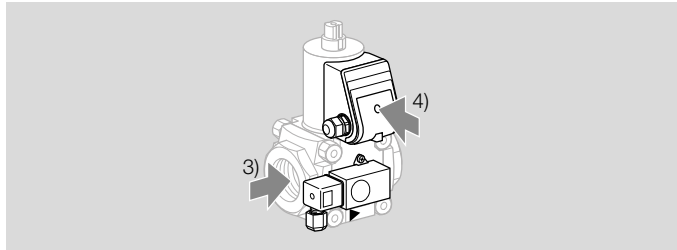
4) Viewing side for the electr. connection: looking at the connection box, see order example.

5) VAS 240 and VAS 350 available with ISO flange (pursuant to ISO 7005)

## Order example

VAS 225R/NW

Fitted pressure switch for test point  $p_U$



### 5.2.1 Type code

<b>VAS</b>	Solenoid valve for gas
<b>1-3</b>	Sizes
<b>-</b>	Without flange
<b>10-65</b>	Inlet and outlet flange nominal size
<b>R</b>	Rp internal thread
<b>F</b>	Flange to ISO 7005
<b>N</b>	NPT internal thread
<b>/N</b>	Quick opening, quick closing
<b>/L</b>	Slow opening, quick closing
<b>W</b>	Mains voltage 230 V AC, 50/60 Hz
<b>Q</b>	Mains voltage 120 V AC, 50/60 Hz
<b>K</b>	Mains voltage 24 V DC
<b>P</b>	Mains voltage 100 V AC, 50/60 Hz
<b>Y</b>	Mains voltage 200 V AC, 50/60 Hz
<b>S</b>	With PS and visual position indicator
<b>G</b>	With PS for 24 V and visual position indicator
<b>R</b>	Viewing side: right
<b>L</b>	Viewing side: left

## 5.3 Selection table for VAS 6–9

Option	VAS 6	VAS 7	VAS 8	VAS 9
DN	65	80	100	125
Pipe connection	F, A	F, A	F, A	F, A
Inlet pressure	05	05	05	05
Opening properties	N, L	N, L	N, L	N, L
Mains voltage	W, Q, K	W, Q, K	W, Q, K	A
Feedback <sup>1)</sup>	S, G	S, G	S, G	S, G
Viewing side <sup>1) 3)</sup>	R, L	R, L	R, L	R, L
Electrical connection <sup>4)</sup>	M20, plug, plug with socket	M20, plug, plug with socket	M20, plug, plug with socket	M20, plug, plug with socket
Basic, prepared for adapter plates	B, E	B, E	B, E	B, E
Accessories, right, inlet <sup>3) 5)</sup>	/P, /M, /1, /2, /3, /4, /B <sup>1)</sup> , /Z <sup>1)</sup> , /V, /E	/P, /M, /1, /2, /3, /4, /B <sup>1)</sup> , /Z <sup>1)</sup> , /V, /E	/P, /M, /1, /2, /3, /4, /B <sup>1)</sup> , /Z <sup>1)</sup> , /V, /E	/P, /M, /1, /2, /3, /4, /B <sup>1)</sup> , /Z <sup>1)</sup> , /V, /E
Accessories, right, outlet <sup>3) 5)</sup>	P, M, 1, 2, 3, 4	P, M, 1, 2, 3, 4	P, M, 1, 2, 3, 4	P, M, 1, 2, 3, 4

1) Proof of closure switch and bypass/pilot gas valve cannot be fitted together on the same side.

2) Specify the test point for inlet pressure  $p_u$  or outlet pressure  $p_d$ .

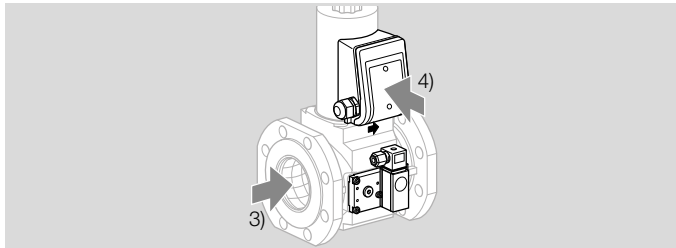
3) Viewed from the right/left: looking into the valve body in the direction of flow, see order example.

4) Viewing side for the electr. connection: looking at the connection box, see order example.

5) The same accessories can be selected for the other viewing side.

## Order example

VAS 665F05NW3E/P2/PP



## 5 Selection

### 5.3.1 Type code

<b>VAS</b>	Solenoid valve for gas
<b>6-9</b>	Sizes
<b>65-125</b>	Inlet and outlet flange nominal size
<b>F</b>	Flange to ISO 7005
<b>05</b>	$p_u$ max. 500 mbar
<b>N</b>	Quick opening, quick closing
<b>L</b>	Slow opening, quick closing
<b>W</b>	Mains voltage 230 V AC, 50/60 Hz
<b>Q</b>	Mains voltage 120 V AC, 50/60 Hz
<b>K</b>	Mains voltage 24 V DC
<b>A</b>	Mains voltage 120-230 V AC, 50/60 Hz
<b>G</b>	With POC/CPS for 24 V and visual position indicator
<b>S</b>	With POC/CPS and visual position indicator
<b>L</b>	Viewing side: left
<b>R</b>	Viewing side: right
<b>3</b>	Electrical connection: M20 cable gland
<b>5</b>	Electrical connection: plug without socket
<b>6</b>	Electrical connection: plug with socket
<b>7</b>	Electrical connection: plug for 2 valves and POC/CPS without socket
<b>8</b>	Electrical connection: plug for 2 valves and POC/CPS with socket
<b>B</b>	Basic
<b>E</b>	Prepared for adapter plates
<b>P</b>	Accessory, right, inlet: screw plug
<b>M</b>	Accessory, right, inlet: pressure test point
<b>1-4</b>	Accessories, right, inlet: pressure switch DG..VC

<b>P</b>	Accessory, right, outlet: screw plug
<b>M</b>	Accessory, right, outlet: pressure test point
<b>1-4</b>	Accessories, right, outlet: pressure switch DG..VC

The same accessories can be selected for the left- or right-hand side.

## 5.4 Selection table for VCS 1–3

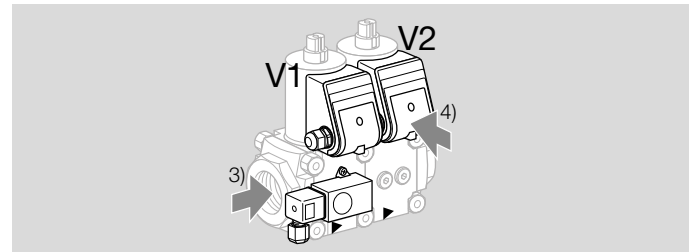
Option	VCS 1	VCS 2	VCS 3
EU certified	E	E	E
DN	–, 10, 15, 25	–, 25, 32, 40, 50	40, 50, 65
Pipe connection	–, R, N	–, R, N, F <sup>5)</sup>	–, R, N, F <sup>5)</sup>
Inlet pressure	05	05	05
Filter module VMF	F	F	F
V1 opening properties	N, L	N, L	N, L
V2 opening properties	N, L	N, L	N, L
Fine-adjusting valve VMV, measuring orifice VMO	V, O	V, O	V, O
Mains voltage	W, Q, K, P, Y	W, Q, K, P, Y	W, Q, K, P, Y
Feedback <sup>1)</sup>	S, G	S, G	S, G
Viewing side <sup>3)</sup>	R, L	R, L	R, L
Electrical connection <sup>4)</sup>	M20, plug, plug with socket	M20, plug, plug with socket	M20, plug, plug with socket
Accessories, right, inlet <sup>3)</sup>	/P, /M, 1 <sup>2)</sup> , 2 <sup>2)</sup> , 3 <sup>2)</sup> , 4 <sup>2)</sup>	/P, /M, 1 <sup>2)</sup> , 2 <sup>2)</sup> , 3 <sup>2)</sup> , 4 <sup>2)</sup>	/P, /M, 1 <sup>2)</sup> , 2 <sup>2)</sup> , 3 <sup>2)</sup> , 4 <sup>2)</sup>
Accessories, left, inlet <sup>3)</sup>	P, M, 1 <sup>2)</sup> , 2 <sup>2)</sup> , 3 <sup>2)</sup> , 4 <sup>2)</sup> , BY <sup>1)</sup> , BS <sup>1)</sup> , ZY <sup>1)</sup> , ZS <sup>1)</sup>	P, M, 1 <sup>2)</sup> , 2 <sup>2)</sup> , 3 <sup>2)</sup> , 4 <sup>2)</sup> , BY <sup>1)</sup> , BS <sup>1)</sup> , ZY <sup>1)</sup> , ZS <sup>1)</sup>	P, M, 1 <sup>2)</sup> , 2 <sup>2)</sup> , 3 <sup>2)</sup> , 4 <sup>2)</sup> , BY <sup>1)</sup> , BS <sup>1)</sup> , ZY <sup>1)</sup> , ZS <sup>1)</sup>

- 1) Proof of closure switch and bypass/pilot gas valve cannot be fitted together on the same side.
- 2) Specify the test point for inlet pressure  $p_u$  or outlet pressure  $p_d$ . When attaching DG..VC for  $p_z$ , the installation space left at the other valve is only sufficient for screw plugs.
- 3) Viewed from the right/left: looking into the valve body in the direction of flow, see order example.
- 4) Viewing side for the electr. connection: looking at the connection box, see order example.
- 5) VCS 240 and VCS 350 available with ISO flange (pursuant to ISO 7005)

## Order example

VCS 2E40R/40R05NNWR3/2-PP/PPPP

Fitted pressure switch for test point  $p_u$



## 5 Selection

### 5.4.1 Type code

<b>VCS</b>	Double solenoid valve
<b>1-3</b>	Sizes
<b>E</b>	EU certified
<b>10-65</b>	Inlet and outlet flange nominal size
<b>R</b>	Rp internal thread
<b>F</b>	Flange to ISO 7005
<b>05</b>	$p_u$ max. 500 mbar
<b>L</b>	Valve 1 slow opening, quick closing
<b>N</b>	Valve 1 quick opening, quick closing, with flow adjustment
<b>L</b>	Valve 2 slow opening, quick closing
<b>N</b>	Valve 2 quick opening, quick closing, with flow adjustment
<b>W</b>	Mains voltage 230 V AC, 50/60 Hz
<b>Q</b>	Mains voltage 120 V AC, 50/60 Hz
<b>K</b>	Mains voltage 24 V DC
<b>P</b>	Mains voltage 100 V AC, 50/60 Hz
<b>Y</b>	Mains voltage 200 V AC, 50/60 Hz
<b>S</b>	With POC/CPS and visual position indicator
<b>G</b>	With POC/CPS for 24 V and visual position indicator
<b>R</b>	Viewing side: right
<b>L</b>	Viewing side: left
<b>3</b>	Electrical connection via cable gland
<b>/P</b>	Accessory, right, inlet: screw plug
<b>/M</b>	Accessory, right, inlet: pressure test point
<b>P</b>	Accessory, right, interspace 1: screw plug
<b>M</b>	Accessory, right, interspace 1: pressure test point

<b>P</b>	Accessory, right, interspace 2: screw plug
<b>M</b>	Accessory, right, interspace 2: pressure test point
<b>P</b>	Accessory, right, outlet: screw plug
<b>M</b>	Accessory, right, outlet: pressure test point
The same accessories can be selected for the left- or right-hand side.	

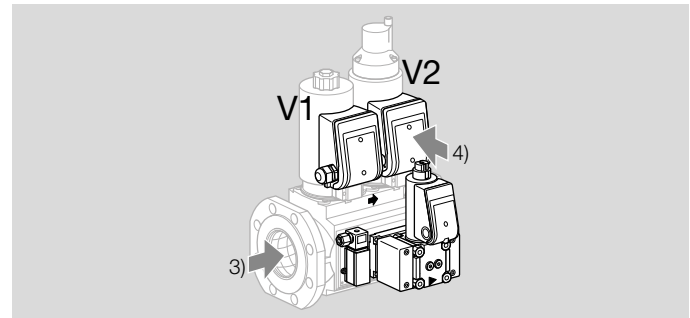
## 5.5 Selection table for VCS 6–9

Option	VCS 6	VCS 7	VCS 8	VCS 9
DN	65	80	100	125
Pipe connection	F, A	F, A	F, A	F, A
Inlet pressure	05	05	05	05
V1 opening properties	N, L	N, L	N, L	N, L
V2 opening properties	N, L	N, L	N, L	N, L
Mains voltage	W, A, Q, K	W, Q, K	W, Q, K	A
Feedback <sup>1)</sup>	S, G	S, G	S, G	S, G
Viewing side <sup>3)</sup>	R, L	R, L	R, L	R, L
Electrical connection <sup>4)</sup>	M20, plug, plug with socket	M20, plug, plug with socket	M20, plug, plug with socket	M20, plug, plug with socket
Basic, prepared for adapter plates	B, E	B, E	B, E	B, E
Accessories, right, inlet <sup>3) 5)</sup>	/P, /M, /1 <sup>2)</sup> , /2 <sup>2)</sup> , /3 <sup>2)</sup> , /4 <sup>2)</sup>	/P, /M, /1 <sup>2)</sup> , /2 <sup>2)</sup> , /3 <sup>2)</sup> , /4 <sup>2)</sup>	/P, /M, /1 <sup>2)</sup> , /2 <sup>2)</sup> , /3 <sup>2)</sup> , /4 <sup>2)</sup>	/P, /M, /1 <sup>2)</sup> , /2 <sup>2)</sup> , /3 <sup>2)</sup> , /4 <sup>2)</sup>
Accessories, right, interspace 1 <sup>3) 5)</sup>	P, M, 1 <sup>2)</sup> , 2 <sup>2)</sup> , 3 <sup>2)</sup> , 4 <sup>2)</sup>	P, M, 1 <sup>2)</sup> , 2 <sup>2)</sup> , 3 <sup>2)</sup> , 4 <sup>2)</sup>	P, M, 1 <sup>2)</sup> , 2 <sup>2)</sup> , 3 <sup>2)</sup> , 4 <sup>2)</sup>	P, M, 1 <sup>2)</sup> , 2 <sup>2)</sup> , 3 <sup>2)</sup> , 4 <sup>2)</sup>
Accessories, right, interspace 2 <sup>3) 5)</sup>	P, M, 1 <sup>2)</sup> , 2 <sup>2)</sup> , 3 <sup>2)</sup> , 4 <sup>2)</sup> , B, Z, V, E	P, M, 1 <sup>2)</sup> , 2 <sup>2)</sup> , 3 <sup>2)</sup> , 4 <sup>2)</sup> , B, Z, V, E	P, M, 1 <sup>2)</sup> , 2 <sup>2)</sup> , 3 <sup>2)</sup> , 4 <sup>2)</sup> , B, Z, V, E	P, M, 1 <sup>2)</sup> , 2 <sup>2)</sup> , 3 <sup>2)</sup> , 4 <sup>2)</sup> , B, Z, V, E
Accessories, right, outlet <sup>3) 5)</sup>	P, M, 1 <sup>2)</sup> , 2 <sup>2)</sup> , 3 <sup>2)</sup> , 4 <sup>2)</sup>	P, M, 1 <sup>2)</sup> , 2 <sup>2)</sup> , 3 <sup>2)</sup> , 4 <sup>2)</sup>	P, M, 1 <sup>2)</sup> , 2 <sup>2)</sup> , 3 <sup>2)</sup> , 4 <sup>2)</sup>	P, M, 1 <sup>2)</sup> , 2 <sup>2)</sup> , 3 <sup>2)</sup> , 4 <sup>2)</sup>

- 1) Specify wiring of 1<sup>st</sup> or 2<sup>nd</sup> proof of closure switch (or “none”).
- 2) Specify the test point for inlet pressure  $p_u$ , interspace pressure  $p_z$  or outlet pressure  $p_d$ .
- 3) Viewed from the right/left: looking into the valve body in the direction of flow, see order example.
- 4) Viewing side for the electr. connection: looking at the connection box, see order example.
- 5) The same accessories can be selected for the other viewing side.

## Order example

VCS 665F05NLW3E/2B/PPPP



## 5 Selection

### 5.5.1 Type code

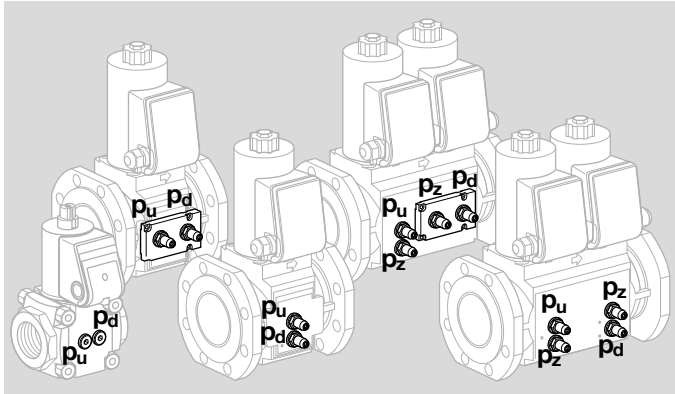
<b>VAS</b>	Solenoid valve for gas
<b>VCS</b>	Double solenoid valve
<b>6-9</b>	Sizes
<b>65-125</b>	Inlet and outlet flange nominal size
<b>F</b>	Flange to ISO 7005
<b>05</b>	$p_u$ max. 500 mbar
<b>N</b>	Valve 1 quick opening, quick closing
<b>L</b>	Valve 1 slow opening, quick closing
<b>L</b>	Valve 2 slow opening, quick closing
<b>N</b>	Valve 2 quick opening, quick closing, with flow adjustment
<b>W</b>	Mains voltage 230 V AC, 50/60 Hz
<b>Q</b>	Mains voltage 120 V AC, 50/60 Hz
<b>K</b>	Mains voltage 24 V DC
<b>G</b>	With POC/CPS for 24 V and visual position indicator
<b>S</b>	With POC/CPS and visual position indicator
<b>L</b>	Viewing side: left
<b>R</b>	Viewing side: right
<b>3</b>	Electrical connection: M20 cable gland
<b>5</b>	Electrical connection: plug without socket
<b>6</b>	Electrical connection: plug with socket
<b>7</b>	Electrical connection: plug for 2 valves and POC/CPS without socket
<b>8</b>	Electrical connection: plug for 2 valves and POC/CPS with socket
<b>B</b>	Basic
<b>E</b>	Prepared for adapter plates

<b>P</b>	Accessory, right, inlet: screw plug
<b>M</b>	Accessory, right, inlet: pressure test point
<b>1-4</b>	Accessories, right, inlet: pressure switch DG..VC
<b>P</b>	Accessory, right, interspace 1: screw plug
<b>M</b>	Accessory, right, interspace 1: pressure test point
<b>1-4</b>	Accessories, right, interspace 1: pressure switch DG..VC
<b>P</b>	Accessory, right, interspace 2: screw plug
<b>M</b>	Accessory, right, interspace 2: pressure test point
<b>Z</b>	Accessories, right, interspace 2: pilot gas valve VAS 1
<b>B</b>	Accessories, right, interspace 2: bypass valve VAS 1
<b>E</b>	Accessories, right, interspace 2: prepared for Rp 1 vent line
<b>1-4</b>	Accessories, right, interspace 2: pressure switch DG..VC
<b>P</b>	Accessory, right, outlet: screw plug
<b>M</b>	Accessory, right, outlet: pressure test point
<b>1-4</b>	Accessories, right, outlet: pressure switch DG..VC
The same accessories can be selected for the left- or right-hand side.	



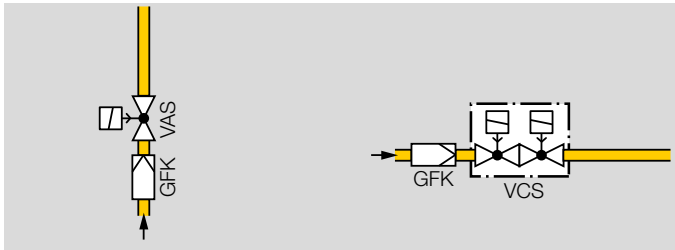
## 6 Project planning information

### 6.1 Connections $p_u$ , $p_d$ , $p_z$



The inlet pressure  $p_u$ , the interspace pressure  $p_z$  and the outlet pressure  $p_d$  can be measured at the pressure test points on both sides.

### 6.2 Installation

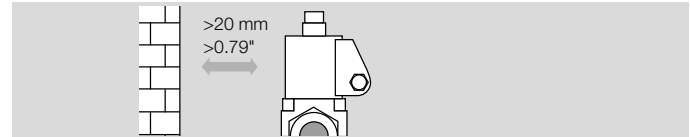


Installation position: black solenoid actuator in the vertical upright position or tilted up to the horizontal, not upside down.

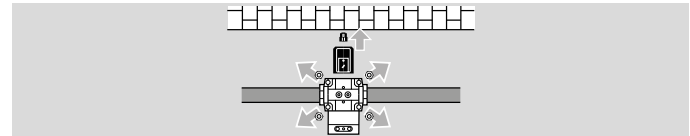
Sealing material and thread cuttings must not be allowed to get into the valve housing. Install a filter upstream of every system.

The pipe system must be designed in such a way so as to avoid strain at the connections.

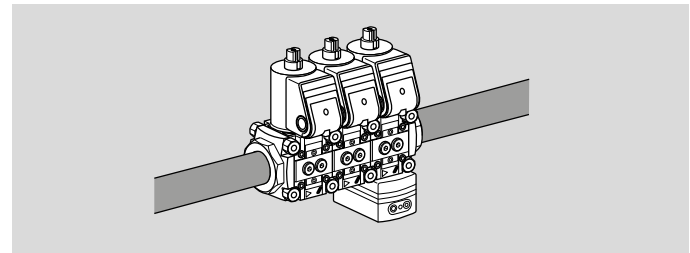
Do not store or install the unit in the open air.



The device must not be in contact with masonry. Minimum clearance 20 mm (0.79 inch).

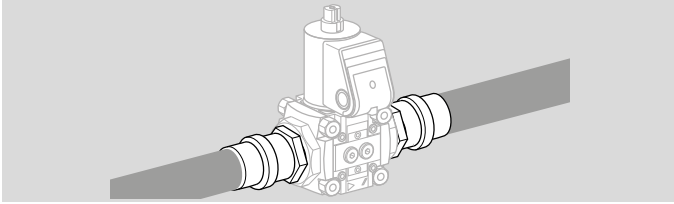


Ensure that there is sufficient space for installation, adjustment and maintenance work. Minimum clearance of 25 cm (9.8 inch) above the black solenoid actuator.



If more than three valVario controls are installed in line, the controls must be supported.

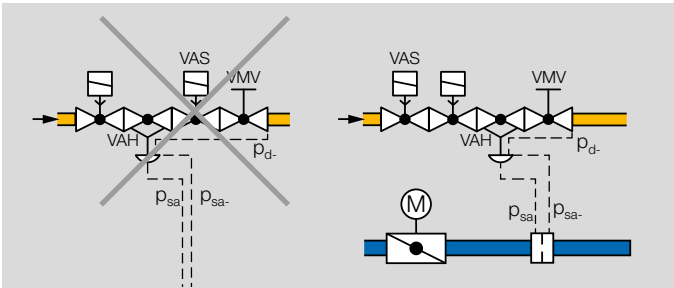
## 6 Project planning information



The seals in some gas compression fittings are approved for temperatures of up to 70°C (158°F). This temperature limit will not be exceeded if the flow through the pipe is at least 1 m<sup>3</sup>/h (35.31 SCFH) of gas and the maximum ambient temperature is 50°C (122°F).

In the case of a VCx combination, it is recommended to always install the bypass/pilot gas valve on the rear of the second valve and the tightness control on the viewing side of the first valve, together with the connection box.

### 6.3 Design specifications



It is not permitted to install a gas solenoid valve VAS downstream of flow rate regulator VAH and upstream of fine-adjusting valve VMV. The VAS would no longer be able to perform its function as a second safety valve if installed in the above-mentioned position.

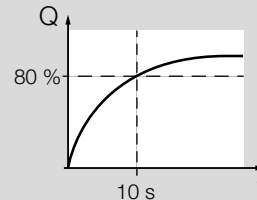
The measuring orifice in the air line for impulse lines  $p_{sa}$  and  $p_{sa-}$  must always be installed downstream of the air control valve.

### 6.4 Opening times

VAS../N quick opening:  $\leq 1$  s;

VAS../L slow opening: up to 10 s.

Factory setting of the damping speed: 80% of the maximum flow rate are supplied within an opening time of 10 s.



#### 6.4.1 Note on settings

##### VAS 1–3..L, VCS 1–3..L: damping speed

The opening speed can be influenced by turning the nozzle screw on the damping unit, see Operating instructions VAS 1–3, VCS 1–3, Setting the damping speed.

### 6.5 Flow rate for bypass or pilot gas valve

Characteristic flow rates, see accessories, page 38 (7.2 Bypass/pilot gas valve VAS 1) and page 42 (7.3 Bypass/pilot gas valve VBY 8).

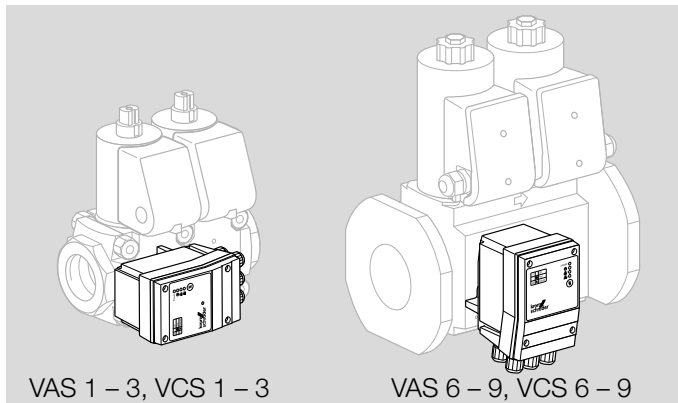
## 6.6 Hydrogen



Other hydrogen-compatible products can be found here: Technical Information, Products for hydrogen.

## 6.7 Tightness control TC 1V

Tightness control TC 1V can be mounted directly onto the valve, see accessories, page 48 (7.12 Tightness control TC 1V).



Tightness control TC 1V and bypass/pilot gas valve cannot be fitted together on the same side of the double block valve.

## 6.8 Electrical connection

Use temperature-resistant cable (> 90°C) for the electrical connection.

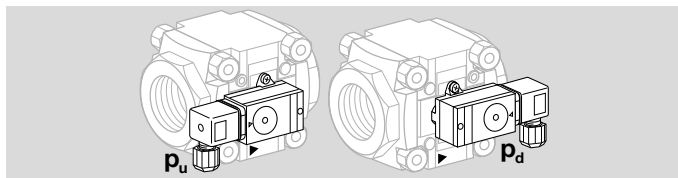


The solenoid actuator heats up during operation. Surface temperature approx. 85°C (185°F) pursuant to EN 60730-1. In the case of double solenoid valves, the position of the connection box can only be changed by removing the actuator and reinstalling it rotated by 90° or 180°. The solenoid actuator cannot be rotated on solenoid valves with proof of closure switch VCx..S or VCx..G.

## 7 Accessories

### 7.1 Pressure switch for gas DG..C

Monitoring the inlet pressure  $p_u$ : the electrical plug of the pressure switch for gas points towards the inlet flange.  
Monitoring the outlet pressure  $p_d$ : the electrical plug of the pressure switch for gas points towards the outlet flange.

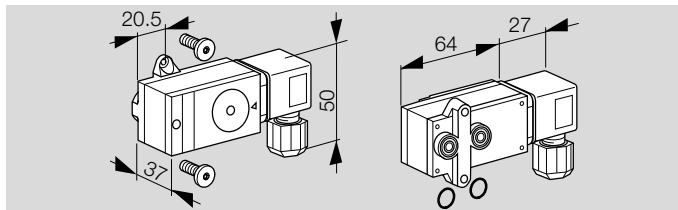


Scope of delivery:

- 1 x pressure switch for gas,
- 2 x retaining screws,
- 2 x sealing rings.

Also available with gold-plated contacts for voltages of 5 to 250 V.

### DG..VC

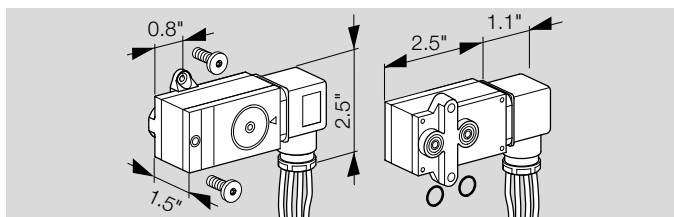


Type	Adjusting range [mbar]	Order No.
DG 17VC	2 to 17	75455241
DG 40VC	5 to 40	75455243
DG 45VC	10 to 45	75455244
DG 110VC	30 to 110	75455245
DG 300VC	100 to 300	75455246

Type	Adjusting range [mbar]	Order No.
With gold-plated contacts for voltages of 5 to 250 V		
DG 17VC..G	2 to 17	75455247
DG 40VC..G	5 to 40	75455249
DG 45VC..G	10 to 45	75455250
DG 110VC..G	30 to 110	75455251
DG 300VC..G	100 to 300	75455252

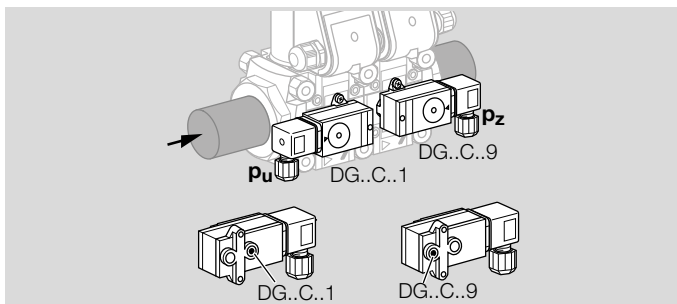
### DG..VCT

With AWG 18 connection conductors



Type	Adjusting range [\"WC]	Order No.
DG 17VCT	0,8 to 6,8	75454583
DG 40VCT	2 to 16	74214174
DG 110VCT	12 to 44	75454585
DG 300VCT	40 to 120	75454586
With gold-plated contacts for voltages of 5 to 250 V		
DG 17VCT..G	0,8 to 6,8	75454587
DG 40VCT..G	2 to 16	75454588
DG 110VCT..G	12 to 44	75454589
DG 300VCT..G	40 to 120	75454590

### 7.1.1 Installation on VCS 1–3

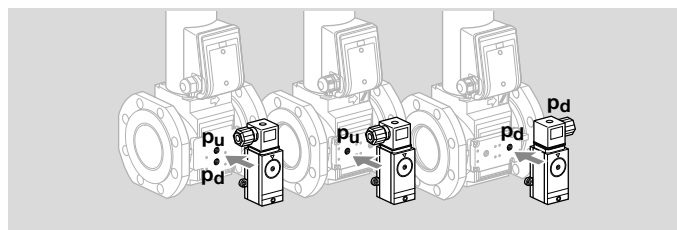


If, when monitoring the inlet or outlet pressure and the interspace pressure, both pressure switches should be fitted on the same side of the valve, only the combination DG..C..1 and DG..C..9 may be used for design reasons. The socket of the gas pressure switch DG..C..1 points towards the test point  $p_u$  (towards the inlet flange). The DG..C..9 is also optionally available for monitoring the interspace pressure  $p_z$ . The socket points towards the outlet flange.

### 7.1.2 DG..C fastening set for VAX 1–3

Order No.: 74922376,  
scope of delivery:  
2 x retaining screws,  
2 x sealing rings.

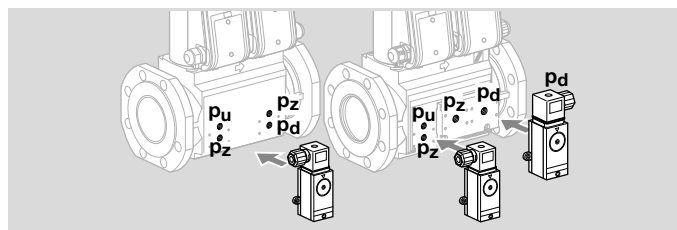
### 7.1.3 Installation on VAS 6–9



Monitoring the inlet pressure  $p_u$ : the pressure switch for gas is mounted on the inlet side.

Monitoring the outlet pressure  $p_d$ : the pressure switch for gas is mounted on the outlet side.

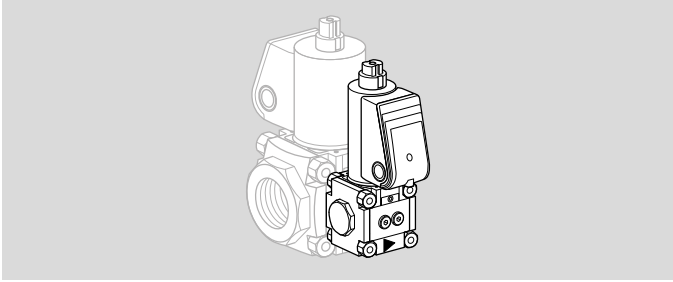
### 7.1.4 Installation on VCS 6–9



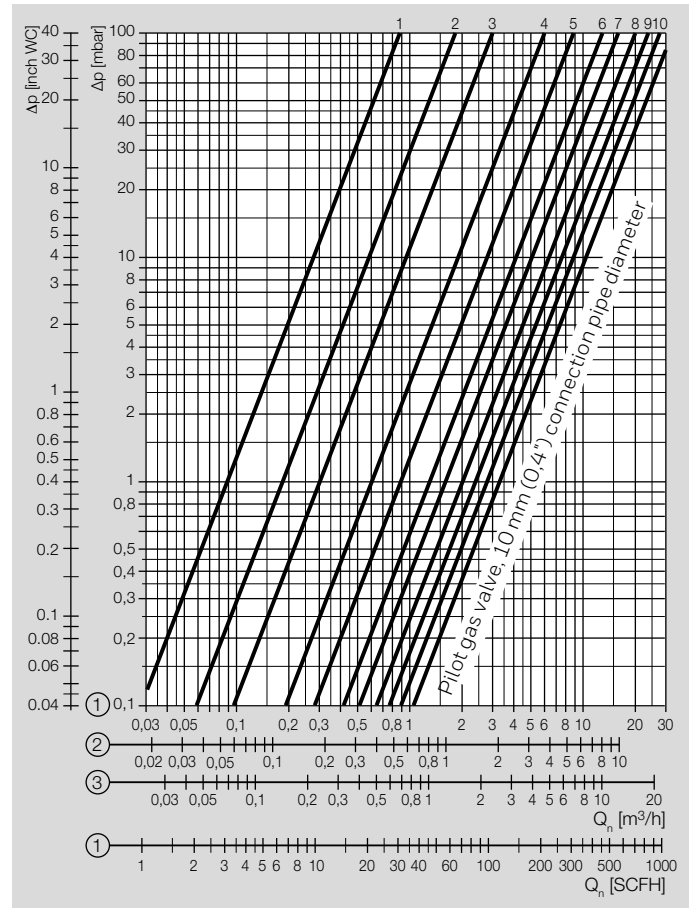
Monitoring the inlet pressure  $p_u$ , interspace pressure  $p_z$ , outlet pressure  $p_d$ : for this, attach the pressure switch for gas at the relevant position in each case.

## 7.2 Bypass/pilot gas valve VAS 1

### 7.2.1 Flow rate, VAS 1 attached to VAx 1, VAx 2, VAx 3



The characteristic flow rate curves have been measured for bypass valve VAS 1 with connection pipe diameter 1 to 10 mm (0.04–0.4") and for the pilot gas valve with 10 mm connection pipe.

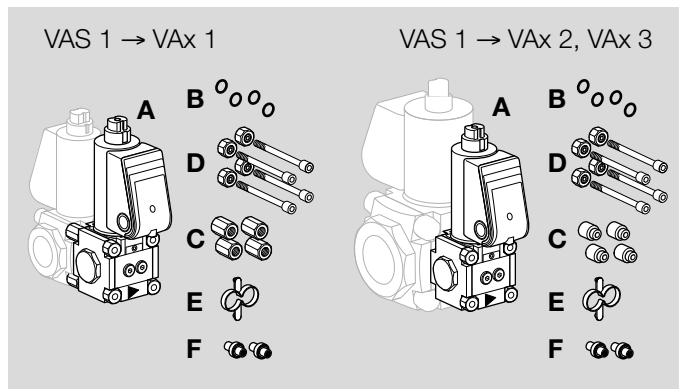


1 = natural gas ( $\rho = 0.80 \text{ kg/m}^3$ )

2 = propane ( $\rho = 2.01 \text{ kg/m}^3$ )

3 = air ( $\rho = 1.29 \text{ kg/m}^3$ )

**7.2.2 Scope of delivery of VAS 1 for VAx 1, VAx 2, VAx 3**



- A** 1 x bypass/pilot gas valve VAS 1,
- B** 4 x O-rings,
- C** 4 x double nuts for VAS 1 -> VAx 1,
- C** 4 x spacer sleeves for VAS 1 -> VAx 2/VAx 3,
- D** 4 x connection parts,
- E** 1 x mounting aid.

Pilot gas valve VAS 1:

- F** 1 x connection pipe, 1 x sealing plug, if the pilot gas valve has a threaded flange on the outlet side.

Bypass valve VAS 1:

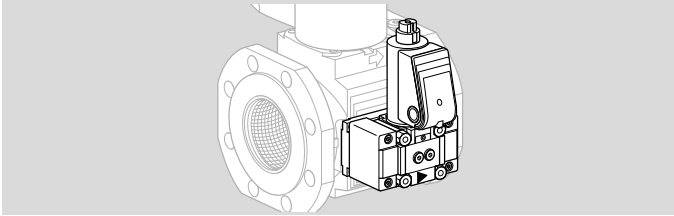
- F** 2 x connection pipes, if the bypass valve has a blind flange on the outlet side.

Standard: Ø 10 mm.

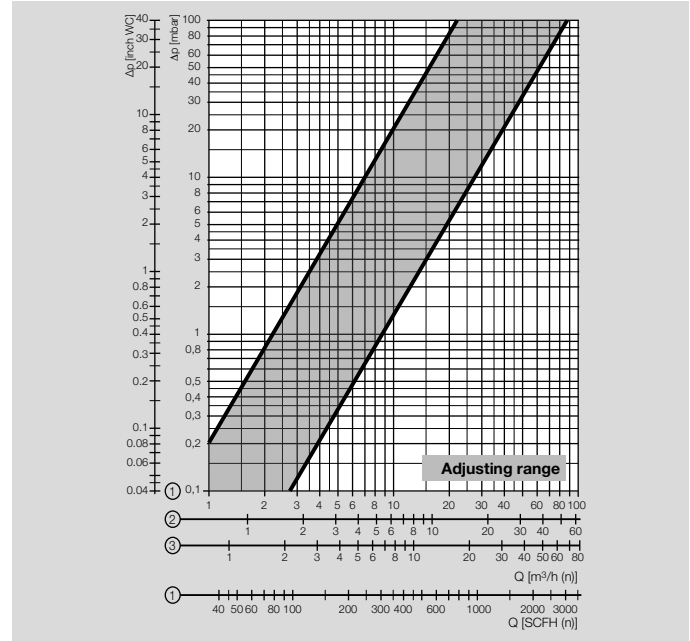
Other connection pipes ( **F** ) with bypass diameter as of 1 mm are available.

Ø	Order No.
1 mm	74923877
2 mm	74923910
3 mm	74923911
4 mm	74923912
5 mm	74923913
6 mm	74923914
7 mm	74923915
8 mm	74923916
9 mm	74923917
10 mm	74923918

7.2.3 Flow rate, VAS 1 attached to VAS 6-9, VCS 6-9



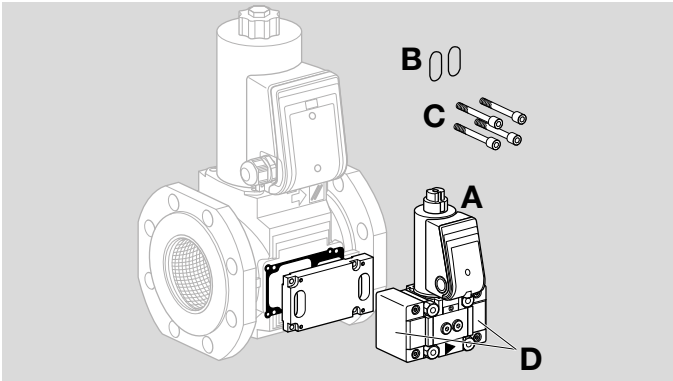
The adjusting range for the bypass valve, and pilot gas valve, VAS 1 was determined using the values measured for open flow adjustment ( $Q_{max.}$ ) and fully reduced flow adjustment ( $Q_{min.}$ ).



- 1 = natural gas ( $\rho = 0.80 \text{ kg/m}^3$ )
- 2 = propane ( $\rho = 2.01 \text{ kg/m}^3$ )
- 3 = air ( $\rho = 1.29 \text{ kg/m}^3$ )



### 7.2.4 Scope of delivery of VAS 1 for VAS 6–9, VCS 6–9



- A** 1 x bypass or pilot gas valve VAS 1,
- B** 2 x flange O-rings,
- C** 4 x connecting screws.

Bypass valve VAS 1:

- D** 2 x adapter flanges.

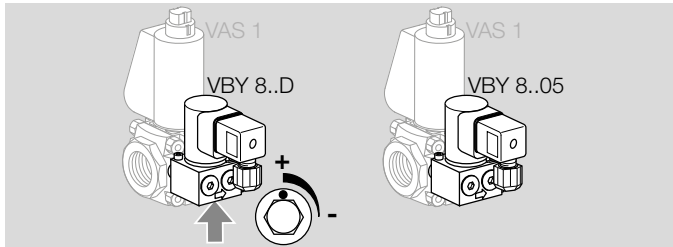
Pilot gas valve VAS 1:

- D** 1 x adapter flange,
- 1 x adapter flange with threaded hole.

For connection to VAS 6–9, VCS 6–9, the adapter plate must be ordered separately, see page 46 (7.8.1 Bypass adapter).

## 7.3 Bypass/pilot gas valve VBY 8

### 7.3.1 Flow rate, VBY



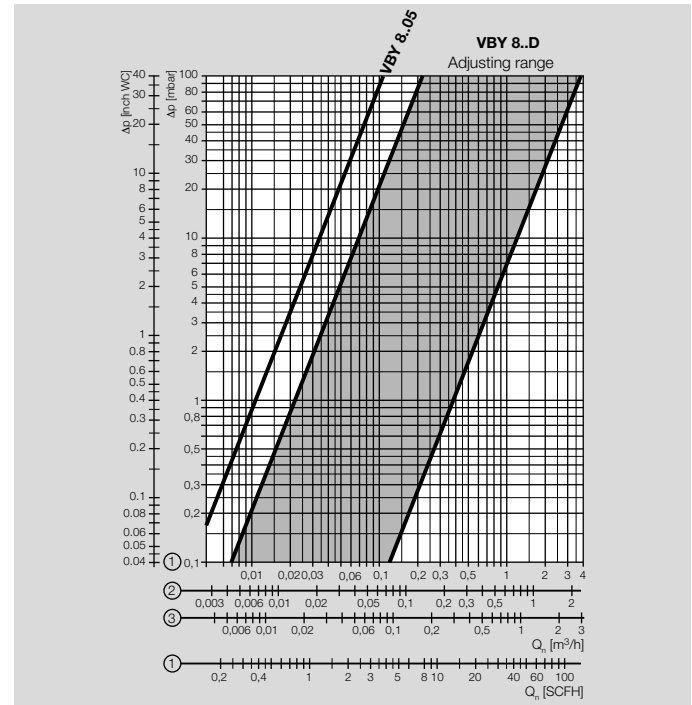
#### VBY 8..D

The flow rate can be set by turning the flow rate restrictor (4 mm/0.16" hexagon socket)  $\frac{1}{4}$  of a turn. Flow rate: 10 to 100%.

» Only adjust the flow rate restrictor in the marked range; otherwise, the required gas volume will not be reached.

#### VBY 8..05

The flow is routed through a 0.5 mm (0.02") nozzle and thus has a fixed characteristic flow rate curve. Adjustment is not possible.



1 = natural gas ( $\rho = 0.80 \text{ kg/m}^3$ )

2 = propane ( $\rho = 2.01 \text{ kg/m}^3$ )

3 = air ( $\rho = 1.29 \text{ kg/m}^3$ )

### 7.3.2 Technical data VBY 8

Inlet pressure  $p_{u \max}$ : 500 mbar (7 psig).

Ambient temperature:

0 to +60 °C (32 to 140 °F), no condensation permitted.

Storage temperature:

0 to +40 °C (32 to 104 °F).

Power consumption:

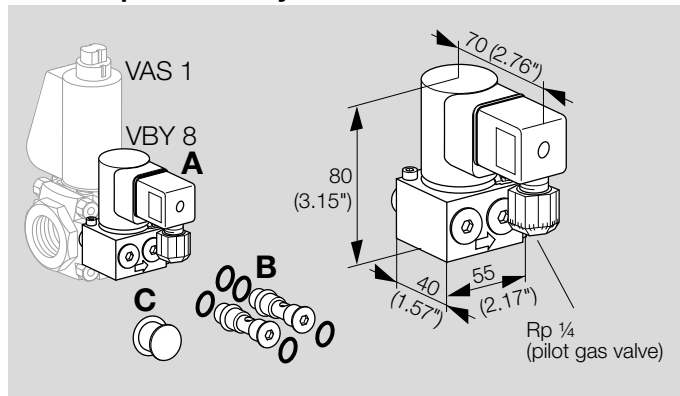
24 V DC = 8 W,

120 V AC = 8 W,

230 V AC = 9,5 W.

Enclosure: IP 54.

### 7.3.3 Scope of delivery of VBY for VAX 1



### Scope of delivery of VBY 8I as bypass valve

**A** 1 x bypass valve VBY 8I,

**B** 2 x retaining screws with 4 x O-rings: both retaining screws have a bypass orifice,

**C** grease for O-rings.

### Scope of delivery of VBY 8R as a pilot gas valve

**A** 1 x pilot gas valve VBY 8R,

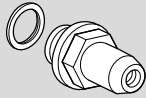
**B** 2 x retaining screws with 5 x O-rings: one retaining screw has a bypass orifice (2 x O-rings), the other does not (3 x O-rings),

**C** grease for O-rings.

### 7.3.4 Type code

<b>VBY</b>	Gas valve
<b>8</b>	Nominal size
<b>I</b>	For internal gas pick-up as bypass valve
<b>R</b>	For external gas pick-up as pilot gas valve
<b>Q</b>	Mains voltage 120 V AC, 50/60 Hz
<b>K</b>	Mains voltage 24 V DC
<b>W</b>	Mains voltage 230 V AC, 50/60 Hz
<b>6L</b>	Electrical connection via plug and socket with LED
<b>-R</b>	Attachment side of main valve: right
<b>-L</b>	Attachment side of main valve: left
<b>B</b>	Enclosed (separate packing unit)
<b>05</b>	Nozzle: 0.5 mm
<b>D</b>	With flow adjustment

## 7.4 Pressure test nipples



### Scope of delivery

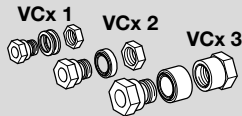
1 x test nipple with 1 x profiled sealing ring,  
Rp 1/4: Order No. 74923390.

1 x test nipple (steel) with 1 x profiled sealing ring (Viton),  
1/4 NPT: Order No. 74921869.

## 7.5 Cable gland set

When wiring double solenoid valve VCx 1–3, the connection boxes are to be connected using a cable gland set.

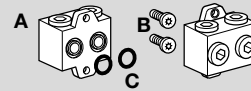
The cable gland set can only be used if the connection boxes are at the same height and on the same side and if both valves are equipped either with or without a proof of closure switch.



VA 1, Order No. 74921985,  
VA 2, Order No. 74921986,  
VA 3, Order No. 74921987.

## 7.6 Attachment block VA 1–3

For locked installation of pressure gauge or other accessories on the gas solenoid valve VAS 1–3.



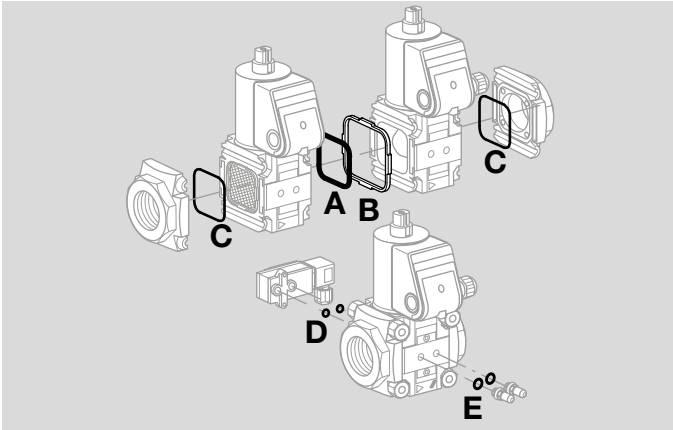
Attachment block Rp 1/4, Order No. 74922228,  
Attachment block 1/4 NPT, Order No. 74926048.

Scope of delivery:

- A** 1 x attachment block,
- B** 2 x self-tapping screws for installation,
- C** 2 x O-rings.

### 7.7 Seal set for sizes 1–3

When retrofitting accessories or a second valVario control or when servicing, we recommend replacing the seals.



#### VAx 1–3

VA 1, Order No. 74921988,  
VA 2, Order No. 74921989,  
VA 3, Order No. 74921990.

#### Scope of delivery:

**A** 1 x double block seal,  
**B** 1 x retaining frame,  
**C** 2 x O-rings (flange),  
**D** 2 x O-rings (pressure switch),

for test nipple/screw plug:

**E** 2 x sealing rings (flat sealing),  
2 x profiled sealing rings.

#### VCx 1-3

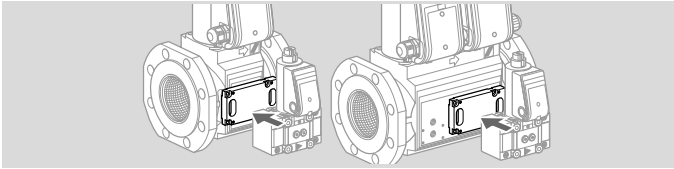
VA 1, Order No. 74924978,  
VA 2, Order No. 74924979,  
VA 3, Order No. 74924980.

#### Scope of delivery:

**A** 1 x double block seal,  
**B** 1 x retaining frame.

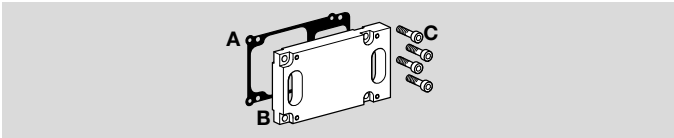
## 7.8 Adapter plates for VAS/VCS 6–9

### 7.8.1 Bypass adapter



For connecting the bypass/pilot gas valve VAS 1.

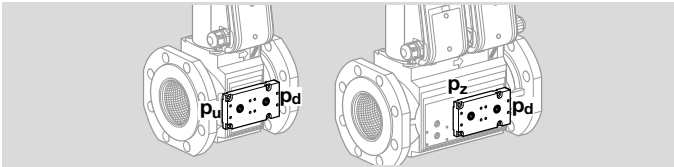
Order No. 74923023



#### Scope of delivery:

- A 1 x seal,
- B 1 x bypass plate,
- C 4 x M5 set screws.

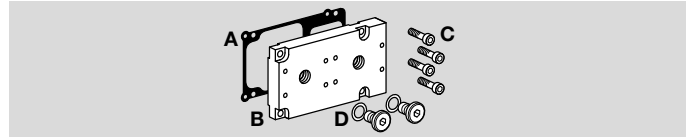
### 7.8.2 Measuring adapter



For the connection of the pressure switch DG..C, with a screw plug or pressure test nipple.

VAS/VCS 6–9, Order No. 74923021,

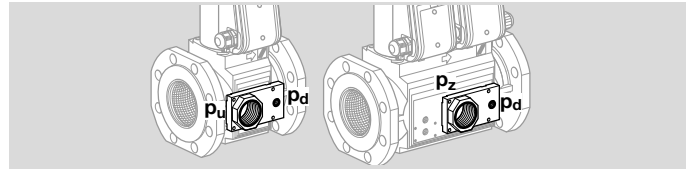
VAS..T/VCS..T 6–9, Order No. 74923022.



#### Scope of delivery:

- A 1 x seal,
- B 1 x measuring plate,
- C 4 x M5 set screws,
- D 2 x screw plugs with sealing rings.

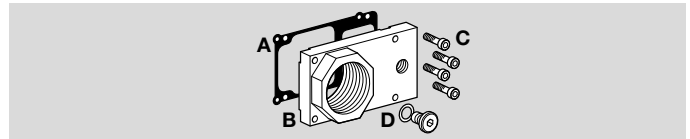
### 7.8.3 Relief line adapter



For the connection of a relief line (1½ NPT, Rp 1), with a screw plug or pressure test nipple.

Rp 1, VAS/VCS 6–9, Order No. 74923025,

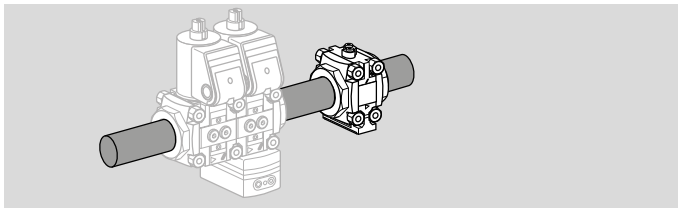
1½ NPT, VAS..T/VCS..T 6–9, Order No. 74923024.



#### Scope of delivery:

- A 1 x seal,
- B 1 x Z flange,
- C 4 x M5 set screws,
- D 1 x screw plug with sealing ring

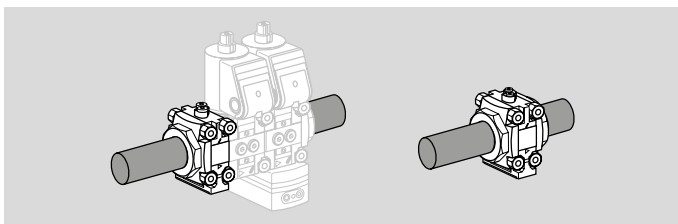
## 7.9 Measuring orifice VMO



The measuring orifice VMO is designed to reduce the gas and air flow rates and is installed downstream of the valVario control. The measuring orifice is available with Rp internal thread (NPT internal thread) or flange to ISO 7005.

Technical Information VMO, see [www.docuthek.com](http://www.docuthek.com).

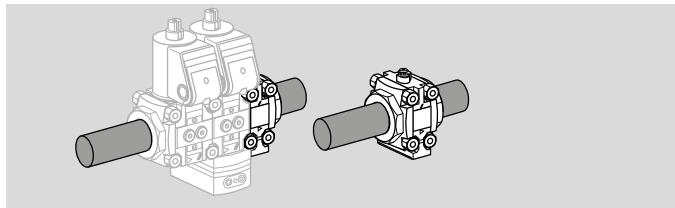
## 7.10 Filter module VMF



Using the filter module VMF, the gas flow upstream of the gas solenoid valve VAS and the air/gas ratio control is cleaned. The filter module is available with Rp internal thread (NPT internal thread) or flange to ISO 7005 and can also be supplied with fitted pressure switch as an option.

Technical Information VMF, see [www.docuthek.com](http://www.docuthek.com).

## 7.11 Fine-adjusting valve VMV

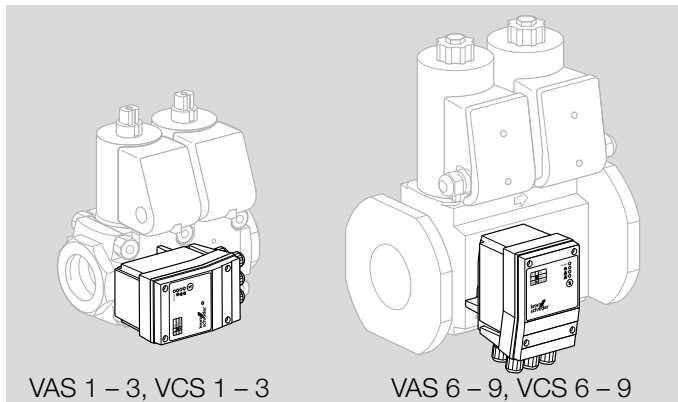


The flow rate is set using the fine-adjusting valve VMV. The fine-adjusting valve is available with Rp internal thread (NPT internal thread) or flange to ISO 7005.

Technical Information VMV, see [www.docuthek.com](http://www.docuthek.com).

## 7.12 Tightness control TC 1V

TC 1V checks the tightness of two safety valves before or after burner run. For further information, see [www.docuthek.com](http://www.docuthek.com).



### Control voltage = mains voltage

TC 1V05W/W, Order No. 84765541,

TC 1V05Q/Q, Order No. 84765543,

TC 1V05K/K, Order No. 84765545.

### Control voltage = 24 V DC

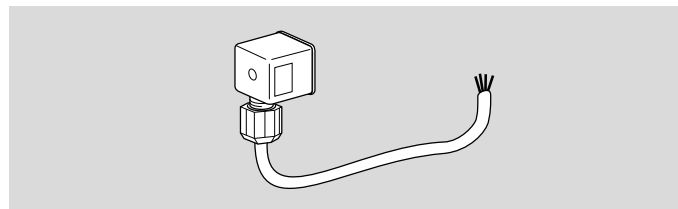
TC 1V05W/K, Order No. 84765542,

TC 1V05Q/K, Order No. 84765544.

### 7.12.1 Type code TC 1V

<b>TC</b>	Tightness control
<b>1V</b>	For attachment to valVario
<b>05</b>	$p_u$ max. 500 mbar
<b>W</b>	Mains voltage 230 V AC, 50/60 Hz
<b>Q</b>	Mains voltage 120 V AC, 50/60 Hz
<b>K</b>	Mains voltage 24 V DC
<b>/W</b>	Control voltage: 230 V AC, 50/60 Hz
<b>/Q</b>	Control voltage: 120 V AC, 50/60 Hz
<b>/K</b>	Control voltage: 24 V DC

## 7.13 Valve connection cable



Standard socket, 3 pins + PE, black, 4-core electrical cable, cable length 0.45 m, Order No. 74960689



## 8 Technical data

### 8.1 Ambient conditions

Icing, condensation and dew in and on the unit are not permitted.

Avoid direct sunlight or radiation from red-hot surfaces on the unit. Note the maximum medium and ambient temperatures!

Avoid corrosive influences, e.g. salty ambient air or SO<sub>2</sub>.

The unit may only be stored/installed in enclosed rooms/buildings.

The unit is suitable for a maximum installation height of 2000 m AMSL.

Ambient temperature: -20 to +60°C (-4 to +140°F), no condensation permitted.

Long-term use in the upper ambient temperature range accelerates the ageing of the elastomer materials and reduces the service life (please contact manufacturer).

Storage temperature = transport temperature: -20 to +40°C (-4 to +104°F).

Enclosure: IP 65.

This unit is not suitable for cleaning with a high-pressure cleaner and/or cleaning products.

VAS/VCS 1–3: NEMA 2 approved.

VAS/VCS 6–9: NEMA 4 approved.

### 8.2 Mechanical data

Gas types: natural gas, LPG (gaseous), biogas (max. 0.1 %-by-vol. H<sub>2</sub>S), hydrogen or clean air; other types of gas on request. The gas must be clean and dry in all temperature conditions and must not contain condensate.

Medium temperature = ambient temperature.

CE and FM approved, UL listed, max. inlet pressure p<sub>U</sub>: 500 mbar (7.25 psig).

FM approved, non operational pressure: 700 mbar (10 psig). ANSI/CSA approved: 350 mbar (5 psig).

Flow adjustment limits the maximum flow rate to between approx. 20 and 100%.

Adjustment of the start gas rate: 0 to approx. 70%.

Opening times:

VAS../N quick opening: < 1 s;

VAS../L slow opening: up to max. 10 s.

Closing time:

VAS../N, VAS../L quick closing: < 1 s.

Switching frequency:

VAS../N: any, max. 30 x per minute.

VAS../L: max. 2 x per minute. There should be a period of 20 seconds between switching off and on again so that the damping is fully effective.

Safety valve:

Class A, Group 2 pursuant to EN 13611 and EN 161, Factory Mutual (FM) Research Class: 7400 and 7411, ANSI Z21.21 and CSA 6.5.

Valve housing: aluminium, valve seal: NBR.

Connection flanges:

up to size 3: Rp internal thread to ISO 7-1, NPT to ANSI/ASME;

## 8 Technical data

size 2 and higher: with PN 16 ISO flange (pursuant to ISO 7005),

size 6 and higher: with ANSI flange pursuant to ANSI 150.

Cable gland: M20 x 1.5.

Electrical connection: cable with max. 2.5 mm<sup>2</sup> (AWG 12) or plug with socket to EN 175301-803.

Duty cycle: 100%.

Power factor of the solenoid coil:  $\cos \varphi = 0.9$ .

### 8.2.1 $k_V$ values

$k_V$  = valve coefficient ( $k_V$  min. = rough specification for fully restricted flow adjustment)

#### Gas solenoid valves VAS

Type	$k_V$ max. (m <sup>3</sup> /h)	$k_V$ min. (m <sup>3</sup> /h)
VAS 110	5	2
VAS 115	6.4	2
VAS 120	9.6	2
VAS 125	10.9	2
VAS 225	19.2	5.3
VAS 232	24.1	5.3
VAS 240	26.7	5.3
VAS 250	27.2	5.3
VAS 340	38.6	8.5
VAS 350	41.8	8.5
VAS 365	43.5	8.5
VAS 665	76.4	15.3
VAS 780	109.3	21.9
VAS 8100	165.7	33.1
VAS 9125	247.9	–

#### Double solenoid valves VCS

Type	$k_V$ max. (m <sup>3</sup> /h)	$k_V$ min. (m <sup>3</sup> /h)
VCS 110	4.7	2
VCS 115	5.7	2
VCS 120	7.6	2
VCS 125	8.1	2
VCS 225	16.2	5.3
VCS 232	19.0	5.3
VCS 240	20.3	5.3
VCS 250	20.6	5.3
VCS 340	30.8	8.5
VCS 350	32.7	8.5
VCS 365	33.9	8.5
VCS 665	59.5	11.9
VCS 780	84.6	16.9
VCS 8100	127.7	25.5
VCS 9125	190.5	–

### 8.3 Electrical data for VAS 1–3/VCS 1–3

Mains voltage:

230 V AC, +10/-15%, 50/60 Hz;

200 V AC, +10/-15%, 50/60 Hz;

120 V AC, +10/-15%, 50/60 Hz;

100 V AC, +10/-15%, 50/60 Hz;

24 V DC, ±20%.

Power consumption:

Type	Voltage	Power
VAS 1	24 V DC	25 W
VAS 1	100 V AC	25 W (26 VA)
VAS 1	120 V AC	25 W (26 VA)
VAS 1	200 V AC	25 W (26 VA)
VAS 1	230 V AC	25 W (26 VA)
VAS 2, VAS 3	24 V DC	36 W
VAS 2, VAS 3	100 V AC	36 W (40 VA)
VAS 2, VAS 3	120 V AC	40 W (44 VA)
VAS 2, VAS 3	200 V AC	40 W (44 VA)
VAS 2, VAS 3	230 V AC	40 W (44 VA)
VBY	24 V DC	8 W
VBY	120 V AC	8 W
VBY	230 V AC	9,5 W

Contact rating of proof of closure switch:

Type	Voltage	Current (resistive load)	
		min.	max.
VAS..S,VCS..S	12–250 V AC, 50/60 Hz	100 mA	3 A
VAS..G,VCS..G	12–30 V DC	2 mA	0,1 A

Switching frequency of proof of closure switch: max. 5 x per minute.

Switching current	Switching cycles*	
	cos φ = 1	cos φ = 0.6
0.1	500,000	500,000
0.5	300,000	250,000
1	200,000	100,000
3	100,000	–

\* Limited to max. 200,000 cycles for heating systems.

## 8.4 Electrical data for VAS 6–9/VCS 6–9

Mains voltage for VAS 6–8/VCS 6–8:

120 V AC, +10/-15%, 50/60 Hz,  
230 V AC, +10/-15%, 50/60 Hz,  
24 V DC, ±20%.

Mains voltage for VAS 9/VCS 9:

120–230 V AC, +10/-15%, 50/60 Hz.

Switching frequency: max. 1 x per minute.

Max. temperature of solenoid coil:

+20°C (+68°F) above ambient temperature.

Current consumption at 20°C (68°F):

Pick-up current: 1.8 A,

holding current: 0.3 A.

Power consumption:

Type	Voltage	Power
VAS 6	24 V DC	70 W
VAS 6	120 V AC	63 W
VAS 6	230 V AC	63 W
VAS 7	24 V DC	75 W
VAS 7	120 V AC	90 W
VAS 7	230 V AC	83 W
VAS 8	24 V DC	99 W
VAS 8	120 V AC	117 W
VAS 8	230 V AC	113 W
VAS 9	24 V DC	–
VAS 9	120 V AC	200 (15*) W
VAS 9	230 V AC	200 (15*) W
VCS 6	24 V DC	140 W
VCS 6	120 V AC	126 W
VCS 6	230 V AC	126 W
VCS 7	24 V DC	150 W
VCS 7	120 V AC	180 W
VCS 7	230 V AC	166 W

Type	Voltage	Power
VCS 8	24 V DC	198 W
VCS 8	120 V AC	234 W
VCS 8	230 V AC	226 W
VCS 9	24 V DC	–
VCS 9	120 V AC	400 (30*) W
VCS 9	230 V AC	400 (30*) W

\* After opening.

Contact rating of proof of closure switch:

Type	Voltage	Current (resistive load)	
		min.	max.
VAS..S, VCS..S	12–250 V AC, 50/60 Hz	100 mA	3 A
VAS..G, VCS..G	12–30 V DC	2 mA	0.1 A

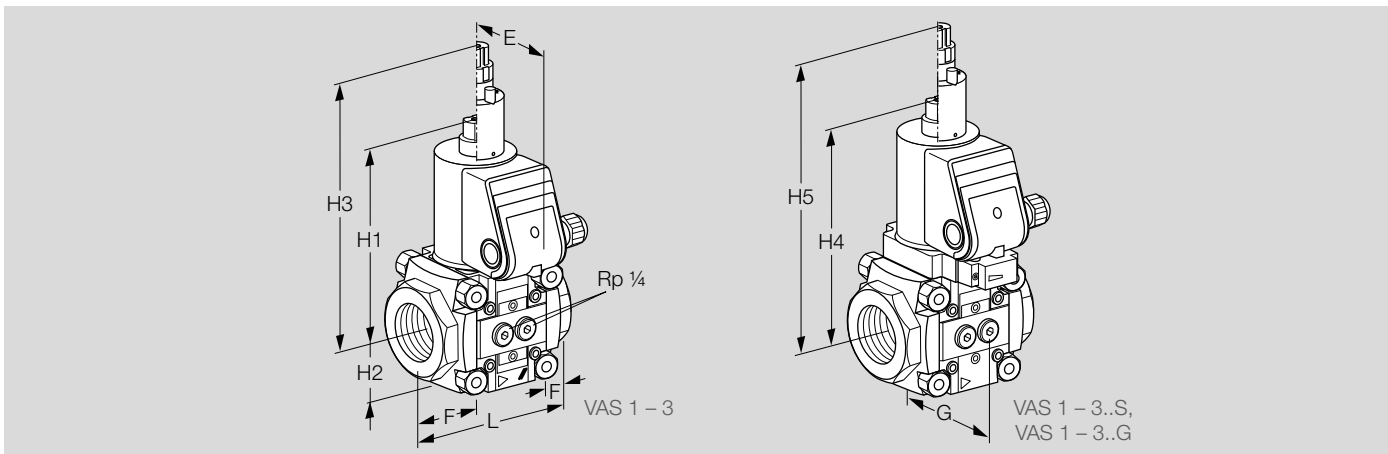
Switching frequency of proof of closure switch: max. 5 x per minute.

Switching current	Switching cycles*	
	cos φ = 1	cos φ = 0.6
0.1	500,000	500,000
0.5	300,000	250,000
1	200,000	100,000
3	100,000	–

\* Limited to max. 200,000 cycles for heating systems.

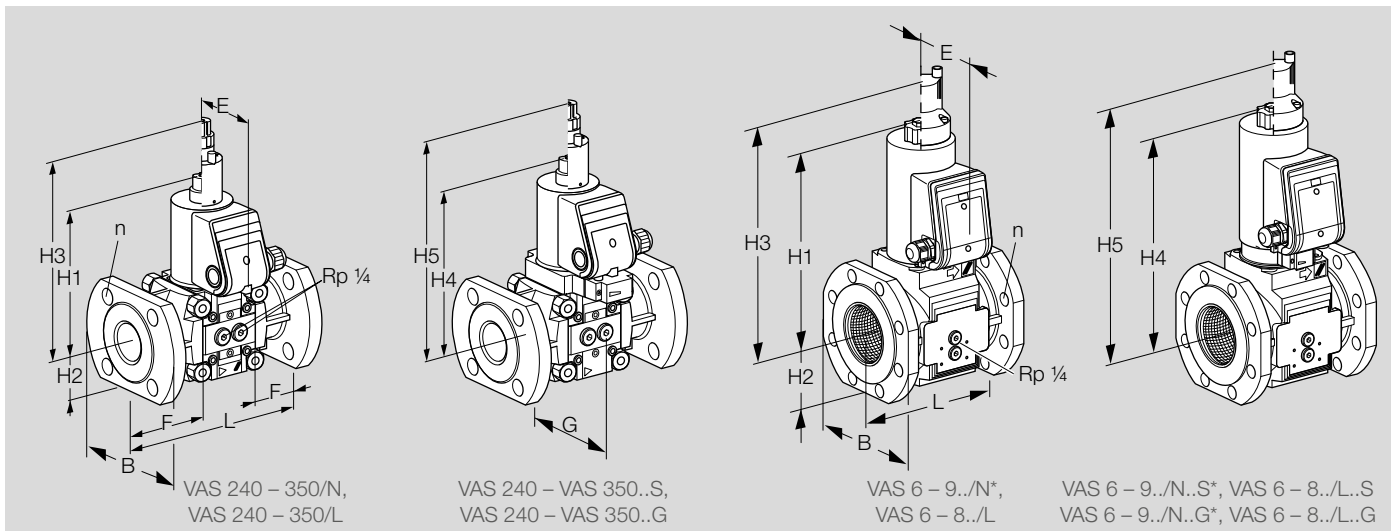
## 9 Dimensions

## 9.1 VAS 1–3 with Rp internal thread [mm]



Type	Connection		Dimensions [mm]									Weight [kg]
	Rp	DN	L	E	F	G	H1	H2	H3	H4	H5	
VAS 110	3/8	10	75	75	15	67.3	143	32	208	161	226	1.4
VAS 115	1/2	15	75	75	15	67.3	143	32	208	161	226	1.4
VAS 120	3/4	20	91	75	23	67.3	143	32	208	161	226	1.5
VAS 125	1	25	91	75	23	67.3	143	32	208	161	226	1.4
VAS 225	1	25	127	85	29	98.2	170	47	235	191	256	3.8
VAS 232	1 1/4	32	127	85	29	98.2	170	47	235	191	256	3.8
VAS 240	1 1/2	40	127	85	29	98.2	170	47	235	191	256	3.8
VAS 250	2	50	127	85	29	98.2	170	47	235	191	256	3.6
VAS 340	1 1/2	40	155	85	36	113.3	180	59	245	201	266	5.2
VAS 350	2	50	155	85	36	113.3	180	59	245	201	266	5.0
VAS 365	2 1/2	65	155	85	36	113.3	180	59	245	201	266	4.8

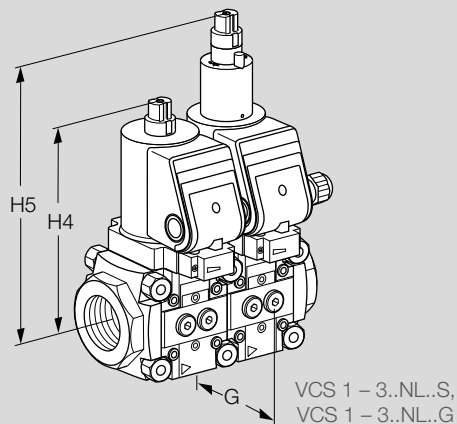
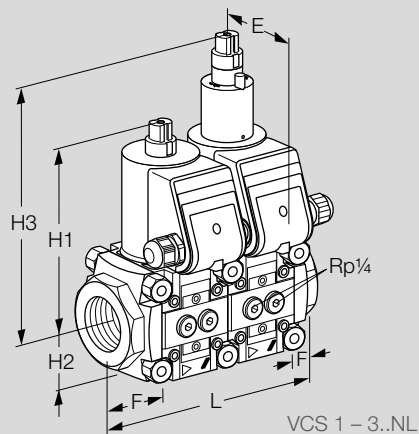
9.2 VAS 2-9 with ISO flange [mm]



Type	Connection		Dimensions [mm]									n	Weight [kg]
	DN	L	E	F	G	B	H1	H2	H3	H4	H5		
VAS 240	40	200	85	66	98.2	150	175	56	240	196	258	4	5
VAS 350	50	230	85	74	113.3	165	180	65	245	200	265	4	6.5
VAS 665	65	190	106	-	-	175	285	77	340	310	365	4	11
VAS 780	80	203	106	-	-	190	295	88	350	320	380	8	12
VAS 8100	100	229	120	-	-	210	350	103	405	380	430	8	23
VAS 9125*	125	254	120	-	-	240	365	114	-	395	-	8	27

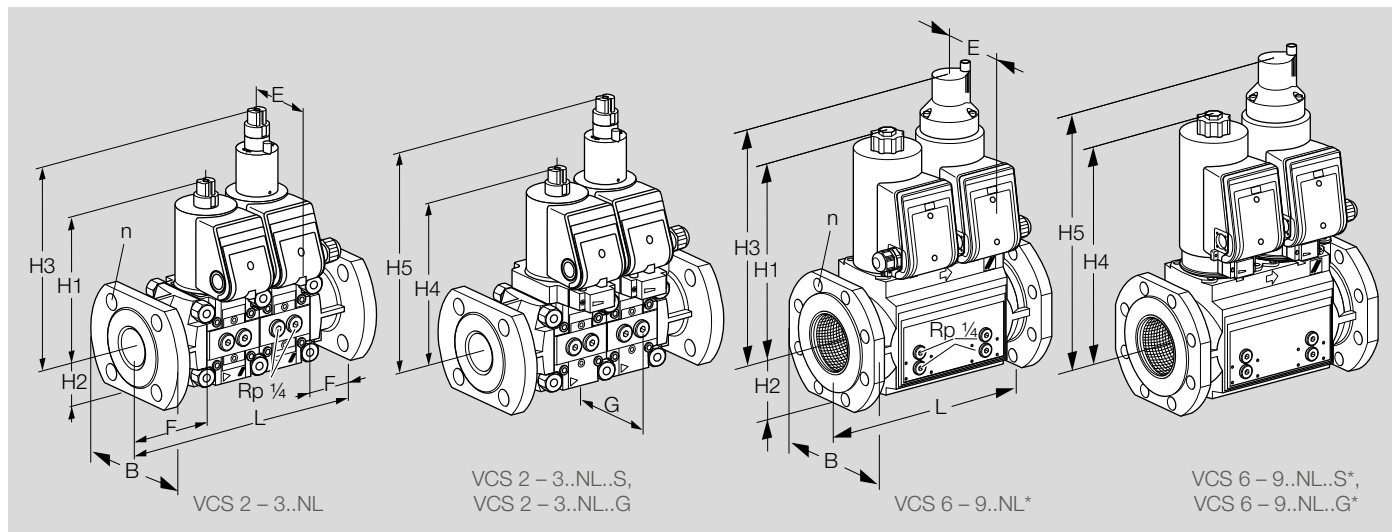
\* VAS 9 only available without damping unit

## 9.3 VCS 1–3 with Rp internal thread [mm]



Type	Connection		Dimensions [mm]									Weight [kg]
	Rp	DN	L	E	F	G	H1	H2	H3	H4	H5	
VCS 110	3/8	10	120	75	15	67.3	143	32	208	161	226	2.6
VCS 115	1/2	15	120	75	15	67.3	143	32	208	161	226	2.6
VCS 120	3/4	20	136	75	23	67.3	143	32	208	161	226	2.7
VCS 125	1	25	136	75	23	67.3	143	32	208	161	226	2.5
VCS 225	1	25	196	85	29	98.2	170	47	235	191	256	6.8
VCS 232	1 1/4	32	196	85	29	98.2	170	47	235	191	256	6.9
VCS 240	1 1/2	40	196	85	29	98.2	170	47	235	191	256	6.8
VCS 250	2	50	196	85	29	98.2	170	47	235	191	256	6.6
VCS 340	1 1/2	40	238	85	36	113.3	180	59	245	201	266	8.8
VCS 350	2	50	238	85	36	113.3	180	59	245	201	266	8.6
VCS 365	2 1/2	65	238	85	36	113.3	180	59	245	201	266	8.5

9.4 VCS 2-9 with ISO flange [mm]

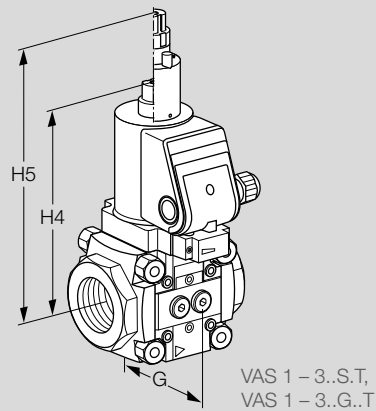
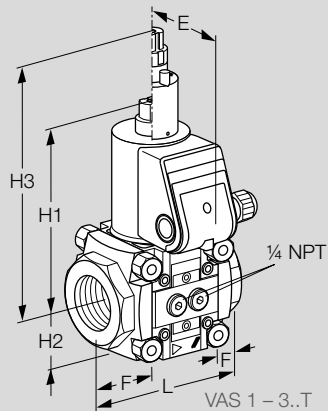


Type	Connection		Dimensions [mm]									n	Weight [kg]
	DN	L	E	F	G	B	H1	H2	H3	H4	H5		
VCS 240	40	270	85	66	98.2	150	175	56	240	196	258	4	8.3
VCS 350	50	314	85	74	113.3	165	180	65	245	200	265	4	10.8
VCS 665	65	295	106	-	-	175	285	77	340	310	365	4	18
VCS 780	80	310	106	-	-	190	295	88	350	320	380	8	21
VCS 8100	100	350	120	-	-	210	350	103	405	380	430	8	40
VCS 9125*	125	400	120	-	-	240	365	114	-	395	-	8	45

\* VCS 9 only available without damping unit

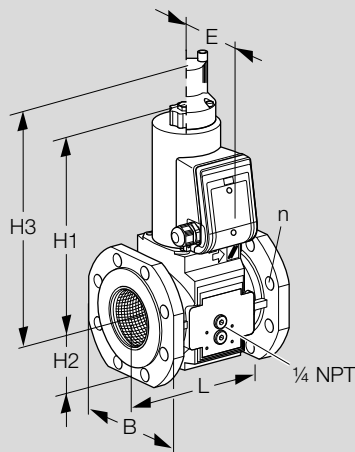


## 9.5 VAS 1–3..T with NPT internal thread [inch]

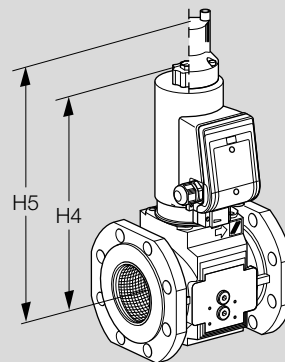


Type	Connection		Dimensions [inch]									Weight [lbs]
	NPT	DN	L	E	F	G	H1	H2	H3	H4	H5	
VAS 110	3/8	10	2.95	2.95	0.59	2.65	5.63	1.26	8.19	6.34	8.9	3.08
VAS 115	1/2	15	2.95	2.95	0.59	2.65	5.63	1.26	8.19	6.34	8.9	3.08
VAS 120	3/4	20	3.58	2.95	0.91	2.65	5.63	1.26	8.19	6.34	8.9	3.30
VAS 125	1	25	3.58	2.95	0.91	2.65	5.63	1.26	8.19	6.34	8.9	3.08
VAS 225	1	25	5.00	3.32	1.14	3.87	6.69	1.85	9.25	7.52	10.1	8.36
VAS 232	1 1/4	32	5.00	3.32	1.14	3.87	6.69	1.85	9.25	7.52	10.1	8.36
VAS 240	1 1/2	40	5.00	3.32	1.14	3.87	6.69	1.85	9.25	7.52	10.1	8.36
VAS 250	2	50	5.00	3.32	1.14	3.87	6.69	1.85	9.25	7.52	10.1	7.92
VAS 340	1 1/2	40	6.10	3.32	1.42	4.46	7.09	2.3	9.65	7.91	10.5	11.40
VAS 350	2	50	6.10	3.32	1.42	4.46	7.09	2.3	9.65	7.91	10.5	11.00
VAS 365	2 1/2	65	6.10	3.32	1.42	4.46	7.09	2.3	9.65	7.91	10.5	10.56

9.6 VAS 6–9..T with ANSI flange [inch]



VAS 6 – 9..T../N\*

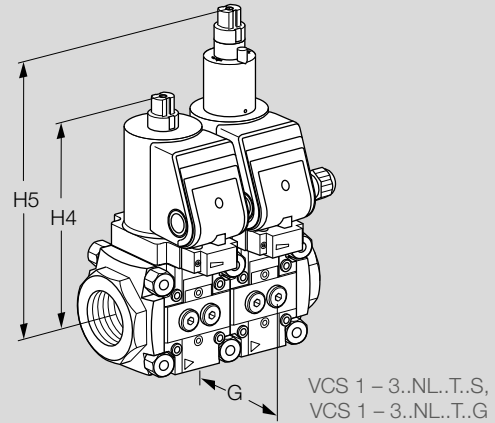
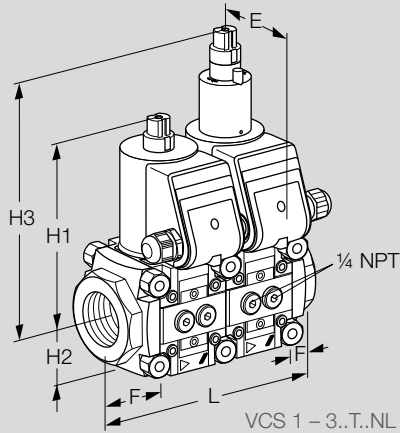


VAS 6 – 8..T../L

Type	Connection	Dimensions [inch]								n	Weight [lbs]
		DN	L	E	B	H1	H2	H3	H4		
VAS 665	65	7.48	4.17	6.89	11.2	3.03	13.4	12.2	14.4	4	24.25
VAS 780	80	7.99	4.17	7.48	11.6	3.46	13.8	12.6	15.0	4	26.45
VAS 8100	100	9	4.72	8.27	13.8	4.06	15.9	15.0	16.9	8	50.71
VAS 9125*	125	10	4.72	9.45	14.4	4.49	–	15.6	–	8	59.52

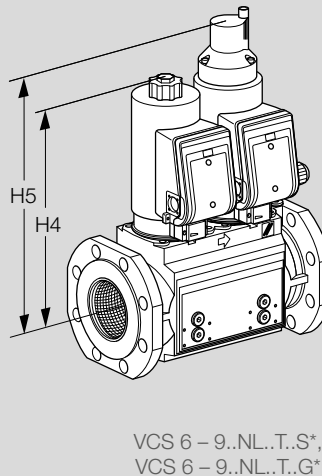
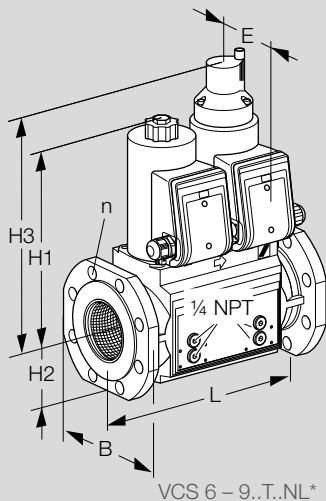
\* VAS 9 only available without damping unit

9.7 VCS 1–3..T with NPT internal thread  
[inch]



Type	Connection		Dimensions [inch]									Weight [lbs]
	NPT	DN	L	E	F	G	H1	H2	H3	H4	H5	
VCS 110	3/8	10	4.72	2.95	0.59	2.65	5.63	1.26	8.19	6.34	8.9	5.72
VCS 115	1/2	15	4.72	2.95	0.59	2.65	5.63	1.26	8.19	6.34	8.9	5.72
VCS 120	3/4	20	5.35	2.95	0.91	2.65	5.63	1.26	8.19	6.34	8.9	5.94
VCS 125	1	25	5.35	2.95	0.91	2.65	5.63	1.26	8.19	6.34	8.9	5.72
VCS 225	1	25	7.72	3.32	1.14	3.87	6.69	1.85	9.25	7.52	10.1	14.96
VCS 232	1 1/4	32	7.72	3.32	1.14	3.87	6.69	1.85	9.25	7.52	10.1	15.18
VCS 240	1 1/2	40	7.72	3.32	1.14	3.87	6.69	1.85	9.25	7.52	10.1	14.96
VCS 250	2	50	7.72	3.32	1.14	3.87	6.69	1.85	9.25	7.52	10.1	14.52
VCS 340	1 1/2	40	9.37	3.32	1.42	4.46	7.09	2.3	9.65	7.91	10.5	19.36
VCS 350	2	50	9.37	3.32	1.42	4.46	7.09	2.3	9.65	7.91	10.5	18.92
VCS 365	2 1/2	65	9.37	3.32	1.42	4.46	7.09	2.3	9.65	7.91	10.5	18.70

9.8 VCS 6–9.T with ANSI flange [inch]



Type	Connection	Dimensions [inch]								n	Weight [lbs]
		DN	L	E	B	H1	H2	H3	H4		
VCS 665	65	11.41	4.17	6.89	11.2	3.03	13.4	12.2	14.4	4	39.68
VCS 780	80	12.20	4.17	7.48	11.6	3.46	13.8	12.6	15.0	4	46.30
VCS 8100	100	13.78	4.72	8.27	13.8	4.06	15.9	15.0	16.9	8	88.18
VCS 9125*	125	15.75	4.72	9.45	14.4	4.49	–	15.6	–	8	99.21

\* VCS 9 only available without damping unit

## **10 Converting units**

See [www.adlatus.org](http://www.adlatus.org)

## 11 Safety-specific characteristic values for SIL and PL

Certificates – see [www.docuthek.com](http://www.docuthek.com).

For a glossary of terms, see page 67 (14 Glossary).

For SIL	
Suitable for Safety Integrity Level	SIL 1, 2, 3
Diagnostic coverage DC	0
Type of subsystem	Type A to EN 61508-2, 7.4.4.1.3
Mode of operation	High demand mode pursuant to EN 61508-4, 03/05/2016
For PL	
Suitable for Performance Level	PL a, b, c, d, e
Category	B, 1, 2, 3, 4
Common cause failure CCF	> 65
Application of essential safety requirements	Satisfied
Application of tried-and-tested safety requirements	Satisfied
For SIL and PL	
B <sub>10d</sub> value of VAS 1	15,845,898 operating cycles
B <sub>10d</sub> value of VAS 2–3	15,766,605 operating cycles
B <sub>10d</sub> value of VAS 6–9	6,700,000 operating cycles
Hardware fault tolerance (1 component/switch) HFT	0
Hardware fault tolerance (2 components/switches, redundant operation) HFT	1
Safe failure fraction SFF	> 90%
Fraction of undetected common cause failures β	≥ 2%

### Relationship between the Performance Level (PL) and the Safety Integrity Level (SIL)

PL	SIL
a	–
b	1
c	1
d	2
e	3

### 11.1 Determining the PFH<sub>D</sub> value, λ<sub>D</sub> value and MTTF<sub>d</sub> value

$$PFH_D = \lambda_D = \frac{1}{MTTF_d} = \frac{0,1}{B_{10d}} \times n_{op}$$

PFH<sub>D</sub> = Probability of dangerous failure (HDM = high demand mode) [1/hour]

PFD<sub>avg</sub> = Average probability of a dangerous failure of the safety function on demand (LDM = low demand mode)

λ<sub>D</sub> = Mean dangerous failure rate [1/hour]

MTTF<sub>d</sub> = Mean time to dangerous failure [hours]

n<sub>op</sub> = Demand rate (mean number of annual operations) [1/hour]

### 11.2 Designed lifetime

Max. service life under operating conditions in accordance with EN 13611, EN 161 for VAS, VCS:  
designed lifetime after date of production, plus max. ½ year in storage prior to first use, or once the given number of operating cycles has been reached, depending on which is achieved first:

Type	Designed lifetime	
	Switching cycles	Time (years)
VAS 110 to 225	500,000	10
VAS 232 to 365	200,000	10
VAS/VCS 665 to 780	100,000	10
VAS/VCS 8100 to 9125	50,000	10

### 11.3 Use in safety-related systems

For systems up to SIL 3 pursuant to EN 61508 and PL e pursuant to ISO 13849.

The devices are suitable for single-channel systems (HFT = 0) up to SIL 2/PL d, and up to SIL 3/PL e when two redundant devices are installed in a double-channel architecture (HFT = 1), provided that the complete system complies with the requirements of EN 61508/ISO 13849.

## **12 Safety information in accordance with EN 61508-2**

### **12.1 Scope of application**

The gas solenoid valves are designed for shutting off the gas supply to gas burners and gas appliances.

For further information, see page 12 (2 Certification) and page 5 (1 Application).

### **12.2 Product description**

See page 14 (3 Function) and page 5 (1 Application) for information about the product description and the device functions.

### **12.3 Reference documents**

Operating instructions, see [www.docuthek.com](http://www.docuthek.com).

Certificate, see [www.docuthek.com](http://www.docuthek.com).

A web app for spare parts is available at [www.adlatus.org](http://www.adlatus.org).

A web app selecting the correct product is available at [www.adlatus.org](http://www.adlatus.org).

### **12.4 Applicable standards**

Standards used for certification, see [www.docuthek.com](http://www.docuthek.com).

### **12.5 Safety function**

The safety function involves interrupting a gas flow by adopting the safety position using the internal energy accumulator within the closing time and guaranteeing internal and external tightness.

### **12.6 Safety instructions concerning operating limits**

The function is only guaranteed when used within the specified limits – see page 49 (8 Technical data) or operating instructions at [www.docuthek.com](http://www.docuthek.com).

### **12.7 Installation and commissioning**

Installation and commissioning procedures are described in the operating instructions.

### **12.8 Maintenance/Checks**

Internal and external tightness and the function once per annum, twice per annum for biogas.

Further information can be found in the operating instructions.

### **12.9 Troubleshooting**

In the event of faults after maintenance work or function checks: remove the unit and return it to the manufacturer for inspection.

### **12.10 Safety instructions concerning design verification**

A Failure Mode and Effects Analysis has been carried out to assess possible design-related failures and to classify these into safe and dangerous failures.



## **12.11 Characteristic safety data/SIL capability**

See page 62 (11 Safety-specific characteristic values for SIL and PL) and page 49 (8 Technical data).

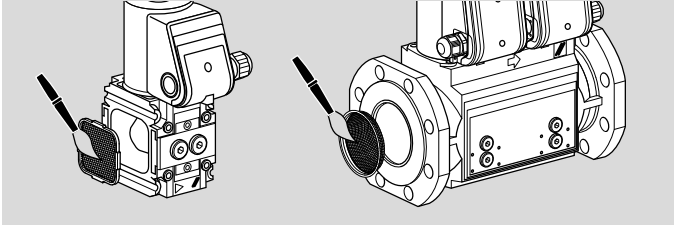
## **12.12 Mode of operation**

The gas solenoid valves are suitable for a 100% duty cycle.

## 13 Maintenance cycles

At least once a year, at least twice a year in the case of biogas.

If the flow rate drops, clean the strainer.



## 14 Glossary

### 14.1 Diagnostic coverage DC

Measure of the effectiveness of diagnostics, which may be determined as the ratio between the failure rate of detected dangerous failures and the failure rate of total dangerous failures

NOTE: Diagnostic coverage can exist for the whole or parts of a safety-related system. For example, diagnostic coverage could exist for sensors and/or logic system and/or final elements. Unit: %

see EN ISO 13849-1

### 14.2 Mode of operation

High demand mode or continuous mode

Operating mode, where the frequency of demands for operation made on a safety-related system is greater than one per year or greater than twice the proof-test frequency

see EN 61508-4

### 14.3 Category

Classification of the safety-related parts of a control system in respect of their resistance to faults and their subsequent behaviour in the fault condition, and which is achieved by the structural arrangement of the parts, fault detection and/or by their reliability

see EN ISO 13849-1

### 14.4 Common cause failure CCF

Failures of different items, resulting from a single event, where these failures are not consequences of each other

see EN ISO 13849-1

### 14.5 Fraction of undetected common cause failures $\beta$

Fraction of undetected failures of redundant components due to a single event, whereby these failures are not based on mutual causes

NOTE:  $\beta$  is expressed as a fraction in the equations and as a percentage elsewhere.

see EN 61508-6

### 14.6 $B_{10d}$ value

Mean number of cycles until 10% of the components fail dangerously

see EN ISO 13849-1

### 14.7 $T_{10d}$ value

Mean time until 10% of the components fail dangerously

see EN ISO 13849-1

### 14.8 Hardware fault tolerance HFT

A hardware fault tolerance of N means that N + 1 is the minimum number of faults that could cause a loss of the safety function

see IEC 61508-2

### 14.9 Mean dangerous failure rate $\lambda_D$

Mean rate of dangerous failures during operation time ( $T_{10d}$ ). Unit: 1/h

see EN ISO 13849-1

### **14.10 Safe failure fraction SFF**

Fraction of safe failures related to all failures, which are assumed to appear

see EN 13611/A2

### **14.11 Probability of dangerous failure $\text{PFH}_D$**

Value describing the likelihood of dangerous failure per hour of a component for high demand mode or continuous mode. Unit: 1/h

see EN 13611/A2

### **14.12 Mean time to dangerous failure $\text{MTTF}_D$**

Expectation of the mean time to dangerous failure

see EN ISO 13849-1:2008

### **14.13 Demand rate $n_{Op}$**

Mean number of annual operations

see EN ISO 13849-1

### **14.14 Average probability of dangerous failure on demand $\text{PFD}_{avg}$**

(LDM = 1 – 10 switching cycles/year)

Average probability of a dangerous failure of the safety function on demand (LDM = low demand mode)

see EN 61508-6

## For more information

The Honeywell Thermal Solutions family of products includes Honeywell Combustion Safety, Eclipse, Exothermics, Hauck, Kromschroder and Maxon. To learn more about our products, visit [ThermalSolutions.honeywell.com](https://ThermalSolutions.honeywell.com) or contact your Honeywell Sales Engineer.

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