Solenoid valves for gas VAS, Double solenoid valves VCS

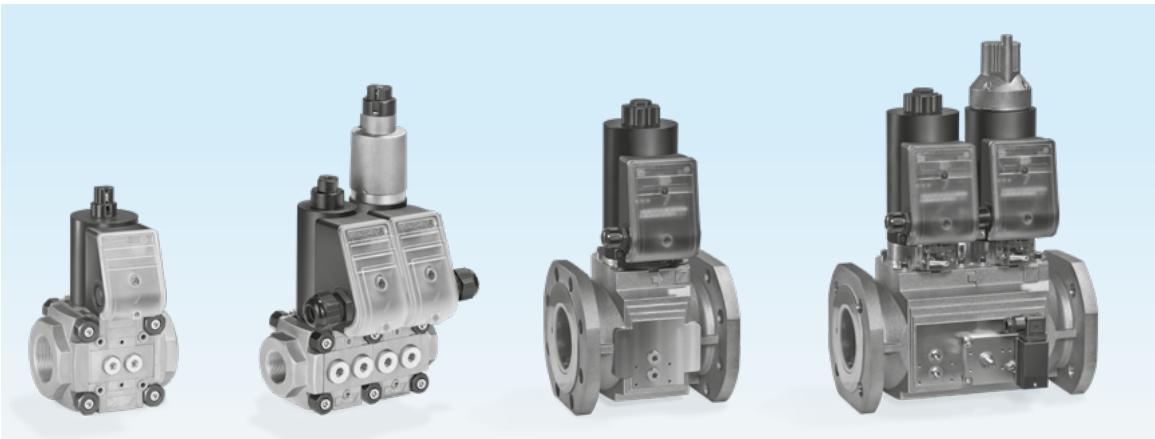
Technical Information · GB
3 Edition 06.19

- 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

Safety manual for products complying with EN 61508-2

Contents

= To be continued



VAS..R
quick opening

VCS..R
with damping unit

VAS..F
quick opening

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

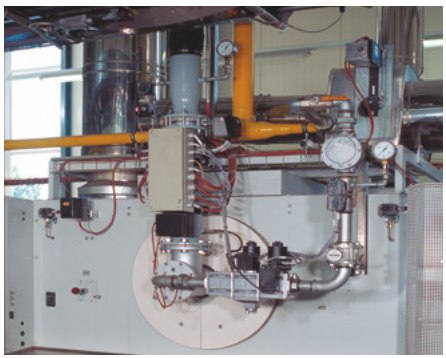
The modular design principle allows the individual components of the VAS, VCS Series to be easily assembled: e.g. quick opening, slow opening, with proof of closure switch and visual position indicator, slow opening with attached pressure switch.

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, also in commercial heat generation, such as the packaging, paper and foodstuffs industries.

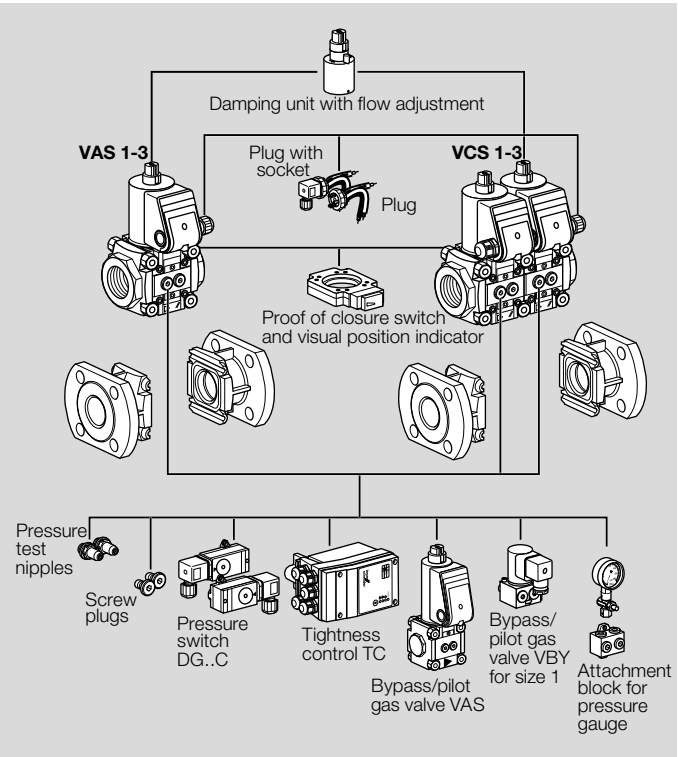
Ceramics industry

Aluminium industry: curing oven for wheel rims



Foodstuffs industry: baking oven

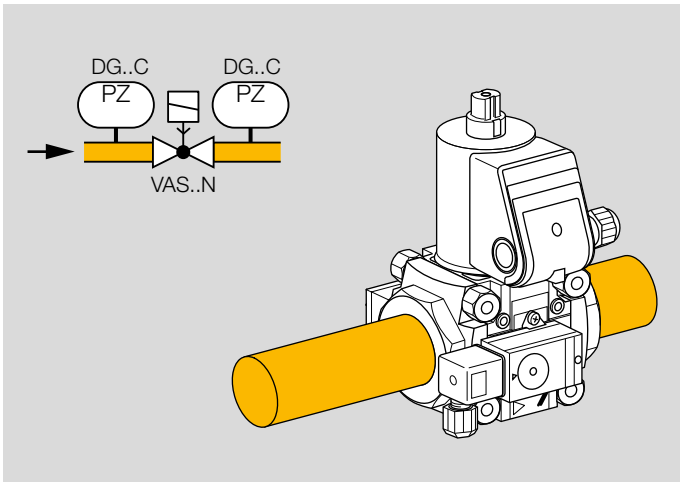
1.1 Configuring solenoid valves for gas VAS1 – 3 or double solenoid valves VCS 1 – 3



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:

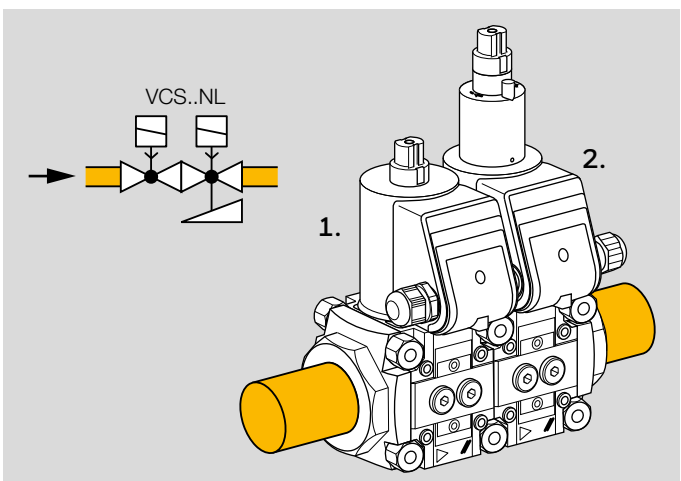
- Damping unit
- Proof of closure switch
- Plug (with or without socket)
- Pressure test nipples
- Screw plugs
- Pressure switch DG..C for inlet and/or outlet pressure
- Tightness control TC
- Bypass/pilot gas valve
- Attachment block for the connection of a pressure gauge, for example



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

1.2.1 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



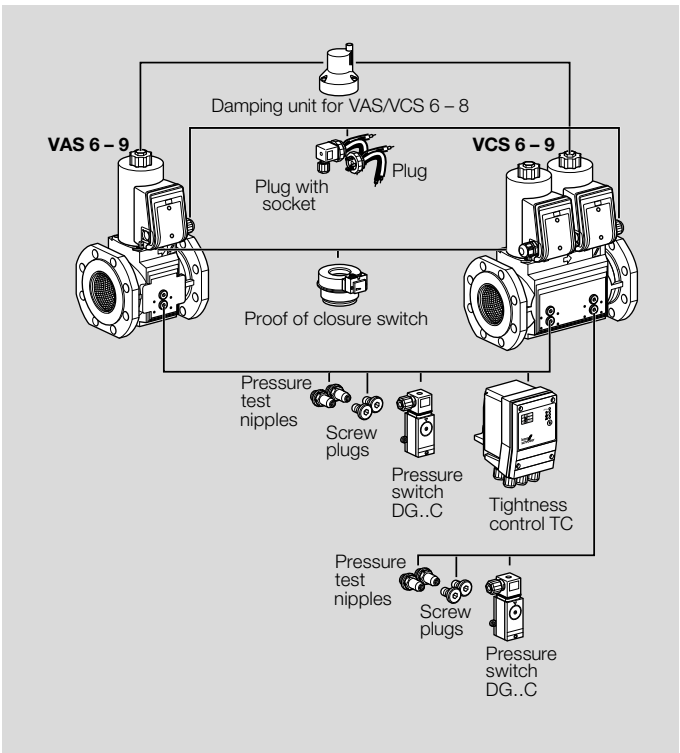
1.2.2 Double solenoid valve VCS with damping unit

VCS..NL

1st valve: quick opening, quick closing, with flow adjustment

2nd valve: slow opening, quick closing

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

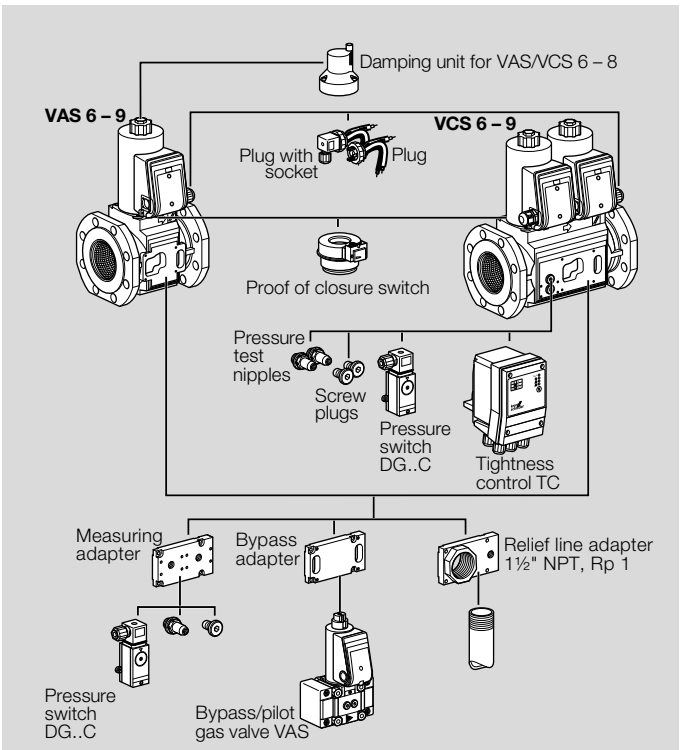


Gas solenoid valve and double solenoid valve with flanged connection (ISO or ANSI) for pipe connections from DN 65 to 125.

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 VAS6 – 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 nipples
- Screw plug
- Bypass or pilot gas valve VAS

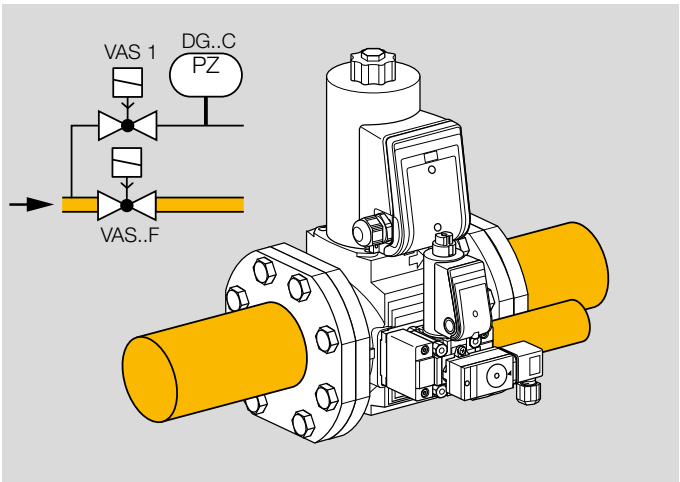
VCS 6 – 9

With two threaded connections for:

Pressure switch DG..C for inlet/interspace pressure

- Tightness control TC

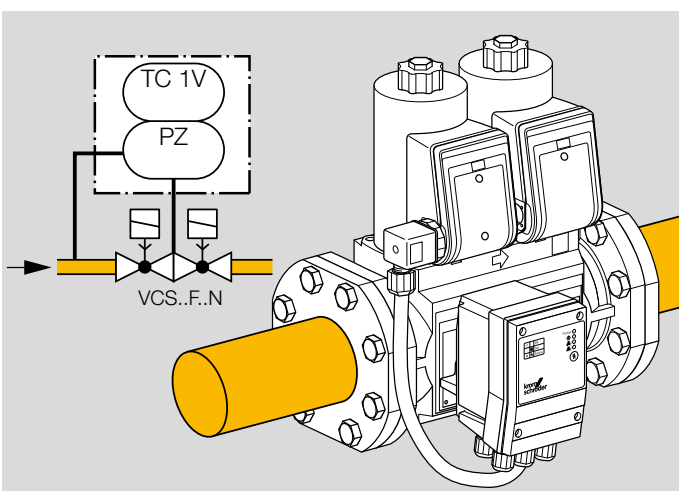
Expandable with relief line adapter (1½ NPT, Rp 1) for relief line.



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

1.5.1 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.



1.5.2 Double solenoid valve with tightness control

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

2 Certification

Certificates – see Docuthek.

Certified to SIL and PL

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

See page 66 (Safety-specific characteristic values for SIL and PL).

EU certified

- 2014/35/EU (LVD) – Low Voltage Directive
- 2014/30/EU (EMC) – Electromagnetic Compatibility Directive
- (EU) 2016/426 (GAR) – Gas Appliances Regulation
- 2011/65/EU, RoHS II
- 2015/863/EU, RoHS III
- EN 161:2011+A3:2013
- EN 126:2012
- EN 1854:2010

FM approved*

Factory Mutual Research Class: 7400 and 7411 Safety overpressure slam shut valves. Designed for applications pursuant to NFPA 85 and NFPA 86.
www.approvalguide.com

ANSI/CSA approved*

American National Standards Institute/Canadian Standards Association – ANSI Z21.21/CSA 6.5.
www.csagroup.org – Class number: 3371-83 (natural gas, LPG), 3371-03 (natural gas, propane)

VAS 1 – 3 (120 V AC), VAS 6 – 8: UL listed*

Underwriters Laboratories – UL 429 “Electrically operated valves”. www.ul.com -> Tools (at the bottom of the page) -> Online Certifications Directory

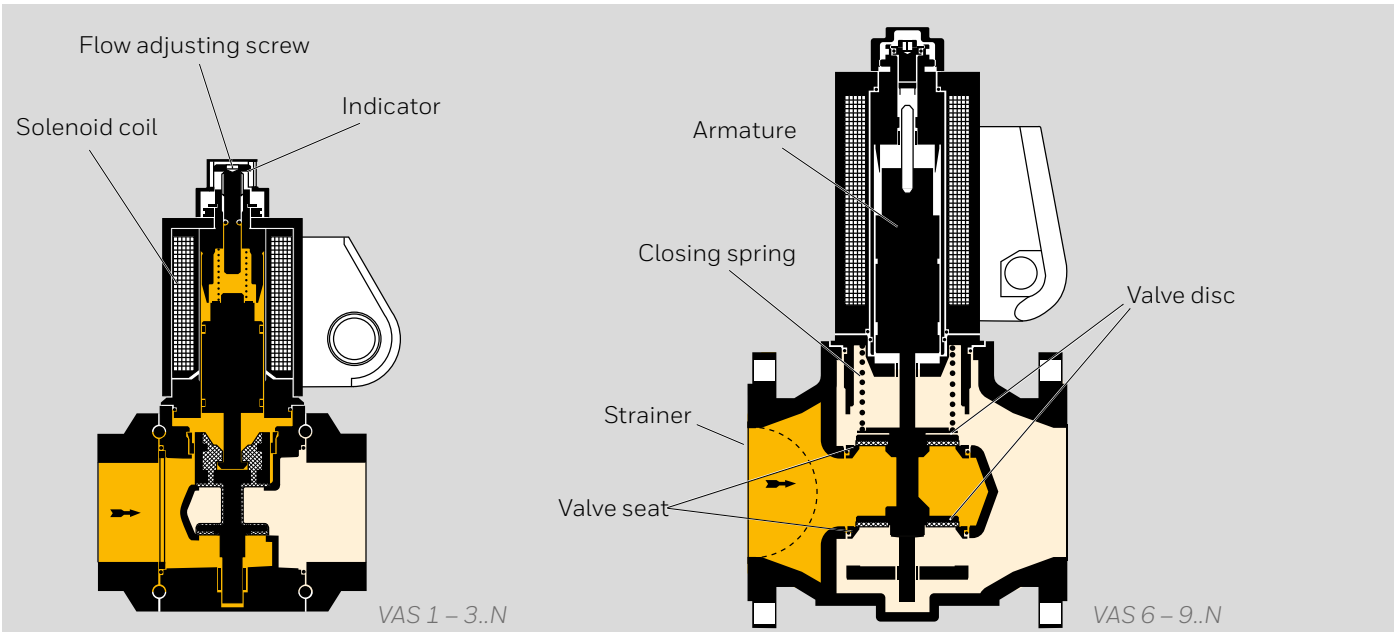
AGA approved*

Australian Gas Association, Approval No.: 3968
http://www.aga.asn.au/product_directory

Eurasian Customs Union

The product VAS, VCS meets the technical specifications of the Eurasian Customs Union.

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



3 Function

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

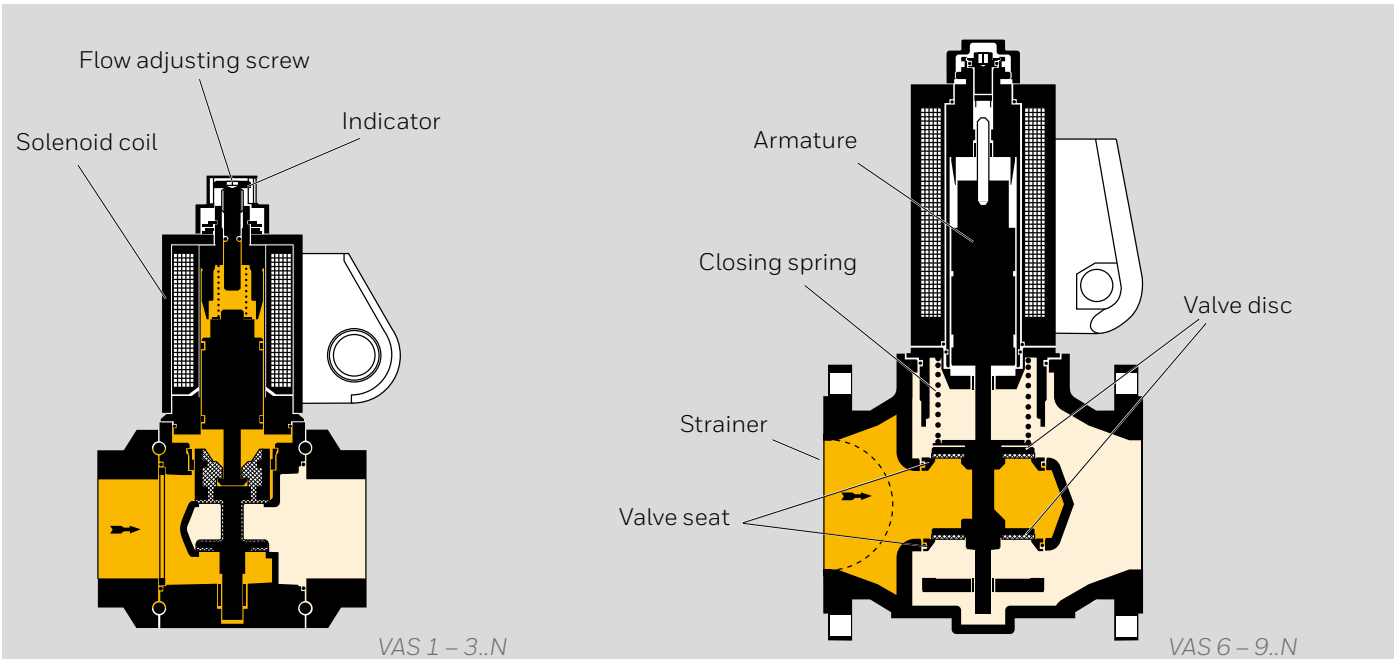
Opening: connect the system to the electrical power supply (alternating voltage will be rectified). The blue LED lights up. The coil's magnetic field pulls the armature with the attached valve discs upwards. The gas solenoid valve VAS opens. The double valve seat means that the forces from the inlet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

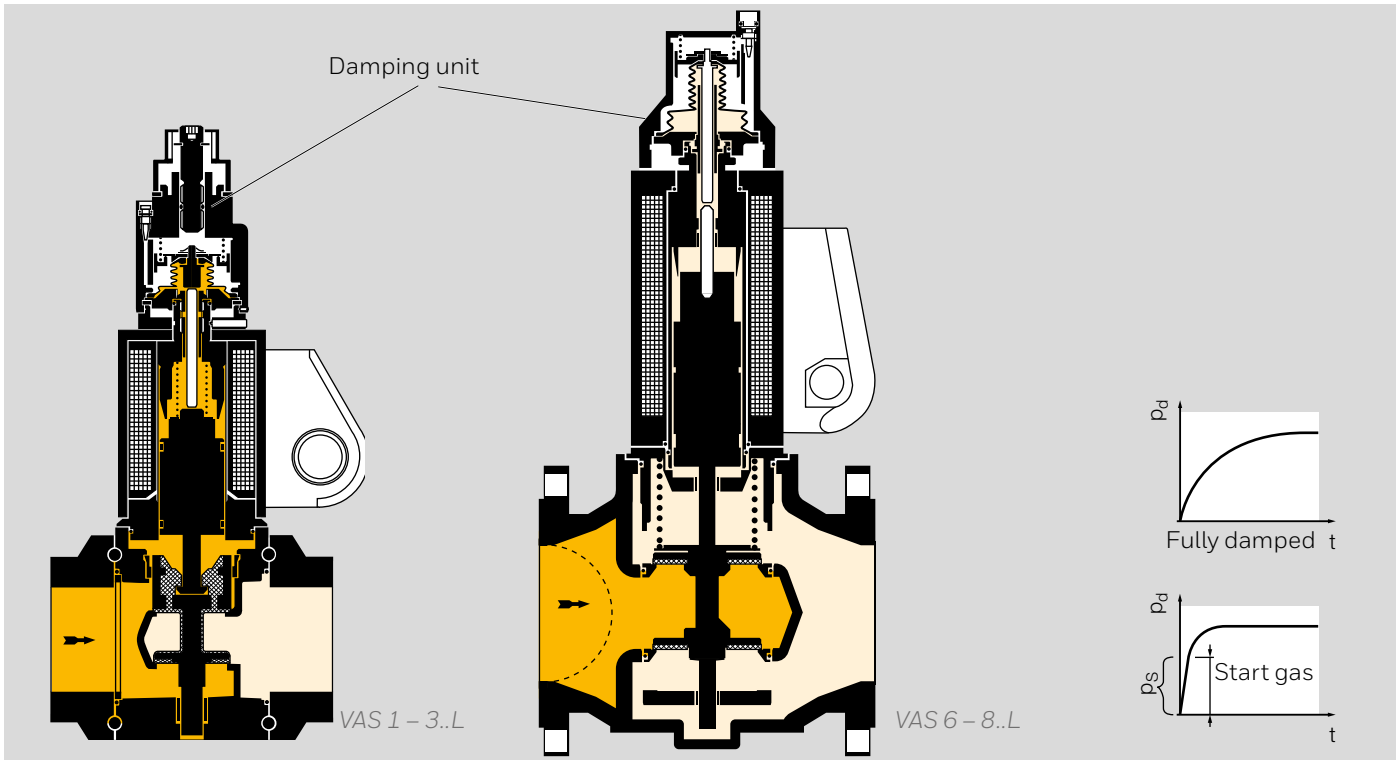
VAS 1 – 8..N, VAS 1 – 3..L

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.

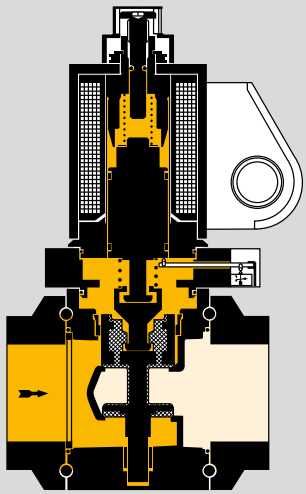


3.2 Solenoid valve for gas VAS..L, slow opening

The solenoid valve for gas VAS..L opens within 10 s.

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 reduce the start gas rate,
turning it anti-clockwise will increase the start gas rate.



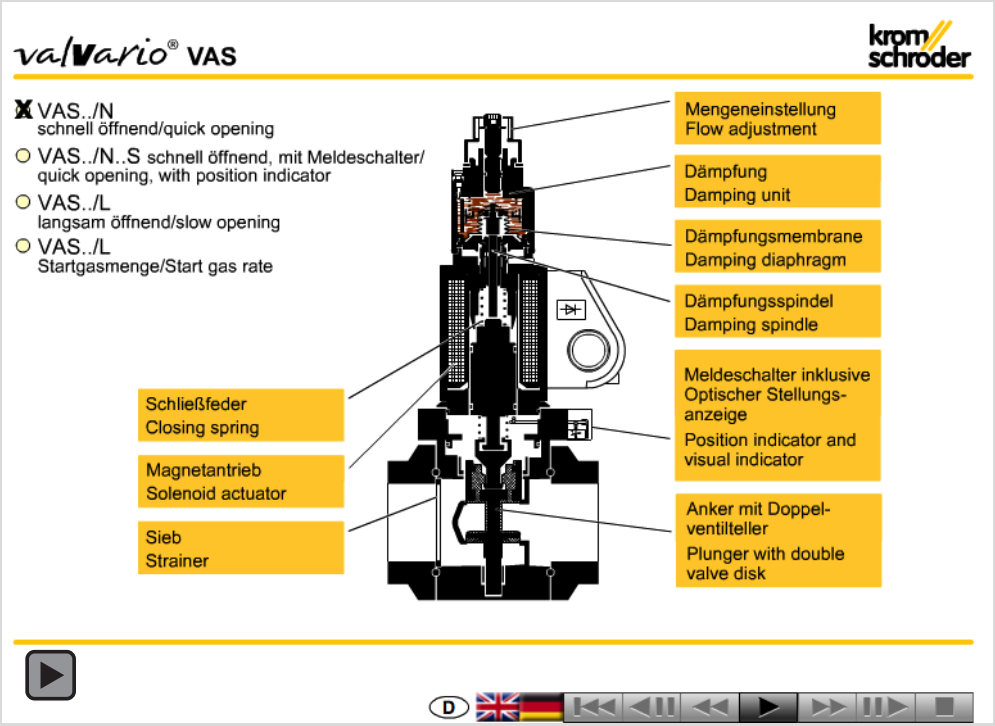
3.3 Solenoid valve for gas VAS..S/VAS..G, proof of closure switch with visual position indicator

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 voltage 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 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 closed position switch with 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 Animation

The interactive animation shows the function of the gas solenoid valve VAS.

Click on the picture. The animation can be controlled using the control bar at the bottom of the window (as on a DVD player).

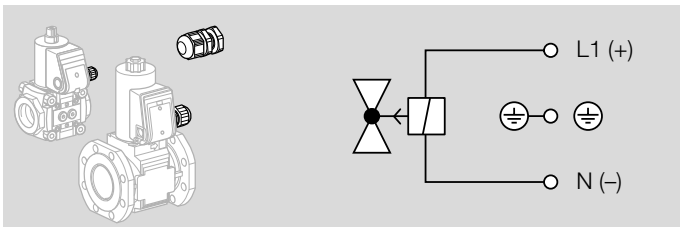
To play the animation, you will need Adobe Reader 7 or a newer version. If you do not have Adobe Reader on your system, you can download it from the Internet.

If the animation does not start to play, you can download it from the document library (Docuthek) as an independent application.

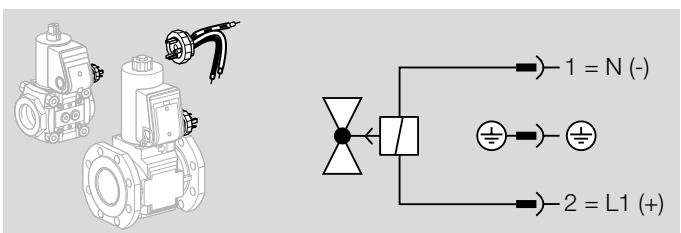
3.5 Connection diagram

Wiring to EN 60204-1.

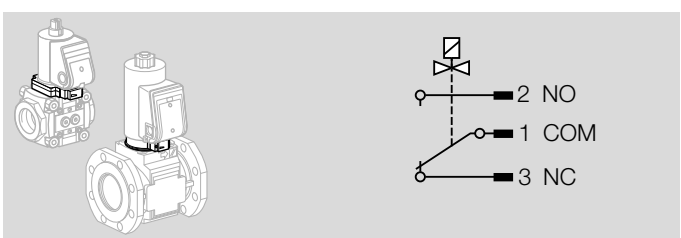
3.5.1 VAS with M20 cable gland



3.5.2 VAS with plug

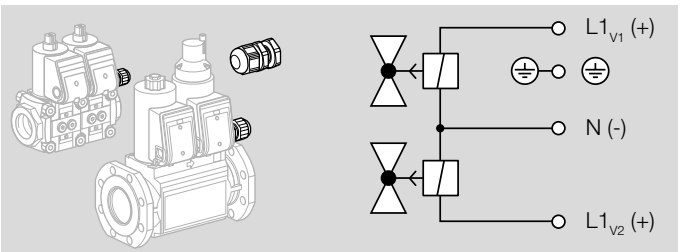


3.5.3 VAS..S/VAS..G, proof of closure switch with visual position indicator

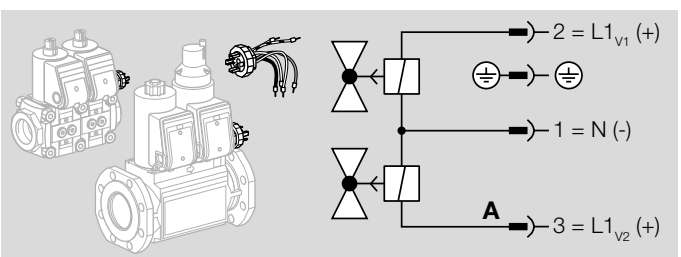


The designed lifetime of the proof of closure switch cannot be reached with frequent cycling operation, see page 54 (Technical data).

3.5.4 VCS with M20 cable gland



3.5.5 VCS with plug



VAS, VCS

Further connection options, see Docuthek -> Operating instructions VAS 1 – 3, VCS 1 – 3 or Operating instructions VAS 6 – 9, VCS 6 – 9.

4 Replacement possibilities

4.1 Solenoid valve for gas VG is to be replaced by VAS

Type				Type
VG	Gas solenoid valve		Gas solenoid valve	VAS
10/15	DN 10 internal 15 mm (0.59")		Size 1 DN 10	110
15	DN 15		Size 1 DN 15	115
15/12	DN 15 internal 12 mm (0.47")		– –	–
20	DN 20		Size 1 DN 20	120
25	DN 25		Size 1 DN 25	125
25/15	DN 25 internal 15 mm (0.59")		– –	–
40/32	DN 40 internal 32 mm (1.26")		Size 2 DN 40	240
40	DN 40		Size 2 DN 40	240
40/33	DN 40 internal 33 mm (1.30")		– –	–
50	DN 50		Size 3 DN 50	350
50/39	DN 50 internal 39 mm (1.54")		– –	–
50/65	DN 50 internal 65 mm (2.59")		Size 3 DN 50	350
65	DN 65		Size 3 DN 65	365
65	DN 65		Size 6 DN 65	665
65/49	DN 65 internal 49 mm (1.93")		– –	–
80	DN 80		Size 7 DN 80	780
100	DN 100		Size 8 DN 100	8100
T	T-product		T-product	T
R	Rp internal thread		Rp internal thread	R
N	NPT internal thread		NPT internal thread	N
F	ISO flange		ISO flange	F
A	ANSI flange		ANSI flange	A
02	$p_{u\,max.}$: 200 mbar (2 psig)		$p_{u\,max.}$: 500 mbar (7 psig)	●
03	360 mbar (5 psig)		500 mbar (7 psig)	●
10	1000 mbar (14.5 psig)		–	–
18	1800 mbar (26.1 psig)		–	–
N	Quick opening		Quick opening	/N
L	Slow opening		Slow opening	/L
K	Mains voltage: 24 V DC		Mains voltage: 24 V DC	K
–	–		100 V AC	P
Q	120 V AC		120 V AC	Q
–	–		200 V AC	Y
T	220/240 V AC		230 V AC	W

Continuation

Type				Type
3	Electrical connection via terminals		Electrical connection via terminals	3
6	Electrical connection via socket		Electrical connection via socket	○
9	Metal terminal connection box		Electrical connection via terminals	3
1	Screw plug at the inlet		Screw plug at the inlet and outlet	●
3	Screw plug at the inlet and outlet		Screw plug at the inlet and outlet	●
4	Pressure test point at the inlet		Pressure test point at the inlet and outlet*	○
6	Pressure test point at the inlet and outlet		Pressure test point at the inlet and outlet*	○
D	Flow adjustment		Flow adjustment***	●
S	Proof of closure switch		Proof of closure switch with visual position indicator**	S
G	Proof of closure switch for 24 V		Proof of closure switch for 24 V with visual position indicator**	G
OCS	Overtravel switch		Proof of closure switch with visual position indicator**	S
CPS	Proof of closure switch		Proof of closure switch with visual position indicator**	S
VI	Visual position indicator		Proof of closure switch with visual position indicator**	S
M	Suitable for biogas		Suitable for biogas	●
V	Viton valve disc seal		–	–
VG 25R02NT31DM		**Example**	**Example**	VAS 125R/NW

● = *standard*, ○ *available*

For length compensation when replacing VG by VAS 6 – 9, install an adapter for length compensation – see Accessories, Adapter for length compensation.

* *Pressure test points may be attached at the left- and/or right-hand side.*

** *Proof of closure switch with visual position indicator can be attached at the left- or right-hand side.*

*** *Flow adjustment for VAS/VCS..N 1 – 8, VAS/VCS 1 – 3..L.*

4.1.1 Searching for an order number or type

vg

VG Order No.	VG type designation
85205160	VG 15R02LK31D
85205190	VG 15R02LK61D
85205144	VG 15R02LK61DM
85205191	VG 15R02LK6L1D
85205150	VG 15R02LM31D

Hits: 315

VG is to be replaced by VAS

VAS Order No. 88000562

VAS type designation VAS 115R/LK

4.2 MODULINE solenoid valve for gas VS is to be replaced by VAS

Type	Flange			Type
VS	Gas solenoid valve		Gas solenoid valve	VAS
115 125	3/8"	Size 115 Size 125	Size 1, DN 10	110
115 125	½"	Size 115 Size 125	Size 1, DN 15	115
115 125	¾"	Size 115 Size 125	Size 1, DN 20	120
115 125	1"	Size 115 Size 125	Size 1, DN 25	125
230 240	1"	Size 232 Size 240	Size 2, DN 25	225
232 240	1½"	Size 232 Size 240	Size 2, DN 40	240
350	1½"	Size 350	Size 3, DN 40	340
350	2"	Size 350	Size 3, DN 50	350
ML	MODULINE + Rp internal thread connection flanges		Rp internal thread	R
TML	MODULINE + NPT internal thread connection flanges		NPT internal thread	N
02	$p_{u\ max.}$ 200 mbar (2 psig)		$p_{u\ max.}$ 500 mbar (7 psig)	●
03	$p_{u\ max.}$ 360 mbar (3 psig)		$p_{u\ max.}$ 500 mbar (7 psig)	●
N	Quick opening		Quick opening	/N
L	Slow opening		Slow opening	/L
D	Flow adjustment		Flow adjustment*	●
K	Mains voltage: 24 V DC		Mains voltage: 24 V DC	K
–	–		100 V AC	P
M	120 V AC		120 V AC	Q
–	–		200 V AC	Y
T	220/240 V AC		230 V AC	W

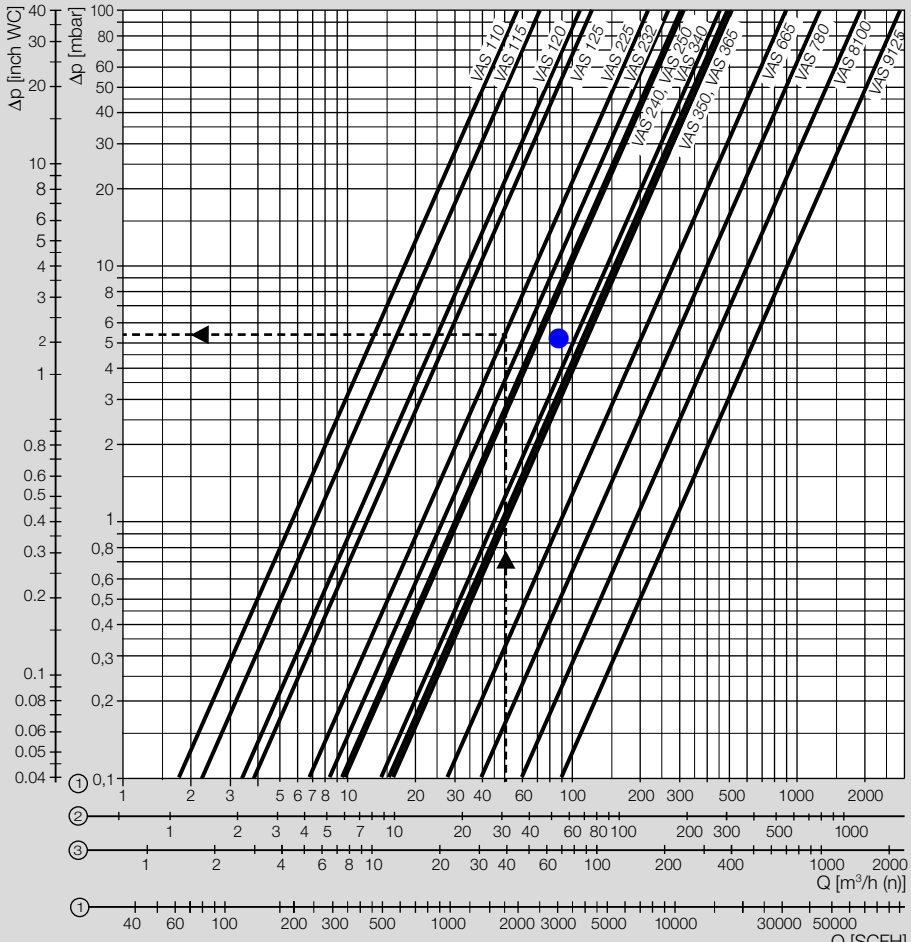
Continuation

Type	Flange			Type
3	Electrical connection via terminals		Electrical connection via terminals	3
6	Electrical connection via socket		Electrical connection via socket	○
9	Metal terminal connection box		Electrical connection via terminals	3
●	Pressure test point at the inlet		Pressure test point at the inlet and outlet	○
S	Proof of closure switch		Proof of closure switch	S
G	Proof of closure switch for 24 V		Proof of closure switch for 24 V	G
M	Contains no non-ferrous metals		Contains no non-ferrous metals	●
V	Viton valve disc seal		–	–

VS 350ML02LT3 with Rp 1½ connection flanges **Example** **Example** VAS 340R/LW with test points

* *Flow adjustment for VAS/VCS..N 1 – 3, VAS/VCS 1 – 2..L.*

● = *standard*, ○ *available*



① = natural gas (ρ = 0.80 kg/m³)
② = propane (ρ = 2.01 kg/m³)
③ = air (ρ = 1.29 kg/m³)

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

* Qmin. = rough specification for fully restricted flow adjustment and $\Delta p_{max.}$

5 Flow rate

5.1 VAS

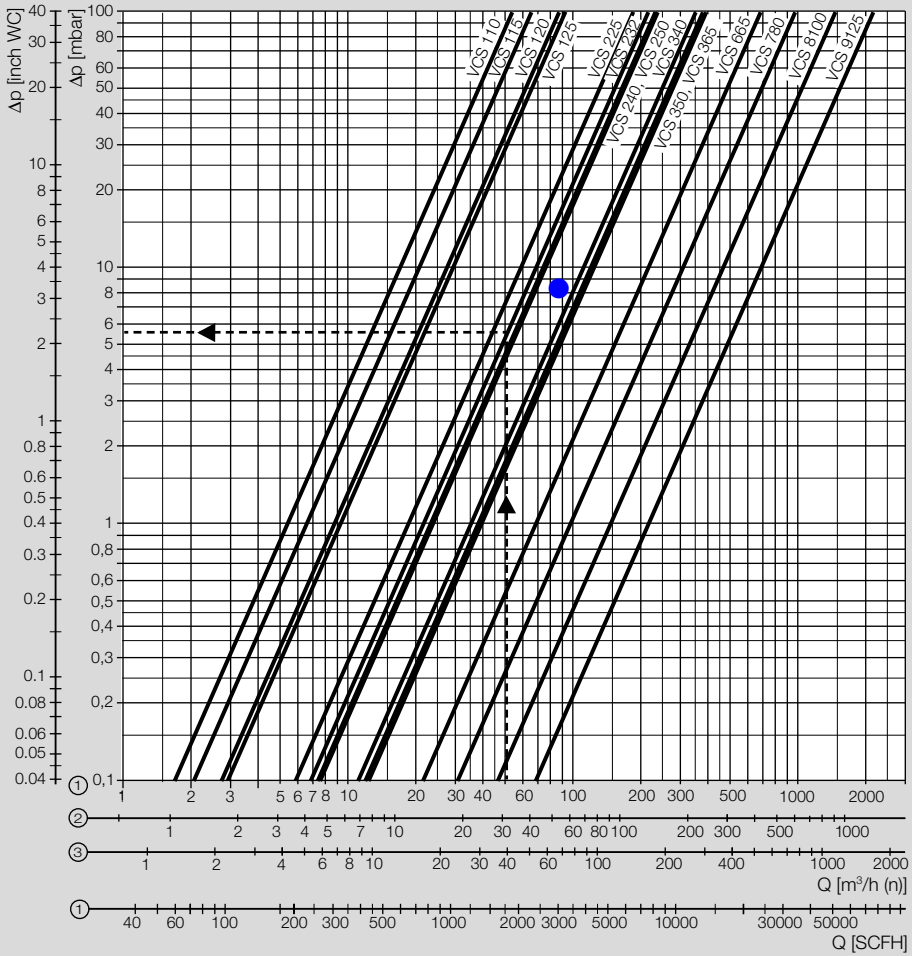
When determining the pressure loss, operating cubic metres must be entered. Then the pressure loss Δp read must be multiplied by the absolute pressure in bar (positive pressure + 1) to account for the change in the medium's density.
Example:
inlet pressure p_u (positive pressure) = 0.3 bar, gas type: natural gas,
operating flow rate Q = 50 m³/h (b),
Δp in the diagram = 5.5 mbar,
Δp = 5.5 mbar x (1 + 0.3) = 7.2 mbar on the solenoid valve VAS 225

5.1.1 Calculating the nominal size

(•) metric ( ) imperial

Natural gas	0,80	kg/m3
Flow rate Q (standard)	111	m3/h
Inlet pressure p_u	300	mbar
$\Delta p_{max.}$	10,0	mbar
Medium temperature	0	°C
Flow rate Q (operation)	85,6	m3/h

Product	Δp [mbar]	$Q_{min.}$* [m3/h]	v [m/s]
VAS 340	5,2	33,7	16
VAS 350	4,5	33,7	10
VAS 365	4,1	33,7	6
VAS 665	1,3	60,7	6
VAS 780	0,6	86,9	4
VAS 8100	0,3	131,4	3
VAS 9125	0,1	0,0	2



① = natural gas (ρ = 0.80 kg/m³)
② = propane (ρ = 2.01 kg/m³)
③ = air (ρ = 1.29 kg/m³)

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

* $Q_{min.}$ = rough specification for fully restricted flow adjustment and $\Delta p_{max.}$

5.2 VCS

When determining the pressure loss, operating cubic metres must be entered. Then the pressure loss Δp 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 = 64.8 m³/h (b),
Δp in the diagram = 5.7 mbar,
Δp = 5.7 mbar x (1 + 0.3) = 7.4 mbar on the double solenoid valve VCS 232

5.2.1 Calculating the nominal size

(•) metric ( ) imperial

Natural gas	0,80	kg/m3
Flow rate Q (standard)	111	m3/h
Inlet pressure p_u	300	mbar
$\Delta p_{max.}$	10,0	mbar
Medium temperature	0	°C
Flow rate Q (operation)	85,6	m3/h

Product	Δp [mbar]	$Q_{min.}$ * [m3/h]	v [m/s]
VCS 340	8,2	33,7	16
VCS 350	7,3	33,7	10
VCS 365	6,8	33,7	6
VCS 665	2,2	47,2	6
VCS 780	1,1	67,1	4
VCS 8100	0,5	101,2	3
VCS 9125	0,2	0,0	2

5.3 k_V value

The size and nominal flange diameter is determined using the flow rate diagram or by calculation using the k_V value.

$Q_{(n)}$ = Flow rate (standard state) [m³/h]

k_V = Valve coefficient ($k_{V\ min.}$ = rough specification for fully restricted flow adjustment)

Δp = Pressure loss [bar]

p_d = Outlet pressure (absolute) [bar]

ρ_n = Density [kg/m³] (air 1.29, natural gas 0.80, propane 2.01, butane 2.71)

T = Medium temperature (absolute) [K]

see page 65 (Converting units)

$$k_v = \frac{Q_{(n)}}{514} \cdot \sqrt{\frac{\rho_n \cdot T}{\Delta p \cdot p_d}} \qquad Q_{(n)} = 514 \cdot k_v \cdot \sqrt{\frac{\Delta p \cdot p_d}{\rho_n \cdot T}}$$

$$\Delta p = \left(\frac{Q_{(n)}}{514\ k_v}\right)^2 \cdot \frac{\rho_n \cdot T}{p_d}$$

VAS	$k_{V\ max.}$ m³/h	$k_{V\ min.}$ m³/h
VAS 110	5.0	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	–

VCS	$k_{V\ max.}$ m³/h	$k_{V\ min.}$ m³/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	–

Example

We want to find the size and nominal flange diameter for a gas solenoid valve VAS.

We have the maximum flow rate $Q_{(n)\ max.}$, the inlet pressure p_u and the natural gas temperature T.

$Q_{(n)\ max.}$ = 60 m³/h

p_u = 70 mbar = 0.07 bar ->

$p_{u\ absolute}$ = 0.07 bar + 1 bar = 1.07 bar

$\Delta p_{max.}$ = 0.01 bar (desired)

$p_{d\ absolute} = p_{u\ absolute} - \Delta p_{max.}$

$p_{d\ absolute}$ = 1.07 bar – 0.01 bar = 1.06 bar

T = 27°C ->

$T_{absolute}$ = 27 + 273 K = 300 K

$$k_V = \frac{60}{514} \cdot \sqrt{\frac{0.83 \cdot 300}{0.01 \cdot 1.06}} = 17.9$$

The gas solenoid valve is selected using the next higher k_V value (see table): VAS 225.

6 Selection

6.1 Selection table for VAS 1 – 3

Type	Nominal size DN	Rp R	NPT N	ISO F	Quick opening, quick closing /N	Slow opening, quick closing /L	230 V AC W	200 V AC Y	120 V AC Q	100 V AC P	24 V DC K	Proof of closure switch [1)3)] S	Proof of closure switch 24 V [1)3)] G	Viewed from the right [1)3)] R	Viewed from the left [1)3)] L	M20 cable gland [4)]	Plug with socket [4)]	Plug without socket [4)]	Accessories, right [3)] Screw plug	Pressure test point	DG 17VC [2)]	DG 40VC [2)]	DG 110VC [2)]	DG 300VC [2)]	Bypass/pilot valve VBY [1)]	Bypass/pilot valve VAS 1 [1)]	Accessories, left [3)] Screw plug	Pressure test point	DG 17VC [2)]	DG 40VC [2)]	DG 110VC [2)]	DG 300VC [2)]	Bypass/pilot valve VBY [1)]	Bypass/pilot valve VAS 1 [1)]
VAS 1					●	●	●	○	○	○	○	○	○	○	○	●	○	○	●	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○
VAS 1	10 – 25	●	○		●	●	●	○	○	○	○	○	○	○	○	●	○	○	●	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○
VAS 2		●			●	●	●	○	○	○	○	○	○	○	○	●	○	○	●	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○
VAS 2	25	●	○		●	●	●	○	○	○	○	○	○	○	○	●	○	○	●	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○
VAS 2	32	●	○		●	●	●	○	○	○	○	○	○	○	○	●	○	○	●	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○
VAS 2	40	●	○	○	●	●	●	○	○	○	○	○	○	○	○	●	○	○	●	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○
VAS 2	50	●	○		●	●	●	○	○	○	○	○	○	○	○	●	○	○	●	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○
VAS 3					●	●	●	○	○	○	○	○	○	○	○	●	○	○	●	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○
VAS 3	40	●	○		●	●	●	○	○	○	○	○	○	○	○	●	○	○	●	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○
VAS 3	50	●	○	○	●	●	●	○	○	○	○	○	○	○	○	●	○	○	●	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○
VAS 3	65	●	○		●	●	●	○	○	○	○	○	○	○	○	●	○	○	●	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○

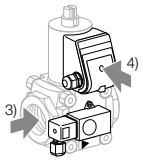
● = *standard*, ○ = *available*

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.*



Order example

VAS 225R/NW

Fitted pressure switch for test point p_u

A web app selecting the correct product is available at www.adlatus.org -> Product finder (ProFi)

6.2 Type code for VAS 1 – 3

Code	Description
VAS	Gas solenoid valve
1 – 3	Size
T	T-product
– -0 10 – 65	No inlet and outlet flange Blind flange Nominal inlet and outlet diameter
R N F	Rp internal thread NPT internal thread ISO flange
/N /L	Quick opening, quick closing Slow opening, quick closing
K P Q Y W	Mains voltage: 24 V DC Mains voltage: 100 V AC; 50/60 Hz Mains voltage: 120 V AC; 50/60 Hz Mains voltage: 200 V AC; 50/60 Hz Mains voltage: 230 V AC; 50/60 Hz
S G	Proof of closure switch with visual position indicator Proof of closure switch for 24 V with visual position indicator
R L	Viewed from the right (in the direction of flow) Viewed from the left (in the direction of flow)

6.3 Selection table for VAS 6 – 9

Type	Nominal size DN	ISO	ANSI	500 mbar	Quick opening, quick closing	Slow opening, quick closing	230 V AC	120 – 230 V AC	120 V AC	24 V DC	Proof of closure switch[1]	Proof of closure switch 24 V[1]	Viewed from the right[1,3]	Viewed from the left[1,3]	M20 cable gland[4]	Plug with socket[4]	Plug without socket[4]	Basic	Prepared for adapter plates	Accessories, viewed from the right[3,5]															
																				Inlet										Outlet					
																				Screw plug	Pressure test point	DG 17/VC	DG 40/VC	DG 110/VC	DG 300/VC	Bypass valve[1]	Pilot gas valve[1]	1½ NPT breather line	Rp 1 breather line	Screw plug	Pressure test point	DG 17/VC	DG 40/VC	DG 110/VC	DG 300/VC
		F	A	05	N	L	W	A	Q	K	S	G	R	L	3			B	E	/P	/M	/1	/2	/3	/4	/B	/Z	/V	/E	P	M	1	2	3	4
VAS 6	65	●	○	●	●	●	●		○	○	○	○	○	○	●	○	○	●	●	●	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○
VAS 7	80	●	○	●	●	●	●		○	○	○	○	○	○	●	○	○	●	●	●	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○
VAS 8	100	●	○	●	●	●	●		○	○	○	○	○	○	●	○	○	●	●	●	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○
VAS 9	125	●	○	●	●			●			○	○	○	○	●	○	○	●	●	●	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○

● = *standard*, ○ = *available*

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.*

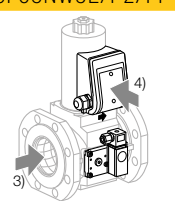
3) *Viewed from the right/left: looking into the valve body in the direction of flow, see order example.*

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



A web app selecting the correct product is available at www.adlatus.org -> Product finder (ProFi)

6.4 Type code for VAS 6– 9

Code	Description
VAS	Gas solenoid valve
6 – 9	Size
T	T-product
65 – 125	Nominal inlet flange diameter
F A	ISO flange ANSI flange
05	Max. inlet pressure $p_{u\ max.}$ = 500 mbar (7 psig)
N L	Quick opening, quick closing Slow opening, quick closing
W A Q K	Mains voltage: 230 V AC; 50/60 Hz Mains voltage: 120 – 230 V AC; 50/60 Hz Mains voltage: 120 V AC; 50/60 Hz Mains voltage: 24 V DC
S G	Proof of closure switch with visual position indicator Proof of closure switch for 24 V with visual position indicator
R L	Viewed from the right (in the direction of flow) Viewed from the left (in the direction of flow)
3	Electrical connection: M20 cable gland
B E	Basic Prepared for adapter plates

Code	Description
	Accessories, right, inlet
/P	Screw plug
/M	Test point for inlet pressure p_u
/1	Gas pressure switch DG 17VC
/2	Gas pressure switch DG 40VC
/3	Gas pressure switch DG 110VC
/4	Gas pressure switch DG 300VC
/B	Bypass valve VAS 1, fitted
/Z	Pilot gas valve VAS 1, fitted
/V	Prepared for 1½ NPT breather line
/E	Prepared for Rp 1 breather line
	Accessories, right, outlet
P	Screw plug
M	Test point for outlet pressure p_d
1	Gas pressure switch DG 17VC
2	Gas pressure switch DG 40VC
3	Gas pressure switch DG 110VC
4	Gas pressure switch DG 300VC
	Accessories, left, inlet
/P	Screw plug
/M	Test point for inlet pressure p_u
/1	Gas pressure switch DG 17VC
/2	Gas pressure switch DG 40VC
/3	Gas pressure switch DG 110VC
/4	Gas pressure switch DG 300VC
/B	Bypass valve VAS 1, fitted
/Z	Pilot gas valve VAS 1, fitted
/V	Prepared for 1½ NPT breather line
/E	Prepared for Rp 1 breather line
	Accessories, left, outlet
P	Screw plug
M	Test point for outlet pressure p_d
1	Gas pressure switch DG 17VC
2	Gas pressure switch DG 40VC
3	Gas pressure switch DG 110VC
4	Gas pressure switch DG 300VC

6.5 Selection table for VCS 1 – 3

Type	Nominal size DN	Rp NPT ISO			500 mbar	Filter module VMF	V1 = quick opening, quick closing	V1 = slow opening, quick closing	V2 = quick opening, quick closing	V2 = slow opening, quick closing	Fine-adjusting valve VMV	Measuring orifice VMO	230 V AC	200 V AC	120 V AC	100 V AC	24 V DC	Proof of closure switch[1]	Proof of closure switch 24 V[1]	Viewed from the right[3]	Viewed from the left[3]	M20 cable gland[4]	Plug with socket[4]	Plug without socket[4]	Accessories[3] Viewed from the right: Screw plug	Pressure test point	DG 17VC[2]	DG 40VC[2]	DG 110VC[2]	DG 300VC[2]	Viewed from the left: Screw plug	Pressure test point	DG 17VC[2]	DG 40VC[2]	DG 110VC[2]	DG 300VC[2]	Bypass valve VBY[1]	Bypass valve VAS 1[1]	Pilot gas valve VBY[1]	Pilot gas valve VAS 1[1]
		R	N	F	05	F	N	L	N	L	V	O	W	Y	Q	P	K	S	G	R	L	3			/P	/M	1	2	3	4	P	M	1	2	3	4	BY	BS	ZY	ZS
VCS 1					●	●	●	●	●	●	○	○	●	○	○	○	○	○	○	○	○	●	○	○	●	○	○	○	○	○	○	●	○	○	○	○	○	○	○	○	○
VCS 1	10 – 25	●	○		●	●	●	●	●	●	○	○	●	○	○	○	○	○	○	○	○	●	○	○	●	○	○	○	○	○	○	●	○	○	○	○	○	○	○	○	○
VCS 2		●			●	●	●	●	●	●	○	○	●	○	○	○	○	○	○	○	○	●	○	○	●	○	○	○	○	○	○	●	○	○	○	○	○		○		○
VCS 2	25	●	○		●	●	●	●	●	●	○	○	●	○	○	○	○	○	○	○	○	●	○	○	●	○	○	○	○	○	○	●	○	○	○	○	○		○		○
VCS 2	32	●	○		●	○	●	●	●	●	○	○	●	○	○	○	○	○	○	○	○	●	○	○	●	○	○	○	○	○	○	●	○	○	○	○	○		○		○
VCS 2	40	●	○	○	●	○	●	●	●	●	○	○	●	○	○	○	○	○	○	○	○	●	○	○	●	○	○	○	○	○	○	●	○	○	○	○	○		○		○
VCS 2	50	●	○		●	○	●	●	●	●	○	○	●	○	○	○	○	○	○	○	○	●	○	○	●	○	○	○	○	○	○	●	○	○	○	○	○		○		○
VCS 3					●		●	●	●	●			●	○	○	○	○	○	○	○	○	●	○	○	●	○	○	○	○	○	○	●	○	○	○	○	○		○		○
VCS 3	40	●	○		●		●	●	●	●			●	○	○	○	○	○	○	○	○	●	○	○	●	○	○	○	○	○	○	●	○	○	○	○	○		○		○
VCS 3	50	●	○	○	●		●	●	●	●			●	○	○	○	○	○	○	○	○	●	○	○	●	○	○	○	○	○	○	●	○	○	○	○	○		○		○
VCS 3	65	●	○		●		●	●	●	●			●	○	○	○	○	○	○	○	○	●	○	○	●	○	○	○	○	○	○	●	○	○	○	○	○		○		○

● = standard, ○ = available

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

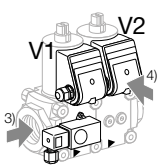
2) *Specify the test point for inlet pressure p_u, interspace pressure p_z or outlet pressure p_d. When attaching DG..VC for p_z, the installation space left at the other valve is only sufficient for screw plugs.*

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.*

Order example

VCS 240R/40R05NNWR3/2-PP/PPPP



Fitted pressure switch for test point p_u

Selecting VMF, VMV, VMO and accessories, see page 39 (Accessories).

6.6 Type code for VCS 1 – 3

Code	Description
VCS	Gas solenoid valve
1 – 3	Size
E T	EU certfied T-product
– 10 – 65	No inlet and outlet flange Nominal inlet and outlet diameter
R N F	Rp internal thread NPT internal thread Flange to ISO 7005
05	Max. inlet pressure p_u = 500 mbar (7 psig)
F	Filter module
N L	1st valve quick opening, quick closing 1st valve slow opening, quick closing
N L	2nd valve quick opening, quick closing 2nd valve slow opening, quick closing
V 010 – 032	Fine-adjusting valve VMV Measuring orifice VMO, Ø 10 – Ø 32 mm
K P Q Y W	Mains voltage: 24 V DC Mains voltage: 100 V AC; 50/60 Hz Mains voltage: 120 V AC; 50/60 Hz Mains voltage: 200 V AC; 50/60 Hz Mains voltage: 230 V AC; 50/60 Hz
S G	Proof of closure switch with visual position indicator Proof of closure switch for 24 V with visual position indicator
R L	Flow from left to right Flow from right to left
3	Electrical connection: M20 cable gland

Code	Description
	Accessories, right, inlet
/P	Screw plug
/M	Test point for inlet pressure p_u
/1	Gas pressure switch DG 17VC
/2	Gas pressure switch DG 40VC
/3	Gas pressure switch DG 110VC
/4	Gas pressure switch DG 300VC
	Accessories, right, interspace 1
P	Screw plug
M	Test point for interspace pressure p_z
1	Gas pressure switch DG 17VC
2	Gas pressure switch DG 40VC
3	Gas pressure switch DG 110VC
4	Gas pressure switch DG 300VC
	Accessories, right, interspace 2
P	Screw plug
M	Test point for interspace pressure p_z
1	Gas pressure switch DG 17VC
2	Gas pressure switch DG 40VC
3	Gas pressure switch DG 110VC
4	Gas pressure switch DG 300VC
BY	Bypass valve VBY, fitted
ZS	Pilot gas valve VAS 1, fitted
	Accessories, right, outlet
P	Screw plug
M	Test point for outlet pressure p_d
1	Gas pressure switch DG 17VC
2	Gas pressure switch DG 40VC
3	Gas pressure switch DG 110VC
4	Gas pressure switch DG 300VC
BY	Bypass valve VBY, fitted
ZS	Pilot gas valve VAS 1, fitted

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

6.7 Selection table for VCS 6 – 9

Type	Nominal size DN	ISO	ANSI	500 mbar	V1 = quick opening, quick closing	V1 = slow opening, quick closing	V2 = quick opening, quick closing	V2 = slow opening, quick closing	230 V AC	120 – 230 V AC	120 V AC	24 V DC	Proof of closure switch[1]	Proof of closure switch 24 V[1]	Viewed from the right[3]	Viewed from the left[3]	M20 cable gland[4]	Plug with socket[4]	Plug without socket[4]	Basic	Prepared for adapter plates
		F	A	05	N	L	N	L	W	A	Q	K	S	G	R	L	3			B	E
VCS 6	65	●	○	●	●	●	●	●	●		○	○	○	○	○	○	●	○	○	●	●
VCS 7	80	●	○	●	●	●	●	●	●		○	○	○	○	○	○	●	○	○	●	●
VCS 8	100	●	○	●	●	●	●	●	●		○	○	○	○	○	○	●	○	○	●	●
VCS 9	125	●	○	●	●		●			●			○	○	○	○	●	○	○	●	●

Accessories, viewed from the right[3),5)]

Type	Inlet: Screw plug	Inlet: Pressure test point	Inlet: DG 17VC[2]	Inlet: DG 40VC[2]	Inlet: DG 110VC[2]	Inlet: DG 300VC[2]	Interspace 1: Screw plug	Interspace 1: Pressure test point	Interspace 1: DG 17VC[2]	Interspace 1: DG 40VC[2]	Interspace 1: DG 110VC[2]	Interspace 1: DG 300VC[2]	Interspace 2: Screw plug	Interspace 2: Pressure test point	Interspace 2: DG 17VC[2]	Interspace 2: DG 40VC[2]	Interspace 2: DG 110VC[2]	Interspace 2: DG 300VC[2]	Interspace 2: Bypass valve	Interspace 2: Pilot gas valve	Interspace 2: 1½ NPT breather line	Interspace 2: Rp 1 breather line	Outlet: Screw plug	Outlet: Pressure test point	Outlet: DG 17VC[2]	Outlet: DG 40VC[2]	Outlet: DG 110VC[2]	Outlet: DG 300VC[2]
	/P	/M	/1	/2	/3	/4	P	M	1	2	3	4	P	M	1	2	3	4	B	Z	V	E	P	M	1	2	3	4
VCS 6	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○
VCS 7	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○
VCS 8	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○
VCS 9	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○

● = standard, ○ = available

1) *Specify wiring of 1st or 2nd 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.*

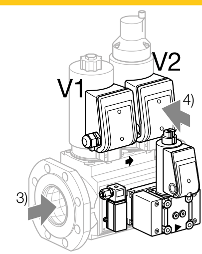
3) *Viewed from the right/left: looking into the valve body in the direction of flow.*

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



6.8 Type code for VCS 6– 9

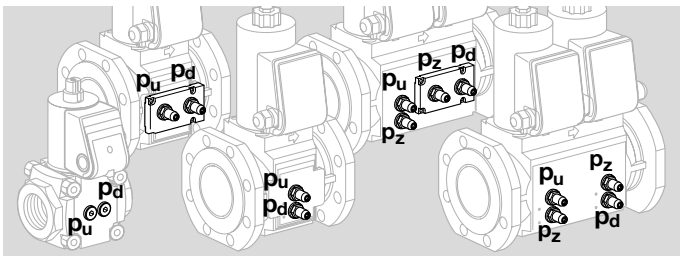
Code	Description
VCS	Gas solenoid valve
6 – 9	Size
T	T-product
65 – 125	Niminal inlet flange diameter size
F	ISO flange
A	ANSI flange
05	Max. inlet pressure $p_{u\ max.}$ 500 mbar (7 psig)
N	1st valve quick opening, quick closing
L	1st valve slow opening, quick closing
N	2nd valve quick opening, quick closing
L	2nd valve slow opening, quick closing
K	Mains voltage: 24 V DC
Q	Mains voltage: 120 V AC; 50/60 Hz
W	Mains voltage: 230 V AC; 50/60 Hz
A	Mains voltage: 120 – 230 V AC; 50/60 Hz
S	Proof of closure switch with visual position indicator
G	Proof of closure switch for 24 V with visual position indicator
R	Viewed from the right (in the direction of flow)
L	Viewed from the left (in the direction of flow)
3	Electrical connection: M20 cable gland
B	Basic
E	Prepared for adapter plates

Code	Description
	Accessories, right, inlet
/P	Screw plug
/M	Test point for inlet pressure p_u
/1	Gas pressure switch DG 17VC
/2	Gas pressure switch DG 40VC
/3	Gas pressure switch DG 110VC
/4	Gas pressure switch DG 300VC
	Accessories, right, interspace 1
P	Screw plug
M	Test point for interspace pressure p_z
1	Gas pressure switch DG 17VC
2	Gas pressure switch DG 40VC
3	Gas pressure switch DG 110VC
4	Gas pressure switch DG 300VC
	Accessories, right, interspace 2
P	Screw plug
M	Test point for interspace pressure p_z
1	Gas pressure switch DG 17VC
2	Gas pressure switch DG 40VC
3	Gas pressure switch DG 110VC
4	Gas pressure switch DG 300VC
B	Bypass valve VAS 1, fitted
Z	Pilot gas valve VAS 1, fitted
V	Prepared for 1½ NPT breather line
E	Prepared for Rp 1 breather line
	Accessories, right, outlet
P	Screw plug
M	Test point for outlet pressure p_d
1	Gas pressure switch DG 17VC
2	Gas pressure switch DG 40VC
3	Gas pressure switch DG 110VC
4	Gas pressure switch DG 300VC

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

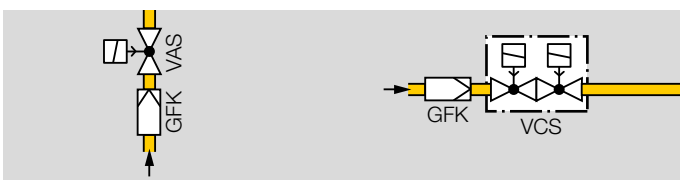
7 Project planning information

7.1 Connection 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.

7.2 Installation



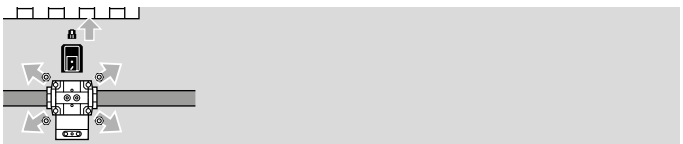
Installation position: black solenoid actuator in the vertical upright position or tilted up to the horizontal, not upside down.

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

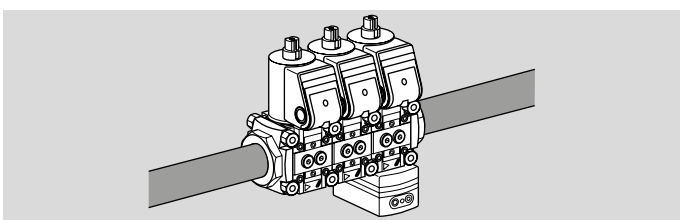
The pipe system must be designed in such a way so as to avoid strain at the connections.

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

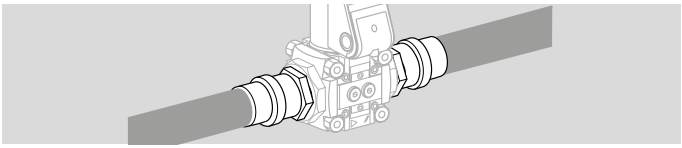
The unit must not be in contact with masonry. Minimum clearance 20 mm (0.79 inches).



Ensure that there is sufficient space for installation, adjustment and maintenance work. Minimum clearance of 50 cm (19.7 inch) above the black solenoid actuator.



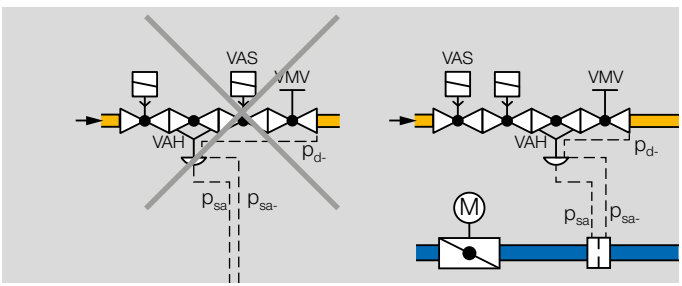
If more than three valVario controls are installed in line, the controls must be supported.



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 m³/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.

7.3 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.

7.4 Note on settings

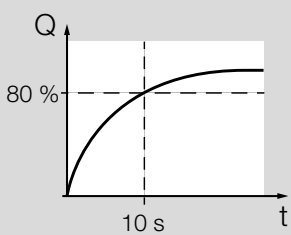
VAS 1 – 3..L, VCS 1 – 3..L:

Damping speed

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

7.5 Opening times

VAS../N quick opening: ≤ 1 s;
VAS../L slow opening: up to 10 s.

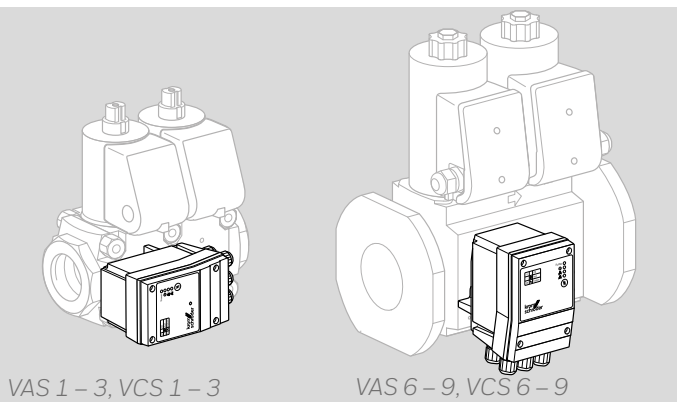


7.6 Flow rate for bypass or pilot gas valve

Characteristic flow rates, see accessories on page 41 (Bypass/pilot gas valve VAS 1) and page 45 (Bypass/pilot gas valve VBY 8).

7.7 Tightness control TC 1V

Tightness control TC 1V can be mounted directly onto the valve, see Accessories, page 52 (Tightness control TC 1V).



VAS 1 – 3, VCS 1 – 3 *VAS 6 – 9, VCS 6 – 9*

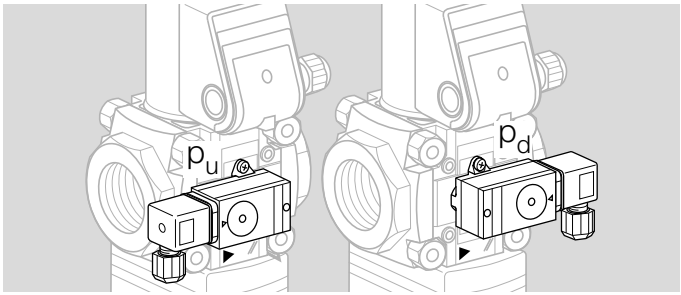
Tightness control TC 1V and bypass/pilot gas valve cannot be fitted together on the same side of the double block valve.

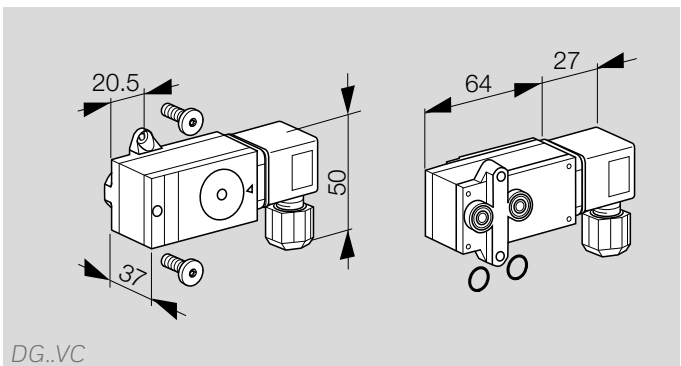
7.8 Electrical connection

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

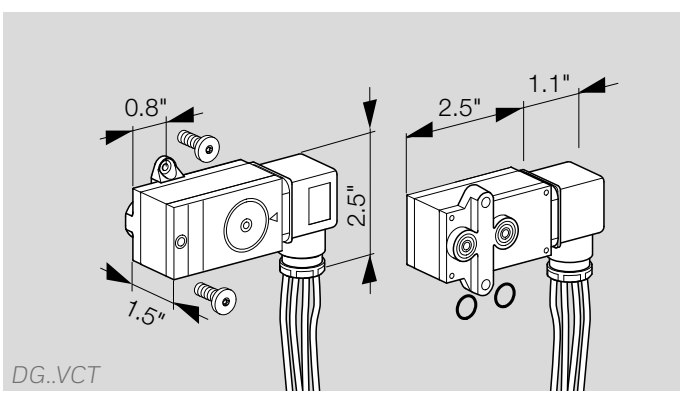
The solenoid actuator heats up during operation. Surface temperature approx. 85°C (approx. 185°F) pursuant to EN 60730-1.

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.





DG..VC



DG..VCT

8 Accessories

8.1 Gas pressure switch 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 for VAS/VCS

Type	Adjusting range [mbar]
DG 17VC	2 to 17
DG 40VC	5 to 40
DG 110VC	30 to 110
DG 300VC	100 to 300

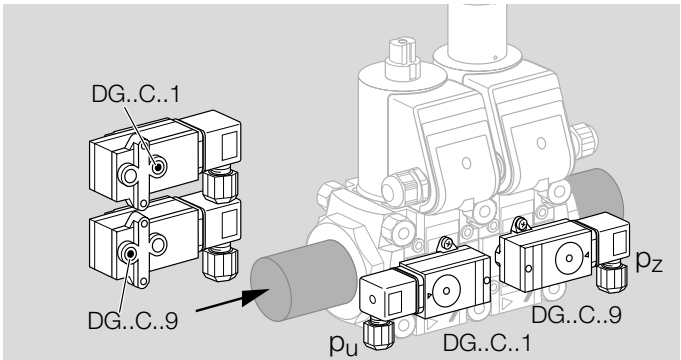
DG..VCT for VAS..T/VCS..T

with AWG 18 connection wires

Type	Adjusting range ["WC]
DG 17VCT	0.8 to 6.8
DG 40VCT	2 to 16
DG 110VCT	12 to 44
DG 300VCT	40 to 120

Fastening set DG..C for VAx 1 – 3

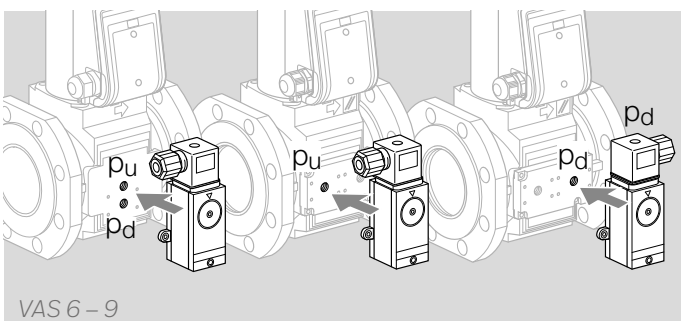
Order No.: 74921507, scope of delivery:
2 x retaining screws,
2 x sealing rings.



VCS 1 – 3

8.1.1 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.

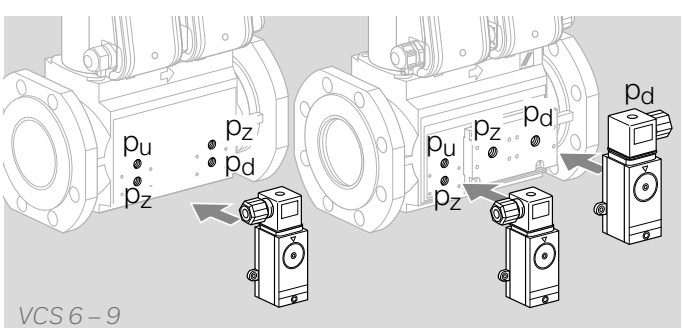


VAS 6 – 9

8.1.2 Installation on VAS 6 – 9

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

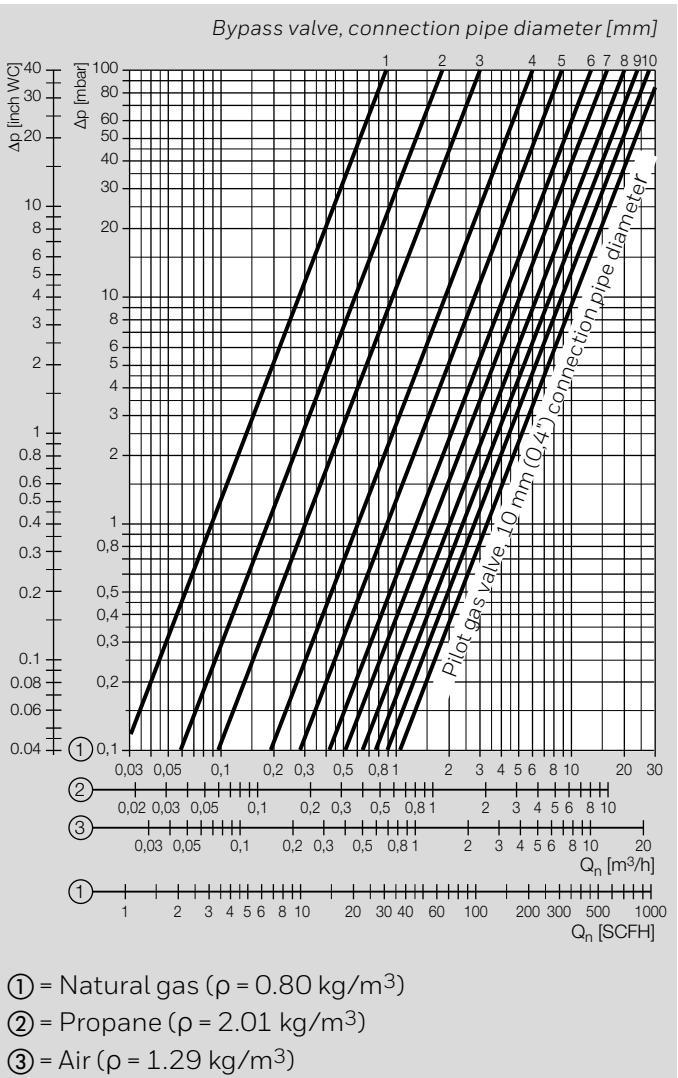
Monitoring the outlet pressure p_d: the pressure switch for gas is mounted on the outlet side.



VCS 6 – 9

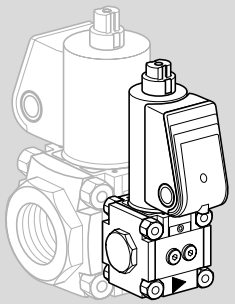
8.1.3 Installation on VCS 6 – 9

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.



8.2 Bypass/pilot gas valve VAS 1

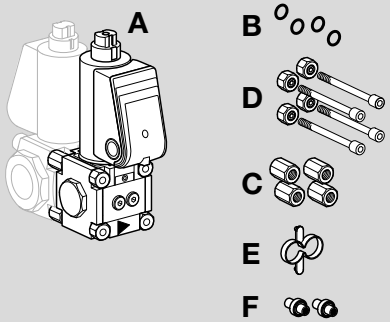
8.2.1 Flow rate, VAS 1 attached to VAS 1, VAS 2, VAS 3



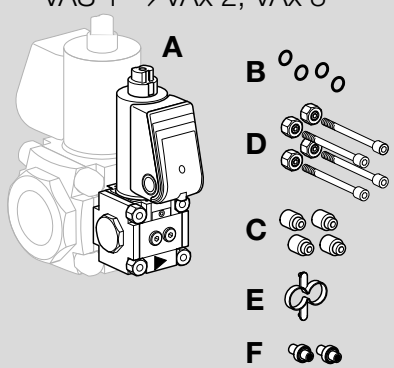
The characteristic flow rate curves have been measured for bypass valve VAS 1 with connection pipe diameter 1 to 10 mm (0.04 to 0.4") and for the pilot gas valve with 10 mm (0.4") connection pipe.

Scope of delivery and connection pipes, see page 42 (Scope of delivery of VAS 1 for VAS 1, VAS 2, VAS 3).

VAS 1 → VAx 1



VAS 1 → VAx 2, VAx 3



8.2.2 Scope of delivery of VAS 1 for VAS 1, VAS 2, VAS 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:

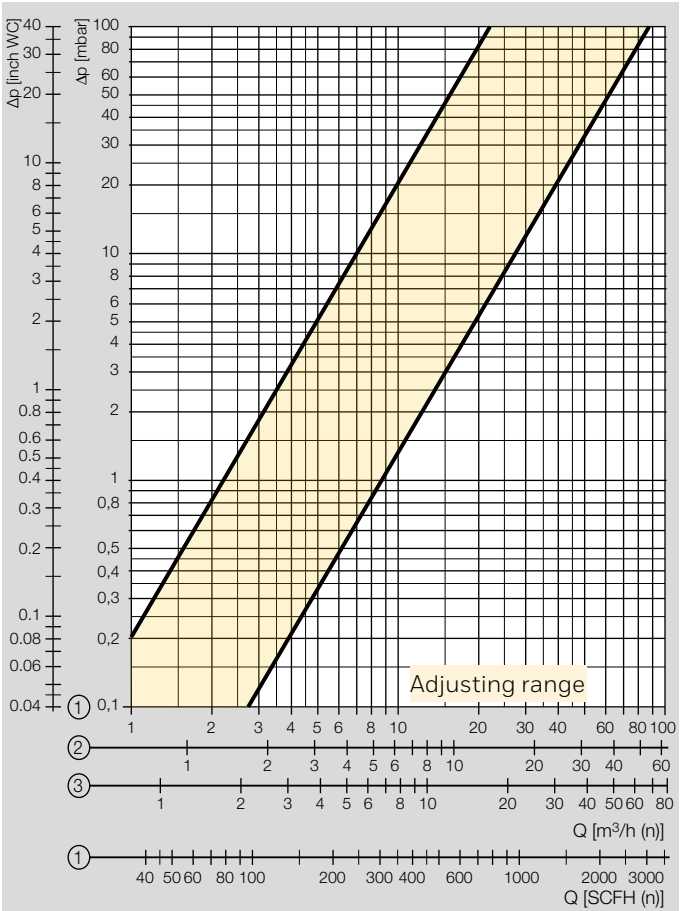
F 1 x connection pipe, 1 x sealing plug, if the pilot gas valve has a threaded flange on the outlet side.

Bypass valve VAS 1:

F 2 x connection pipes, if the bypass valve has a blind flange on the outlet side.
Standard: diameter 10 mm.

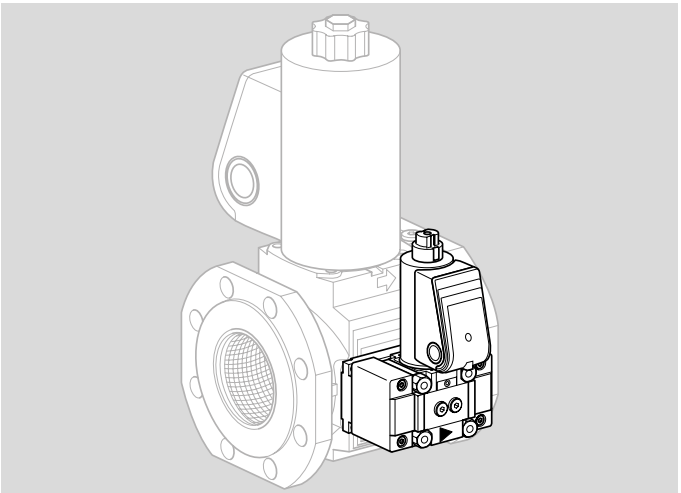
Other connection pipes with bypass diameter as of 1 mm are available:

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



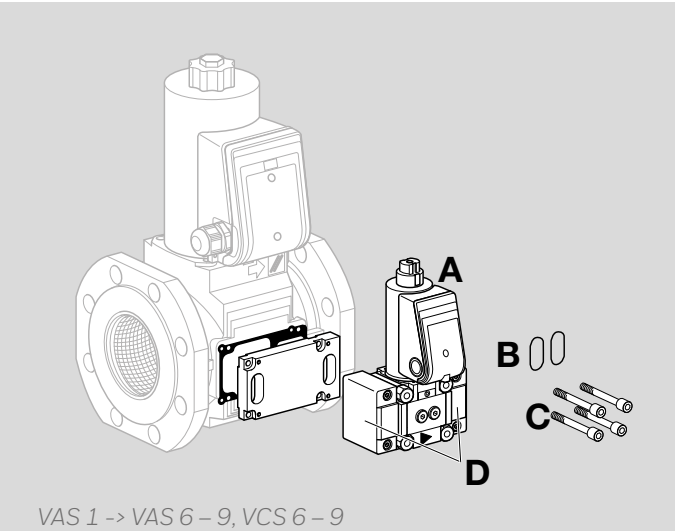
① = Natural gas (ρ = 0.80 kg/m³)
② = Propane (ρ = 2.01 kg/m³)
③ = Air (ρ = 1.29 kg/m³)

8.2.3 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 ($Q_{min.}$).

Scope of delivery, see page 44 (Scope of delivery of VAS 1 for VAS 6 – 9, VCS 6 – 9).



VAS 1 -> VAS 6 – 9, VCS 6 – 9

8.2.4 Scope of delivery of VAS 1 for VAS 6 – 9, VCS 6 – 9

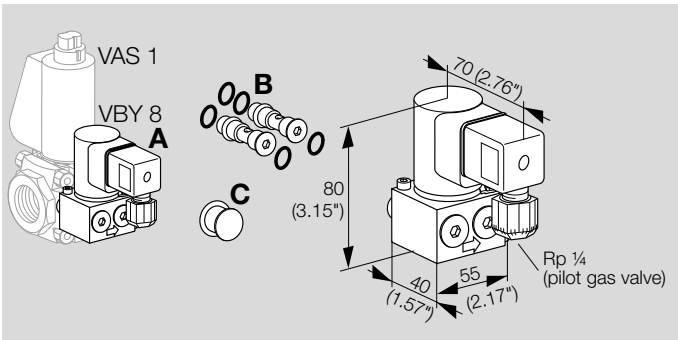
A 1 x bypass or pilot gas valve VAS 1,
B 2 x flange O-rings,
C 4 x connecting screws,

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 49 (By-pass adapter).

8.3 Bypass/pilot gas valve VBY 8



For mounting on gas solenoid valve VAS 1 and double solenoid valve VCS 1.

8.3.1 Scope of delivery, 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 1 x grease for O-rings.

8.3.2 Scope of delivery, VBY 8R as 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 1 x grease for O-rings.

8.3.3 Selection

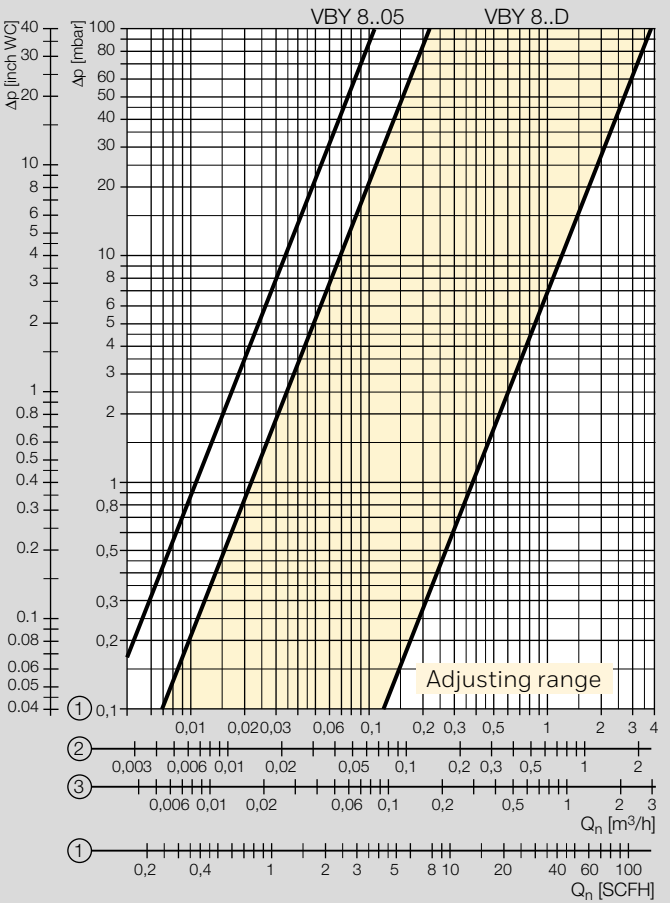
Type	I	R	W	Q	K	6L	-R	-L	E	B	D	05
VBY 8	●	●	●	●	●	●	●	●	●	●	●	●

Order example

VBY 8RW6L-LED

8.3.4 Type code

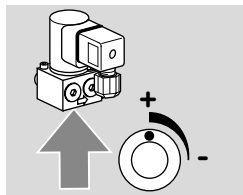
Code	Description
VBY	Gas solenoid valve
8	Nominal size
I R	For internal gas pick-up as bypass valve For external gas pick-up as pilot gas valve
K Q W	Mains voltage: 24 V DC Mains voltage: 120 V AC; 50/60 Hz Mains voltage: 230 V AC; 50/60 Hz
6L	Electrical connection via plug and socket with LED
-R -L	Attachment side of main valve: right-hand side Attachment side of main valve: left-hand side
E B	Attached to the VAS Enclosed (separate packing unit)
D 05	Flow adjustment Nozzle diameter = 0.5 mm (0.02")



① = Natural gas (ρ = 0.80 kg/m³)
② = Propane (ρ = 2.01 kg/m³)
③ = Air (ρ = 1.29 kg/m³)

8.3.5 Flow rate

VBY 8..D



The flow rate can be set by turning the flow rate restrictor (4 mm/0.16" Allen screw) ¼ of a turn. Flow rate: 10 to 100%.

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.

8.3.6 Technical data

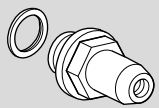
Inlet pressure $p_{u\ max.}$:
500 mbar (7 psig).

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.

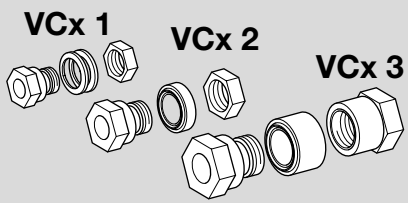
Enclosure: IP 54.



8.4 Pressure test nipple

Test nipple to check the inlet pressure p_u and outlet pressure p_d.

Scope of delivery:
1 x test nipple with 1 x profiled sealing ring.
Rp ¼: Order No. 74923390, ¼ NPT: Order No. 75455894.

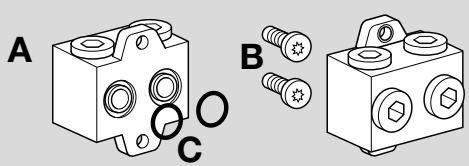


8.5 Cable gland set

When wiring double solenoid valve VCS 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.

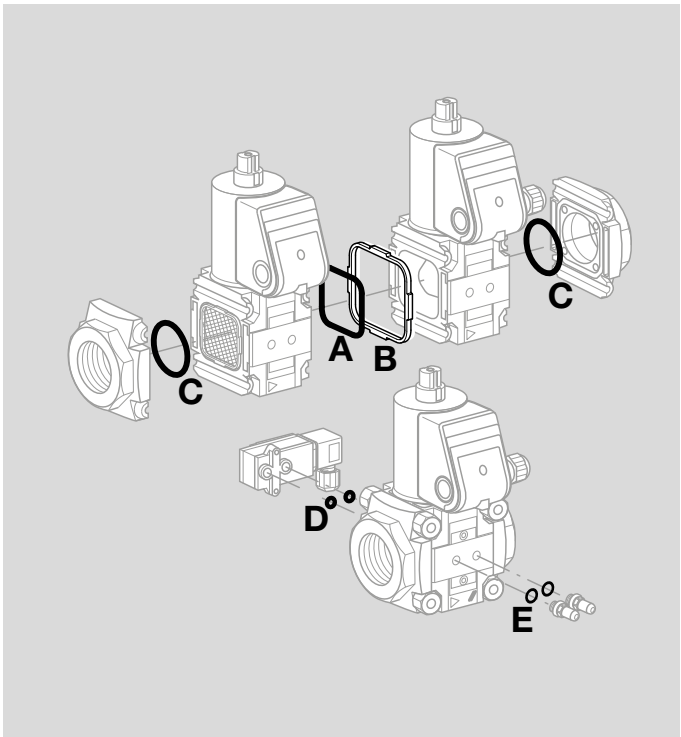


8.6 Attachment block VA 1 – 3

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

Attachment block Rp ¼, Order No. 74922228,
Attachment block ¼ 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.



8.7 Seal set VA 1 – 3

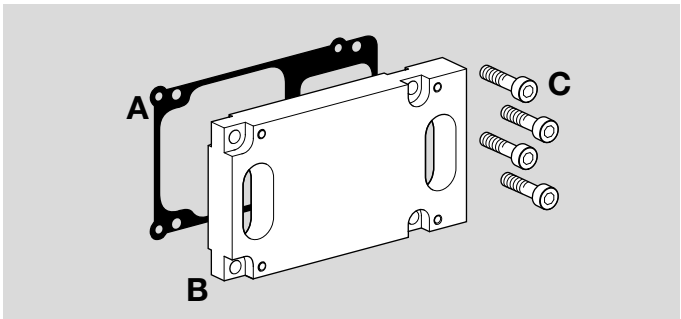
VA 1, Order No. 74921988,
VA 2, Order No. 74921989,
VA 3, Order No. 74921990.

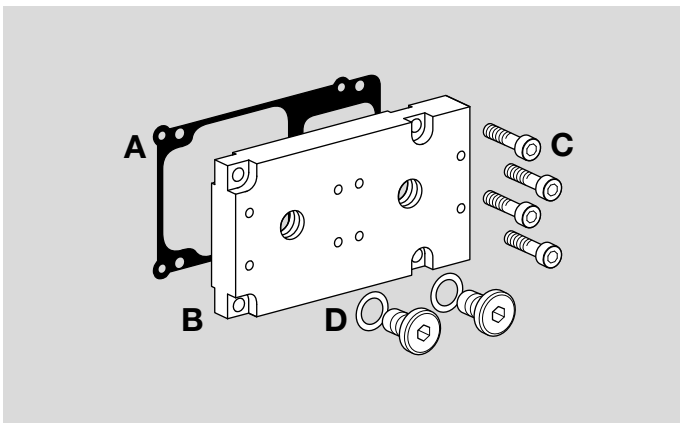
Scope of delivery:
A 1 x double block seal,
B 1 x retaining frame,
C 2 x O-rings (flange),
D 2 x O-rings (pressure switch),
for pressure test point/screw plug:
E 2 x sealing rings (flat sealing),
2 x profiled sealing rings.

8.8 Seal set VCS 1 – 3

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

Scope of delivery:
A 1 x double block seal,
B 1 x retaining frame.





8.9 Adapter plates for VAS/VCS 6 – 9

8.9.1 Bypass adapter

For the connection of 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.

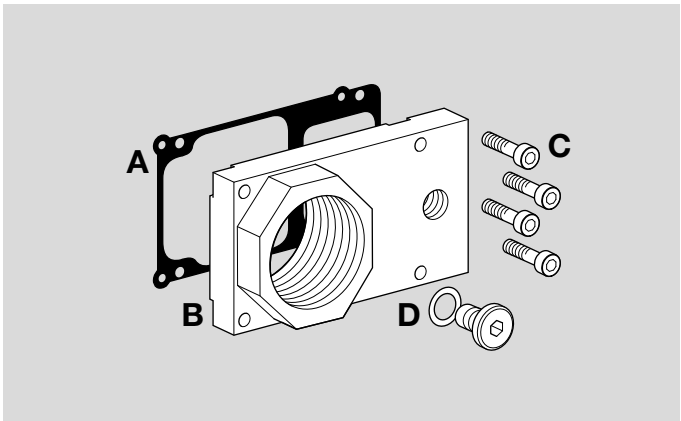
8.9.2 Measuring adapter

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

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.

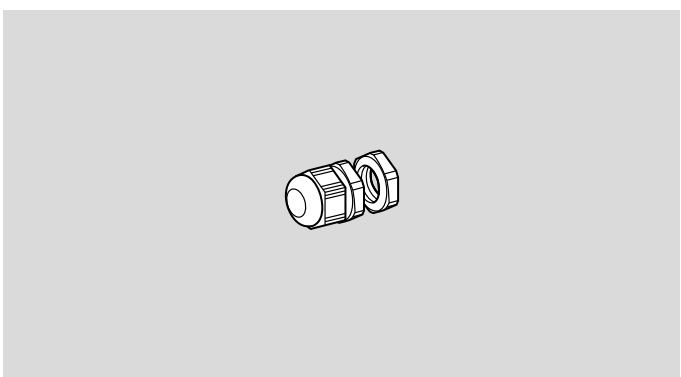


8.9.3 Relief line adapter

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

Rp 1, VAS/VCS 6 – 9, Order No. 74923025,
1½ NPT, VAS..T/VCS..T 6 – 9, Order No. 74923024.

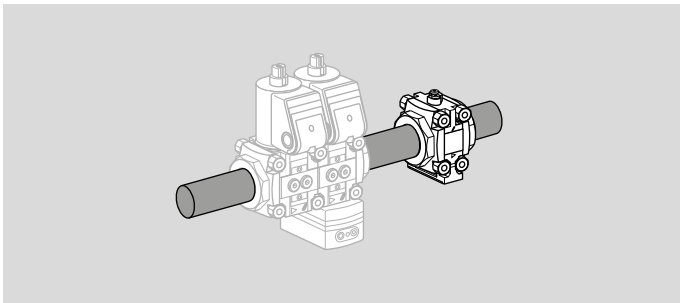
Scope of delivery:
A 1 x seal,
B 1 x Z flange,
C 4 x M5 set screws,
D 1 x screw plug with sealing ring.



8.10 Cable gland with pressure equalization element

To avoid the formation of condensation, the cable gland with pressure equalization element can be used instead of the standard M20 cable gland. The diaphragm in the gland is designed to ventilate the device, without allowing water to enter.

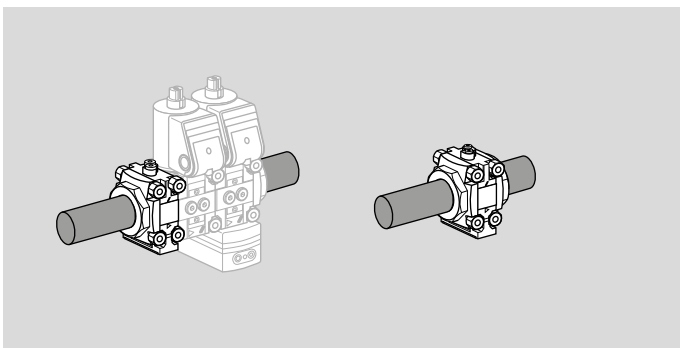
1 x cable gland, Order No. 74924686.



8.11 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.

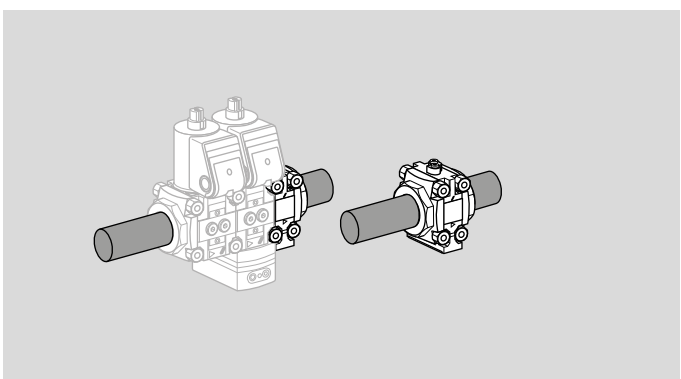
See www.docuthek.com -> Technical Information -> VMO



8.12 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.

See www.docuthek.com -> Technical Information -> VMF



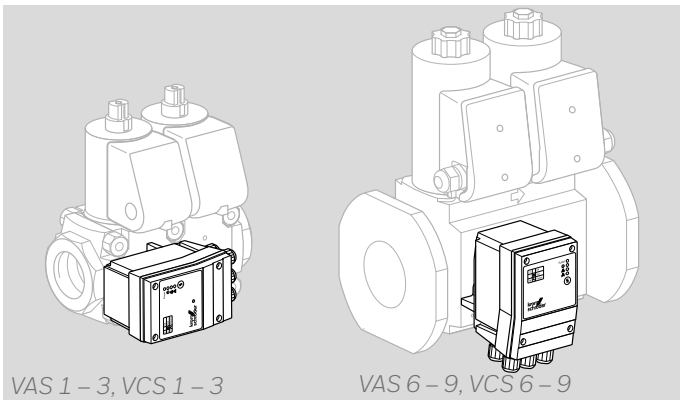
8.13 Fine-adjusting valve VMV

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.

See www.docuthek.com -> Technical Information -> VMV.

8.14 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 -> Technical Information -> TC.



VAS 1 – 3, VCS 1 – 3 *VAS 6 – 9, VCS 6 – 9*

Control voltage = mains voltage

TC 1V05W/W, Order No. 84765541,
TC 1V05Q/Q, Order No. 84765543,
TC 1V05K/Q, Order No. 84765545.

Control voltage: 24 V DC

TC 1V05W/K, Order No. 84765542,
TC 1V05Q/K, Order No. 84765544.

8.14.1 Selection table

	R	N	05	W/W	Q/Q	K/K	W/K	Q/K
TC 1V			●	●	●	●	●	●

● = *standard*, ○ = *available*

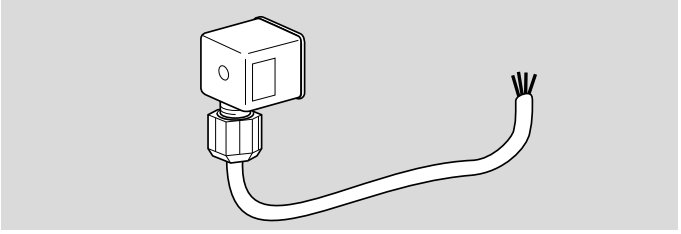
Order example

TC 1V05W/K

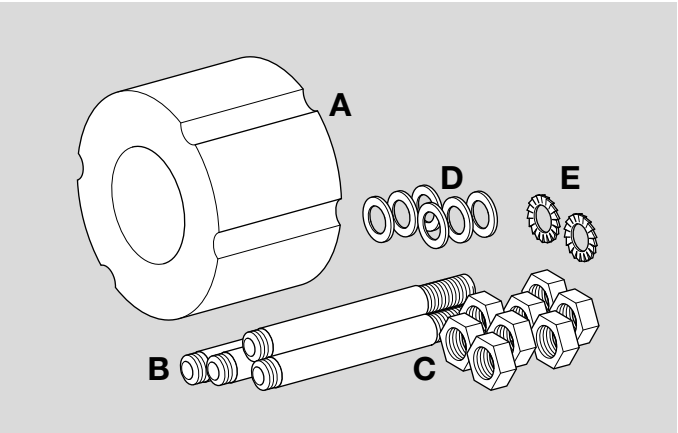
8.14.2 Type code

Code	Description
TC	Tightness control
1V	For attachment to valVario
05	$p_{u\ max.}$ 500 mbar
W Q K	Mains voltage: 230 V AC, 50/60 Hz 120 V AC, 50/60 Hz 24 V DC
/W /Q /K	Control voltage: 230 V AC, 50/60 Hz 120 V AC, 50/60 Hz 24 V DC

8.15 Valve connection cable



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



8.16 Adapter for length compensation VAS 6 – 9

For length compensation when replacing VG by VAS 6 – 9.

Adapter for length compensation:
VAS 6, Order No. 74923271,
VAS 7, Order No. 74923272,
VAS 8, Order No. 74923273
VAS 9, Order No. 74923274.

Scope of delivery VAS/VCS 6:
A 1 x adapter for length compensation,
B 4 x threaded bolts,
C 8 x nuts,
D 6 x washers,
E 2 x serrated lock washers.

Scope of delivery VAS/VCS 7 to 9:
A 1 x adapter for length compensation,
B 8 x threaded bolts,
C 16 x nuts,
D 14 x washers,
E 2 x serrated lock washers.

9 Technical data

9.1 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_2.

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 temperatures:
-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: -20 to +40°C (-4 to +104°F).

Enclosure: IP 65.

This unit is not suitable for cleaning with a highpressure cleaner and/or cleaning products.

9.2 Mechanical data

Gas types: natural gas, LPG (gaseous), biogas (max. 0.1 %-by-vol. H_2S) or clean air; other gases 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_u: 500 mbar (7 psig).

FM approved, non operational pressure: 700 mbar (10 psig).

ANSI/CSA approved: 350 mbar (5 psig).

Flow adjustment limits the maximum flow volume between approx. 20 and 100%. On VAS 1 – 3, the setting can be monitored on an indicator.

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

Opening times:
VAS../N quick opening: ≤ 1 s;
VAS../L slow opening: up to 10 s.

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

Switching frequency:
VAS../N: max. 30 x per minute.

VAS../L: there must 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:
VAS/VCS 1 – 3 with internal thread:
Rp pursuant to ISO 7-1, NPT pursuant to ANSI/ASME;
VAS/VCS of size 2 and higher: with PN 16 ISO flange (pursuant to ISO 7005), with ANSI flange pursuant to ANSI 150.

Cable gland: M20 x 1.5.
Electrical connection: cable with max. 2.5 mm^2 (AWG 12) or plug with socket to EN 175301-803

Duty cycle: 100%.

Power factor of the solenoid coil: cos φ = 0,9.

9.3 Electrical data 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	–
	100 AC	25 W	(26 VA)
	120 AC	25 W	(26 VA)
	200 AC	25 W	(26 VA)
	230 AC	25 W	(26 VA)
VAS 2, VAS 3	24 V DC	36 W	–
	100 AC	36 W	(40 VA)
	120 AC	40 W	(44 VA)
	200 AC	40 W	(44 VA)
	230 AC	40 W	(44 VA)
VBY	24 V DC	8 W	–
	120 AC	8 W	–
	230 AC	9,5 W	–

Proof of closure switch contact rating:

Type	Voltage	Min. current (resistive load)	Max. current (resistive load)
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

Proof of closure switching frequency: max. 5 x per minute.

Switching current [A]	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.*

9.4 Electrical data VAS 6 – 9/VCS 6 – 9

Mains voltage 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 VAS 9/VCS 9:
120 – 230 V AC, +10/-15%, 50/60 Hz.

Switching frequency: max. 1 x°66 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
	120 V AC	63 W
	230 V AC	63 W
VAS 7	24 V DC	75 W
	120 V AC	90 W
	230 V AC	83 W
VAS 8	24 V DC	99 W
	120 V AC	117 W
	230 V AC	113 W
VAS 9	24 V DC	–
	120 V AC	200 (15*) W
	230 V AC	200 (15*) W
VCS 6	24 V DC	140 W
	120 V AC	126 W
	230 V AC	126 W
VCS 7	24 V DC	150 W
	120 V AC	180 W
	230 V AC	166 W
VCS 8	24 V DC	198 W
	120 V AC	234 W
	230 V AC	226 W
VCS 9	24 V DC	–
	120 V AC	400 (30*) W
	230 V AC	400 (30*) W

**after opening*

Proof of closure switch contact rating:

Type	Voltage	Min. current (resistive load)	Max. current (resistive load)
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

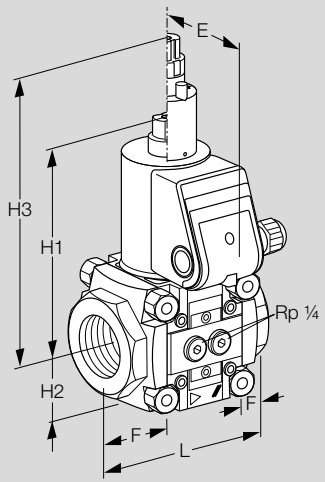
Proof of closure switching frequency: max. 5 x per minute.

Switching current [A]	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	–

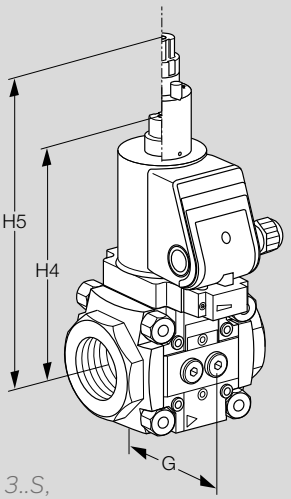
* *Limited to max. 200,000 cycles for heating systems.*

10 Dimensions

10.1 VAS 1 – 3 with Rp internal thread [mm]



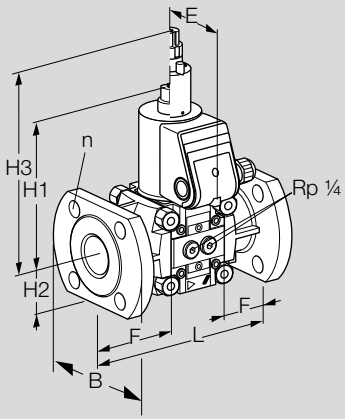
VAS 1 – 3



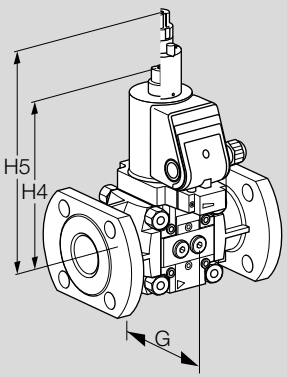
VAS 1 – 3..S,
VAS 1 – 3..G

Type	Connection		Dimensions									Weight
			L	E	F	G	H1	H2	H3	H4	H5	
	Rp	DN	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg
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	11/4	32	127	85	29	98.2	170	47	235	191	256	3.8
VAS 240	11/2	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	11/2	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	21/2	65	155	85	36	113.3	180	59	245	201	266	4.8

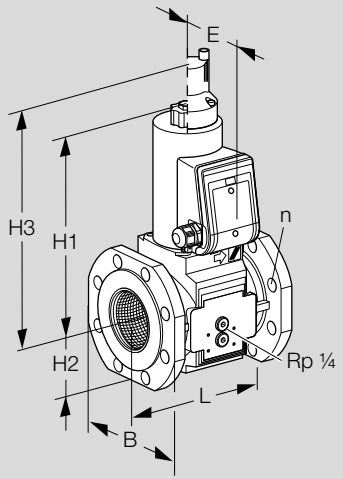
10.2 VAS 2 – 9 with ISO flange [mm]



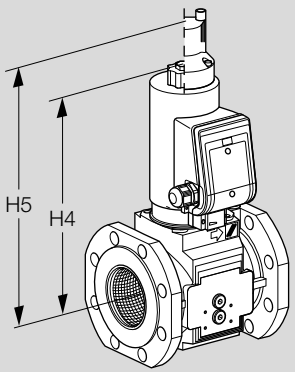
VAS 240 – 350/N,
VAS 240 – 350/L



VAS 240 – VAS 350..S,
VAS 240 – VAS 350..G



VAS 6 – 9../N,*
VAS 6 – 8../L

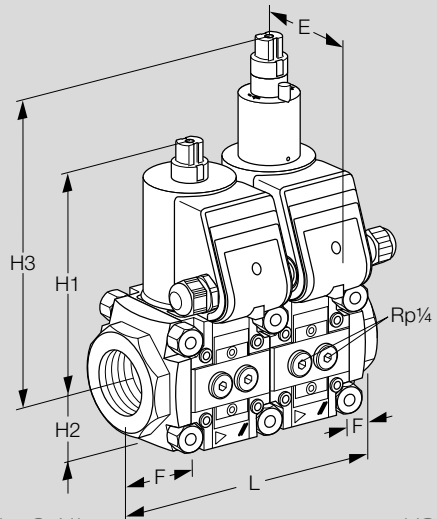


VAS 6 – 9../N..S, VAS 6 – 8../L..S*
VAS 6 – 9../N..G, VAS 6 – 8../L..G*

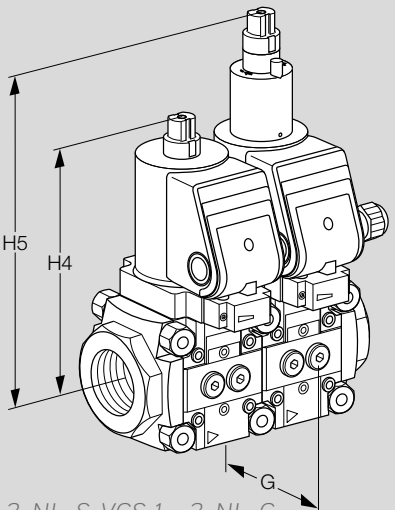
Type	Connection	Dimensions											Weight
		L	E	F	G	B	n	H1	H2	H3	H4	H5	
	DN	mm	mm	mm	mm	mm		mm	mm	mm	mm	mm	kg
VAS 240	40	200	85	66	98.2	150	4	175	56	240	196	258	5
VAS 350	50	230	85	74	113.3	165	4	180	65	245	200	265	6.5
VAS 665	65	190	106	–	–	175	4	285	77	340	310	365	11
VAS 780	80	203	106	–	–	190	8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

** VAS 9 only available without damping unit*

10.3 VCS 1 – 3 with Rp internal thread [mm]



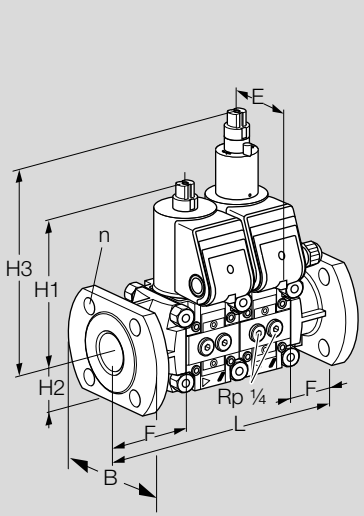
VCS 1 – 3..NL



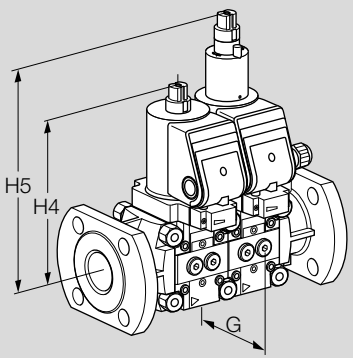
VCS 1 – 3..NL..S, VCS 1 – 3..NL..G

Type	Connection		Dimensions									Weight
			L	E	F	G	H1	H2	H3	H4	H5	
	Rp	DN	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg
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	11/4	32	196	85	29	98.2	170	47	235	191	256	6.9
VCS 240	11/2	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	11/2	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	21/2	65	238	85	36	113.3	180	59	245	201	266	8.5

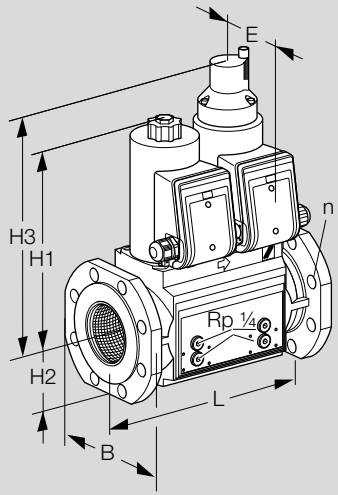
10.4 VCS 2 – 9 with ISO flange [mm]



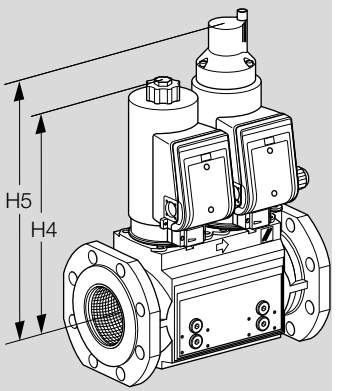
VCS 2 – 3..NL



VCS 2 – 3..NL..S,
VCS 2 – 3..NL..G



*VCS 6 – 9..NL**

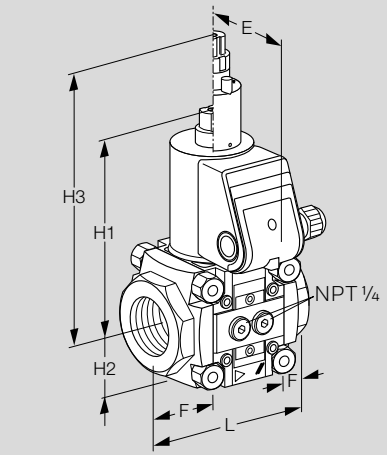


VCS 6 – 9..NL..S,*
*VCS 6 – 9..NL..G**

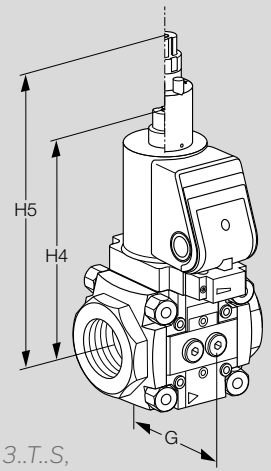
Type	Connection	Dimensions											Weight
		L	E	F	G	B	n	H1	H2	H3	H4	H5	
	DN	mm	mm	mm	mm	mm		mm	mm	mm	mm	mm	kg
VCS 240	40	270	85	66	98.2	150	4	175	56	240	196	258	8.3
VCS 350	50	314	85	74	113.3	165	4	180	65	245	200	265	10.8
VCS 665	65	295	106	–	–	175	4	285	77	340	310	365	18
VCS 780	80	310	106	–	–	190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

* *VAS 9 only available without damping unit*

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



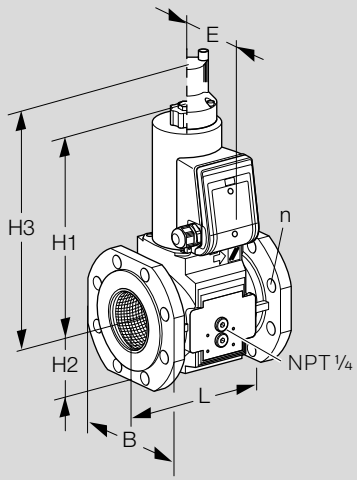
VAS 1 – 3..T



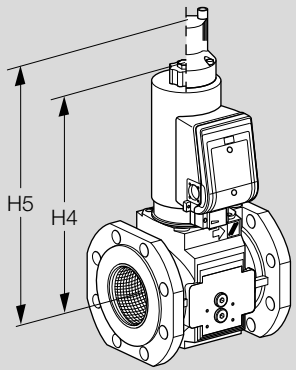
VAS 1 – 3..T..S,
VAS 1 – 3..T..G

Type	Connection		Dimensions									Weight
			L	E	F	G	H1	H2	H3	H4	H5	
	NPT	DN	inch	inch	inch	inch	inch	inch	inch	inch	inch	lbs
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	11/4	32	5.00	3.32	1.14	3.87	6.69	1.85	9.25	7.52	10.1	8.36
VAS 240	11/2	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	11/2	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	21/2	65	6.10	3.32	1.42	4.46	7.09	2.3	9.65	7.91	10.5	10.56

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



*VAS 6 – 9..T../N**

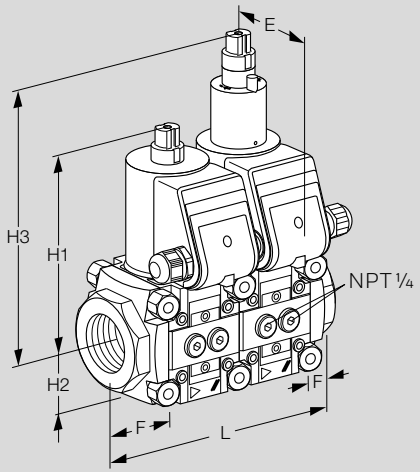


VAS 6 – 8..T../L

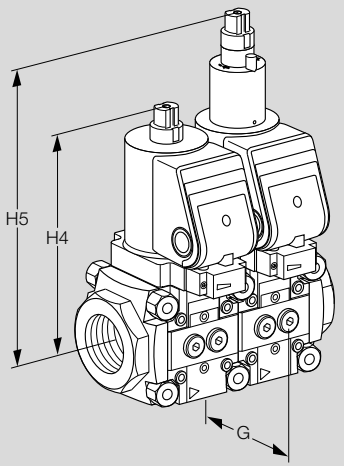
Type	Connection	Dimensions									Weight
		L	E	B	n	H1	H2	H3	H4	H5	
	DN	inch	inch	inch		inch	inch	inch	inch	inch	lbs
VAS 665	65	7.48	4.17	6.89	4	11.2	3.03	13.4	12.2	14.4	24.25
VAS 780	80	7.99	4.17	7.48	4	11.6	3.46	13.8	12.6	15.0	26.45
VAS 8100	100	9	4.72	8.27	8	13.8	4.06	15.9	15.0	16.9	50.71
VAS 9125*	125	10	4.72	9.45	8	14.4	4.49	–	15.6	–	59.52

* *VAS 9 only available without damping unit*

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



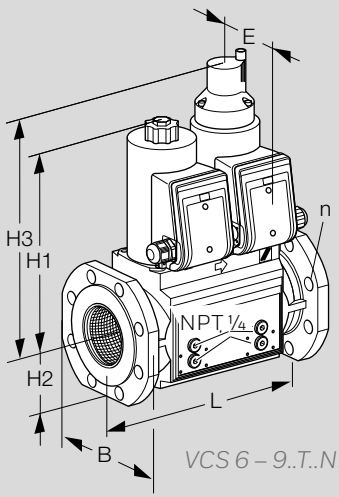
VCS 1 – 3..T..NL



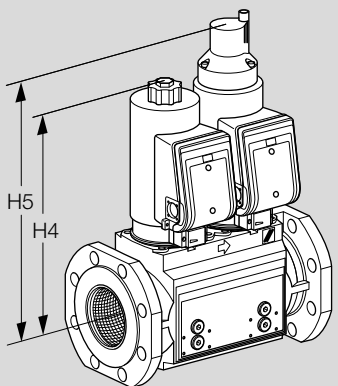
VCS 1 – 3..T..NL..S, VCS 1 – 3..T..NL..G

Type	Connection		Dimensions									Weight
			L	E	F	G	H1	H2	H3	H4	H5	
	NPT	DN	inch	inch	inch	inch	inch	inch	inch	inch	inch	lbs
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	11/4	32	7.72	3.32	1.14	3.87	6.69	1.85	9.25	7.52	10.1	15.18
VCS 240	11/2	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	11/2	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	21/2	65	9.37	3.32	1.42	4.46	7.09	2.3	9.65	7.91	10.5	18.70

10.8 VCS 6 – 9..T with ANSI flange [inch]



*VCS 6 – 9..T..NL**



VCS 6 – 9..T..NL..S,*
*VCS 6 – 9..T..NL..G**

Type	Connection	Dimensions									Weight
		L	E	B	n	H1	H2	H3	H4	H5	
	DN	inch	inch	inch		inch	inch	inch	inch	inch	lbs
VCS 665	65	11.41	4.17	6.89	4	11.2	3.03	13.4	12.2	14.4	39.68
VCS 780	80	12.20	4.17	7.48	4	11.6	3.46	13.8	12.6	15.0	46.30
VCS 8100	100	13.78	4.72	8.27	8	13.8	4.06	15.9	15.0	16.9	88.18
VCS 9125*	125	15.75	4.72	9.45	8	14.4	4.49	–	15.6	–	99.21

* *VCS 9 only available without damping unit*

11 Converting units

see www.adlatus.org

12 Safety-specific characteristic values for SIL and PL

Certificates – see Docuthek.

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, 3.5.16
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_{10d} value	Operating cycles: VAS 1: 15,845,898 VAS 2 – 3: 15,766,605 VAS 6 – 9: 6,700,000
Hardware fault tolerance (1 valve) HFT	0
Hardware fault tolerance (2 valves) 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

12.1 Determining the PFH_D value, the λ_D value and the $MTTF_d$ value

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

12.1.1 Calculating the PFH_D and PFD_{avg}

Type.	VAS 1	
n_{op}	0,50	1/h
n_{op}	4.380	1/a
Cycle time	7.200	s
B_{10d}	15.845.898	
T_{10d}	10,0	a
$PFH_{D\,(1\ VAS)}$	3,16 e-9	1/h
$PFD_{avg\,(1\ VAS)}$	0,00 e-0	
suitable for	PL d, SIL 2	
$PFH_{D\,(2\ VAS)}$	6,39 e-11	1/h
$PFD_{avg\,(2\ VAS)}$	0,00 e-0	
suitable for	PL e, SIL 3	

PFH_D = Probability of dangerous failure (HDM = high demand mode) [1/hour]

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

λ_D = Mean dangerous failure rate [1/hour]

$MTTF_d$ = Mean time to dangerous failure [hours]

n_{op} = Demand rate (mean number of annual operations) [1/hour]

12.2 Designed lifetime

Max. service life under operating conditions in accordance with EN 13611, EN 161 for Vxx:

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

12.3 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 valves are installed in a double-channel architecture (HFT = 1), provided that the complete system complies with the requirements of EN 61508/ ISO 13849.

For a glossary of terms, see page 71 (Glossary).

13 Safety information in accordance with EN 61508-2

13.1 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 5 (Application) and page 12 (Certification).

13.2 Product description

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

13.3 Reference documents

See www.docuthek.com -> Home -> Thermal Solutions -> Products -> 03 Valves and butterfly valves -> Solenoid valves for gas VAS, VCS
for types of document
– Operating instructions
– Certificate

See www.adlatus.org for
– Spare parts –> PartDetective
– Product finder –> ProFi

13.4 Applicable standards

Standards used for certification, see page 12 (Certification).

13.5 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.

13.6 Operating limits/ambient conditions

The function is only guaranteed when used within the specified limits – see page 54 (Technical data) or operating instructions.

13.7 Installation and commissioning

Installation and commissioning procedures are described in the operating instructions.

13.8 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.

13.9 Troubleshooting

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

13.10 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.

13.11 Characteristic safety data/SIL capability

See page 66 (Safety-specific characteristic values for SIL and PL) and page 54 (Technical data).

13.12 Mode of operation

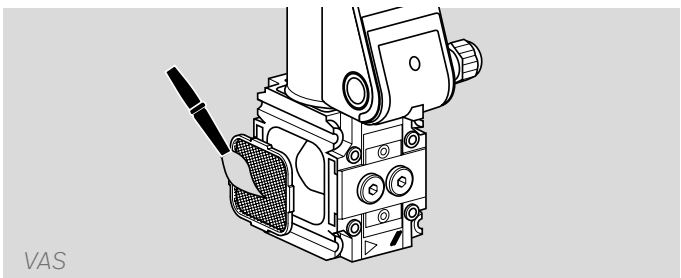
The gas solenoid valves are suitable for a 100% duty cycle.

= To be continued

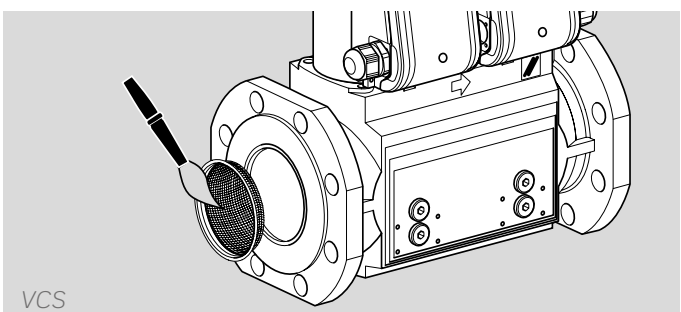
14 Maintenance cycles

At least once per annum, at least twice per annum for biogas.

If the flow rate drops, clean the strainer!



VAS



VCS

15 Glossary

15.1 Safety function

Defined function which is executed by a safety-related system with the aim of achieving or maintaining a safe state for the system in the light of a defined dangerous occurrence.

See EN 61508, EN 61511

15.2 SIL Safety Integrity Level

International standard IEC 61508 defines four discrete Safety Integrity Levels (SIL 1 to SIL 4). Each level corresponds to a probability range for the failure of a safety function. The higher the Safety Integrity Level of the safety-related system, the lower the probability that it will not execute the required safety functions.

See EN 61508

15.3 Dangerous failure

Failure with the potential to set the safety-related system to a dangerous state or a state in which the safety functions are inoperable.

See EN 61508

15.4 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: %

from EN ISO 13849-1

15.5 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

from EN 61508-4

15.6 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

from EN ISO 13849-1

15.7 Common cause failure CCF

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

from EN ISO 13849-1

15.8 Fraction of undetected common cause failures β

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

NOTE: β is expressed as a fraction in the equations and as a percentage elsewhere

from EN 61508-6

15.9 B_{10d} value

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

from EN ISO 13849-1

15.10 T_{10d} value

Mean time until 10% of the components fail dangerously

from EN ISO 13849-1

15.11 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

from IEC 61508-2:2010

15.12 Mean dangerous failure rate λ_D

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

from EN ISO 13849-1:2008

15.13 Safe failure fraction SFF

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

from EN 13611/A2:2011

15.14 Probability of dangerous failure PFH_D

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

from EN 13611/A2:2011

15.15 Mean time to dangerous failure $MTTF_d$

Expectation of the mean time to dangerous failure

from EN ISO 13849-1:2008

15.16 Demand rate n_{op}

Mean number of annual operations

from EN ISO 13849-1:2008

15.17 Average probability of dangerous failure on demand 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

Feedback

Finally, we are offering you the opportunity to assess this “Technical Information (TI)” and to give us your opinion, so that we can improve our documents further and suit them to your needs.

Clarity

- ○ Found information quickly
- ○ Searched for a long time
- ◉ Didn’t find information
  What is missing? xv
- ○ No answer

Comprehension

- ○ Coherent
- ○ Too complicated
- ○ No answer

Scope

- ○ Too little
- ○ Sufficient
- ○ Too wide
- ○ No answer

Use

- ☐ To get to know the product
- ☐ To choose a product
- ☐ Planning
- ☐ To look for information

Navigation

- ○ I can find my way around
- ○ I got “lost”
- ○ No answer

My scope of functions

- ○ Technical department
- ○ Sales
- ○ No answer

Remarks

xfvsdv

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We reserve the right to make technical modifications in the interests of progress.

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