

# Pressure regulator with solenoid valve VAD

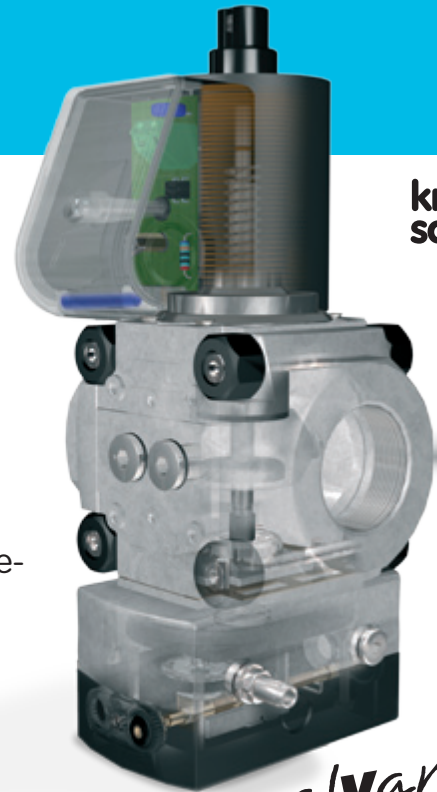
## Air/gas ratio control with solenoid valve VAG

### Variable air/gas ratio control with solenoid valve VAV

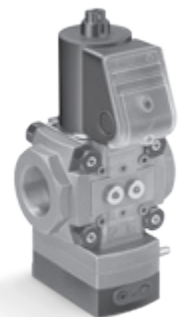
Product brochure · GB  
3.1.0.4 Edition 08.09



**krom  
schroder**

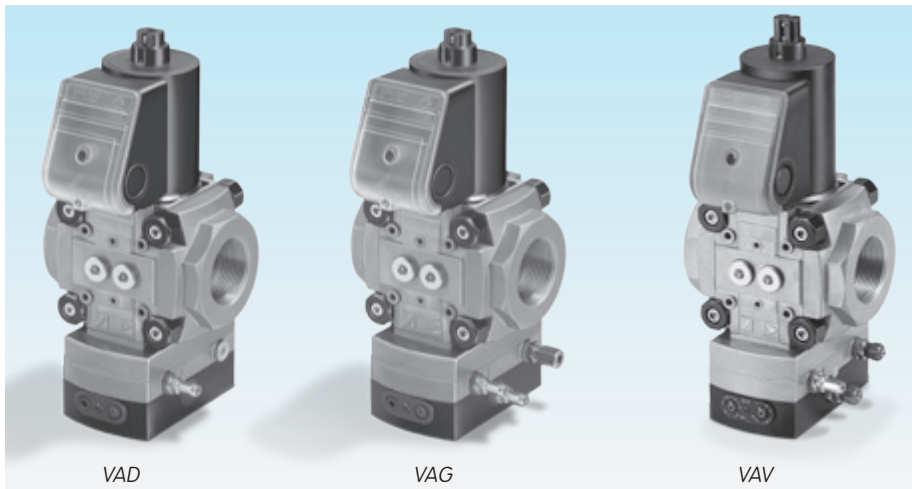


*valVario®*



- All-purpose servo regulator for gaseous media with integrated safety valve
- Suitable for a max. inlet pressure of 500 mbar (500 hPa/7 psig)
- Minimum installation effort: no external impulse line required
- Check indication by blue LED
- Setting options from two sides
- EC type-tested and certified
- VAD, VAG (230 V AC, 120 V AC, 24 V DC):  
FM and CSA approved
- VAD, VAG, VAV (230 V AC, 120 V AC, 24 V DC):  
AGA approved





VAD: controls gas outlet pressure  $p_G$  via setpoint spring.  
 VAG: constant gas/air pressure ratio via air control pressure  $p_L$ .  
 VAV: adjustable gas/air pressure ratio.  
 Pressure fluctuations in the combustion chamber can be compensated via the combustion chamber control pressure  $p_F$ .

## Application

Pressure regulator VAD, air/gas ratio control VAG and variable air/gas ratio control VAV incorporating servo technology for shut-off and precise control of the 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 domestic or commercial heat generation, such as the packaging, paper and foodstuffs industries.

### VAD

Constant pressure governor, Class A, with high control accuracy, for excess air burners, atmospheric burners or single-stage force draught burners. Pressure preset via setpoint spring.

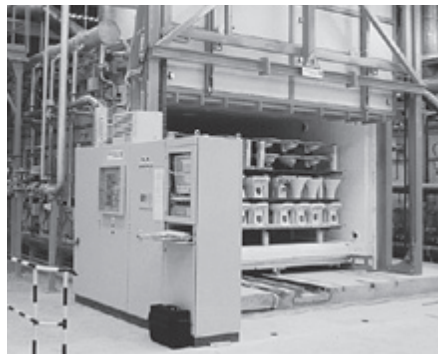
### VAG

Air/gas ratio control, Class A, for maintaining a constant air/gas pressure ratio for modulating-controlled burners or with VAS 1 bypass valve for stage-controlled burners. Pressure preset by the air control line.

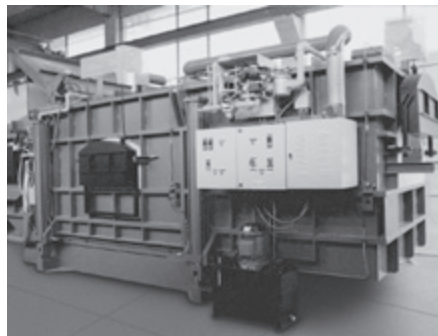
The VAG..N can also be used as a zero governor for gas engines.

### VAV

Variable air/gas ratio control, Class A, for maintaining a constant gas/air pressure ratio for modulating-controlled burners. Pressure preset by the air control line. The ratio of gas pressure to air pressure remains constant. It can be set from 0.6:1 to 3:1. Pressure fluctuations in the combustion chamber can be compensated via the combustion chamber control pressure  $p_F$ .



Regulator on excess air burners in the ceramics industry

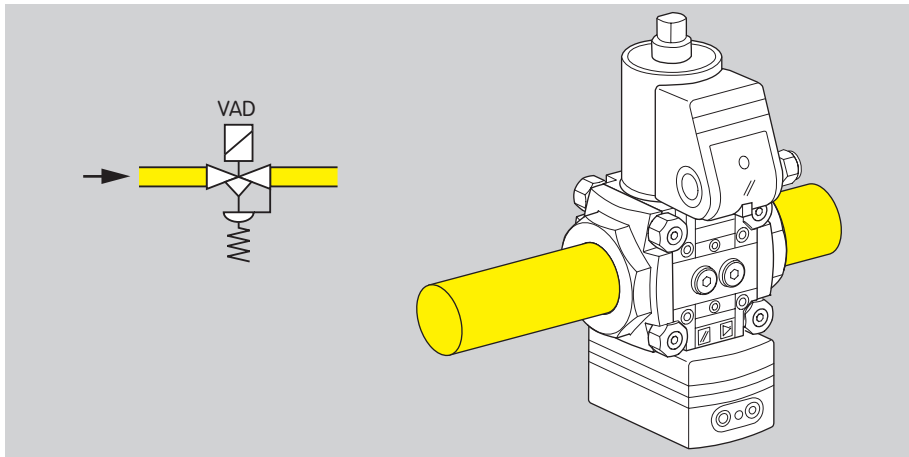


Air/gas ratio control on melting furnace for ensuring stoichiometric combustion over the entire capacity range



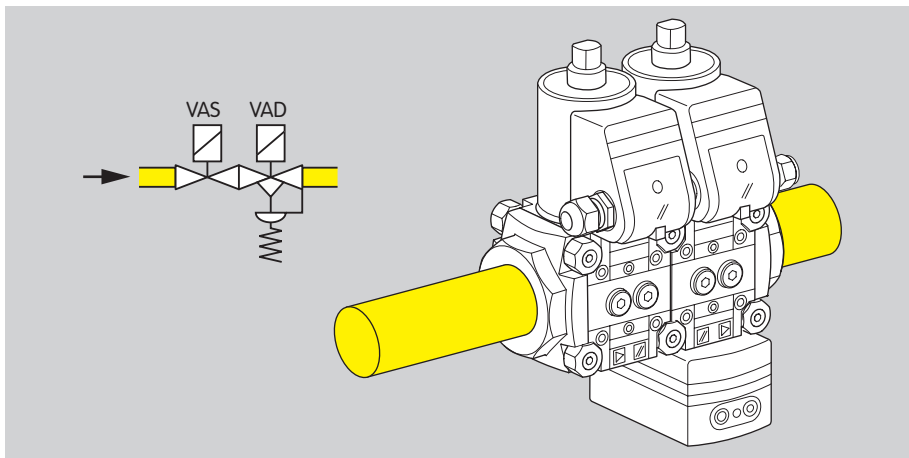
Aluminium age-hardening furnace with air/gas ratio controls for air deficiency cut-out

Application examples



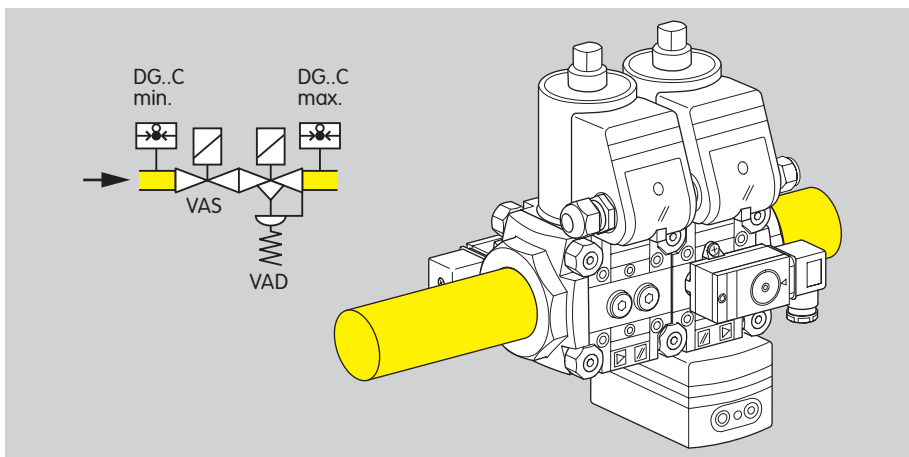
Constant pressure control

The pressure regulator with gas solenoid valve VAD maintains the set gas outlet pressure  $p_G$  constant when subject to differing flow rates. If a second gas solenoid valve is used upstream of the VAD, this complies with the requirements of EN 746-2 for two Class A gas solenoid valves connected in series.



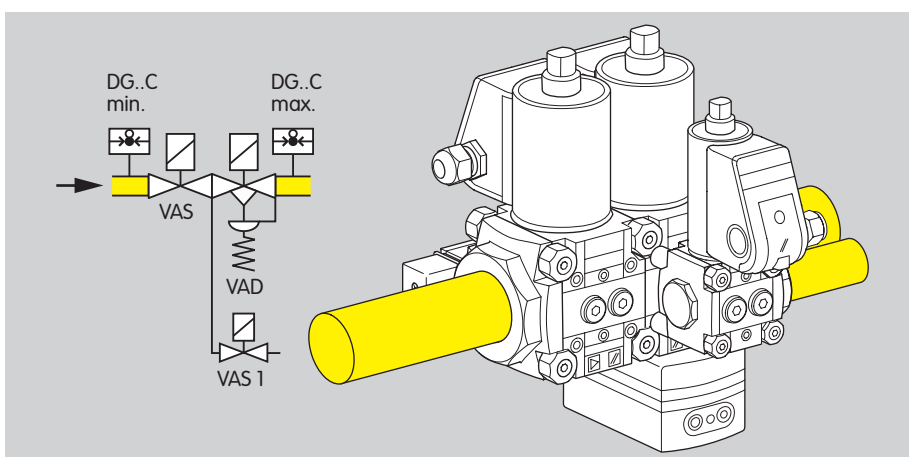
Constant pressure control with two gas solenoid valves

The pressure regulator with gas solenoid valve VAD maintains the set gas outlet pressure  $p_G$  constant when subject to differing flow rates.



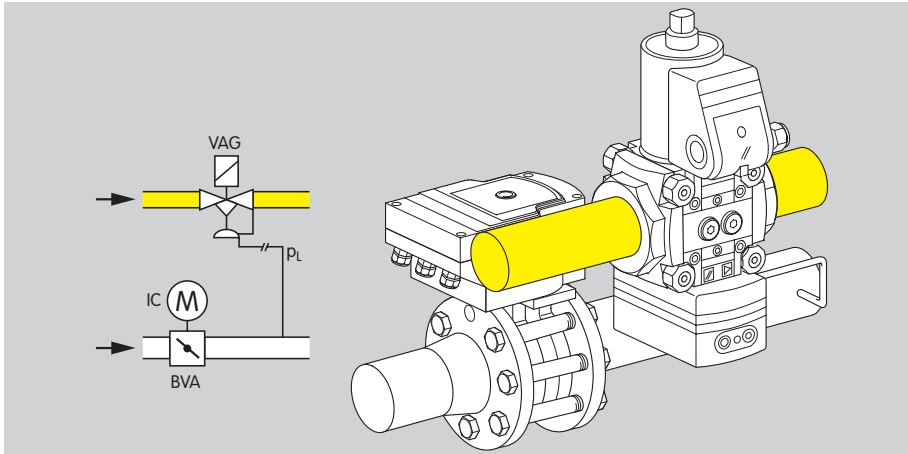
Constant pressure control with max. pressure switch

In this example, the minimum inlet pressure  $p_e$  and the maximum outlet pressure  $p_G$  are monitored with the pressure switches DG..C. The simple attachment of the pressure switch module makes installation easier.



Constant pressure control with non-controlled pilot gas outlet

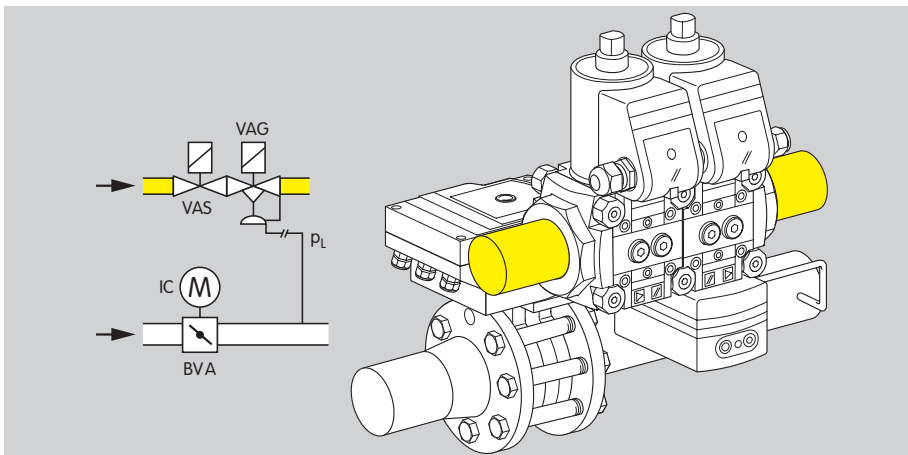
In this application, the pilot burner is supplied with a high inlet pressure via the pilot gas outlet. The simple attachment of the bypass valve module makes installation easier. The minimum inlet pressure  $p_e$  and the maximum outlet pressure  $p_G$  are monitored with the pressure switches DG..C.



### Modulating control

The gas outlet pressure  $p_G$  is controlled via the air/gas ratio control with gas solenoid valve VAG. The gas outlet pressure  $p_G$  follows the changing air control pressure  $p_L$ . The ratio of gas pressure to air pressure remains constant. The VAG is suitable for a control range up to 10:1.

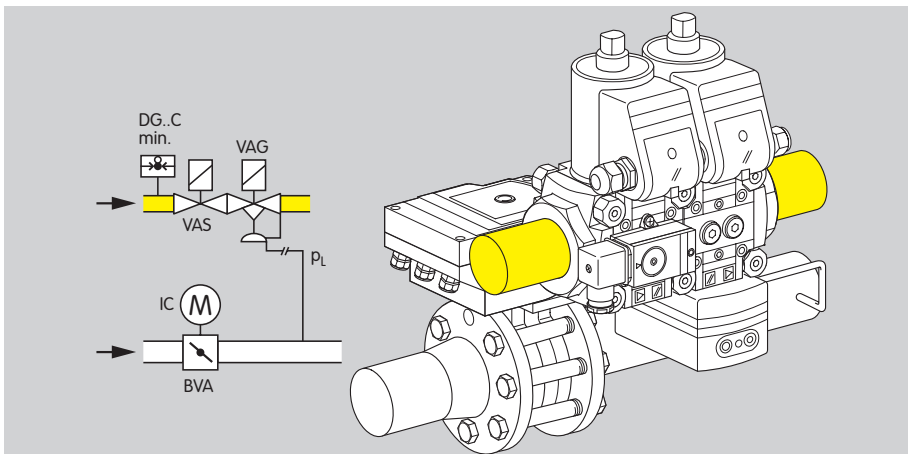
If a second solenoid valve is used upstream of the VAG, this complies with the requirements of EN 746-2 for two Class A valves connected in series.



### Modulating control with two gas solenoid valves

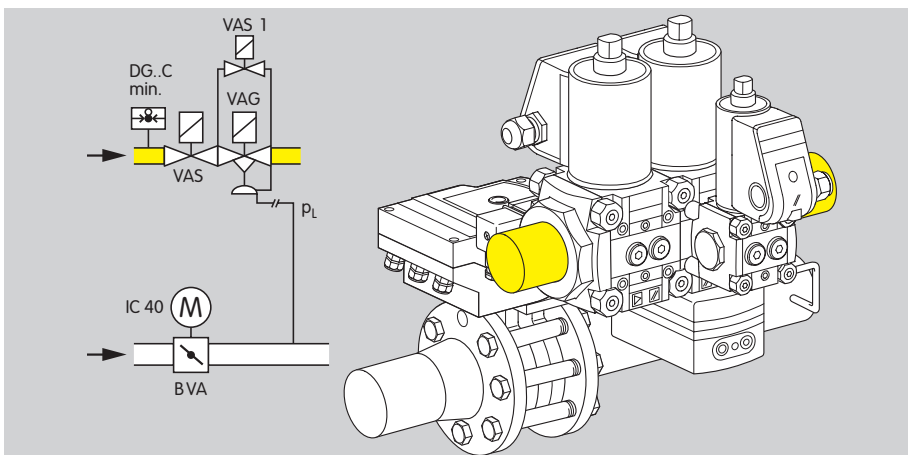
The gas outlet pressure  $p_G$  is controlled via the air/gas ratio control with gas solenoid valve VAG. The gas outlet pressure  $p_G$  follows the changing air control pressure  $p_L$ . The ratio of gas pressure to air pressure remains constant. The VAG is suitable for a control range up to 10:1.

The gas line is two Class A shut-off valves connected in series, in accordance with the requirements of EN 746-2.



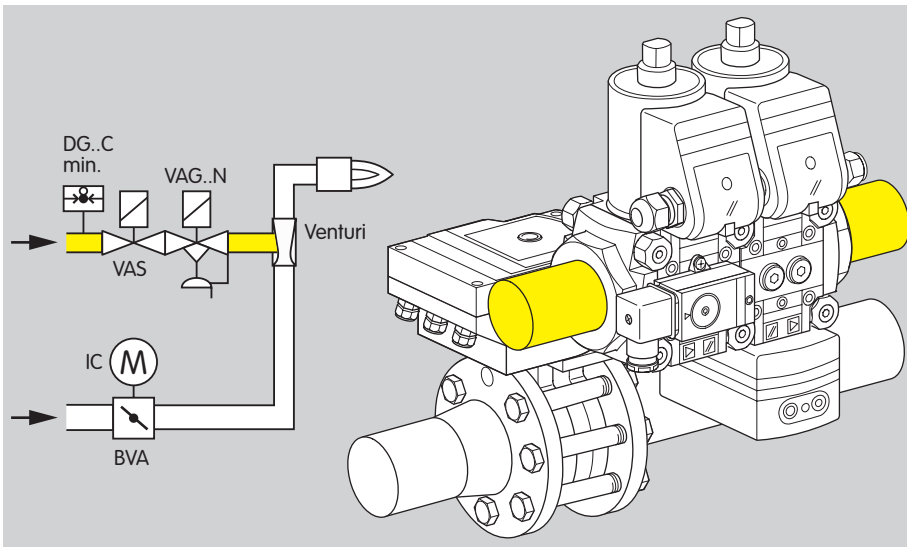
### Modulating control with two gas solenoid valves and inlet pressure switch

In this case, the minimum inlet pressure  $p_e$  is monitored by the pressure switch DG..C. The simple attachment of the pressure switch module makes installation easier.



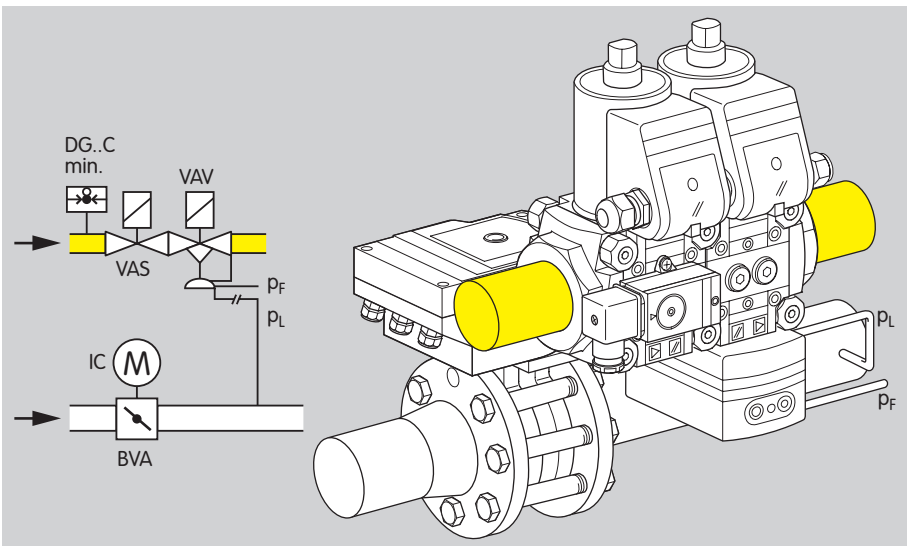
### High/Low control

At high fire, the gas outlet pressure  $p_G$  follows the air control pressure  $p_L$ . The ratio of gas pressure to air pressure remains constant. Low fire is determined via the bypass valve. Here as well, the simple attachment of the bypass valve module makes installation easier.



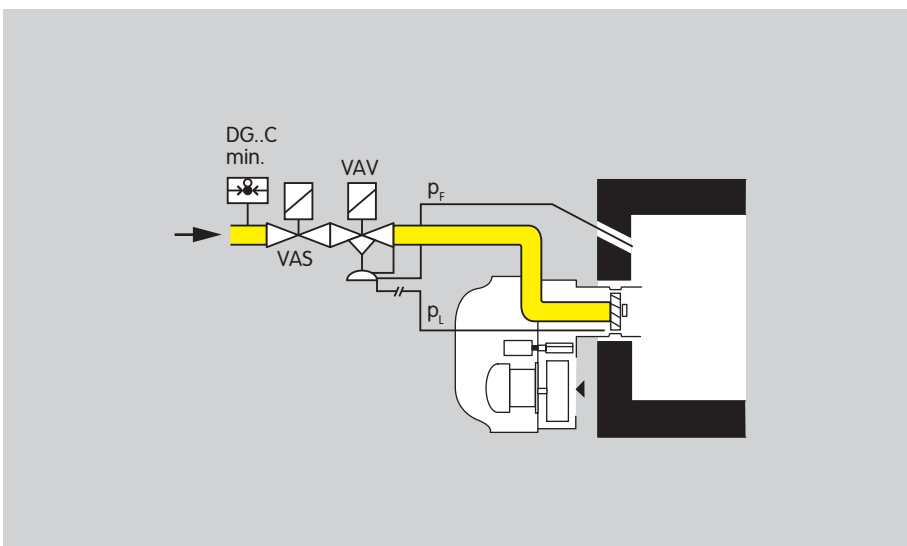
### Zero pressure control

In this application, the control air pressure is the atmospheric air pressure. The air flow rate generates a negative pressure in the gas pipe via the Venturi. This negative pressure is compensated by the air/gas ratio control with gas solenoid valve VAG..N. The greater the negative pressure, the greater the gas flow rate.



### Modulating control with variable air/gas ratio control with gas solenoid valve

The ratio of air pressure to gas pressure can be adjusted infinitely between 0.6:1 and 3:1. Pressure fluctuations in the combustion chamber can be compensated via the combustion chamber control pressure  $p_F$ .



### Modulating control in domestic heat generation

This application shows the variable air/gas ratio control with solenoid valve VAV fitted to a modulating-controlled forced draught burner.

The combustion air volume is set via a butterfly valve for air or by adjusting the fan speed.

## Replacement possibility for MODULINE pressure regulators with gas solenoid valve

GVS, GVI, GVIB and GVR are to be replaced by VAD, VAG, VAG+VAS and VAV

Type			Type
GVS	Pressure regulator with gas solenoid valve	Pressure regulator with gas solenoid valve	VAD
GVI	Air/gas ratio control with gas solenoid valve	Air/gas ratio control with gas solenoid valve	VAG
GVIB	Air/gas ratio control with gas solenoid valve and bypass valve	Air/gas ratio control with gas solenoid valve and bypass valve	VAG+VAS
GVR	Variable air/gas ratio control with gas solenoid valve	Variable air/gas ratio control with solenoid valve	VAV
115 125	Flange 3/8"	Size 115 Size 125	on request
115 125	Flange 1/2"	Size 115 Size 125	Size 1, DN 15
115 125	Flange 3/4"	Size 115 Size 125	Size 1, DN 20
115 125	Flange 1"	Size 115 Size 125	Size 1, DN 25
232 240	Flange 1"	Size 232 Size 240	on request
232 240	Flange 1 1/2"	Size 232 Size 240	Size 2, DN 40
350	Flange 1 1/2"	Size 350	on request
350	Flange 2"	Size 350	Size 3, DN 50
ML	MODULINE + connection flanges Rp internal thread	Rp internal thread	R
TML	MODULINE + connection flanges NPT internal thread	NPT internal thread	N
01	$p_{e \max.}$ : 100 mbar (100 hPa/1.5 psig)	$p_{e \max.}$ : 500 mbar (500 hPa/7 psig)	●
02	200 mbar (200 hPa/3 psig)	500 mbar (500 hPa/7 psig)	●
●	Quick opening	Quick opening	/N
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
3	Electrical connection via terminals	Electrical connection via terminals	●
6	Electrical connection via socket	Electrical connection via socket	○
9	Metal terminal connection box	Electrical connection via terminals	●
S	Position indicator	Position indicator with visual indicator**	S
G	Position indicator for 24 V	Position indicator for 24 V with visual indicator**	G
M	Suitable for biologically produced methane	Suitable for biologically produced methane	●
●	Pressure test point at the inlet	Pressure test point at the inlet and outlet*	○
		Outlet pressure $p_G$ :	-25
	Outlet pressure $p_G$ :	2.5 – 25 mbar (2.5 – 25 hPa/1 – 10 "WC)	
●	2 – 90 mbar (2 – 90 hPa/0.8 – 36 "WC)	5 – 50 mbar (5 – 50 hPa/2 – 20 "WC)	-50
		10 – 100 mbar (10 – 100 hPa/4 – 40 "WC)	-100
		Standard seat	A

### Example

GVS 350ML01T3  
with Rp 2 connection flanges

### Example

VAD 350R/NW-100A  
with test points

● = standard, ○ = available

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

\*\* Position indicator with visual indicator can be attached at the left- or right-hand side.



Selection table air/gas ratio control with gas solenoid valve VAG, variable air/gas ratio control with gas solenoid valve VAV

Type <sup>1)</sup>												Accessories right					Accessories left																					
	T	R	N	F	/N	K	P	Q	Y	W	S <sup>2)</sup>	G <sup>2)</sup>	R <sup>2)</sup>	L <sup>2)</sup>	M20 cable gland Plug with socket Plug without socket	A	B	E <sup>3)</sup>	K	A <sup>3)</sup>	N <sup>3)</sup>	Screw plug Pressure test point DG 17VC <sup>4)</sup> DG 40VC <sup>4)</sup> DG 110VC <sup>4)</sup> DG 300VC <sup>4)</sup> Bypass valve VBY Bypass valve VAS 1	Screw plug Pressure test point DG 17VC <sup>4)</sup> DG 40VC <sup>4)</sup> DG 110VC <sup>4)</sup> DG 300VC <sup>4)</sup> Bypass valve VBY Bypass valve VAS 1															
VAG/VAV 115	○	●	○	-	●	○	○	○	○	○	○	○	○	○	●	○	○	-	●	●	●	●	●	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○
VAG/VAV 120	○	●	○	-	●	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○
VAG/VAV 125	○	●	○	-	●	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○
VAG/VAV 240	○	●	○	●	●	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○
VAG/VAV 350	○	●	○	●	●	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○

● = standard, ○ = available

<sup>1)</sup> The following nominal inlet flange diameters are also available: size 1 with nominal diameter DN 10, size 2 with nominal diameters DN 25, DN 32 and DN 50, size 3 with nominal diameters DN 40 and DN 65.

<sup>2)</sup> Position indicator and bypass/pilot gas valve cannot be fitted together on the same side.

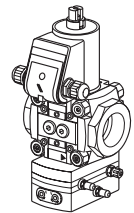
<sup>3)</sup> Connection kit for VAG only.

<sup>4)</sup> Specify the test point for inlet pressure  $p_e$  or outlet pressure  $p_a$ .

Help for dimensioning and configuring the air/gas ratio control VAG and variable air/gas ratio control VAV can be found in the program "Product Selection" on the Catalogue DVD. You can order the Catalogue DVD at → [www.kromschroeder.com](http://www.kromschroeder.com)  
→ Products → CD-ROMs → Catalogue.

Order example

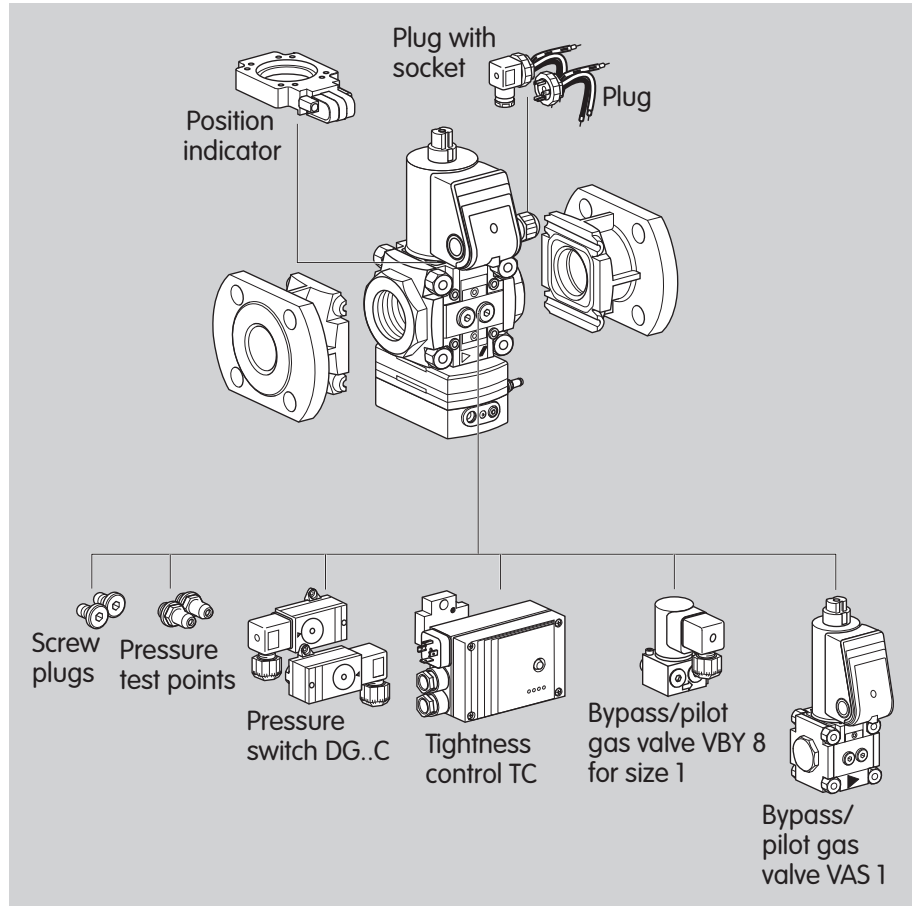
VAG 240R/NWAE



Type code VAG, VAV

Code	Description
VAG	Air/gas ratio control with gas solenoid valve
VAV	Variable air/gas ratio control with gas solenoid valve
1-3	Size
T	T-product
10-65	Nominal inlet and outlet diameter
R	Rp internal thread
N	NPT internal thread
F	ISO flange
/N	Quick opening, quick closing
K	Mains voltage 24 V DC
P	Mains voltage 100 V AC; 50/60 Hz
Q	Mains voltage 120 V AC; 50/60 Hz
Y	Mains voltage 200 V AC; 50/60 Hz
W	Mains voltage 230 V AC; 50/60 Hz
S	Position indicator with visual indicator
G	Position indicator for 24 V with visual indicator
R	Viewed from the right (in the direction of flow)
L	Viewed from the left (in the direction of flow)
A	Standard valve seat
B	Reduced valve seat
	Connection kit for VAG for air control pressure $p_L$ / for VAV for air control pressure $p_L$ and combustion chamber control pressure $p_F$ :
E	Compression fitting for VAG
K	Plastic hose coupling for VAG, VAV
A	NPT 1/4 adapter for VAG
N	Zero governor for VAG

## Accessories



### Accessories for VAD, VAG and VAV

Modularly configurable with:

- Screw plugs
- Pressure test points
- Pressure switch DG..VC for inlet and/ or outlet pressure
- Tightness control TC
- Bypass/pilot gas valve VBY 8 for size 1
- Bypass/pilot gas valve VAS 1

## Technical data

Types of gas: natural gas, town gas, LPG (gaseous), biologically produced methane (max. 0.1 %-by-vol. H<sub>2</sub>S); other gases on request.

The gas must be dry in all temperature conditions and must not contain condensate.

Inlet pressure range  $p_g$ :

10–500 mbar (10–500 hPa/4–200 "WC), FM approved (230 V AC, 120 V AC, 24 V DC), non operational pressure: 700 mbar (700 hPa/10 psig).

CSA approved (230 V AC, 120 V AC, 24 V DC) up to 350 mbar (350 hPa/5 psig).

Opening time of the solenoid valve:

quick opening:  $\leq 0.5$  s.

Closing time: quick closing:  $< 1$  s.

Ambient temperature:

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

Storage temperature:

-20 to +40°C (-4 to 104°F), no condensation permitted.

Safety valve: Class A to EN 161,

Factory Mutual (FM) Research Class: 7410 and 7411

(230 V AC, 120 V AC, 24 V DC),

ANSI Z21.21 and CSA 6.5, ANSI Z21.18 and CSA 6.3.

Control class A to EN 88.

Control range: up to 10:1.

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,  $\pm 20\%$ .

Cable gland: M20 x 1.5,

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

Enclosure: IP 65.

Duty cycle: 100%.

Power factor of the solenoid coil:  $\cos \varphi = 1$ .

Power consumption:

Type	24 V DC [W]	100 V AC [W]	120 V AC [W]	200 V AC [W]	230 V AC [W]
VAD/VAG/VAV 1	29	33	30	33	30
VAD/VAG/VAV 2	46	53	54	54	53
VAD/VAG/VAV 3	46	53	54	54	53

Valve housing: aluminium,

Valve seal: NBR.

Connection flanges with internal thread:

Rp to ISO 7-1,

NPT to ANSI/ASME.

Position indicator contact rating:

Type	Voltage	Min. current (resistive load)	Max. current (resistive load)
VAx..S, VCx..S	12–250 V AC, 50/60 Hz	100 mA	3 A
VAx..G, VCx..G	12–125 V AC, 50/60 Hz	2 mA	0.1 A

Position indicator switching frequency:

max. 5x per minute.

Switching current [A]	Switching cycles*	
	$\cos \varphi = 1$	$\cos \varphi = 0.6$
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.

### VAD

Outlet pressure  $p_G$ :

2.5–25 mbar (2.5–25 hPa/1–10 "WC),

5.0–50 mbar (5.0–50 hPa/2–20 "WC),

10–100 mbar (10–100 hPa/4–40 "WC).

### VAG

Outlet pressure  $p_G$ :

0.5–100 mbar (0.5–100 hPa/0.2–40 "WC).

Adjusting range at low fire:  $\pm 5$  mbar

( $\pm 5$  hPa/ $\pm 2$  "WC).

Transmission ratio of gas to air: 1:1

The inlet pressure must always be higher than the air control pressure  $p_L$  + pressure loss  $\Delta p$  + 5 mbar (5 hPa/2 "WC).

Connection of the air control pressure  $p_L$ :

VAG..K: 1 1/8" coupling for plastic hose (internal dia. 3.9 mm (0.15"), external dia. 6.1 mm (0.24")) or

VAG..E: 1 compression fitting for tube 6x1 or

VAG..A: 1 NPT 1/4 adapter or

VAG..N: zero governor with breathing orifice.

### VAV

Outlet pressure  $p_G$ :  
0.5–30 mbar (0.5–30 hPa/0.2–11.7 "WC).

Air control pressure  $p_L$ :  
0.4–30 mbar (0.4–30 hPa/0.15–11.7 "WC).

Combustion chamber control pressure  $p_F$ :  
-20 to 20 mbar (-20 to 20 hPa/-7.8 to 7.8 "WC).

Min. control pressure differential  $p_L - p_F$ :  
0.4 mbar (0.4 hPa/0.15 "WC).

Min. pressure differential  $p_G - p_F$ :  
0.5 mbar (0.5 hPa/0.2 "WC).

Adjusting range at low fire:  
 $\pm 1.5$  mbar ( $\pm 1.5$  hPa/ $\pm 0.6$  "WC).

Transmission ratio of gas to air:  
0.6:1 to 3:1.

The inlet pressure  $p_e$  must always be higher than the air control pressure  $p_L \times$  transmission ratio  $V$  + pressure loss  $\Delta p$  + 1.5 mbar (1.5 hPa/0.6 "WC).

Connection of the air control pressure  $p_L$ :  
VAV..K: 2 plastic hose couplings (internal dia. 3.9 mm (0.15"), external dia. 6.1 mm (0.24")).

## Certification

### EC type-tested and certified



pursuant to

- Gas Appliances Directive (90/396/EEC) in conjunction with EN 13611, EN 161, EN 88, EN 126, EN 12067-1 and EN 1854.

### Meets the requirements of the

- Low Voltage Directive (2006/95/EC),
- EMC Directive (2004/108/EC).

### VAD, VAG:

FM approved (230 V AC, 120 V AC, 24 V DC)



Factory Mutual Research Class: 7410 and 7411 Safety overpressure slam shut valves.

Designed for applications pursuant to NFPA 85 and NFPA 86.  
[www.fmglobal.com](http://www.fmglobal.com) → Products and Services → Product Certification → Approval Guide

### VAD, VAG:

CSA approved (230 V AC, 120 V AC, 24 V DC)



Canadian Standards Association – ANSI Z21.21 and CSA 6.5, ANSI Z21.18 and CSA 6.3

<http://directories.csa-international.org>  
Class number: 3371-83 (natural gas, LPG), 3371-03 (natural gas, propane)

### VAD, VAG:

UL listed (230 V AC, 120 V AC, 24 V DC)



Underwriters Laboratories – UL 429 "Electrically operated valves".

<http://database.ul.com>

AGA approved (230 V AC, 120 V AC, 24 V DC)

Australian Gas Association

Scan of the AGA approval (GB)

– see [www.docuthek.com](http://www.docuthek.com) → Elster Kromschroder →

Products → 03 Valves and butterfly valves

→ Solenoid valves for gas VAS → Kind of

document: Certificate →

VAS (AGA Standard) / VCS (AGA Standard)

## Detailed information on this product

[www.docuthek.com](http://www.docuthek.com)

## Contact

[www.kromschroeder.com](http://www.kromschroeder.com) → Sales

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