Pressure regulators with solenoid valve VAD, VAG, VAV, VAH

Flow rate regulator VRH

Pressure regulators with double solenoid valve VCD, VCG, VCV, VCH

- All-purpose servo regulator for gaseous media with integrated safety valve
- Suitable for a max. inlet pressure of 500 mbar (7 psig)
- Minimum installation effort: no external impulse line required
- Setting options from two sides
- EU certified
- VAD, VAG: ANSI/CSA and AGA approved
- VAD, VAG, VAV, VAH: FM approved
- VAD, VAG, VAV: UL listed
- VAD, VAG, VAV, VAH: certified for systems up to SIL 3 and PL e
Application

Regulators with solenoid valves are designed for shut-off, and thanks to the servo technology, for precise control of the gas supply to gas burners and gas appliances. They are used in gas control and safety systems in all sectors of the iron, steel, glass and ceramics industries, as well as in residential 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 forced draught burners. Pressure preset via setpoint spring. In the case of fluctuating furnace or kiln pressures, the furnace chamber pressure may also be connected for maintaining a constant burner capacity.

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.

VAH, VRH
Flow rate regulators VAH and VRH are used to maintain a constant gas/air ratio for modulating-controlled and stage-controlled burners. The gas flow rate is controlled proportionally to the air flow rate. In addition, flow rate regulator VAH is designed as a gas solenoid valve and shuts off the gas or air supply safely.

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.

Pressure 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
Examples of application

**Constant pressure control**

The pressure regulator with gas solenoid valve VAD maintains the set gas outlet pressure \( p_d \) 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 \( p_d \) constant when subject to differing flow rates.

**Constant pressure control with max. pressure switch**

In this example, the minimum inlet pressure \( p_u \) and the maximum outlet pressure \( p_d \) 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 \( p_u \) and the maximum outlet pressure \( p_d \) are monitored with the pressure switches DG..C.
**Modulating control**

The gas outlet pressure $p_d$ is controlled via the air/gas ratio control with gas solenoid valve VAG. The gas outlet pressure $p_d$ follows the changing air control pressure $p_{sa}$. 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 $p_d$ is controlled via the air/gas ratio control with gas solenoid valve VAG. The gas outlet pressure $p_d$ follows the changing air control pressure $p_{sa}$. 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 $p_u$ is monitored by the pressure switch switch DG..C. The simple attachment of the pressure switch module makes installation easier.
**High/Low control**

At high fire, the gas outlet pressure $p_d$ follows the air control pressure $p_{sa}$. The ratio of gas pressure to air pressure remains constant. Low fire is determined via the bypass valve VAS 1. 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.

**Staged flow rate control**

This application shows the VAH on a self recuperative burner.

The pressure loss in the recuperator depends on the furnace or kiln temperature. When the furnace or kiln temperature is increased (at a constant air supply pressure), the flow rate drops. This change in the air flow rate is measured by the orifice and the VAH changes the gas volume accordingly.

The air index (lambda) can be set using the fine-adjusting valve VMV.
Continuous or staged flow rate control
This application shows flow rate control for a radiant tube burner system with plug-in recuperator for air preheating.
There are temperature-dependent air pressure losses in the recuperator. The ratio of gas pressure to air pressure does not remain constant. The fluctuating air flow rate is measured at the measuring orifice VMO and the VAH controls the gas flow rate proportionally.
The air index (lambda) can be set using the fine-adjusting valve VMV.

Modulating control with variable air/gas ratio control with gas solenoid valve
The ratio of gas pressure to air 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_{sc}.

Modulating control in residential 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, GVR and GVRH are to be replaced by VAD, VAG, VAG+VAS, VAH and VAV.
### Type code VAD

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAD</td>
<td>Pressure regulator with solenoid valve</td>
</tr>
</tbody>
</table>

#### Code Description

- **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)
- **-25**: Outlet pressure $p_d$: 2.5 – 25 mbar
- **-50**: 20 – 50 mbar
- **-100**: 35 – 100 mbar
- **A**: Standard valve seat
- **B**: Reduced valve seat

### Type code VAV, VAH, VRH

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAG</td>
<td>Air/gas ratio control with solenoid valve</td>
</tr>
<tr>
<td>VAH</td>
<td>Flow rate regulator with solenoid valve</td>
</tr>
<tr>
<td>VRH</td>
<td>Flow rate regulator</td>
</tr>
</tbody>
</table>

#### Code Description

- **1 – 3**: Size
- **T**: T-product
- **15 – 50**: 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
- **E**: Connection kit for air control pressure $p_{sa}$ and combustion chamber control pressure $p_{sc}$:
  - compression fitting
  - plastic hose coupling
  - NPT ⅛ adapter

### Technical data

- **Gas types**: natural gas, LPG (gaseous), biologically produced methane (max. 0.1 % by vol., H₂S) or clean air; other gases on request. The gas must be clean and dry in all temperature conditions and must not contain condensate.
- **CE and FM approved, UL listed**, max. inlet pressure $p_i$: 10 – 500 mbar (4 – 200 "WC), FM approved (230 V AC, 120 V AC, 24 V DC), non-operational pressure: 700 mbar (10 psig).
- **ANSI/CSA approved** (230 V AC, 120 V AC, 24 V DC) up to 350 mbar (5 psig).
- **Opening time of the solenoid valve**: quick opening: $≤ 0.5$ s, closing time: quick closing: $< 1$ s.
- **Medium and ambient temperatures**: -20 to +60°C (-4 to +140°F), no condensation permitted.
- **Storage temperature**: -20 to +40°C (-4 to +104°F).
- **Enclosure**: IP 65.
- **Valve housing**: aluminium, valve seat: NBR.
- **Connection flanges with internal thread**: Rp to ISO 7-1, NPT to ANSI/ASME.
- **Control class A to EN 88-1.**
- **Control range**: up to 10:1.
- **Duty cycle**: 100%.
- **Power factor of the solenoid coil**: cos $\varphi = 0.9$. 

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*Only available for VAG, VAV, VAH.*
Power consumption:

<table>
<thead>
<tr>
<th>Type</th>
<th>Voltage</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAx 1</td>
<td>24 V DC</td>
<td>25 W –</td>
</tr>
<tr>
<td></td>
<td>100 V AC</td>
<td>25 W (26 VA)</td>
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<tr>
<td></td>
<td>120 V AC</td>
<td>25 W (26 VA)</td>
</tr>
<tr>
<td></td>
<td>200 V AC</td>
<td>25 W (26 VA)</td>
</tr>
<tr>
<td></td>
<td>230 V AC</td>
<td>25 W (26 VA)</td>
</tr>
<tr>
<td></td>
<td>24 V DC</td>
<td>36 W –</td>
</tr>
<tr>
<td></td>
<td>100 V AC</td>
<td>36 W (40 VA)</td>
</tr>
<tr>
<td></td>
<td>120 V AC</td>
<td>40 W (44 VA)</td>
</tr>
<tr>
<td></td>
<td>200 V AC</td>
<td>40 W (44 VA)</td>
</tr>
<tr>
<td></td>
<td>230 V AC</td>
<td>40 W (44 VA)</td>
</tr>
<tr>
<td>VAX 2, VAX 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VBY</td>
<td>24 V DC</td>
<td>8 W –</td>
</tr>
<tr>
<td></td>
<td>120 V AC</td>
<td>8 W –</td>
</tr>
<tr>
<td></td>
<td>230 V AC</td>
<td>9.5 W –</td>
</tr>
</tbody>
</table>

VAD
Outlet pressure $p_d$:
- VAD..-25: 2.5 – 25 mbar [1 – 10 "WC],
- VAD..-50: 20 – 50 mbar [8 – 20 "WC],
- VAD..-100: 35 – 100 mbar [14 – 40 "WC].
Combustion chamber control pressure $p_{sc}$ (connection $p_{so}$):
-20 to +20 mbar [-7.8 to +7.8 °WC].

VAG
Outlet pressure $p_d$:
- 0.5 – 100 mbar [0.2 – 40 °WC].
Air control pressure $p_{so}$:
- 0.5 – 100 mbar [0.2 – 40 °WC].
Adjusting range at low fire: ±5 mbar [±2 °WC].
Transmission ratio of gas to air: 1:1.

VAH, VRH
Air control pressure $p_{so}$:
- 0.6 – 100 mbar [0.24 – 40 °WC].
Differential air pressure $\Delta p_{so} = p_{so} - p_{sso}$:
- 0.6 – 50 mbar [0.24 – 19.7 °WC].
Differential gas pressure $\Delta p_{d} = p_{d} - p_{g}$:
- 0.6 – 50 mbar [0.24 – 19.7 °WC].
Transmission ratio of gas to air: 1:1.
Adjusting range at low fire: ±5 mbar [±2 °WC].

VAV
Outlet pressure $p_d$:
- 0.5 – 30 mbar [0.2 – 11.7 °WC].
Air control pressure $p_{so}$:
- 0.4 – 30 mbar [0.15 – 11.7 °WC].
Combustion chamber control pressure $p_{sc}$:
- 20 to +20 mbar [-7.8 to +7.8 °WC].
Min. control pressure differential $p_{sa} - p_{sc}$:
- 0.4 mbar [0.15 °WC].
Min. pressure differential $p_{d} - p_{sc}$:
- 0.5 mbar [0.2 °WC].
Adjusting range at low fire: ±1.5 mbar [±0.6 °WC].
Transmission ratio of gas to air: 0.6:1 to 3:1.

Flow rate

Maintenance cycles
At least once per annum, at least twice per annum for biologically produced methane.
If the flow rate drops, clean the strainer.

Detailed information on this product
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