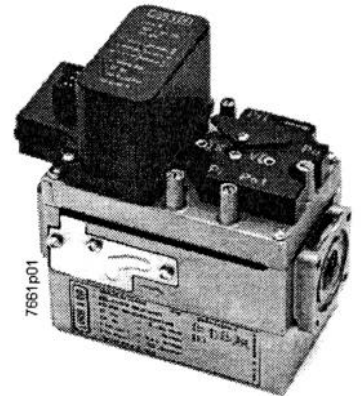


Compact Gas Control Loop with integral pneumatic Air/Gas Ratio Controller

VDA...



Compact gas control loop for modulating control of the gas outlet pressure as function of the air pressure, comprising:

- Pneumatic air/gas ratio controller
- Two safety shut-off valves, class A
- Integral gas pressure switch (optional)
- Gas filter
- Setting units for parallel displacement and slope of the gas/atmospheric pressure ratio (0..1)
- One connection facility for air (no combustion or mixing chamber pressure connection required)
- Pressure measuring points, setting controls and electrical connections at one operating level

Basic design

Basic diagram

Applications

The application range includes atmospheric burners with auxiliary fan as well as forced draught gas burners with fans installed in the supply air duct or flueway. VDA... is suitable in particular for the use in modulating gas burners with full pre-mixing of fuel and air (Pre-Mix).

The VDA gas block provides the functions of a gas safety and control loop with a pneumatic gas pressure governor for modulating control of the gas pressure in function of the air pressure (reference value).

Suitable gases

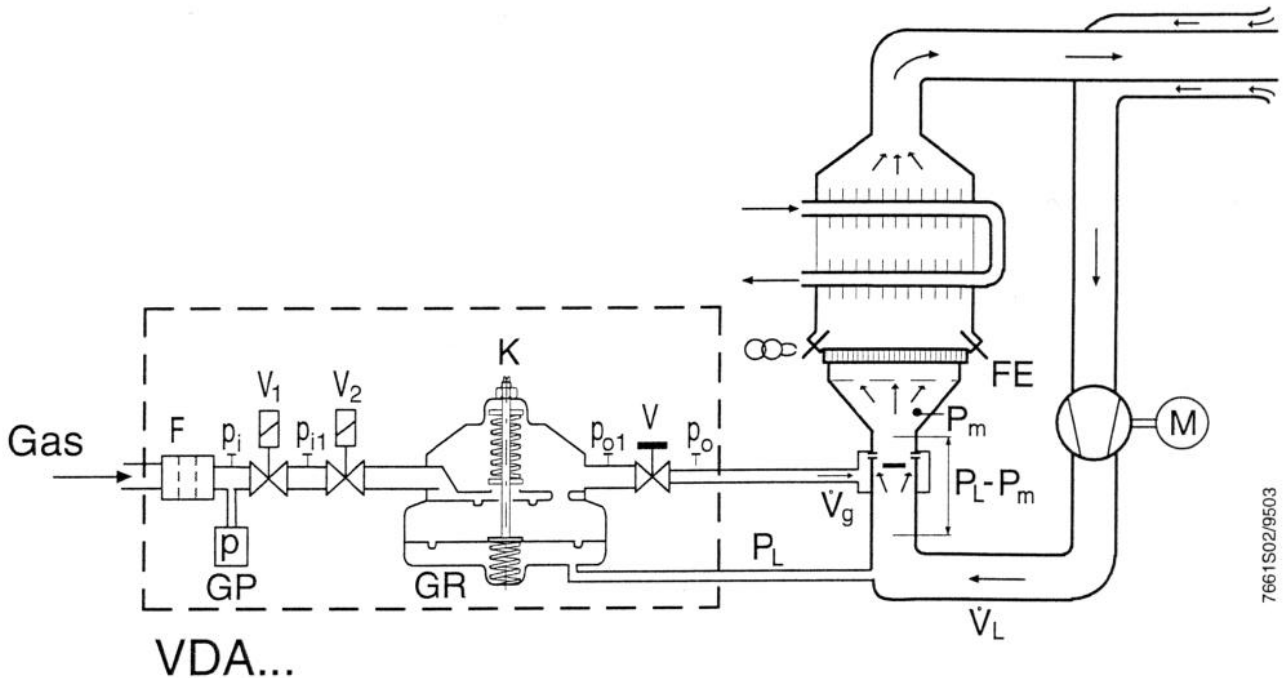
natural gas, propane and butane
(to code of practice DVGW G260/1)

Gas inlet pressure

100 mbar max.

Gas outlet pressure

50 mbar max.



Legend

- F Filter (exchangeable)
- V₁, V₂ Solenoid valves
- GR Pneumatic air/gas ratio controller
- K Adjusting screw for parallel displacement of air/gas pressure ratio
- V Throttle in the main gas line for the slope of the air/gas pressure ratio characteristic
- p_o Gas outlet pressure (on the burner side)
- p_{o1} Gas outlet pressure directly behind the controller (ratio 1:1)

- p_i Gas inlet pressure
- p_{i1} Gas inlet pressure measured between the solenoid valves
- P_L Air pressure (reference value)
- P_m Pressure in the mixing chamber
- V_g Volumetric gas flow
- V_L Volumetric air flow
- FE Detector electrode
- M Fan motor
- VDA... Compact gas control loop
- GP Gas pressure switch (optional)

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Functions

Solenoid valves

The two solenoid valves are safety shutoff valves. They can be energized either together or separately and are of the normally closed type.

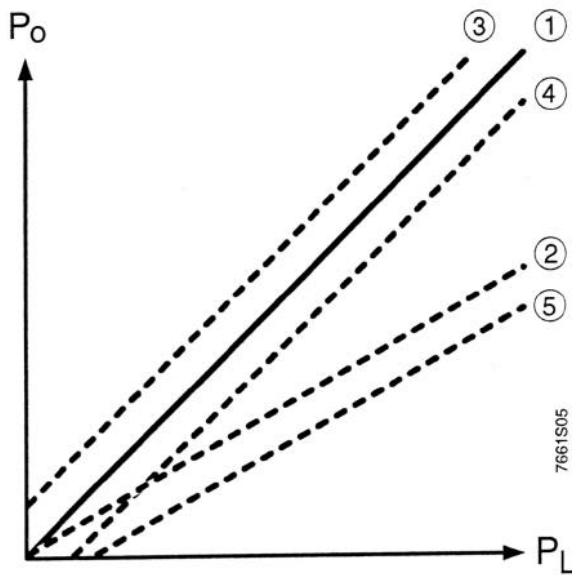
Air/gas ratio controller

The controller is a pneumatic air/gas ratio controller. It regulates the pressure p_o on the gas outlet side in function of the combustion air pressure (p_L).

If no air pressure builds up ($p_L = 0$), the air/gas ratio controller will remain shut.

The air pressure p_L generates a counter-pressure on one side of the diaphragm, which causes the valve to open, resulting in an increase of the gas outlet pressure p_o . The controller will open until the gas pressure p_i and the force of the spring (adjustable with "K") on one side of the diaphragm, and the force generated by the gas pressure p_L on the other side, are in equilibrium.

The air/gas ratio will remain constant over the entire range, that is, at the level adjusted with "K" and "V".



Working characteristics of controller:

Legend

- p_o Gas outlet pressure (on the burner side)
- p_L Air pressure (reference value)
- ① Ideal air/gas pressure ratio (1:1)
Settings at VDA...: K = 0, V = 0 (throttle fully open)
- ② Air/gas pressure ratio with excess air
Settings at VDA...: K = 0, V > 0 (throttling)
- ③ Air/gas pressure ratio with lack of air
Settings at VDA...: K = +, V = 0 (throttle fully open)
- ④ Air/gas pressure ratio with a small amount of excess air
Settings at VDA...: K = -, V = 0 (throttle fully open)
- ⑤ Air/gas pressure ratio with a very large amount of excess air, especially in the low flame range
Settings at VDA...: K = -, V > 0 (throttling)

Technical data

General

Types of gases	natural gas, propane and butane (= gas families II/III, according to DVGW G260/I)
Inlet pressure range, max. permissible according to EN 161	15...100 mbar
Perm. ambient temperatures	0...60°C
- Operation	-20°C +80°C
- Transport and storage	
Relative humidity	Klima F according to DIN 40040
Weight	approx. 1.7 kg
Place of installation	in pipes running horizontally or vertically, with the operating level accessible from the top or the side, not facing downward

Solenoid valves

Valve groups according to	DIN 3394, group A DIN 3391, group A DIN EN 161, class A DIN EN 126, class A
Closing time	<0.5 s
Opening time	0.25 s
Operating frequency	optional
Operating voltage	AC 24V ¹⁾ / 230V (depending on type)
Mains frequency	50...60 Hz
Power consumption (both solenoid valves)	18 VA
On time (ED)	100 %
Degree of protection	IP 30
Performance factor of solenoids	cosφ ≥ 0.95
Insulation of coil	according to IEC 317-20
Fuse	6.3 A max., slow
Electrical connections	RAST5 plug coding 03C

Air/gas ratio controller

Reference value	pressure of combustion air p_L
Perm. control pressure as reference value	
- ($p_L - p_m$) min.	0.3 mbar
- ($p_L - p_m$) max.	50 mbar *
Perm. gas outlet pressure	
- ($p_o - p_m$) min.	0.2 mbar
- ($p_o - p_m$) max.	50 mbar *
Positioning time for reference value p_L with regulating range (p_{Lmax}/p_{Lmin}) ^{1/2} of approx. 3 from MIN to MAX or from MAX to MIN	>2 s
Control accuracy	
- At ($p_L - p_m$) = 0.3 mbar	±15 % of ($p_o - p_m$)
- At ($p_L - p_m$) = 2.0 mbar	±10 % of ($p_o - p_m$)
- At ($p_L - p_m$) = 4.0 mbar	±5 % of ($p_o - p_m$) (intermediate values can be interpolated in a linear manner)
Dia. of impulse pipe for reference pressure p_L	>3 mm
Parallel displacement (adjusting screw "K")	±8 revolutions (corresponding to ±0.2 mbar)
Throttle in the main gas line (adjusting screw "V")	15 revolutions (corresponding to 3...100%)

Gas pressure switch (optional):

integrated in the lower part of the housing

Electrical connections (2 contacts) GP on	6.3 x 0.8 approx. 14 mbar (N.O.)
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1) Protective low voltage, e.g. by using a safety transformer according to IEC 742

* Observe working range !

Fitting and commissioning notes

Gas train

All components required for a gas train are integrated in the VDA... gas block. The VDA... is thus a full replacement for the conventional gas train so that installation will be considerably simplified. All that is required on the gas inlet side is a ball valve, may be a pressure reducing valve, and a manometer, depending on the type of plant. For place of installation of the VDA..., refer to «Technical data».

Adjusting the controller

After the burner is started up, first - in low flame operation - the air/gas pressure ratio is adjusted by making a parallel displacement of the characteristic (adjusting screw "K"). In high flame operation, the throttle in the main gas flow (adjusting screw "V") is used to adjust the volumetric gas flow until the required measuring results are obtained. After the adjustments are made, the results obtained must be checked and, if necessary, corrected in both low and high flame operation.

Available versions

VDA11.A27..01

Customer-specific pre-adjustments (K, V)

2: AC 230 V
8: AC 24 V

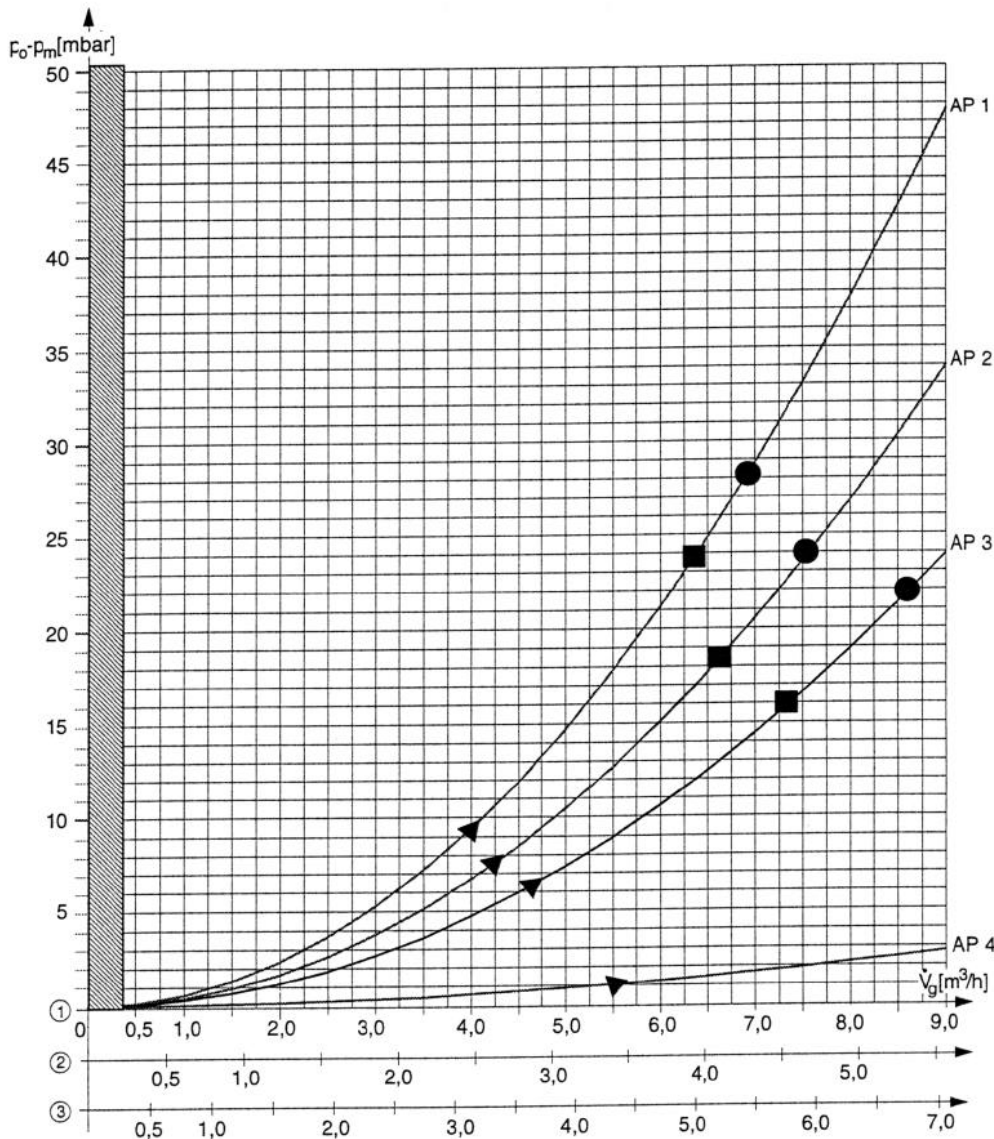
1: Without gas pressure switch
2: With gas pressure switch

Accessories

Through-flange
Angular flange
O-ring for flanges
Screw for flanges

AGL41.A
AGL42.A
AGL61.A
AGL51.A

Working range of VDA... (typical)



Legend

- ① Natural gas (density ratio $dv = 0.62$)
- ② Liquid gas ($dv = 1.68$)
- ③ Air ($dv = 1$)

Working points for gas valve measured with throttle fully open ($V = 0$):
 AP1 Working point $p_L = 4$ mbar; $V_g = 2,54$ m³/h (at $dv = 0,62$)
 AP2 Working point $p_L = 3$ mbar; $V_g = 2,54$ m³/h (at $dv = 0,62$)
 AP3 Working point $p_L = 2$ mbar; $V_g = 2,54$ m³/h (at $dv = 0,62$)
 AP4 Working point deflating against atmosphere

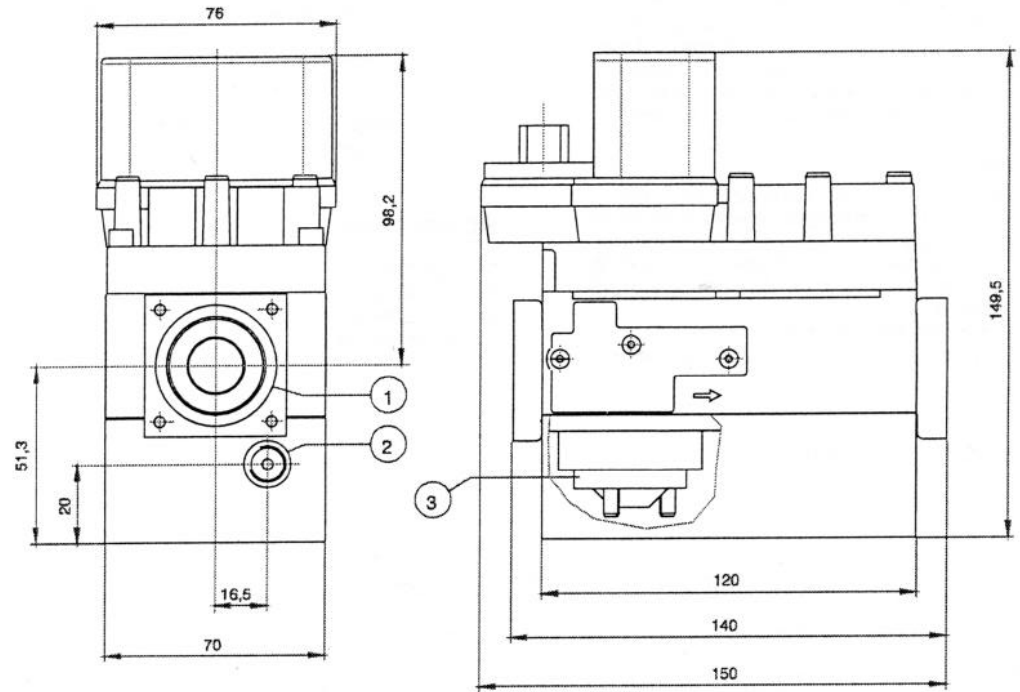
- $p_i = 100$ mbar
- $p_i = 50$ mbar
- ▲ $p_i = 20$ mbar

Note:

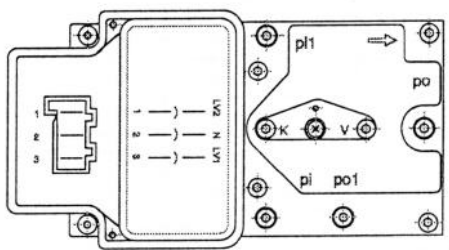
The selected working point must always lie in the working range, regardless of the application

Dimensions

Dimensions in mm



- ① RP 1/2 (ISO 228-1)
- ② RP 1/8 (ISO 228-1)
(air connection)
- ③ Gas pressure switch



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