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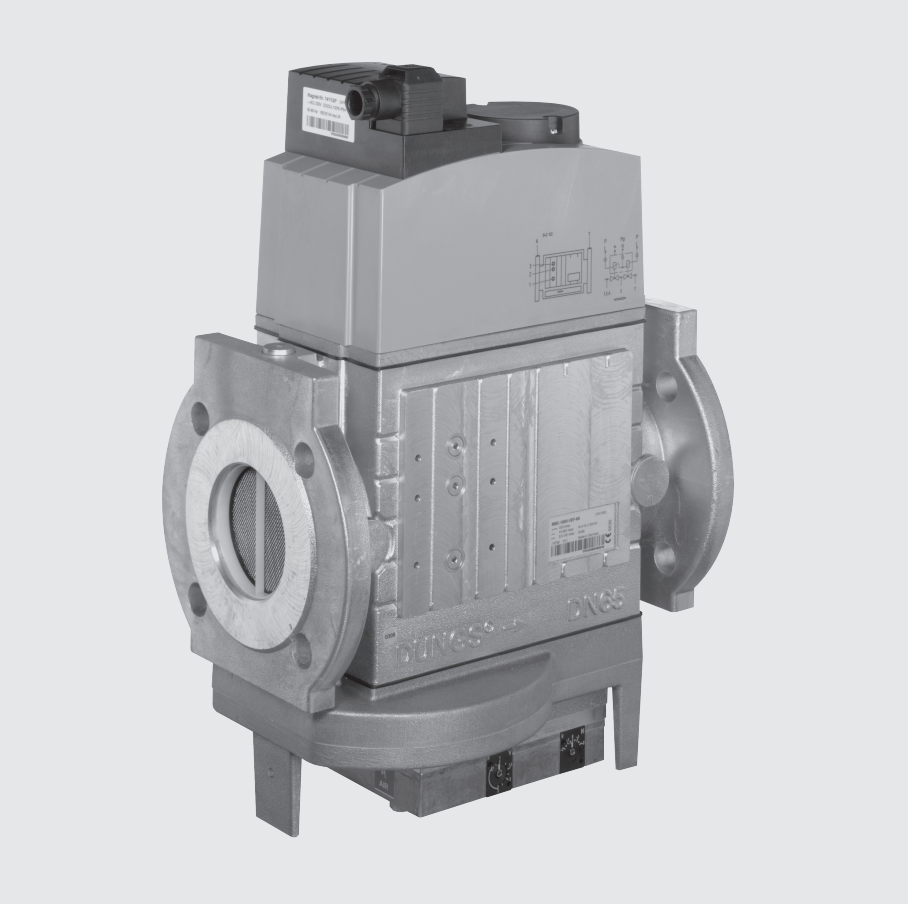
Double solenoid valve Combined pressure regulator and safety valves Gas-air-ratio-control

DUNGS®
Combustion Controls

MBC-...-VEF
DN 65 - DN 100

7.36



Technical Description

The DUNGS multiple actuator MBC-...-VEF integrates 2 valves and 1 gas-air ratio regulator in one compact unit:

- Solenoid valves up to 500 mbar (50 kPa) as per DIN EN 161 Class A Group 2
- Fine setting of gas and air pressure ratio
- Servo pressure regulator as per DIN EN 88 class A group 2; EN 12067-1
- Internal stepping lines for optimised outlet pressure stability, external as an option.
- Flange connection as per ISO 7005
- Easy to install

As this system has a modular design, we can offer individual solutions with valve testing system, mini/maxi pressure switch and pressure limiter. Despite the compact design, high flow rates can be achieved at low pressure difference.

Application

The gas-air ratio regulator permits optimal mixture formation in forced air burners and premix burners. This applies to modulating and two-stage variable operating modes. Suitable for gases belonging to gas families 1, 2, 3 and other inert gaseous media.

Approvals

EC type testing certificate as per:
- EC-Gas Appliances Regulation
- EC-Pressure Equipment Directive

Approvals in other important gas-consuming countries.

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Functional Description

Gas flow

1. If the valves V1 and V2 are closed, chamber a is subjected to inlet pressure up to the double seat of the valve V1.
2. The min. pressure switch (option) is connected to chamber a via a bore hole. If the inlet pressure exceeds the desired value set on the pressure switch, the pressure switch connects through to the gas burner control system.
3. The valves V1 and V2 open after they are enabled by the gas burner control system. Gas flow through chambers a, b and c is enabled.

Functional description of the combined valve-regulator unit at valve V1

A regulator (pressure regulator unit) with admission pressure compensation is integrated in valve V1. The plunger V1 is not connected to the valve disc unit. When the plunger opens, it preloads the compression spring and releases the regulator unit. When the plunger closes, the closing pressure is applied directly to the valve discs of the regulator unit. Valves V1 and V2 are driven together electrically. When valve V3 is in the closed position, it closes off the pressure chamber under the working diaphragm M so that this chamber is not affected by the inlet pressure p1 in chamber a. The plunger of valve V1 controls the valve V3. The pressure under the working diaphragm M depends on a variable flow cross-section D. The comparison diaphragms for burner pressure p_{Br} and blower pressure p_L are connected with a bar. The ratio V can be set by shifting the bearing point. The zero point compensation N acts on this bar. Ambient pressure p_{amb} or firing chamber pressure p_F must be applied to the opposite side of the comparison diaphragms. The firing chamber overpressure reduces the burner pressure when the ratio V > 1. If there are any changes in the equilibrium of forces, the flow cross-section D after the valve V4 is changed. The pressure under the working diaphragm is re-adjusted, and the valve disc unit V1 changes the free cross-section.

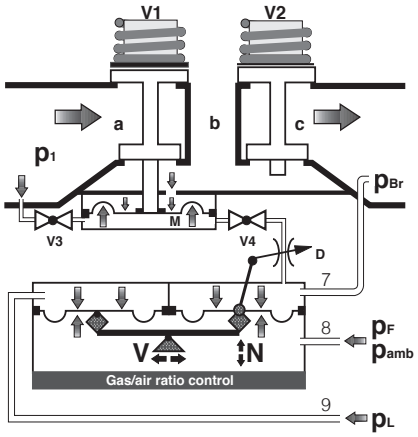
Functional description valve V2

The plunger of the valve V2 is connected to the valve disc unit. When the plunger opens, it preloads the compression spring. The valve V2 opens completely without any delay. The valve V4 is actuated by the valve V2. When the valve V4 is in the closed position, it closes off the area under the working diaphragm M so that this area is not affected by the burner pressure.

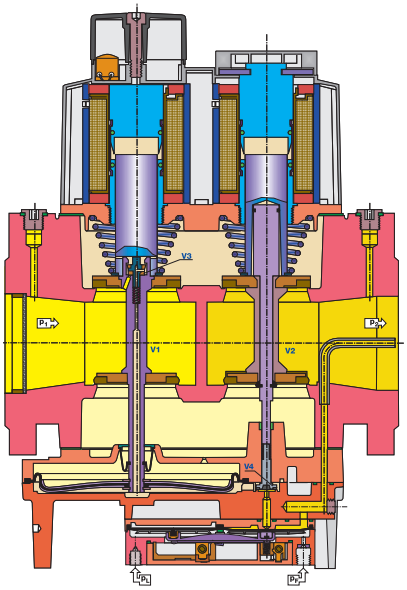
Closing function

If there is an interruption in the power supply to the solenoid coils of the main valves V1 and V2, they are closed by the compression springs in <1s.

Schematic diagram MBC-...-VEF

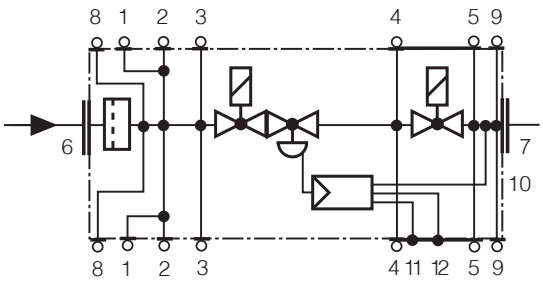


V1	Main valve 1	a, b, c	Pressure chambers in flow direction
V2	Main valve 2		
V3	Control valve 3	p_1	Inlet pressure
V4	Control valve 4	p_{Br}	Burner pressure, outlet pressure
		p_{amb}	Ambient pressure
M	Working diaphragm		
D	Restrictor	2, 3, 4, 5	Screw plug G 1/8
V	Ratio setting	1, 6	Screw plug G 1/4
N	Zero point compensation	7, 8, 9	Stepping line p_{Br}, p_F, p_L



Pressure taps, gas train diagram

MBC-...-VEF



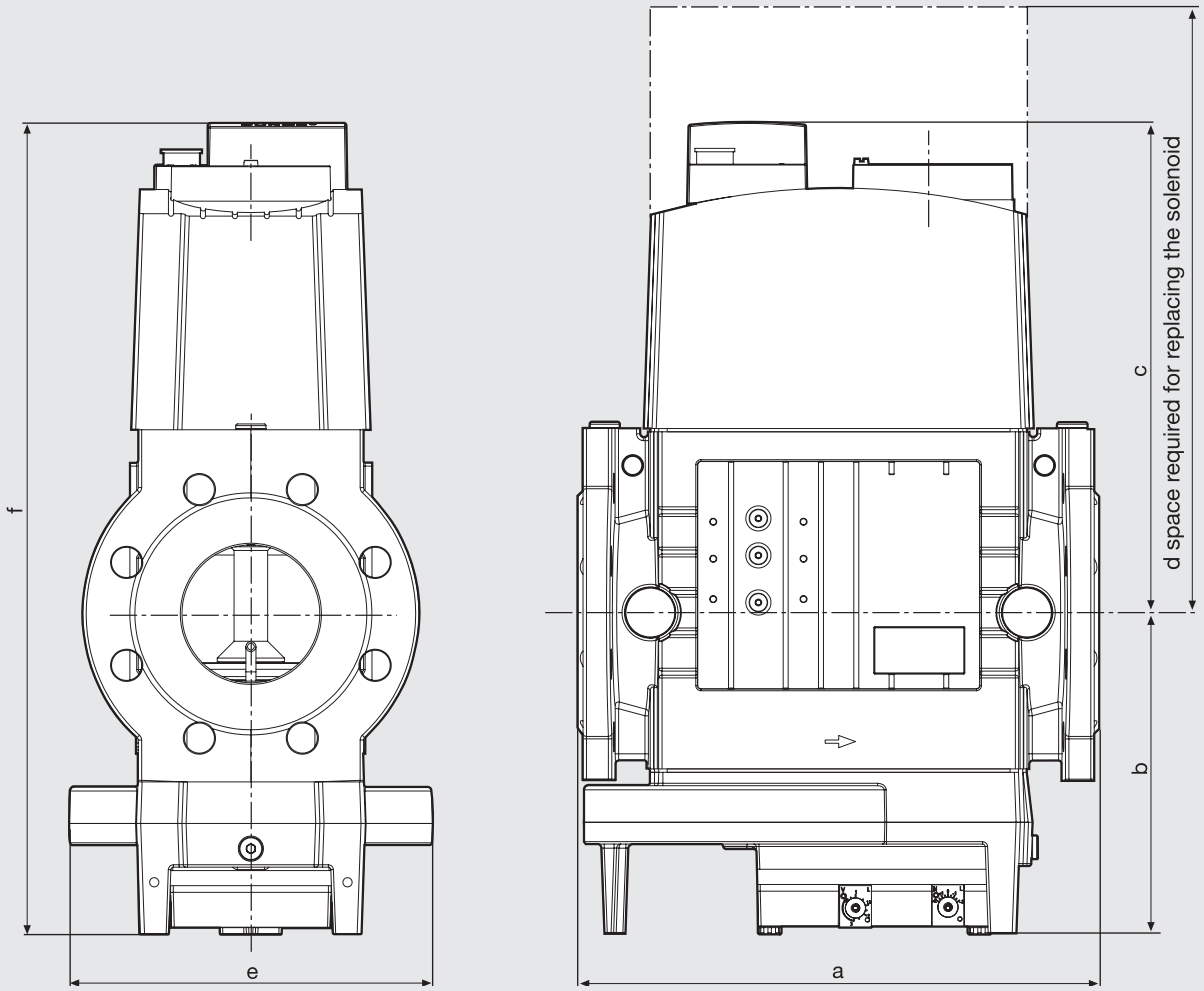
Technical Data

Nominal widths	DN 65 80 100 Connection flanges as per EN 1092-1 for welding neck flanges as per DIN 2633 (PN16) DN 65 - DN 100 Length as per DIN 3202 part 1, series F1.
Max. operating overpressure **Inlet pressure range** **Burner pressure range** **Guiding range**	**500 mbar (50 kPa)** **p_e : 15 mbar (1.5 kPa) to 360 mbar (36 kPa)** **p_{Br} : 0,5 mbar (0.05 kPa) to 100 mbar (10 kPa)** **p_L : 0,4 mbar (0.04 kPa) to 100 mbar (10 kPa)**
Media	Gases belonging to gas families 1, 2, 3 and other inert gaseous media.
Ambient temperature	-15 °C to +60 °C
Dirt trap device	Filter. **A suitable gas filter must be connected upstream**. For further information, see data sheet 11.02 “Gas and air filter”.
Pressure switch	The system can be equipped with pressure switch types GW A5, ÜB A2, NB A2 as per DIN EN 1854. In case of DN 65 GW…A5 cannot be mounted on item 2. For further information, see data sheets 5.07 and 5.02 “Pressure switches for DUNGS multiple actuators”.
Servo pressure regulator	Pressure regulator with admission pressure compensation, sealed with valve V1 when switched off, as per DIN EN 88 Class A Gas-air ratio regulator with adjustable ratio V as well as zero point compensation N and firing chamber pressure connection
Ratio setting range V	Ratio V = p_{Br} / p_L 0.75 : 1 … 3 : 1, other ratios on request
Zero point compensation N	possible
Solenoid valve V1, V2	Valve as per DIN EN 161 Class A Group 2; fast-closing, fast-opening
Measuring gas connection	G 1/4 DIN ISO 228; at inlet and outlet flanges, G 1/8 on both sides after the filter, on both sides between V1 and V2, after V2 (if the pressure switch is assembled, it may not be possible to install a measuring gas connection in some cases)
Burner pressure monitoring device p_{Br}	after valve V2
Stepping line	G 1/8 connection as per DIN ISO 228 for burner pressure (p_{Br}; gas) **Stepping and connection lines must be made of steel and ≥ PN1, DN4. Condensate from stepping and connection lines may not enter the fitting. The operating and assembly instructions must be strictly followed.**
Voltage / frequency	~ (AC) 50 -60 Hz 230 V -15 % +10 % Standard voltages: 110 - 120 VAC, 24 – 28 VDC
Electrical connection	Plug-in connection as per DIN EN 175301-803
Power / current draw Switch-on duration Degree of protection	at ~ (AC) 230 V; +20 °C: see type overview 100 % duty IP 54 as per IEC 529 (EN 60529)
Material used for gas-conveying parts	Housing: cast aluminium Diaphragms, seals: NBR-based, Silopren (silicone rubber) Solenoid drive: aluminium, steel, brass
Installation position	Vertical with upright solenoid

Power / current draw at ~(AC) 230 V, + 20 °C
all indications are effective values

Type	Starting power approx. [W]	Holding power approx. [W]	Break-away starting current [A]	Holding current [A]
MBC-1900…- 65	2 x 95	2 x 20	2 x 0.54	2 x 0.20
MBC-3100…- 80	2 x 125	2 x 25	2 x 0.54	2 x 0.20
MBC-5000…- 100	2 x 125	2 x 25	2 x 0.54	2 x 0.20

Dimensions MBC-...-VEF



Type	Ordering No. 230 VAC	DN	$P_{max.}$ [W] ~(AC) 230 V	$I_{max.}$ ~[A]	Opening time	Dimensions [mm] a	b	c	d	e	f	Solenoid No.	Switching operations/h	Weight [kg]
MBC-1900-VEF-65	**243 083**	DN 65	190	1.8	< 1 s	290	168	246	365	196	414	1511/2P	60	18.4
MBC-3100-VEF-80	**244 428**	DN 80	250	1.8	< 1 s	310	190	292	450	216	482	1611/2P	60	26.0
MBC-5000-VEF-100	**244 301**	DN 100	250	1.8	< 1 s	350	235	329	500	250	564	1711/2P	60	33.3

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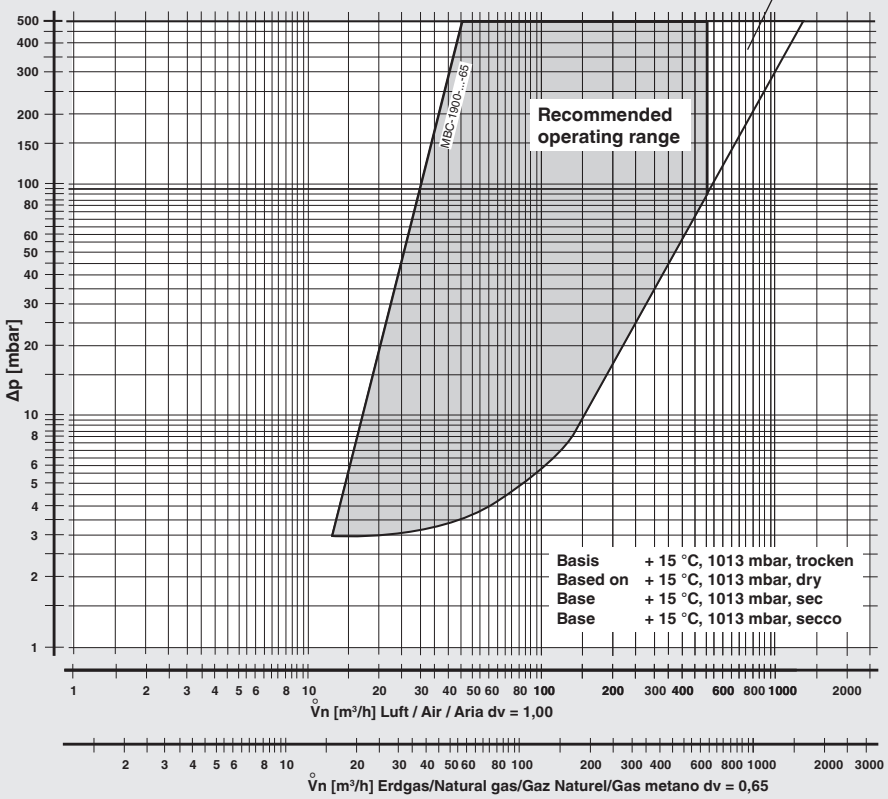
Characteristic curves for volume flow pressure difference in steady state with filter. A suitable gas filter must be used.

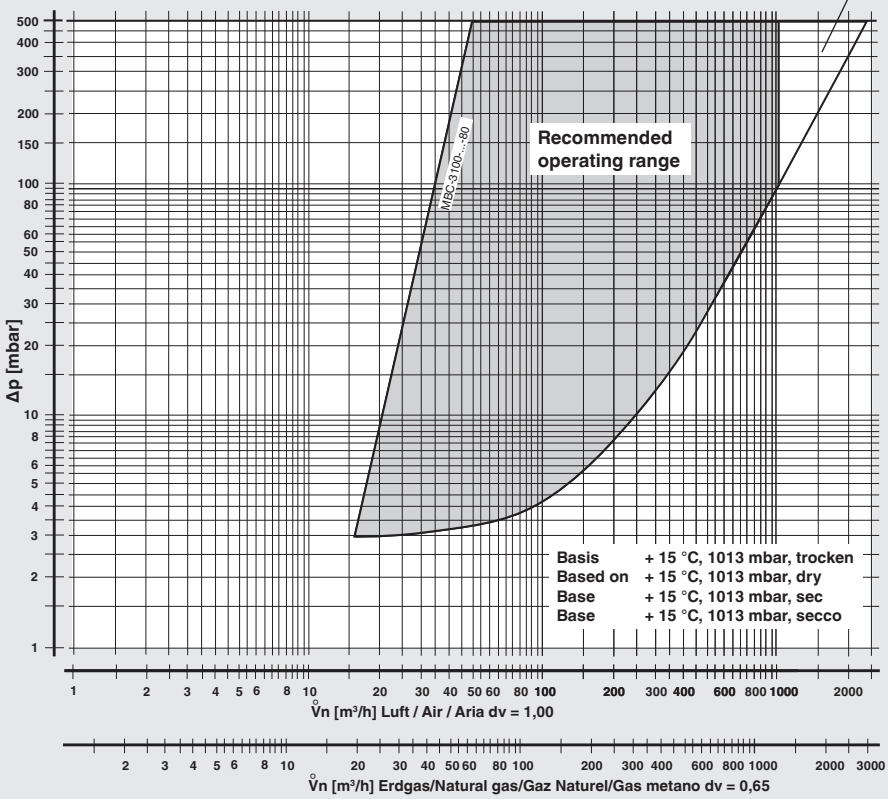
must be checked and enabled in the application

MBC-1900-VEF-65



must be checked and enabled in the application

MBC-3100-VEF-80



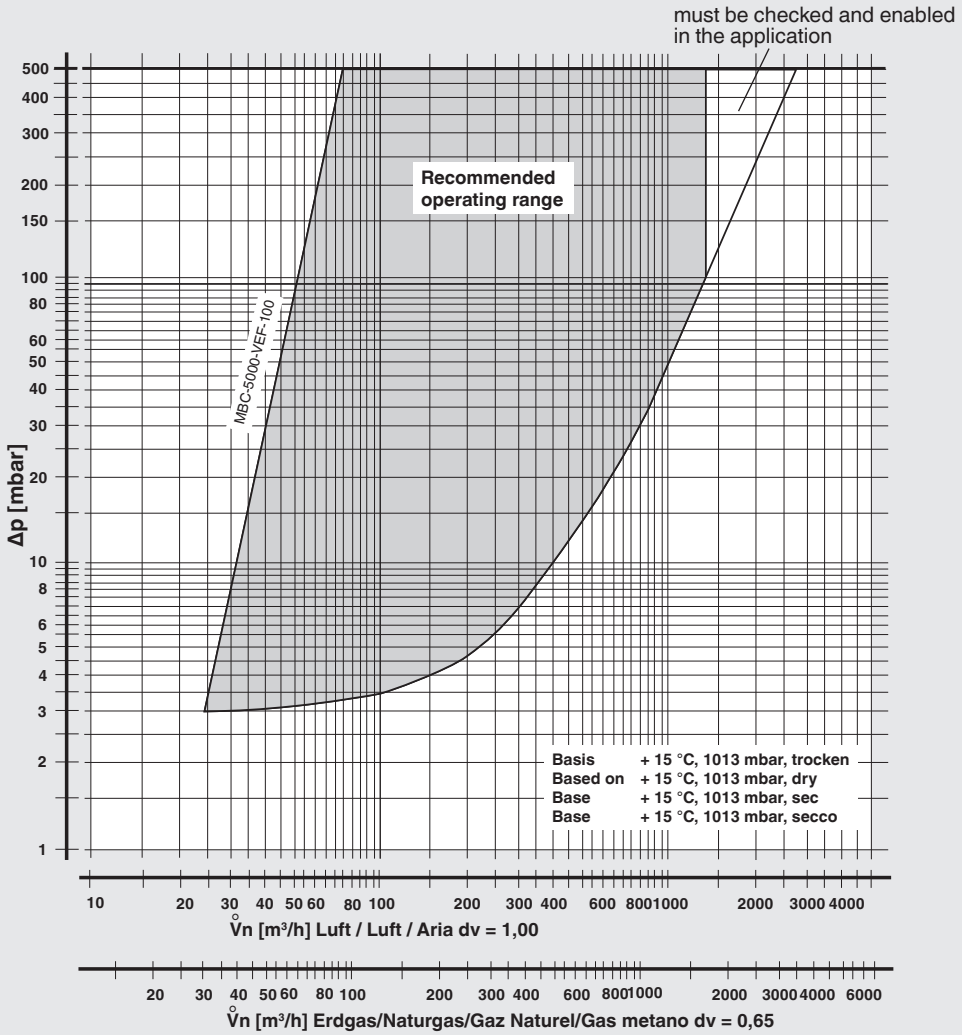
$$f = \sqrt{\frac{\text{Air density}}{\text{Density of the gas used}}}$$

$$\mathring{V}_{\text{gas used}} = \mathring{V}_{\text{air}} \times f$$

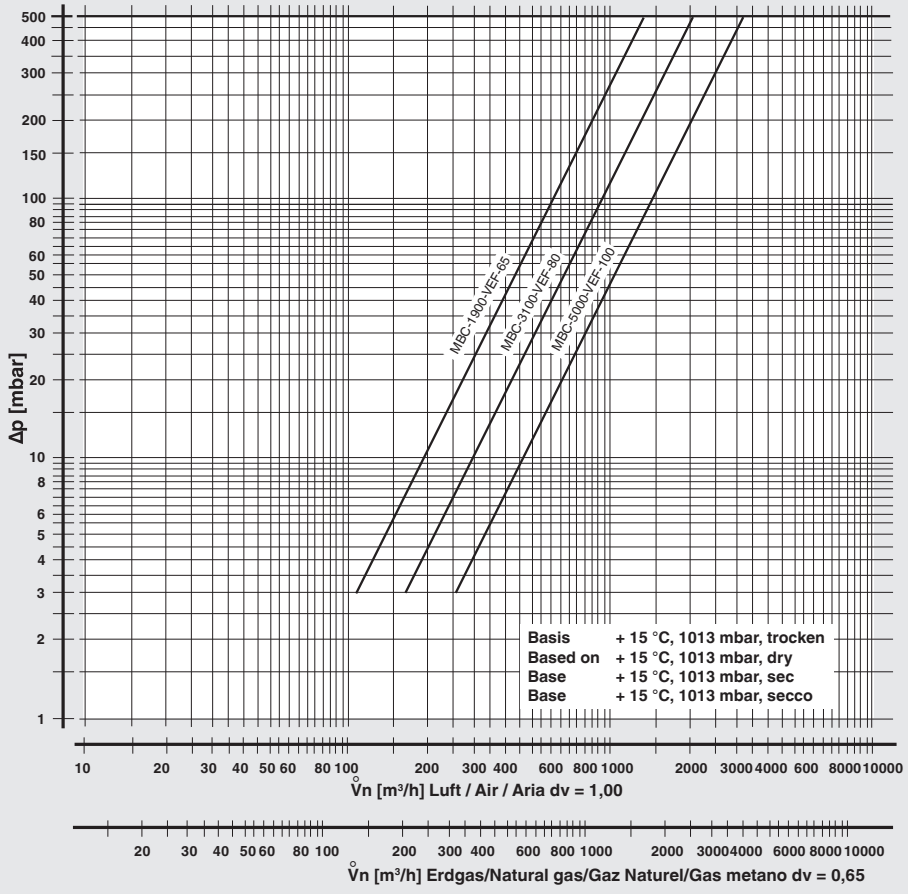
Gas type	Density [kg/m³]	f
Natural gas	0,81	1,24
Town gas	0,58	1,46
Liquefied gas	2,08	0,77
Air	1,24	1,00

Characteristic curves for volume flow pressure difference in steady state with filter. A suitable gas filter must be used.

MBC-5000-VEF-100



mechanically open



System accessories	Further information
Pressure switch	
ÜB…A2, NB…A4	Data sheet 5.07
GW…A5	Data sheet 5.02
Gas filter	
GF/3 DN…	Data sheet 11.02
Valve testing system	
VPS 504 S04	Data sheet 8.10
Motorised butterfly valve	
DMK DN…	Data sheet 11.11

⚠ The DMV-VEF has been designed for direct assembly of DUNGS system accessories and supplementary equipment.

	Ordering no.
Line socket 3 pole + PE	**210 319**
Adapter, pressure gauge flange set G1/2	**216 675**
Ignition gas flange G 3/4	**219 006**
Cover, on the side	**219 005**

⚠ Flanges, plug-in connection and system accessories must be ordered separately.

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Double solenoid valve
Combined pressure regulator and safety valves
Infinitely variable operating mode

MBC-...-VEF
DN 65 - DN 100

Key data

DUNGS®
Combustion Controls

Key data MBC-...-VEF	Application 1	Application 2
Gas Type of gas / specific density [kg/m³]		
Volumetric flow V [m³/h] $V_{min.}$ $V_{max.}$		
Inlet pressure p_e [mbar] $p_{e,min.}$ $p_{e,max.}$		
Burner pressure p_{Br} [mbar] at $V_{min.}$ at $V_{max.}$		
Control range, power range		
Time taken to re-adjust volume restrictors from small load to large load [s]		
Starting load [m³/h]		
Company / address		
Name / person in charge		
Telephone		

We reserve the right to make changes in the interest of technical progress.

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