

VRB00 SERIES

CLASS "B" SERVO REGULATED COMBINATION VALVES

PRODUCT HANDBOOK



APPLICATION

The VRB00 Series class "B" servo regulated combination valves are used for control and regulation of gaseous fuels in gas fired power burners, atmospheric gas boilers, melting furnaces, incinerators and other gas consuming appliances.

These servo regulated combination valves are available in three different versions:

VRB15 (pipe sizes 1/2")

VRB20 (pipe sizes 3/4")

VRB25 (pipe sizes 1")

CONTENTS

GENERAL

Description	2
Features	3

TECHNICAL DATA

Specifications	4
Performance characteristics	5
Capacity curve (DN15) and recommended working area	6
Capacity curve (DN20) and recommended working area	7
Capacity curve (DN25) and recommended working area	8
Dimensional drawing	9

INSTALLATION AND OPERATION

Installation	10
Adjustments and final checkout	11
Construction and working principles	12

VARIOUS

Approvals and standards	13
Ordering information	14
Replacement parts and accessories	15

GENERAL

DESCRIPTION

The VRB00 Series class “B” servo regulated combination valves are suitable for the control of gaseous fuels in gas consuming appliances according to international standards. The VRB00 Series meet the class B + B specification according EN 161.

The VRB00 Series have 1/2” or 3/4” or 1” straight flanged pipe connection.

The VRB00 Series are standard equipped with two main valves V1 and V2.

Both valves are fast opening/closing.

Adjustable flow restriction on second valve.

The pressure regulating valve is located between V1 and V2.

The VRB00 Series class “B” servo regulated combination valves are available for DBI and IP applications.

At both sides of the main body 4 flange connections are provided to mount either an:

- inlet pressure switch C60VR serie
- interim pressure switch C60VR serie
- Valve Proving System (VPS) + pressure switch.

These accessories can be mounted on various positions of the main body of the VRB00.

FEATURES

- **Class “B” servo regulated combination valve for control of gaseous fuels in gas consuming appliances in accordance with international standards.**
- **Main body with two shut-off valves with single seat.**
- **Options for mounting flanged minimum and/or interim pressure switches.**
- **Valve Proving System (VPS).**
- **Closing time: < 1 second.**
- **Coils field replaceable.**
- **Coils suitable for permanent energization.**
- **Fine mesh screen (strainer) between inlet flange and main body.**
- **flow regulation second valve**
- **Various pressure tap points at main body available, when no additional valves or pressure switches are used.**
- **Second main valve with fast opening.**
- **Plug connectors according to DIN 43650.**
- **All adjustments are located on the top of the valve.**
- **Different pressure ranges.**
- **Suitable for electric modulation.**
- **Suitable for electric two stage regulator.**
- **Suitable for gas/air modulation.**
- **Connections for IP application.**

TECHNICAL DATA

SPECIFICATIONS

The specifications described in this chapter are related to the main gas valve (see also Performance characteristics on page 5). The VRB00 Series must be used in combination with a burner programmer.

Models

VRB15 (DN15)

VRB20 (DN20)

VRB25 (DN25)

Optional: adjustable opening characteristics, page 11

For detailed regulator specifications of models with **suffix M** or **suffix P** see the appropriate Product handbook.

VRBxxM: EN2R-9009

VRBxxP: EN2R-9010

Dimensions

See dimensional drawing page 9

Pipe sizes

Inlet and outlet straight with flange connection for 1/2", 3/4" and 1".

All internal pipe thread according to ISO 7-1.

Capacity at $\Delta p = 5$ mbar

See capacity curves on page 6, 7 and 8

VRB15 (DN15): 6 m³ /h air

VRB20 (DN20): 9 m³ /h air

VRB25 (DN25): 13 m³ /h air

Minimum regulating capacity

VRB15: 1 m³ /hr.

VRB20: 1 m³ /hr.

VRB25: 1.5 m³ /hr.

Maximum operating pressure

60 mbar

Connections (see fig. 6. and 7.)

- 1/8" pressure taps at inlet and outlet flanges. At the main body 8 flange connections are provided to mount either a:
 - pressure switches (minimum or maximum.)
 - Valve Proving System (VPS).
- Two 1/8" connections for IP applications.

Torsion and bending stress

Pipe connections meet group 2 according to EN 161 requirements.

Valve classification

Class B + B according to EN 126/EN 161

Regulator classification

Class C according to EN126/EN 88

Supply voltages

230 Vac, 50/60 Hz

Other voltages on request.

Electrical equipment

Direct current coils with combined rectifier inside the cover.

Electrical connections

Connector according to DIN 43650

Ambient temperature range

– 15 ... 60 °C

Coil insulation solenoid valves

Insulation material according class F.

Enclosure

IP 54

Body material

aluminium alloy die cast

Strainer

Fine mesh screen (diameter 0.34 mm), AISI 303 steel, serviceable after removing inlet flange screws.

Meets requirements for strainer according EN 161.

Closing spring

AISI 302 steel

Valve plunger

Coated Fe 360

Seals and gaskets

Hydrocarbon resistant NBR and Viton rubber types.

Table 1. power consumption (W) and current (mA)

Model	230VAC				110 VAC				24 Vac			
	V1		V2		V1		V2		V1		V2	
	W	mA	W	mA	W	mA	W	mA	W	mA	W	mA
VRB15	17	73	17	73	17	155	17	155	17	708	17	708
VRB20/25	31	135	31	135	31	282	31	282	31	1292	31	1292

PERFORMANCE CHARACTERISTICS

Opening time

Dead time maximum 1 second.
Both valves open in less than 1 second.

Maximum allowable leakage

Each VRB00 combination valve has been factory tested to meet the following leakage requirements:

- outerwall: 50 cm³/h at test pressure of 6 and 540 mbar.
- safety valve: 40 cm³/h at test pressure of 6 and 540 mbar.
- main valve : 40 cm³/h at test pressure of 6 and 540 mbar.

High pressure test

In the "OFF" condition, the VRB00 valve will withstand 1.5 bar (air) inlet pressure without damage.
Attempts to operate the VRB00, while in this condition, will not cause damage.

Oscillation

Maximum oscillation under all circumstances: ≤ 0.5 mbar.

Tap sensitivity of outlet pressure set point

For all gases the maximum deviation may be 1 mbar.

Repeatability of outlet pressure set point

For all gases the maximum deviation from set point is ± 0.3 mbar or ± 3% of the set point value, whichever is the greatest.

Table 2. Total set point shift

Pressure range (mbar)	Tolerance
3 ... 37	6% of the set point value or 1 mbar whichever is the greatest
2 ... 20 *	6% of the set point value or 1 mbar whichever is the greatest
8 ... 50	6% of the set point value or 2.2 mbar whichever is the greatest

* 2 ... 20 mbar regulation not to be specified on valves with 360 mbar inlet pressure

Closing time (V1, V2)

Less than 1 second.

Maximum working frequency

1 cycle per minute

Duty cycle

Coil suitable for permanent energization in cooperation with ignition controller

Operational voltage range

The combination gas valve will function satisfactory between 85% and 110% of the rated voltage.

Table 3. Design life

Model	Number of cycles
VRB15	500,000
VRB20	
VRB25	

CAPACITY CURVE (DN15) AND RECOMMENDED WORKING AREA

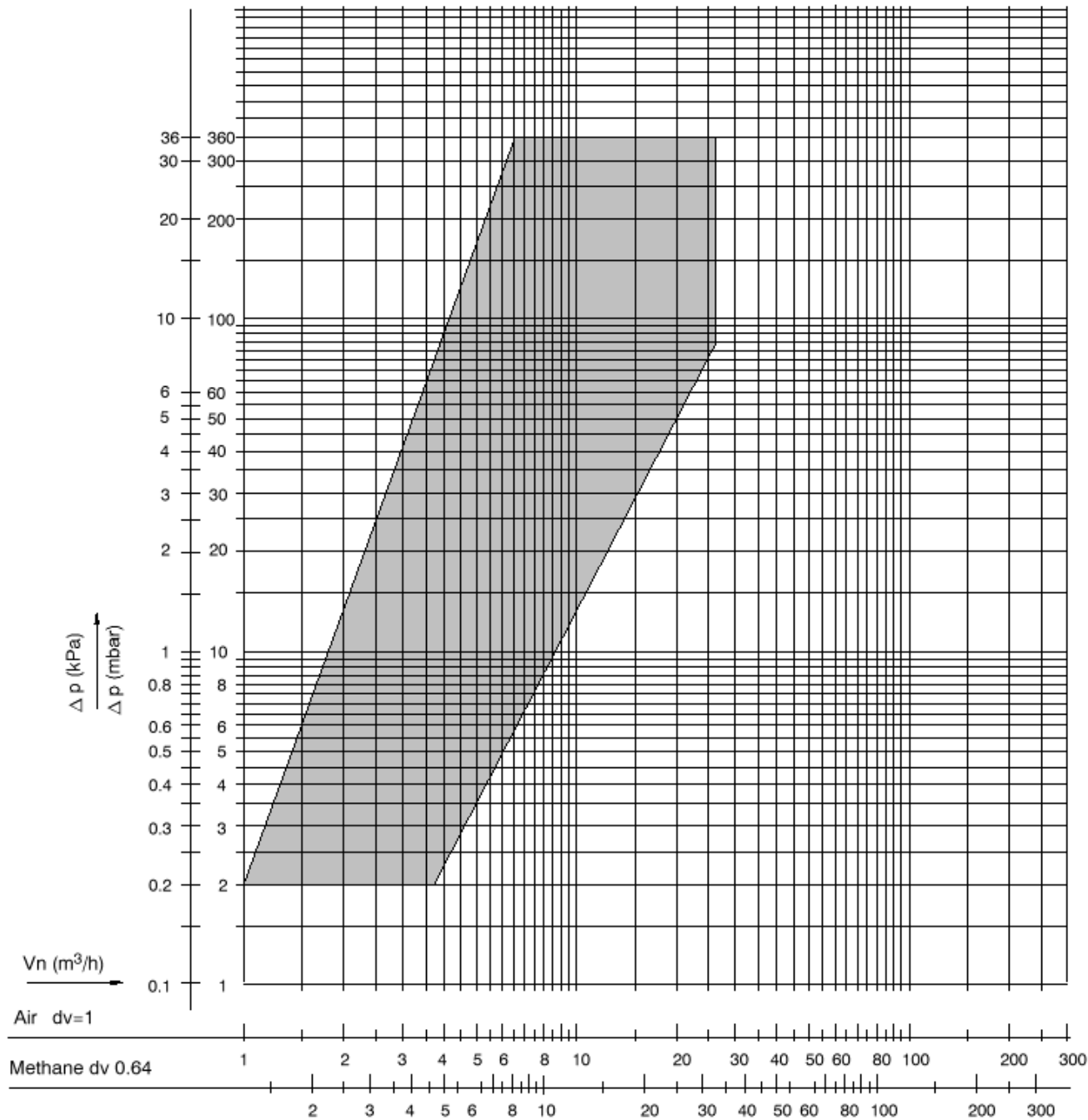


Fig. 1. Capacity curves for VRB15 Series (DN15)

CAPACITY CURVE (DN20) AND RECOMMENDED WORKING AREA

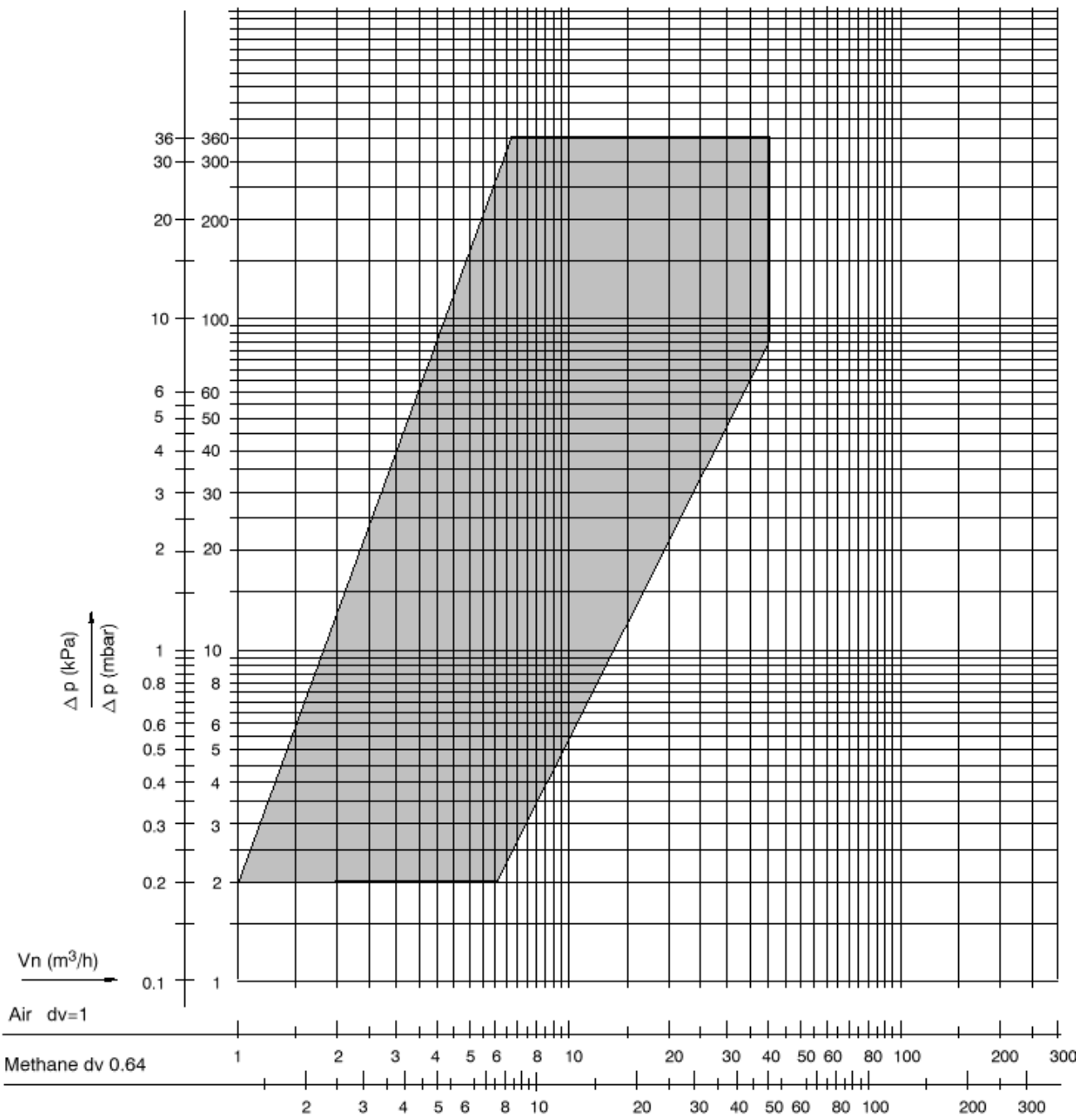


Fig. 2. Capacity curves for VRB20 Series (DN20)

CAPACITY CURVE (DN25) AND RECOMMENDED WORKING AREA

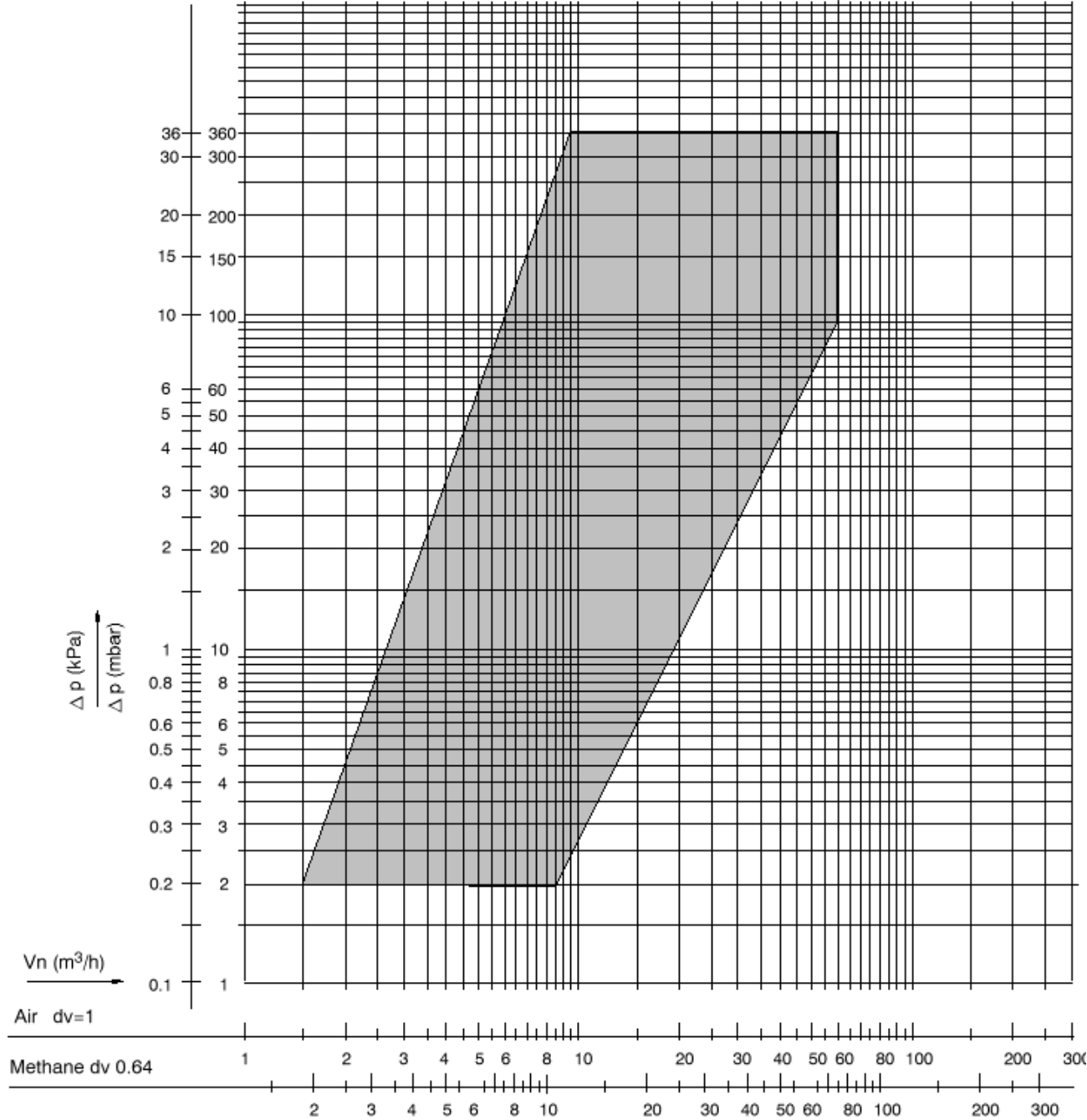


Fig. 3. Capacity curves for VRB25 Series (DN25)

DIMENSIONAL DRAWING VRB15/VRB20/VRB25

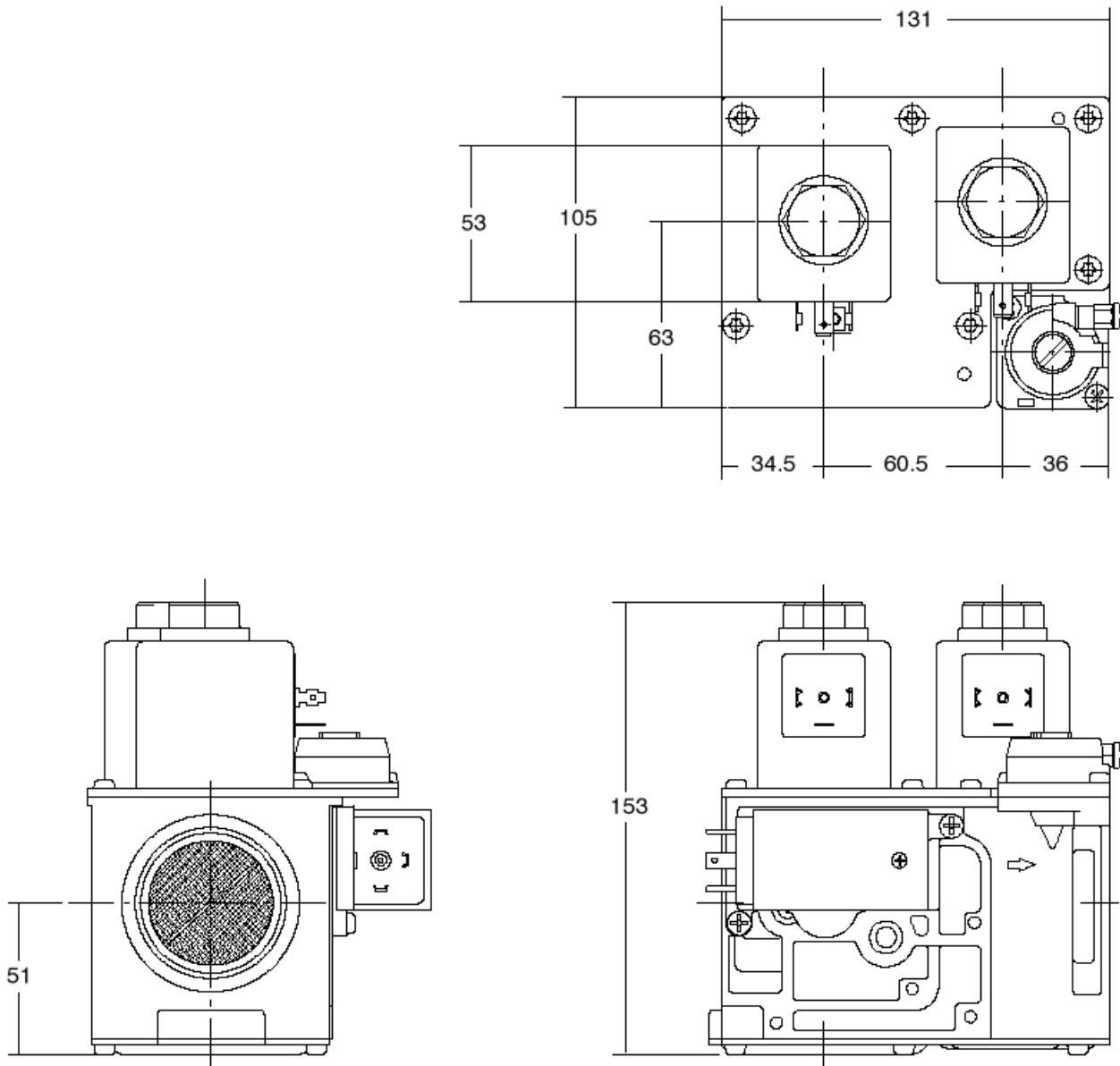


Fig. 4. Dimensional drawing VRB15 (DN15), VRB20 (DN 20) and VRB25 (DN 25)

INSTALLATION AND OPERATION

INSTALLATION

IMPORTANT

Read these instructions carefully. Failure to follow the instructions could damage the product or cause a hazardous condition.

Check the ratings given in the instructions and on the product to make sure the product is suitable for your application.

The installation has to be carried out by qualified personnel only.

Carry out a thorough checkout when installation is completed.



CAUTION

Turn off gas supply before installation.

Disconnect power supply to the valve actuator before beginning the installation to prevent electrical shock and damage to the equipment.

Do not remove the seal over valve inlet and outlet, until ready to connect piping.

The valve must be installed so that the arrow on the valve points in the direction of the gas flow (gas pressure helps to close the valve).

Mounting position

The combination valve can be mounted plus or minus 90 degrees from the vertical.

Mounting location

The distance between the gas valve and the wall/ground, must be at least 30 cm.

Main gas connection

1. Take care that dirt does not enter the gas valve during handling
2. Remove the flanges from the valve.
3. Use a sound taper fitting with thread according to ISO 7-1 or new, properly reamed pipe free from swarf.
4. Apply a moderate amount of good quality thread compound to the pipe for fitting only, leaving the two end threads bare, PTFE tape may be used as an alternative.
5. Screw the flanges onto the pipes.
6. Ensure that the inlet and outlet flanges are in line and separate from each other enough to allow the valve to be mounted between the flanges without damaging the O-ring.
7. Place the "O"-ring. If necessary grease it slightly to keep it in place.
8. Mount the gas valve between the flanges using the bolts for each flange.
9. Complete the electrical connections as instructed in the electrical connection section.



WARNING

Tightness test after installation

Spray all pipe connections and gaskets with a good quality gas leak detection spray.

Start the appliance and check for bubbles. If a leak is found in a pipe connection, remake the joint.

A gasket leak can usually be stopped by tightening the mounting screws. Otherwise, replace the gas valve.

Electrical connection



CAUTION

Switch off power supply before making electrical connections.

All wiring must comply with local codes, ordinances and regulations.

Use lead wire which can withstand 105 °C ambient.

ADJUSTMENTS AND FINAL CHECKOUT

Adjustment outlet pressure

- Disconnect pressure feedback connection (if applicable)
- Energize both electric operators in order to have gas input to burner.
- Check gas input to the appliance using a clocking gas meter or alternatively a pressure gauge connected to the outlet pressure tap.
- Remove pressure regulator cap screw to expose pressure regulator adjustment screw.
- Slowly turn adjustment screw with a small screw driver until the burner pressure required is recorded on the pressure gauge. Turn adjustment screw clockwise to increase or counter-clockwise to decrease gas pressure to the burner.
- For non-regulating mode (LP gas) turn adjustment screw clockwise until it stops.
- Replace pressure regulator cap screw.
- Connect pressure feedback connection (if applicable).

Flow rate adjustment

1. Remove the cap from second operator
2. Turn adjustment screw counter-clockwise to increase or clockwise to decrease the flow rate.

Pressure tap points

The VRB00 Series has a number of connections points for measuring pressure, mounting a pressure switch, or IP applications.

The following pressures can be measured:

1. Inlet pressure
2. Interim pressure (pressure between the two shut-off valves)
3. Outlet pressure

The corresponding numbers can be found on the sides of the valve.

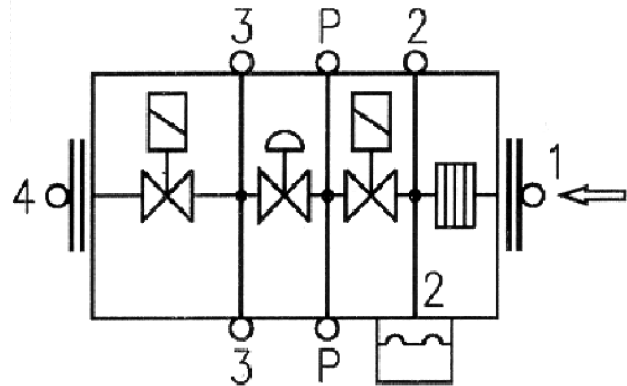


Fig. 6. Pressure tap points

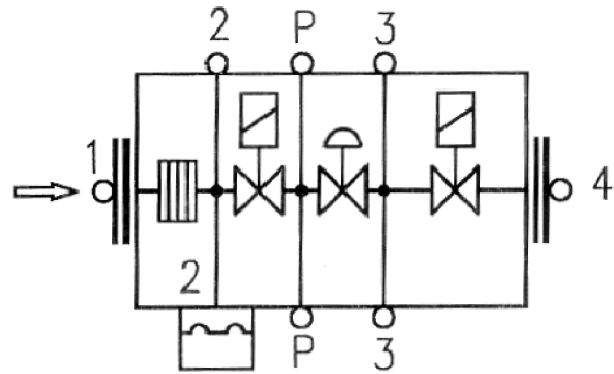


Fig. 7. Pressure tap points

Final checkout of the installation

Set the appliance in operation after any adjustment and observe several complete cycles to ensure that all burner components function correctly.

CONSTRUCTION AND WORKING PRINCIPLES

Servo pressure regulation working

The VRB00 Series servo regulated combination gas valves are 2 x class "B" fail safe shut-off valves. The valve is opened by energizing the direct ON/OFF operators. Each operator consists of a coil and a stop sleeve assy. Inside the stop sleeve assy is a plunger which is connected to a rubber valve and which is able to move up and down and thus opening or closing the valve.

The plunger is coated with an anti friction material.

A strainer made out of AISI303 is incorporated between inlet flange and main body.

The valve closing springs are made of AISI302.

Seals and gaskets are manufactured out of hydrocarbon resistant NBR according to DIN 3535 and EN 291.

The VRB00 Series features the positive servo system, i.e. the regulating valve is closed by spring pressure in the normal shut down position and can only be opened when gas pressure is sufficient to overcome the spring force. This valuable built in safety feature ensures the regulating valve will automatically close in the event of power or gas supply failure. The heart of the system is the servo pressure regulator which consists of a pressure relief valve integrated in a regulator diaphragm which is fitted above and controls the regulating valve.

When both operators are energized, inlet gas flows through the servo orifice into the servo system and into the regulator. This servo gas moves the regulating diaphragm upwards enough to open the regulating valve. As soon as the regulating valve has opened, the outlet pressure generated by the VRB00 Series will be sensed by the regulator diaphragm via the feedback channel.

When the force operated by the pressure is greater than that preset by the adjustment screw, the regulator valve opens relieving some of the working pressure. This reduces the force against the regulating valve spring allowing the regulating valve to close proportionately. Thus the regulating valve limits the outlet (or burner) pressure to the preset level.

As a result, outlet pressure is continuously maintained by comparing it to the preset pressure and adjusting the position of the regulating valve accordingly. This means that a constant outlet pressure is maintained regardless of inlet pressure variations. At shut down, the small volume of working gas in the regulator and in the diaphragm chamber is dumped into the main outlet chamber.

A reference pressure feedback connection further regulates the outlet pressure by compensating for differences in the air pressure in the combustion chamber and at the valve. If pressure regulation working is not needed, the regulator spring can be blocked by turning the adjustment screw down until it stops or the pressure regulation is removed. In these cases the full servo gas pressure opens the regulating valve as far as the pressure drop allows.

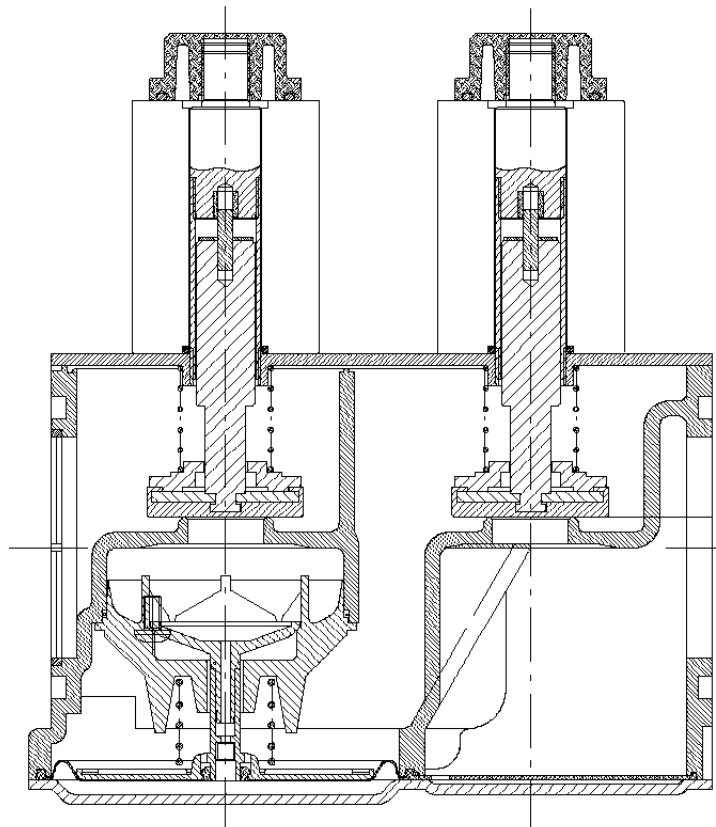


Fig. 8. Servo pressure regulator working

VARIOUS

STANDARD AND APPROVALS

Standards

The VRB00 Series servo regulated combination valves have been designed to meet the European Standard EN126. The safety shut-off valve meets class "B" requirements. According to bending stress the combination valve meets the highest requirements.

Regarding electric safety, the VRB00 Series can be used in appliances according to European Standard for a household electrical requirements EN 60335 series and industrial applications.

The VRB00 Series also meet all Electro Magnetic Compatibility standards for non-industrial and industrial appliances.

Approvals

The VRB00 Series servo regulated class "B" combination valves conform with the following EC-directives:

- Gas Appliance Directive (90/396/EEC)
PIN: pending
- Low Voltage Directive (73/23/EEC)
- Electro Magnetic Compatibility Directive (89/336/EEC)

The fact that the VRB00 Series are certified to European Standard EN 126 means that this series meets more stringent requirements than laid down in the essential requirements stated in the directives and therefore meets the requirements in all EC and EFTA countries.

Details can be found in the Approvals List.

The registration number specific for each O.S. number is mentioned on the label of the control.

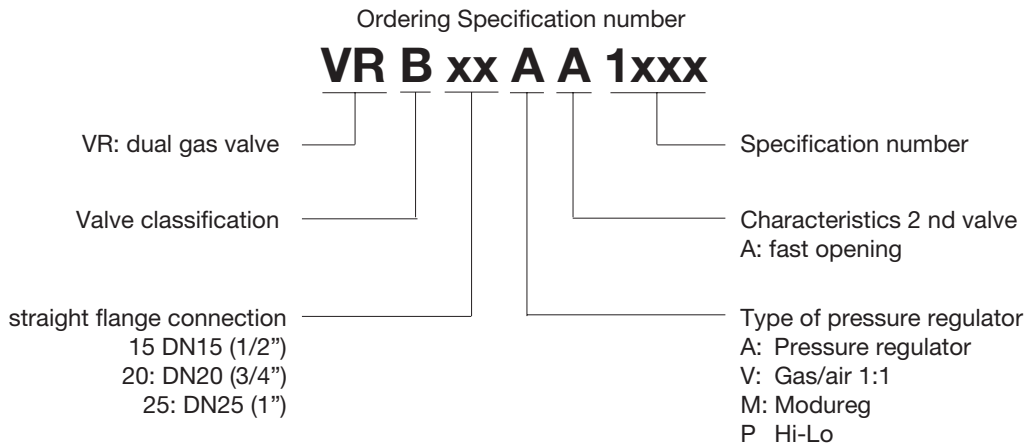
ORDERING INFORMATION

How to select your valve

Standard the VRB00 Series servo regulated combination valves are equipped with two main valves V1 and V2.

Both valves are always fast opening/closing.

At the main body (8) flange connections are provided to mount either pressure switches, a pilot valve, or a VPS + pressure switch. These additional functionalities can be mounted on various positions of the main body of the VRB00.



NOTE:

Flanges to be ordered separately (see Flange kits)

Pressure switch (Min. C60VRB00 serie) is standard included (C6097 on request available) position has to be specified, see table NO TAG on NO TAG.

Fig. 9. Ordering information VRB00 Series combination valves

REPLACEMENT PARTS AND ACCESSORIES

IMPORTANT

When ordering replacement coils include the complete valve O.S. number, in order to provide the coil with proper product identification sticker.



WARNING

Take care that only qualified persons carry out the installation of parts, accessories, and add on components.

Follow the installation instructions included in the package.

Check that the selected part, accessory or add on component is the correct one for the application in question.

Replace the old gaskets with the new ones supplied in the package and check for leakage when the supply is switched on again.

After installation and/or replacement has been completed, a gas leak test must be carried out.

Also check the gas valve for satisfactory operation after fitting accessories.

Table 4. Coils for VRB00 series

Model	Order number	Rated voltage (Vac)	Packing quantity
DN15	BB020037	230	1
DN20/25	BB020153	230	1
DN15	BB020154	110	1
DN20/25	BB020155	110	1
DN15	BB020156	24	1
DN20/25	BB020157	24	1

Table 5. Regulators

Regulator type	Range	O. S. number
Standard regulator	2.5 ... 20	V53306E 1002
	2 ... 10	V5306E 1440
	3 ... 37	V5306E 1143
	10 ... 60	V5306E 1119
High-Low regulator 230 V 50 Hz	3 ... 20	
	4 ... 37	
	8 ... 50	
Modureg 165 or 250 mA	1.5 ... 20	
	3 ... 37	
	8 ... 50	

Flange kits

The kit consist of:

- 1 flange with sealing plug
- 1 "O"-ring and 4 screws

Table 1. Flange kits

Order number	Size (Rp)	Remarks
KTCOMB15	1/2"	with plug
KTCOMB20	3/4"	with plug
KTCOMB25	1"	with plug

Replacement of coil



WARNING

Disconnect power supply before
Beware of the spring under the coil

1. Remove capscrew on top of coil.
2. Remove coil.
3. Replace coil and tighten with capscrew.

Replacement of pressure regulator



WARNING

Disconnect power supply before

1. Disconnect pressure feedback connection (if present).
2. Loosen and remove screws from regulator.
3. Lift regulator.
4. Remove rubber gasket.
5. Place new gasket.
6. Place new regulator and fasten it with screws.
7. Reconnect pressure feedback connection.
8. Reconnect pressure and power supply.
9. Energize valve.
10. Check for leakage.

Honeywell

Automation & Control Solutions

Environmental and Combustion Controls

Satronic AG

Honeywell-Platz 1

CH-8157 Dielsdorf

Switzerland

Phone +41 1 855 22 11

Fax +41 1 855 22 22