



VRA
VLA
VTA

**Solenoid valves for
combustion Air regulation
DN20 ... DN80**

VRA VLA VTA

Solenoid valves for combustion Air regulation

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Description

The VRA/VLA/VTA types are normally closed solenoid valves for cold combustion air regulation (open when energized). This type of device is suitable for high/low control of combustion air in industrial gas burners.

Features

The valves are made of aluminum alloy die-cast, with a wide range for inlet/outlet connections from DN 20 up to DN 80.

Pipe connections meet group 2, according to EN161 requirements.

Suitable for use with cold combustion air (not for safety operation).

Provided with two flow adjustments: minimum and maximum flow rate, for high/low operation.

Suitable for cycle operation and qualified for continuous service (100% ED).

The valve is supplied without an internal filter, because in many applications the air is very dirty and it should clog the filter in short time. It is provided with a special seal able to protect mechanical moving parts.

Provided with G1/4 pressure gauge on two sides in the inlet chamber, to connect manometers, pressure switches or other equipments. Flanged models are provided with gauges also in the outlet chamber.

The coils are provided with terminal box or with ISO 4400 plug (optional). Both systems are provided with suitable cable gland to avoid water and dirty contamination.

All components are designed to withstand any mechanical, chemical and thermal condition occurring during typical service. Effective impregnation and surface treatments have been used to improve mechanical sturdiness, sealing and resistance to corrosion of the components.

Valves are 100% tested by computerized testing machineries and are fully warranted.



WARNING

This control must be installed in compliance with the rules in force.

Functioning and application

The VRA type valve is a fast opening/closing solenoid valve. The VLA type is a slow opening and fast closing solenoid valve. The VTA type is a slow opening/closing solenoid valve. Both Min./Max. can be set from 0 to 100%.

When not energized the spring works on the disc keeping the minimum passage of air. When powering the coil the valve opens, moving the disc to the maximum open position. When power is switched off the valve moves to the minimum position.

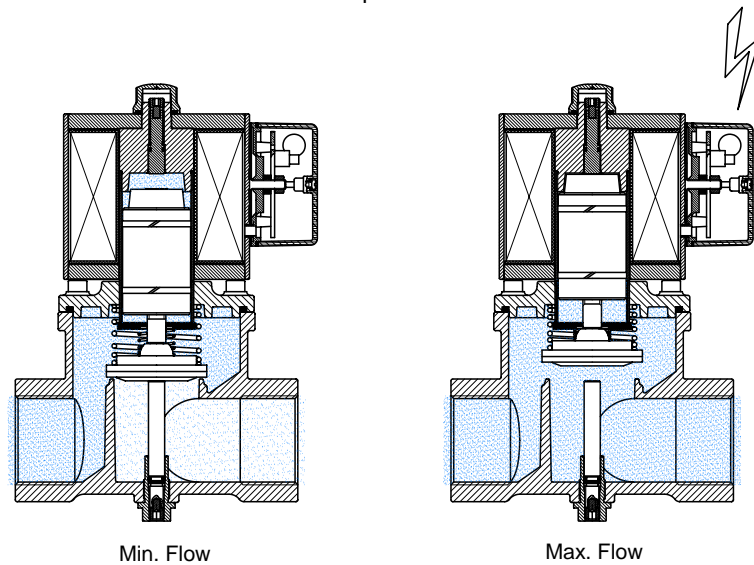


Fig.1

Figure 2 shows an example of installation.

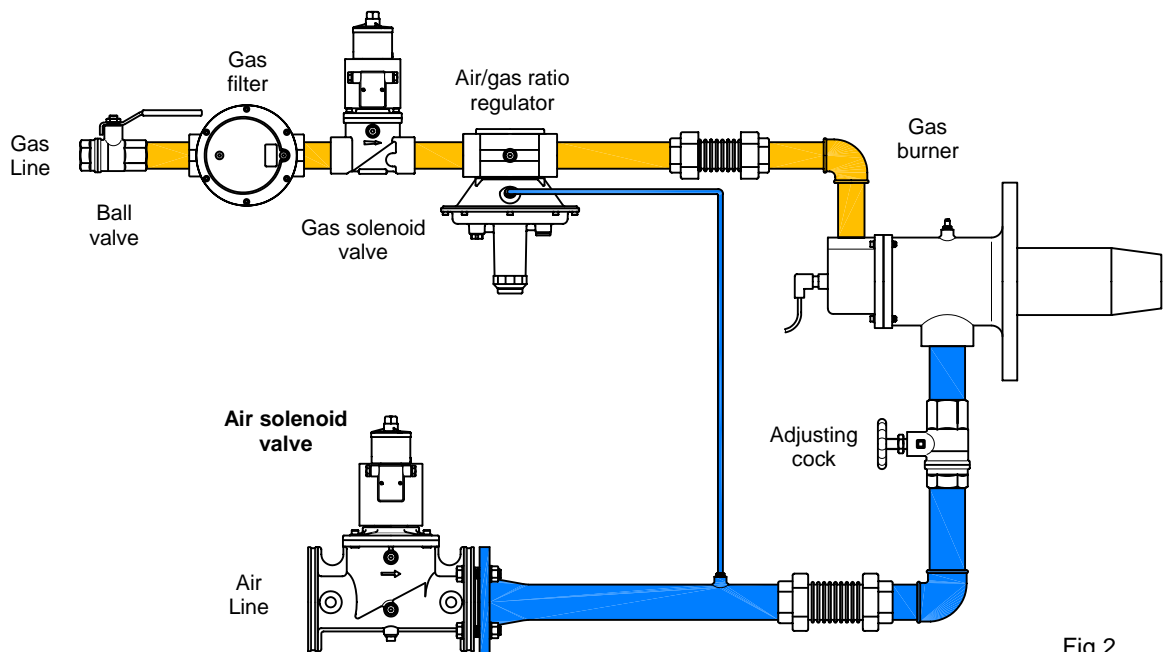


Fig.2



WARNING

This is not a safety valve.

Location and mode of installation must be in compliance with local rules in force.

Special versions e optional

The sizes 1"¼, 1"½ and 2" can be provided with G1/4 gauges also in the outlet chamber.

Protection class can be increased up to IP65. The valves will be provided with a sealed terminal box and cable set.

Whole range can be provided with Ex. Proof labeling according to Directive 94/9/EC (ATEX).

Whole range can be provided with electrical connection made by standard plug ISO 4400.

The threaded models Rp1½ and Rp2 can be provided with flanged connections using an optional kit.

The valves can be supplied with a bypass bore in the valve body for low fire.

Technical specifications

Tab. 1

Connections	Gas threaded ISO 7-1 from Rp3/4 to Rp2½ Flanged PN16 – ISO 7005 from DN40 to DN80
Voltage rating	230 VAC 50/60 Hz 110 VAC 50/60 Hz 24 VAC/DC 12 VAC/DC
Voltage tolerance	-15% / +10%
Power consumption	see charts
Ambient temperature	-15°C / +60°C
Media temperature	+60°C Max.
Max. operating pressure	200 mbar (20 kPa)
Flow capacity	see charts
Operating time	VRA: 1s opening/closing VLA: ~4s opening / 1s closing VTA: ~4s opening/closing
Protection class	IP54 (EN 60529) (optional IP65)
Cable gland	ISO 20 (EN 50262) for terminal box PG 9 for standard plug
Coil winding insulation	Class H (200°C)
Coil thermal resistance	Class F (155°C)
Materials in contact with media	Aluminium alloy Brass Stainless steel Plated steel Anaerobic adhesive Nitrile rubber (NBR) Polytetrafluoroethylene (PTFE)

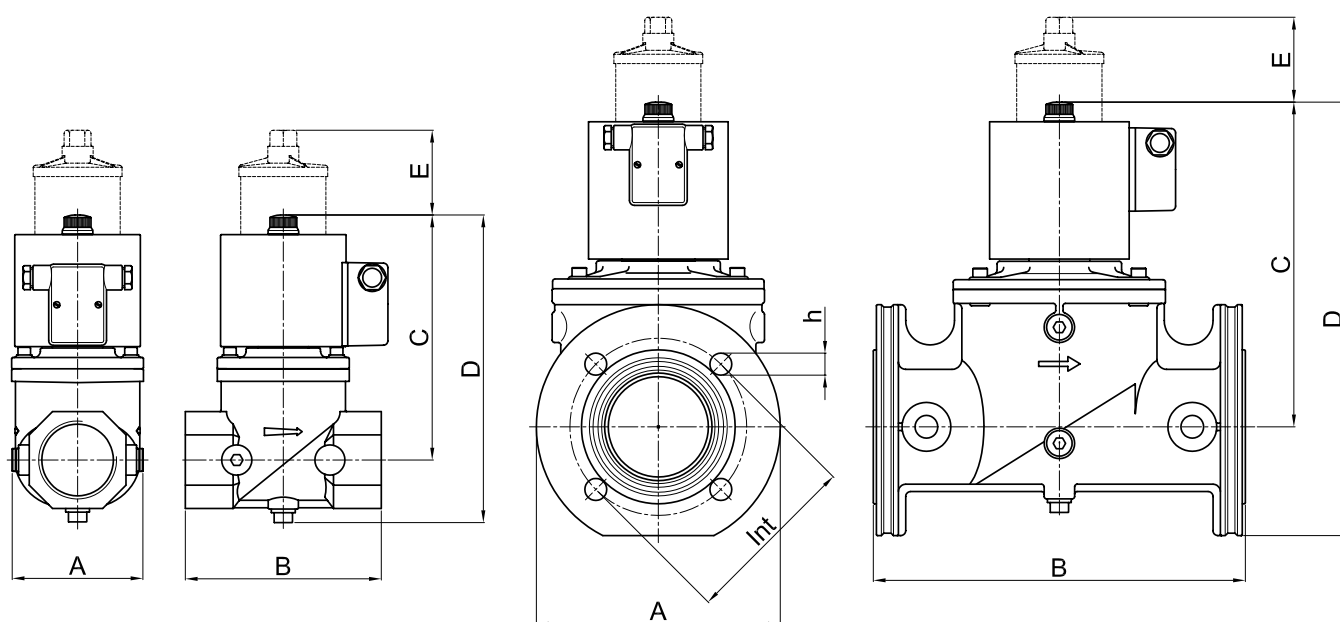


Fig.3

Tab. 2

Connections	Power Consump. @230VAC [W]	Flow factor Kvs [m ³ /h]	Overall dimensions ⁽⁴⁾							Weight ⁽³⁾ [Kg]
			[mm]							
			A	B	C	D	E	Int	h	
Rp 3/4	45	9,5	88	96	145	179	54	-	-	2,5 / 2,7
Rp 1	45	12,0	88	96	145	179	54	-	-	2,5 / 2,7
Rp 1 1/4	45/180 ⁽²⁾	20,0	120	153	191	235	70	-	-	5,7 / 6,0
Rp 1 1/2	45/180 ⁽²⁾	26,0	120	153	191	235	70	-	-	5,7 / 6,0
Rp 2	45/180 ⁽²⁾	40,0	106	156	195	245	70	-	-	6,0 / 6,3
Rp 2 1/2	45/180 ⁽²⁾	63,0	180	218	254	315	70	-	-	12 / 12,5
DN 40 ⁽¹⁾	45/180 ⁽²⁾	26,0	150	193	191	266	70	110	4x18	7,4 / 7,7
DN 50 ⁽¹⁾	45/180 ⁽²⁾	40,0	165	196	195	278	70	125	4x18	8,0 / 8,3
DN 65	45/180 ⁽²⁾	63,0	200	305	266	355	70	145	4x18	14,0 / 14,5
DN 80	45/180 ⁽²⁾	80,0	200	305	266	355	70	160	8x18	14,0 / 14,5

⁽¹⁾ Optional Kit

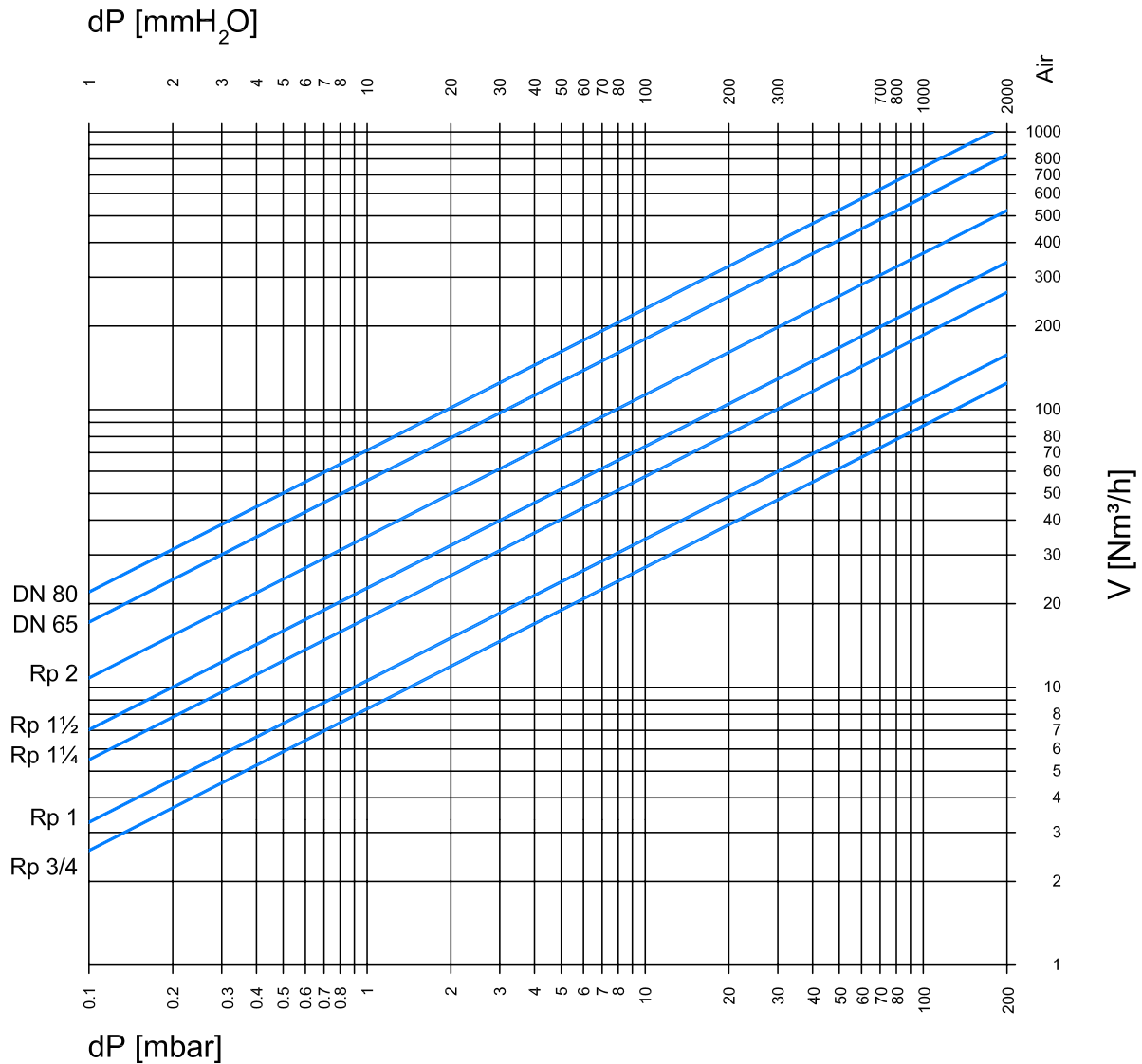
⁽²⁾ Working/Opening

⁽³⁾ VRA/VLA

⁽⁴⁾ VTA type: E+10

Air flow chart

(Pressure drop)



1,25 Kg/ m³, 15°C, 1013 mbar, dry

If requested, the valves can be supplied with a bypass bore in the valve body for low fire. The diameter must be chosen according to the min. flow rate required. The approximate formula to calculate the flow rate is the following:

$$V_{\min} = 0.024 \cdot d^2 \sqrt{\frac{p_1}{\rho}}$$

where:

V_{\min} = min. flow rate [Nm³/h]
 d = diameter of bypass bore [mm]
 ρ = density [Kg/m³]
 p_1 = relative inlet pressure [mbar]

When the flow read on the diagram is referred to operating pressure instead of standard conditions, the pressure drop Δp read on the diagram must be multiplied for the factor (1+ relative pressure in bar).

Example:

In the 2" solenoid valve with an air flow of 80 Nm³/h there is a pressure drop $\Delta p = 5$ mbar. If we consider that 80 m³/h is the flow at 200 mbar of inlet pressure, then the pressure drop to be consider is:

$$\Delta p = 5 \times (1 + 0,2) = 6 \text{ mbar}$$

Normally, pressure drop and flow rate for the valves are read from the air flow diagram. However, the valves can also be chosen in accordance with the characteristic "Kvs value" which is shown in table 2.

The selection of the valve requires the calculation of the Kv under the operating conditions.

Considering only subcritical pressure drops:

$$\Delta p < \frac{p_1}{2}$$

Kv can be calculated with the formula:

$$Kv = \frac{V}{514} \sqrt{\frac{\rho(t+273)}{\Delta p \cdot p_2}}$$

where

- V = flow rate [Nm³/h]
- Kv = flow factor [m³/h]
- ρ = density [Kg/m³]
- p₁ = absolute inlet pressure [bar]
- p₂ = absolute outlet pressure [bar]
- Δp = differential pressure p₁-p₂ [bar]
- t = media temperature [°C]

To the Kv value calculated from operating conditions we add an allowance of 20%, to obtain the minimum Kvs value which the valve should have:

Kvs > 1,2 Kv



Valve must be selected considering the following:

- Pressure drops $\Delta p \leq 0,1 p_1$ are recommended and $\Delta p > p_1/2$ are always inadvisable
- Flow velocities $w \leq 15$ m/s are recommended and $w > 50$ m/s are always inadvisable.

Ordering information

Tab.4

Designation (230VAC)			Connections	Additional code for special voltages		
VRA	VLA	VTA		110VAC	24V AC/DC	12V AC/DC
VRA22	VLA22	-	Rp 3/4	B	C	D
VRA32	VLA32	-	Rp 1			
VRA352	VLA352	VTA352	Rp 11/4			
VRA42	VLA42	VTA42	Rp 11/2			
VRA62	VLA62	VTA62	Rp 2			
VRA42F	VLA42F	VTA42F	DN 40 ⁽¹⁾			
VRA62F	VLA62F	VTA62F	DN 50 ⁽¹⁾			
VRA72T	VLA72T	VTA72T	Rp 2½			
VRA72	VLA72	VTA72	DN 65			
VRA82	VLA82	VTA82	DN 80			

⁽¹⁾ Optional kit



Different voltage than 230V may be order adding to the standard designation the additional code as shown above. Other optionals (standard plug, bypass) must be order with their ordering code.

Example:

VRA62F.**B** for a valve with fast opening, DN50 flanged connections and 110VAC



Manufacturer reserves the right to update or make technical changes without prior notice.

Standards and approvals

The valve design meets current European approval requirements regarding electrical safety.

The following standards/technical specifications have been fulfilled:

- Electromagnetic Compatibility (2004/108/EC)
- Low Voltage Directive (2006/95/EC)

Quality Management System is certified according to UNI EN ISO 9001 and the monitoring is carried out by the notified body:

Kiwa Gastec Italia Spa
Via Treviso, 32/34
I- 31020 San Vendemiano (TV)



Installation, adjustment and servicing

To assure a proper and safe operation, as well as a long life of the valve, the installation procedure and a periodical servicing are very important topics and the following instructions should be always fulfilled.

IMPORTANT: before proceeding with the installation, ensure that all the features of your system comply with the specifications of the valve (media, operating pressure, flow rate, ambient temperature, electrical voltage, etc.).



CAUTION

Shut off the gas supply at the main manual shut-off valve and disconnect electrical power to the system before proceeding installation or servicing.

PIPING CONNECTION

- Check correspondence of flow direction with arrow printed on valve body.
- Check correct alignment of connecting pipes.
- Ensure that installing area is protected from rain and water splashes or drops.
- Remove the end caps and make sure no foreign body is entered into the valve during handling.

THREADED MODELS

- Put sealing agent onto the pipe thread. Avoid excessive quantities which could enter in the valve and damage it.
- Screw the pipes using proper tools only. Do not use unit as lever because damage to the valve stem could result.

FLANGED MODELS

- Position the gasket or sealing agent on the flanges and insert the bolts with washers.
- Screw the nuts tightening them crosswise and using proper tools only. Avoid overtightening and mount tension free.

Following chart shows the maximum values of bending moment (F_{max}), torque (T_{max}) and screws driving torque (C_{max}), according to EN161.

Tab. 5

Connections	F_{max} (Nm) $t < 10$ s	T_{max} (Nm)	C_{max} (Nm)
Rp3/4	225	85	-
Rp1	340	125	-
Rp1½	475	160	-
Rp1½ DN40	610	200	50
Rp2 DN50	1100	250	50
Rp2½ DN65	1600	325	50
DN80	2400	-	50

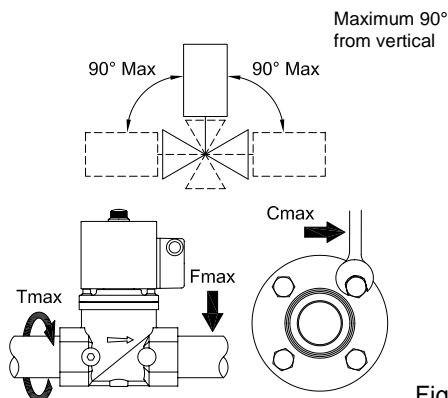


Fig. 5

Valve may be mounted with coil in horizontal or vertical position.
In the event of vertical pipe, the flow direction should be from bottom to top.
Coil may be oriented 360 degrees in any direction.

ELECTRICAL CONNECTION (IEC 730-1)

Valve is provided with terminal box or standard plug (see tab. 4) for the electrical connections. To connect the valve do the following:

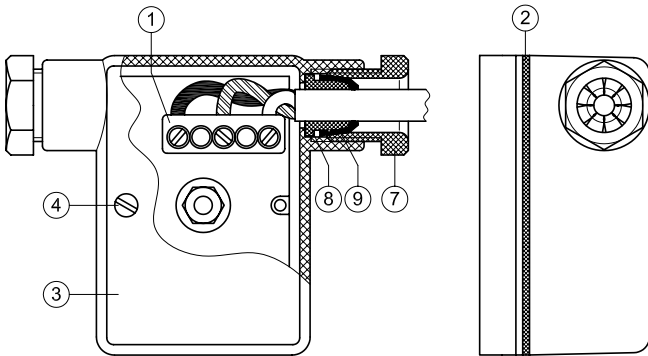


Fig. 6

Terminal box version:

- Using a screwdriver remove the box cover.
- Unscrew the gland-nut (7) and remove the retaining ring (9) and conical grommet (5).
- Insert the cable in to the gland-nut, retaining ring, grommet and then into its housing in the box cover.
- Connect power cables to the rectifier terminals (1) according to printed designation.
- Pull the cable and screw back the box cover, make sure the gasket (2) is properly used.
- Screw back the gland-nut, make sure that the grommet is locked on the cable.

Should cables pass through originally closed opening, use the rubber capsule placed underneath the cap to close any other opening.

Standard plug version (optional):

- Using a screwdriver remove the plug from the coil.
- Unscrew the gland-nut (7) and remove the washer (6) and grommet (5).
- To remove the terminal block (1) from the plug housing (3), remove the gasket (2) and extract the screw (4) completely, then insert a flat screwdriver into the slot located on edge and pull it.
- Insert the cable into the gland-nut, washer, grommet and then into the plug housing.
- Connect power cables to the terminal block according to printed designation.
- Pull back the cable and insert the terminal block into the housing.
- Screw back the gland-nut, make sure that the grommet is locked on the cable.
- Insert the screw and gasket into the housing and screw back the plug on the coil.

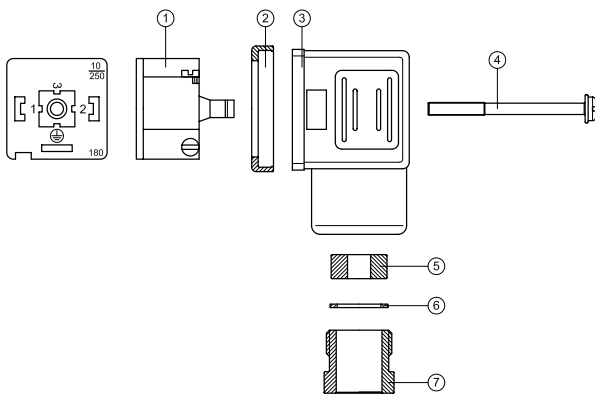


Fig. 7



The continuous service (100% ED) causes inevitable coil heating, depending of working environment. This situation is absolutely normal and has not to worry. To improve the coil cooling, install the valve allowing free air circulation.

**WARNING**

Make sure all gaskets are used properly.

Perform functional tests after mounting.



In order to avoid injury, after a prolonged period of operation, avoid direct contact with the coil.

VRA**MAX. FLOW RATE ADJUSTMENT (\dot{V}_{max})**

Maximum flow rate may be adjusted as follows:

1. Remove coil fastener cap on the top.
2. Using a 4 mm Allen wrench, remove the locking dowel.
3. Located under the locking dowel is the Max. flow regulation screw. Using the Allen wrench, turn the Max. flow regulation screw clockwise to decrease the Max. flow rate (factory setting is max. flow rate).
4. When adjustment is completed, screw back the locking dowel and cap.

MIN. FLOW RATE ADJUSTMENT (\dot{V}_{min})

Minimum flow rate may be adjusted as follows:

1. Using a 4 mm Allen wrench, remove the locking dowel on the bottom.
2. Located under the locking dowel is the min. flow regulation screw. Using the Allen wrench, turn the min. flow regulation screw clockwise to increase the min. flow rate (factory setting is fully shut).
3. When adjustment is completed, screw back the locking dowel.

VLA-VTA**FAST STROKE ADJUSTMENT (\dot{V}_{start})**

Fast flow section may be adjusted as follows:

1. Remove plastic cap.
2. Using an hexagonal wrench, turn the outer screw clockwise to decrease or counter-clockwise to increase the initial fast stroke.
3. When adjustment is completed, screw back the plastic cap.

NOTE: in the DN65 and DN80 models the minimum adjustable stroke is 3mm.

MAX. FLOW RATE ADJUSTMENT (\dot{V}_{max})

Maximum flow rate may be adjusted as follows:

1. Remove plastic cap.
2. Keeping the outer screw fixed, use a screw driver to turn the internal screw clockwise to decrease or counter-clockwise to increase flow rate (factory setting is max. flow rate).
3. When adjustment is completed, screw back the plastic cap.

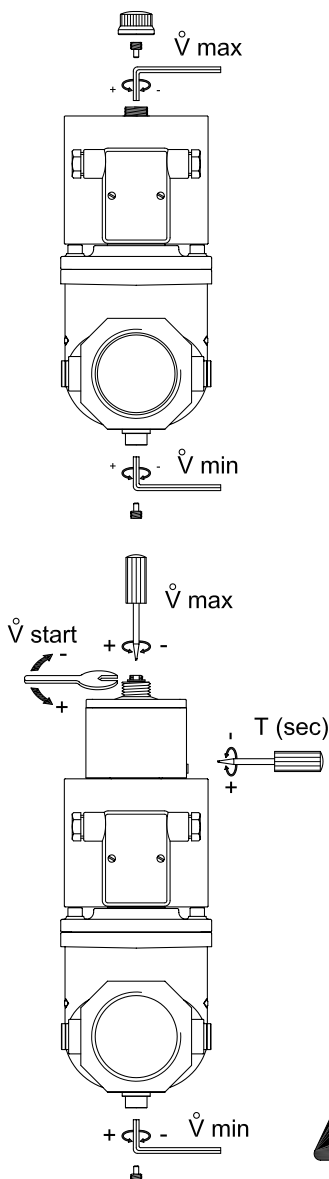
NOTE: the flow rate regulation can not be lower than the fast flow section.

MIN. FLOW RATE ADJUSTMENT (\dot{V}_{min})

Minimum flow rate may be adjusted as above.

OPENING TIME ADJUSTMENT (T)

To regulate opening time, turn the screw located on the side of the brake. One fourth of a turn clockwise increases opening time by 2÷3 s, up to a maximum of about 25 s (slow run). Factory setting is about 4 s.

**WARNING**

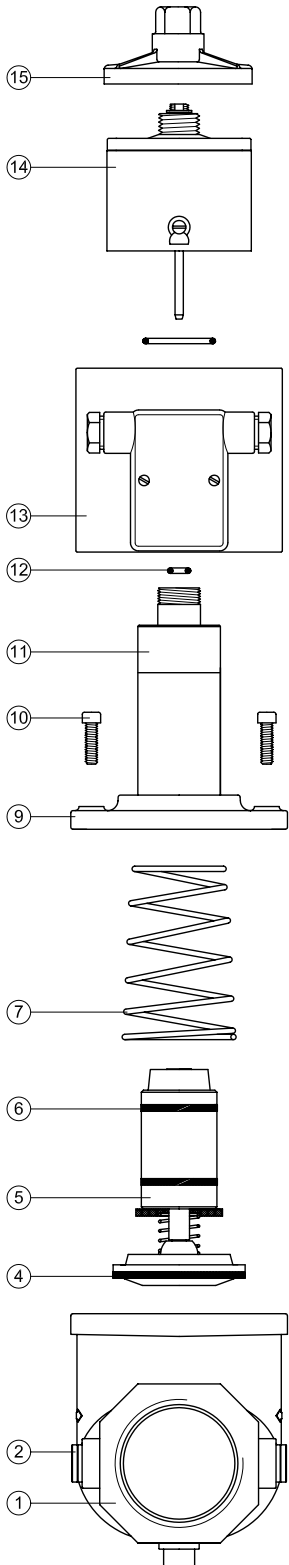
Make sure that capacity adjustments are made while burner is operating.

Check the regulation is not changed during reassembly.

Fig. 8



To maintain a good performance of the system, almost once a year, an external inspection of the valve is recommended.



EXTERNAL INSPECTION

- Turn off all power before servicing any part of the system.
- Check the conditions of the plug/box gasket. If gasket is deteriorated, replace it with a new one.
- Check the electrical connections are clean, dry and correctly tightened.
- Check the proper operation of the valve: power the coil and verify that valve opens, then, turn off power and check the closing function.

INTERNAL INSPECTION

Make this inspection when the valve does not work properly only.

To make an internal inspection of the valve, do the following:

- Shut ball valve upstream the system and make sure no pressure is inside the valve.
- Unscrew coil fastener cap and remove the coil (13). If the valve is a VLA/VTA, remove the hydraulic brake (14) and coil (13).
- Check the hydraulic brake is free of oil leakages (small leakages are admitted). If it's necessary, replace it with a new one.
- Using an Allen key, remove the screws (10) on the upper flange (9), in cross way.
- Check the main O-ring (8). If it's necessary, replace it with an identical one.
- Clean the internal side of the stem (11) with a clean cloth and compressed air.
- Check the wear conditions of the sliding rings (6) and, if it's necessary, replace them.
- Clean the plunger assembly (4, 5, 6) with a clean cloth and compressed air.
- Check the conditions of the sealing gasket (4). If gasket is deteriorated, replace it with a new one (only when the valve works fully shut).
- Reassemble the valve following the inverse sequence.

When reassembling, take attention to the correct position of the spring.

When the reassembly is finished, verify the correct sealing between the upper flange and the valve body.

Open ball valve to restore pressure into the valve.



WARNING

To prevent product damage and dangerous situations, read the Installation and Service Instructions carefully.

Turn off all power before servicing any part of the system.

Do not disassemble or tamper the hydraulic brake.

Perform functional tests after mounting.

Use all gaskets properly (void warranty).

All wiring must be in compliance with local and national codes.

Make sure all works are performed by qualified technicians only and in compliance with local and national codes.

Fig. 9