



## LMV

Linear control valves

DN20-DN80

INDUSTRIAL VALVE SOLUTION



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# LMV

## Linear control valves

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### Description

Modulating valves LMV are used in combustion processes that require linear adjustment of air or gas flow. The flow varies proportionally to the opening angle of inner orifice, therefore flowrate is very predictable. The valve can be operated with stage control (3-point, MZ3 servomotor) or with continuous modulation (analogue signals, MZ5 servomotor)..

### Features

Valve housing is made of aluminum alloy with connections from 3/4" to 3".

Suitable for use with air and non-aggressive gases included in the 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> families (EN 437). Special versions for aggressive gases (Biogas).

Linear ratio of opening angle to flow rate.

Working ratio till 25:1, low pressure drop and limited gas leakage when mechanism is in minimum position.

Full gas orifice and reduced gas orifice are available for each size, to meet specific plant requirements.

Maximum flow can be easily regulated.

Metal mesh in the inlet prevents contamination of the inner mechanism.

On request, an adjustable bypass can be installed to set up precisely the flow rate in minimum position.

Suitable to be driven by MZ series servomotors.

Combined system LMV + MZ is designed to reduce overall dimensions.



MZ servomotors can be supplied in Ex-proof version, suitable for installation in Zone 2 and 22, according to Directive 2014/34/UE (ATEX). Please refer to MZ tech data for further details.

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 and fully warranted.

## Functioning and application

LMV works by means of a double cylinder mechanism, allowing a linear variation of the flow according to position, thanks to specifically shaped gas orifices. Outer cylinder is fixed while inner cylinder can be rotated by the actuator, opening or closing the gas passage. Maximum flow can be adjusted easily to set up the optimal working condition of the valve. Materials and mechanical tolerances are designed to assure low leakage, repeatability of the performance and reliability. Figures 1 and 2 show some typical application examples.

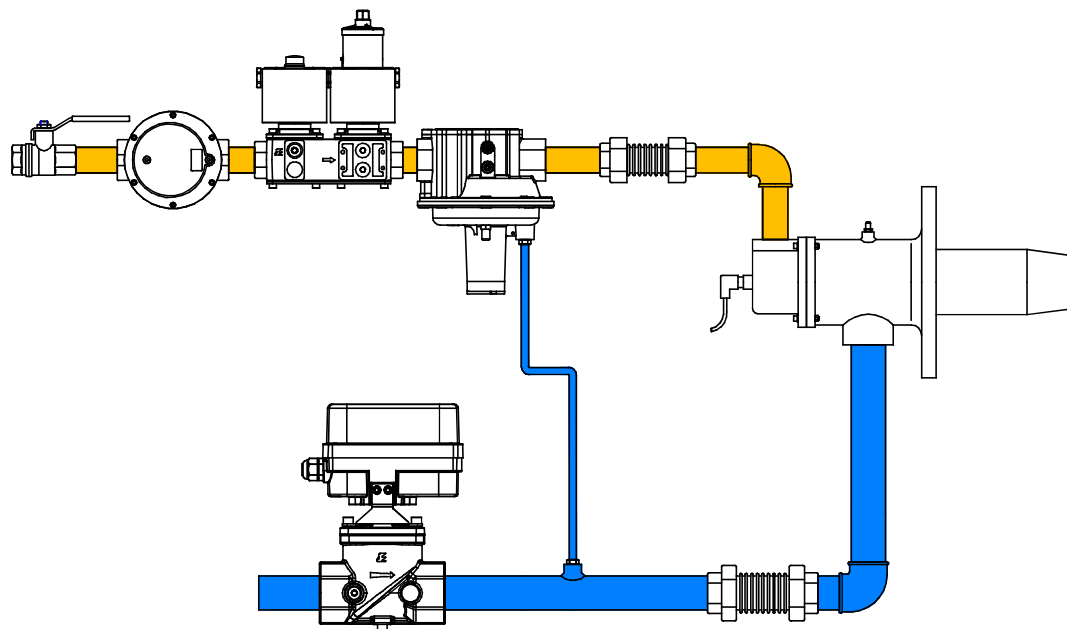


Fig.1 - LMV valve on the air line and gas ratio regulator.

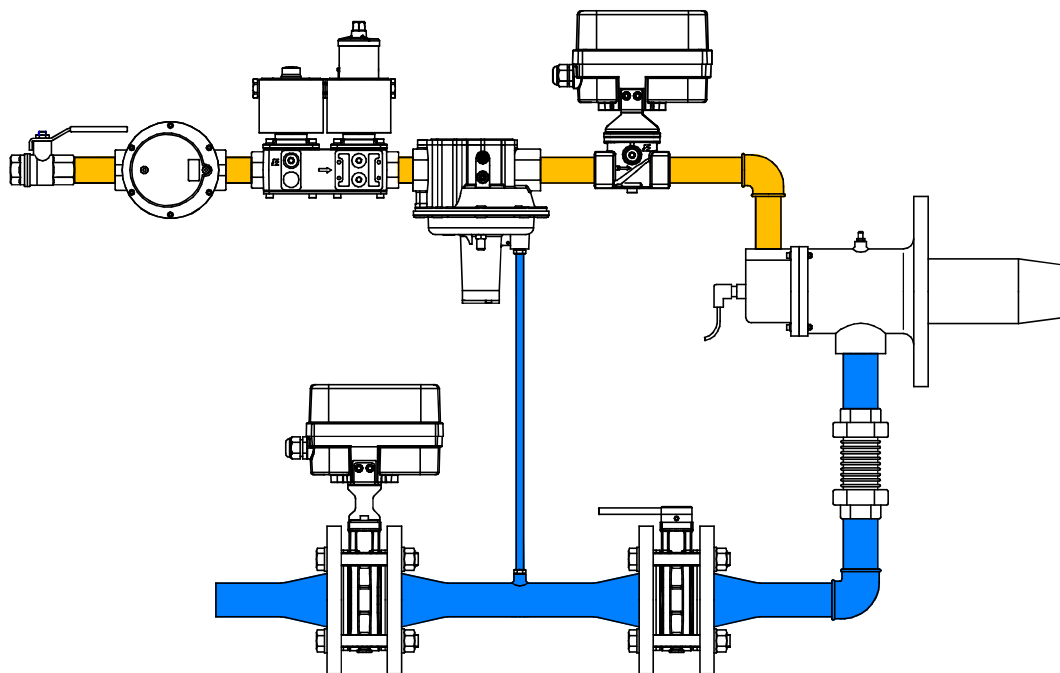


Fig. 2 - LMV valve on the gas line for correcting the Lambda parameter.

## Technical specifications

Tab. 1

<b>Connections</b>	Threaded f/f EN 10226-1 from Rp3/4 to Rp2½ Flanged PN16 ISO 7005 DN40 to DN80 On request: ANSI-ASME B1.20 from 3/4"NPT to 2"½NPT ANSI-ASA-ASME B16.5 class 150 from 2" to 3"
<b>Control ratio</b>	25:1
<b>Ambient temperature</b>	-15°C... +60°C
<b>Max working pressure</b>	500 mbar (50 kPa)
<b>Flow capacity Complete opening</b>	See flow charts or tab. 2 - coefficient Kv
<b>Leakage rate Valve closed</b>	< 2% of Kv
<b>Filtering element</b>	600 µm
<b>Materials in contact with gas</b>	Aluminum alloy Brass Stainless steel Plated steel Anaerobic adhesive Nitrile rubber (NBR) Fluoro elastomer (FPM) Acetal resin (POM)
<b>Voltage rate Servomotor MZ</b>	230 VAC 50/60 Hz 110 VAC 50/60 Hz 24 VAC/DC (depending on servomotor type)
<b>90° opening / closing time</b>	7...90 sec (depending on servomotor type)

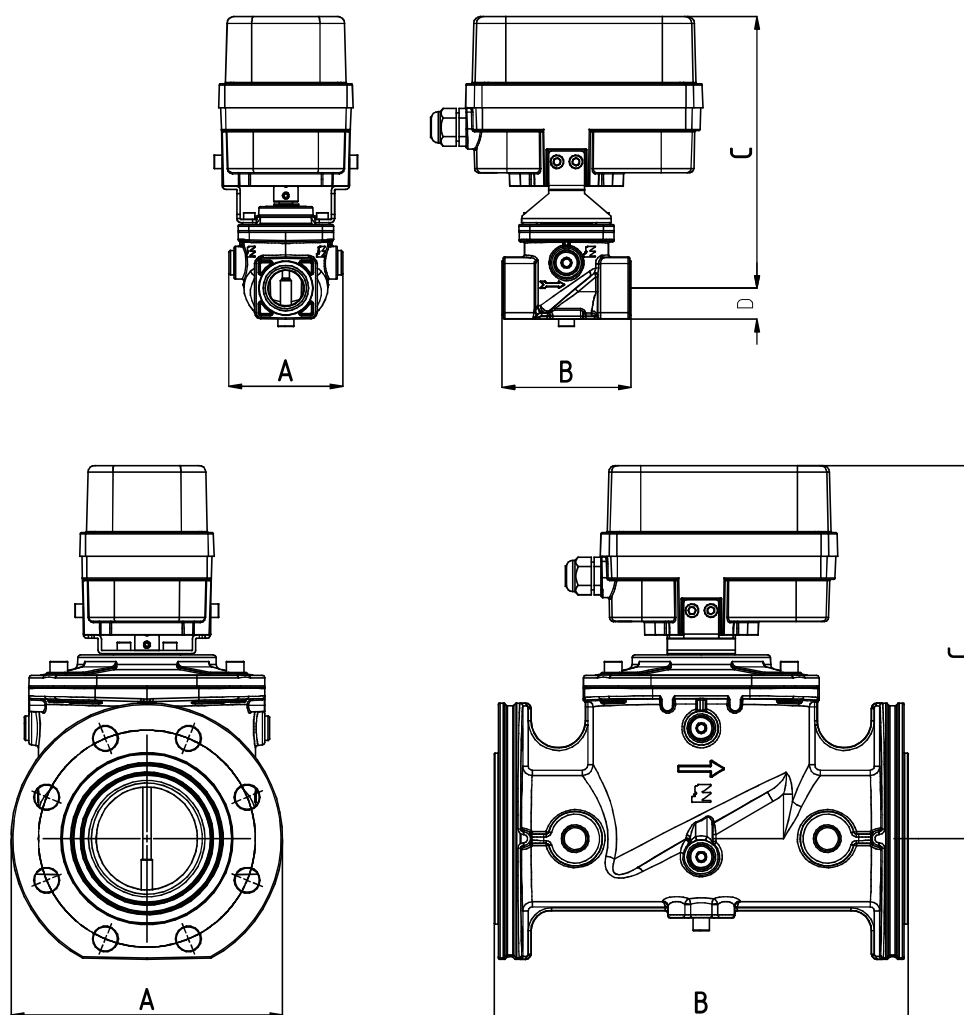


Fig.3

Tab. 2

Overall dimensions [mm]								Flow factor Kv [m <sup>3</sup> /h]		
Conn.	A	B	C <sup>(1)</sup>	D	Int	h	Weight <sup>(2)</sup> (Kg)	Full orifice	Reduced orifice	Micro orifice
Rp 3/4	88	96	200	34	-	-	0.7	8.06	4.35	1.58
Rp 1	88	96	200	34	-	-	0.7	8.06	4.35	1.58
Rp 1¼	120	153	235	43	-	-	1.7	23.5	14.0	-
Rp 1½	120	153	235	43	-	-	1.7	23.5	14.0	-
Rp 2	106	156	240	47	-	-	1.9	23.5	14.0	-
Rp 2½	179	218	261	55	-	-	4.6	56.6	28.5	-
DN 40	163	196	240	75	110	4x18	3.2	23.5	14.0	-
DN 50	163	196	240	75	125	4x18	3.2	23.5	14.0	-
DN 65	180	305	275	89.5	145	4x18	7.5	56.6	28.5	-
DN 80	180	305	275	89.5	160	8x18	7.5	56.6	28.5	-

(1) when a lever joint is installed (LMV..L), add 28mm

(2) excluding servomotor (2.4 Kg)

## Gas Flow Chart

Formula of conversion from air to other gases:

$$V_{\text{GAS}} = k \cdot V_{\text{AIR}}$$

$$k = \sqrt{\frac{\rho_{\text{AIR}}}{\rho_{\text{GAS}}}}$$

Gas type	Specific gravity $\rho$ [Kg/m³]
(1) Natural gas	0,80
(2) LPG	2,00
(3) Air	1,225

15°C, 1013 mbar, dry

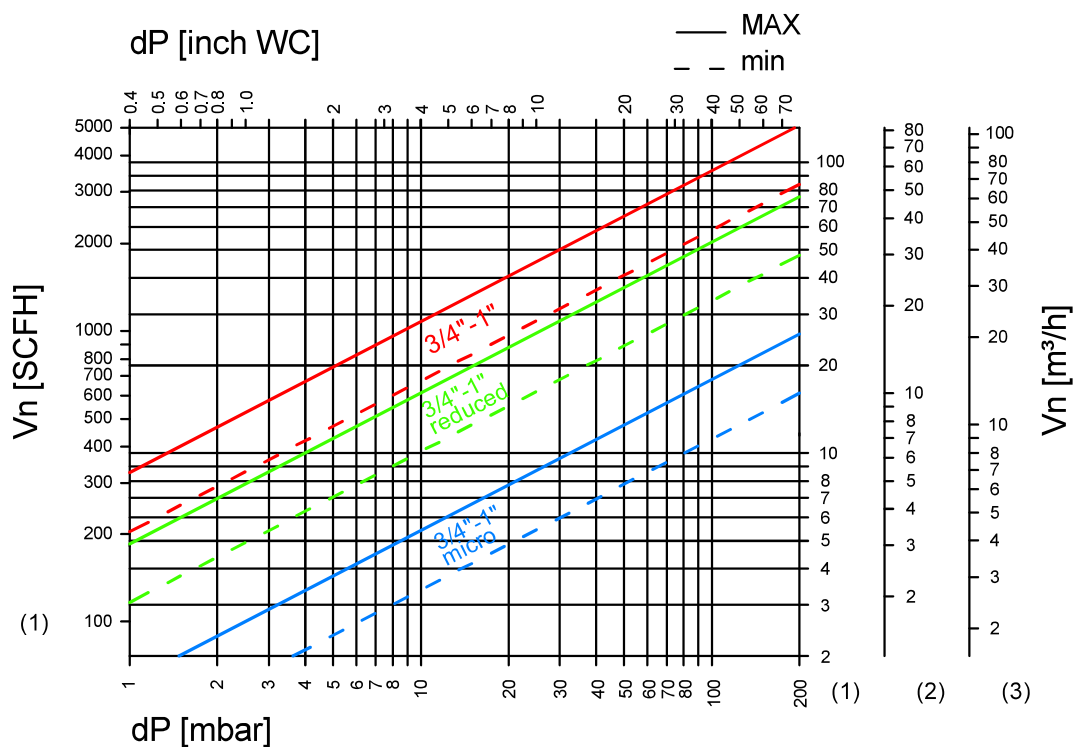
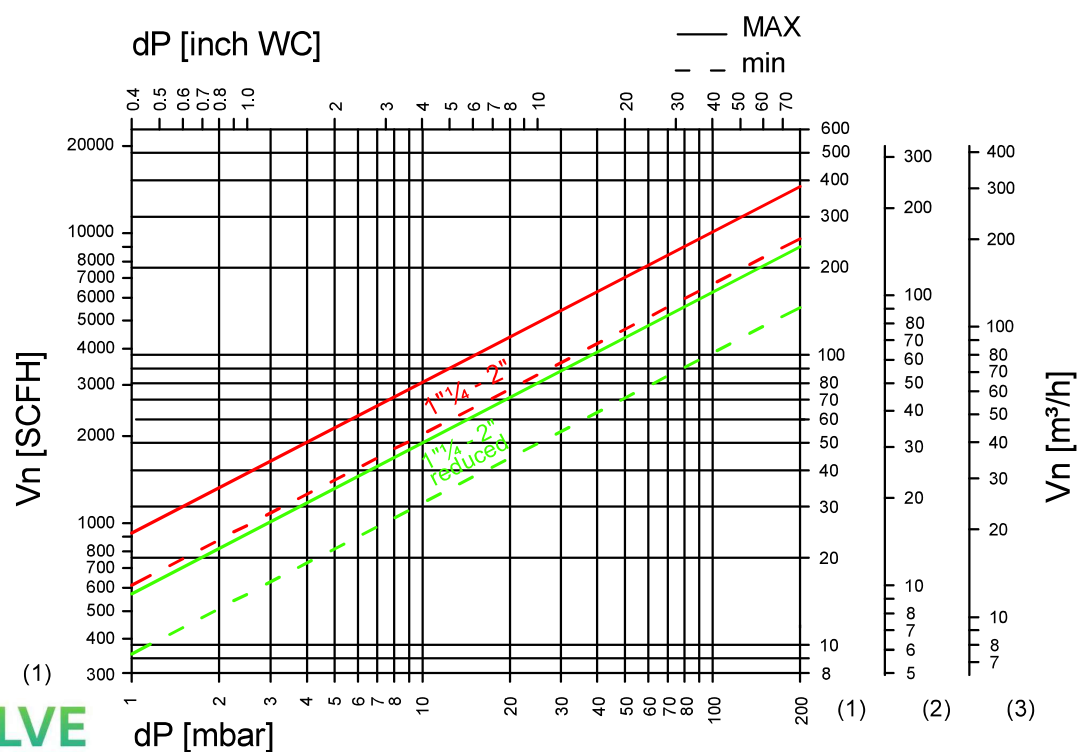


Fig.4



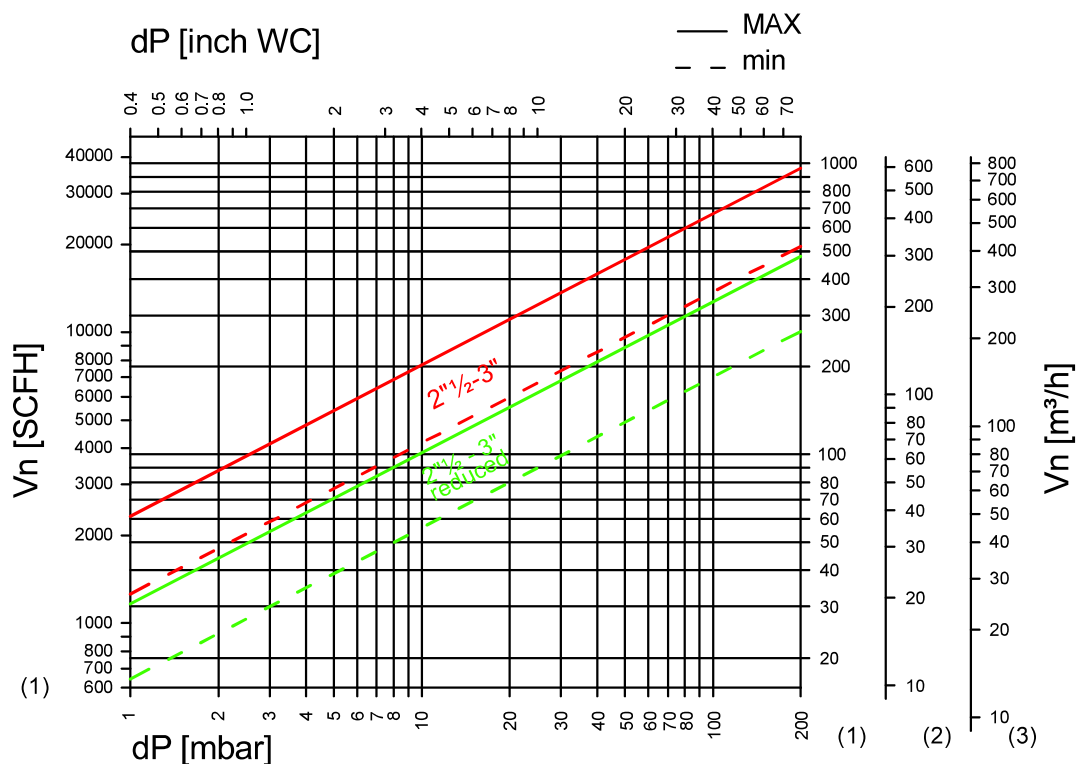


Fig.6

Valve selection: for optimal flow control, it is advisable to have a pressure drop  $\Delta p$  between 20 and 30% of the inlet pressure  $p_1$ .

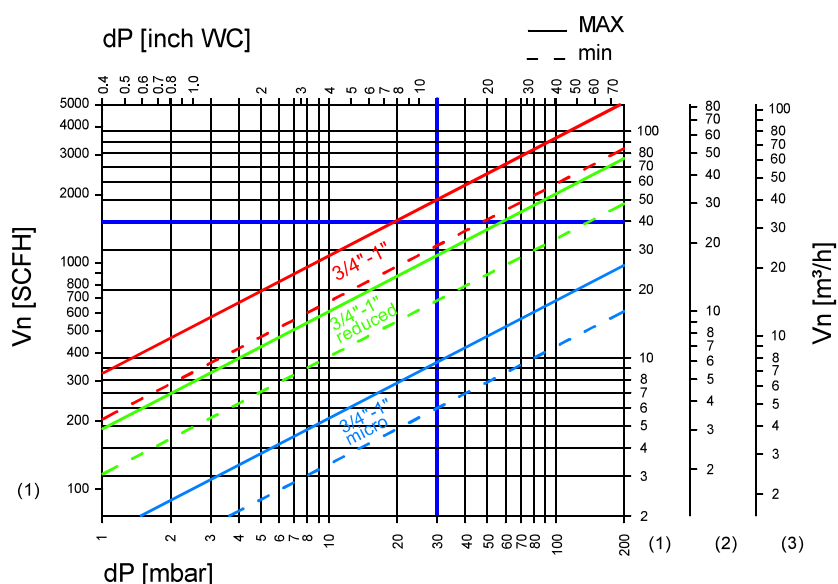


Fig. 7

#### Example:

Select a valve for natural gas flow at standard conditions  $V_n = 40 \text{ Nm}^3/\text{h}$  and a pressure  $p_2 = 70 \text{ mbar}$ .

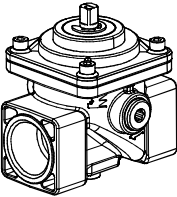
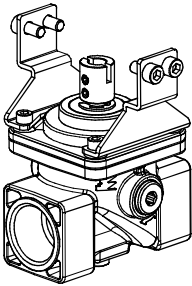
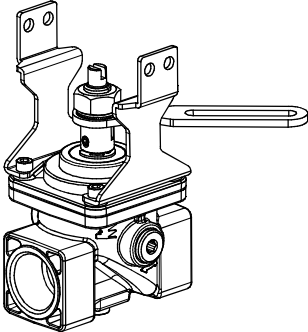
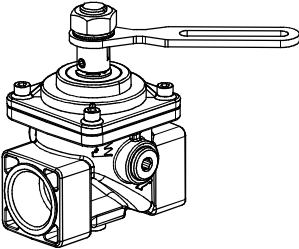
With  $\Delta p$  equal to 30% of  $p_1$ :

$$\Delta p = \left( \frac{0.3}{1 - 0.3} \right) p_2 = 30 \text{ mbar}$$

From the gas flow charts of LMV valves, the size that can guarantee the required flow rate is the 3/4"-1" with full passage, because the working point is between MAX and MIN position of flow regulation.

Tab. 3

**Actuator connection:**

<p><b>LMV..</b> Without joint □8 square shaft</p> 	<p><b>LMV..C</b> compact joint</p> 	<p><b>LMV..L</b> joint with lever: valve is actuated by servomotor above and a second valve can be controlled by lever and angular joints (DIN 71802 – not provided)</p> 	<p><b>LMV..R</b> Lever for remote actuator: valve is actuated by a servomotor installed in another position by lever and angular joints (DIN 71802 – not provided)</p> 
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**Example of LMV..C+MZ:**

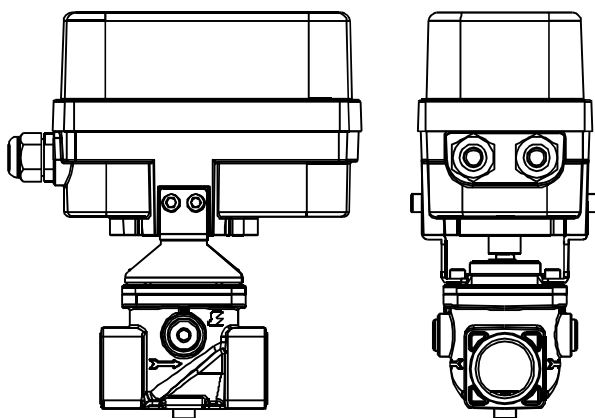


Fig. 8



## Order Information

Tab. 4

	LMV	3	1	M	C
<b>Model</b>					
<b>LMV</b> Linear valve (actuator not included)					
<b>Connection</b>					
<b>2</b> 3/4"					
<b>3</b> 1"					
<b>35</b> 1" 1/4					
<b>4</b> 1" 1/2					
<b>6</b> 2"					
<b>7T</b> 2" 1/2					
<b>4F</b> DN40					
<b>6F</b> DN50					
<b>7</b> DN65					
<b>8</b> DN80					
<b>Variants</b>					
<b>_</b> Rp internal thread / ISO flange					
<b>N</b> NPT thread / ANSI flange (on request)					
<b>Gas orifice</b>					
<b>_</b> Full gas orifice					
<b>1</b> Reduced gas orifice					
<b>2</b> Micro gas orifice (only 3/4"-1")					
<b>Pressure test points and bypass</b>					
<b>_</b> Pressure test point at the inlet					
<b>G</b> Additional pressure points at the outlet (only 1"1/4-2" *)					
<b>M</b> Adjustable bypass (only 3/4"-2")					
<b>Actuator connection</b>					
<b>_</b> without joint (□8 square shaft)					
<b>C</b> compact joint (standard)					
<b>L</b> joint with lever					
<b>R</b> joint with special lever to connect remote actuator					
<b>Special version</b>					
<b>J</b> Biogas					

(\*) not possible for 3/4"-1", standard for 2"1/2-3"

When LMV is coupled to a servomotor, complete product code adding model of servomotor (see MZ tech sheets).

## Special versions and options

- Adjustable by-pass suitable for setting up a very low minimum flow rate, only for 3/4"-2".
- Joint with lever to connect multiple LMV to the same servomotor (Notice: C dimension must be increased of 28 mm).
- Joint to connect remote actuator.
- Test points G1/4 at the outlet: on request for models 1"1/4-1"1/2-2", always present in valves 2"1/2-3".
- Special versions for aggressive gas (J version), manufactured without brass and with special sealing.

## Design, installation and servicing

To assure a proper and safe operation, as well as a long service life of the valve, consider the following recommendations during the design of the system where the valve will be installed:



- ✓ Ensure that all the features of your system comply with the specifications of the valve (gas type, operating pressure, flow rate, ambient temperature, electrical voltage, etc.).
- ✓ Valve may be mounted with actuator in horizontal or vertical position, not upside down.
- ✓ In the event of vertical pipe, the flow direction should be from bottom to top.
- ✓ After removing the end caps make sure no foreign body will enter into the valve during handling or installation (e.g. swarf or excessive sealing agent).
- ✓ A gas filter should be always installed upstream the valve.
- ✓ Gas transiting through the valve must be clean and dry.
- ✓ Ensure that installing area is protected from rain and water splashes or drops.
- ✓ Perform leak and functional tests after mounting (max pressure test 1,5 Pmax).
- ✓ Never install the valve close to walls or other equipment. To improve actuator cooling, install the valve allowing free air circulation.
- ✓ Perform maintenance according to service instructions at least once a year (most often for aggressive gases).
- ✓ Due to seals aging, to ensure safe operation, we recommend valve replacement after 10 years from the date of manufacture stamped on the product. Frequent cycle operation may reduce the expected lifetime.
- ✓ This control must be installed in compliance with the rules in force.
- ✓ Make sure all works are performed by qualified technicians only and in compliance with local and national codes.
- ✓ To prevent product damage and dangerous situations, read carefully the instructions supplied with the product before use.

For more details see the Installation and Service Instructions.



## Standards and approvals

The valves are designed and manufactured in compliance with the following European Directives and subsequent amendments:



2016/426/EU (Gas Appliances Regulation)  
 2014/34/EU (ATEX) when indicated on the product  
 2014/30/EU (Electromagnetic compatibility)  
 2014/35/EU (Low voltage Directive)  
 2011/65/EU (RoHS II)

**CE-Reg.-No. 0063DO1530**



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