



## VMM

**Multiple safety solenoid valve  
for gas regulating trains  
DN20 ... DN80**

# VMM

## Multiple safety solenoid valve for gas regulating trains

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### Description

The VMM type valve is a combination of two solenoid valves in an only compact and versatile valve housing.

This type of device is suitable for air or gas blocking and releasing controls (with one or two stages operation), required in gas power burners, atmospheric gas boiler, industrial kilns and others gas consuming appliances.

### Features

The valves are made of aluminum alloy die-cast, with a range for inlet/outlet connections from DN20 (3/4") up to DN80 (3").

Sealings are made of NBR-based rubber certified for use with gas (EN 549).

Pipe connections meet group 2 and backpressure sealing is compliant with class A, according to EN161 requirements.

A by-pass valve can be fitted on each side with capacity of DN15 or DN25.

Suitable for use with air and non-aggressive gases included in the 1, 2 and 3 families (EN 437). Special versions for aggressive gases.



The whole range can be provided in Ex-proof execution, for use in Zones 2 and 22, according to 2014/34/EU Directive (ATEX).

The valve is open only when energized: if, for any reason, power supply goes down, the valve closes immediately (intrinsic safe).

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

Equipped with flow rate adjustment.

An incorporated fine mesh filter protects the valve seat and disc as well as downstream components and prevents dirty contamination.

Provided with bilateral pressure ports on two sides in all pressure chambers, to connect manometers, pressure switches, leakage tester or other gas equipments.

The coils are provided with terminal box or with ISO 4400 plug. 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.

## Functioning and application

The VMM type valve is a safety shutting device using auxiliary power supply.

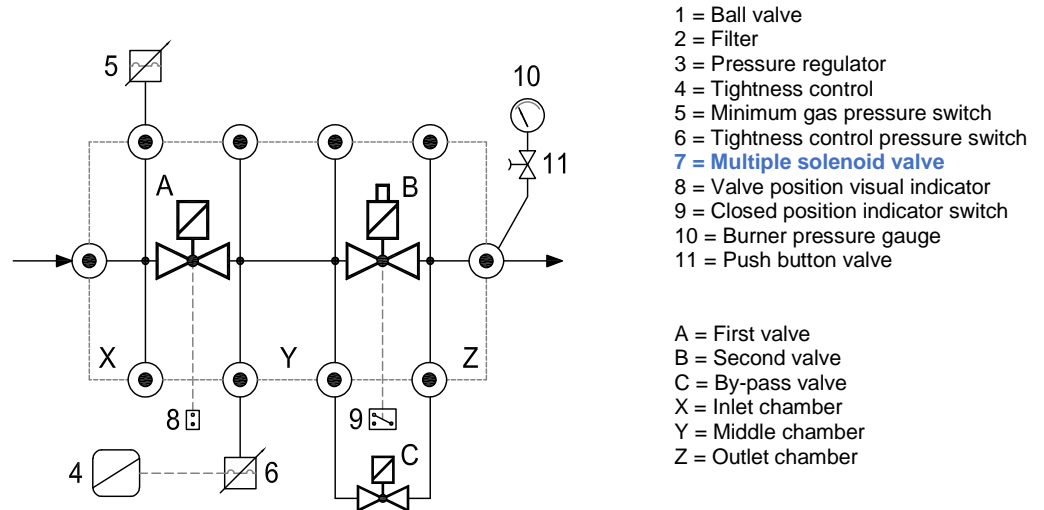
The first valve (A) is a fast opening safety solenoid valve. When it is de-energized, the spring pushes on the seal disc, keeping the gas passage closed. Now, the inlet chamber is under the gas line pressure, and it forces on the disc too, improving the seal.

When the coil is powered the valve opens rapidly, against the strength of the spring and gas pressure.

If the power supply is shut off, the valve rapidly closes, interrupting the gas flow.

Equally, the second valve (B) may be a fast opening or a slow opening solenoid valve to adjust the gas flow, with a first adjustable fast stroke and a second adjustable slow stroke.

It is possible to connect a third by-pass valve (C), which works as pilot stage or to obtain a second fast (slow) stroke or both.



(the above scheme refers to size 1 "1/4-2")

Fig.1

This kind of valve is normally installed as safety and regulating device in gas trains, for industrial applications and gas firing systems.

Figure 2 shows an example of installation.

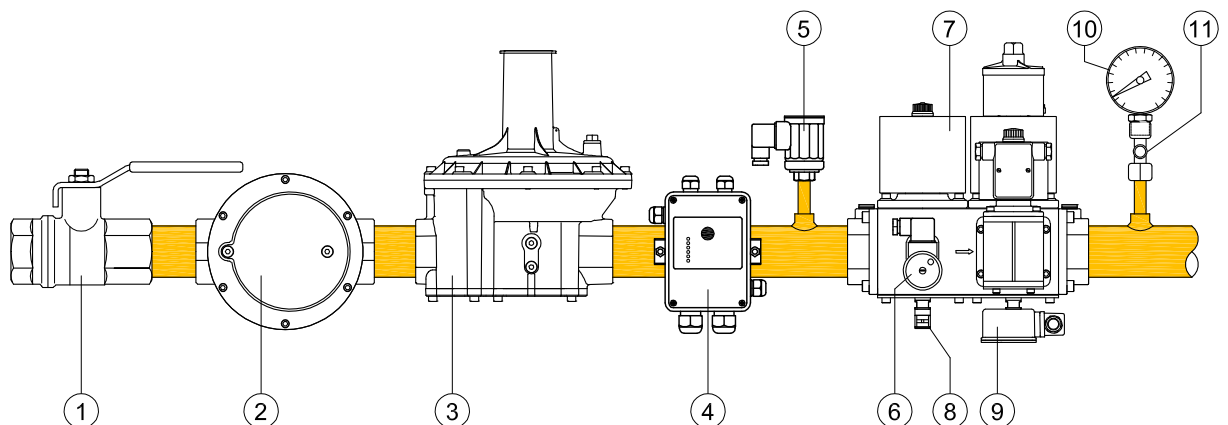


Fig.2

## Technical specifications

Tab. 1

<b>Connections</b>	Gas threaded ISO 7-1 from Rp3/4 to Rp2 or ANSI-ASME B1.20 from 3/4"NPT to 2"NPT Flanged PN16 – ISO 7005 from DN40 to DN80 or ANSI-ASA-ASME B16.5 class 150 from 2" to 3"
<b>By-pass size</b>	DN15 or DN25
<b>Voltage rating</b>	230 VAC 50/60 Hz 120 VAC 50/60 Hz 110 VAC 50/60 Hz 24 VAC/DC
<b>Voltage tolerance</b>	-15% / +10%
<b>Power consumption</b>	70W for 3/4" – 1" 90W (working) for 1"¼ -3" by-pass 1/2" 25W by-pass 1" 35W
<b>Ambient temperature Media temperature</b>	-15°C / +60°C    (+5°F to +140°F)
<b>Max. operating pressure</b>	200 mbar    (3 psig) 500 mbar    (5 psig)
<b>Body test pressure</b>	1 bar        (15 psig)
<b>Flow capacity</b>	see charts
<b>Closing time</b>	< 1 second
<b>Opening time</b>	Adjustable
<b>Pressure ports</b>	G1/4 (add. G1/8 onto flanged models)
<b>Gas strainer</b>	600 µm (0.02 in), metal mesh
<b>Enclosure</b>	IP54 (NEMA 3) optional IP65 with cable (NEMA 4)
<b>Cable gland</b>	M20x1,5 for terminal box PG 9 for ISO plug
<b>Wires cross-section</b>	2,5 mm <sup>2</sup> max. (AWG 12) for terminal board 1,5 mm <sup>2</sup> max. (AWG 14) for ISO plug
<b>Electrical safety</b>	Class I (EN 60335-1)
<b>Coil winding insulation</b>	Class H (200°C, 392°F)
<b>Coil thermal resistance</b>	Class F (155°C, 311°F)

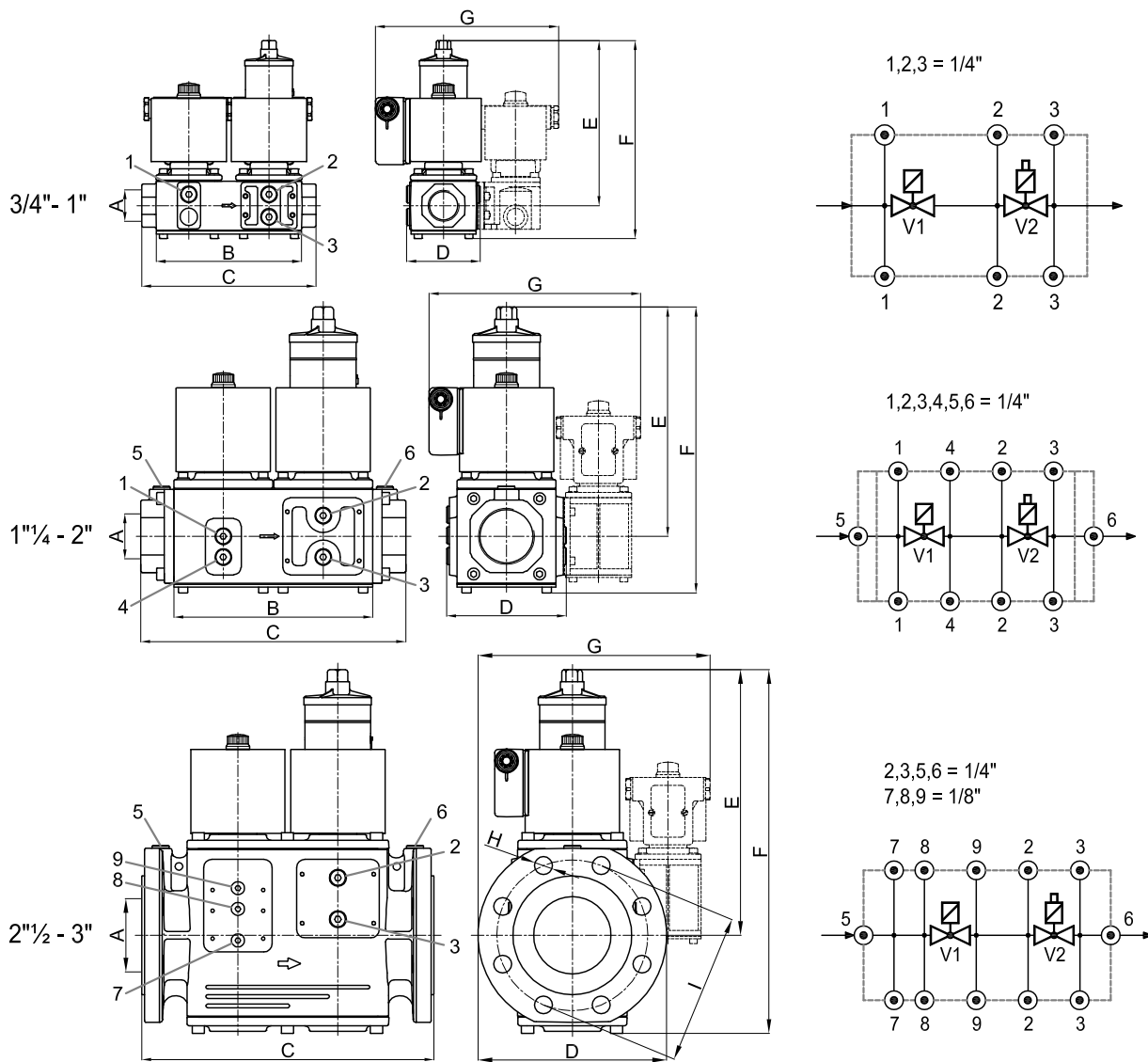


Fig.3

Tab. 2

Model	Overall dimensions (mm/in)									Weight (Kg/lbs)
	A	B	C	D	E	F	G	H	I	
VMM...F00	Rp3/4 3/4"NPT	154/6,06	185/7,28	78/3,07	130/5,12	165/6,50	112/4,41	-	-	5,4/11,9
VMM...S00		154/6,06	185/7,28	78/3,07	186/7,32	221/8,70	112/4,41	-	-	5,8/12,8
VMM...S10		154/6,06	185/7,28	78/3,07	186/7,32	221/8,70	194/7,64	-	-	7,1/15,7
VMM...S20	Rp1 1"NPT	154/6,06	185/7,28	78/3,07	186/7,32	221/8,70	194/7,64	-	-	7,5/16,5
VMM...F00	Rp1 1/4 1 1/4"NPT	211/8,31	280/11,02	127/5,00	170/6,69	230/9,05	148/5,82	-	-	13,0/28,7
VMM...S00		211/8,31	280/11,02	127/5,00	245/9,64	305/12,00	148/5,82	-	-	13,7/30,2
VMM...S10		211/8,31	280/11,02	127/5,00	245/9,64	305/12,00	200/7,87	-	-	15,3/33,7
VMM...S20		211/8,31	280/11,02	127/5,00	245/9,64	305/12,00	200/7,87	-	-	15,5/34,2
VMM...S30	Rp2 2"NPT	211/8,31	280/11,02	127/5,00	245/9,64	305/12,00	220/8,66	-	-	16,3/35,9
VMM...S40		211/8,31	280/11,02	127/5,00	245/9,64	305/12,00	220/8,66	-	-	16,5/36,4
VMM...F00	DN65 2 1/2"ANSI	-	310/12,20	200/7,87	213/8,39	317/12,48	200/7,87	-	-	17,0/37,5
VMM...S00		-	310/12,20	200/7,87	288/11,34	388/15,28	200/7,87	-	-	18,2/40,1
VMM...S10		-	310/12,20	200/7,87	288/11,34	388/15,28	250/9,84	4x18	145	19,8/43,7
VMM...S20		-	310/12,20	200/7,87	288/11,34	388/15,28	250/9,84	8x18	160	20,0/44,1
VMM...S30		-	310/12,20	200/7,87	288/11,34	388/15,28	250/9,84	4x3/4	5,50	20,8/45,9
VMM...S40	DN80 3"ANSI	-	310/12,20	200/7,87	288/11,34	388/15,28	250/9,84	4x3/4	6,00	21,0/46,3

**Gas flow chart**  
(Pressure drop)

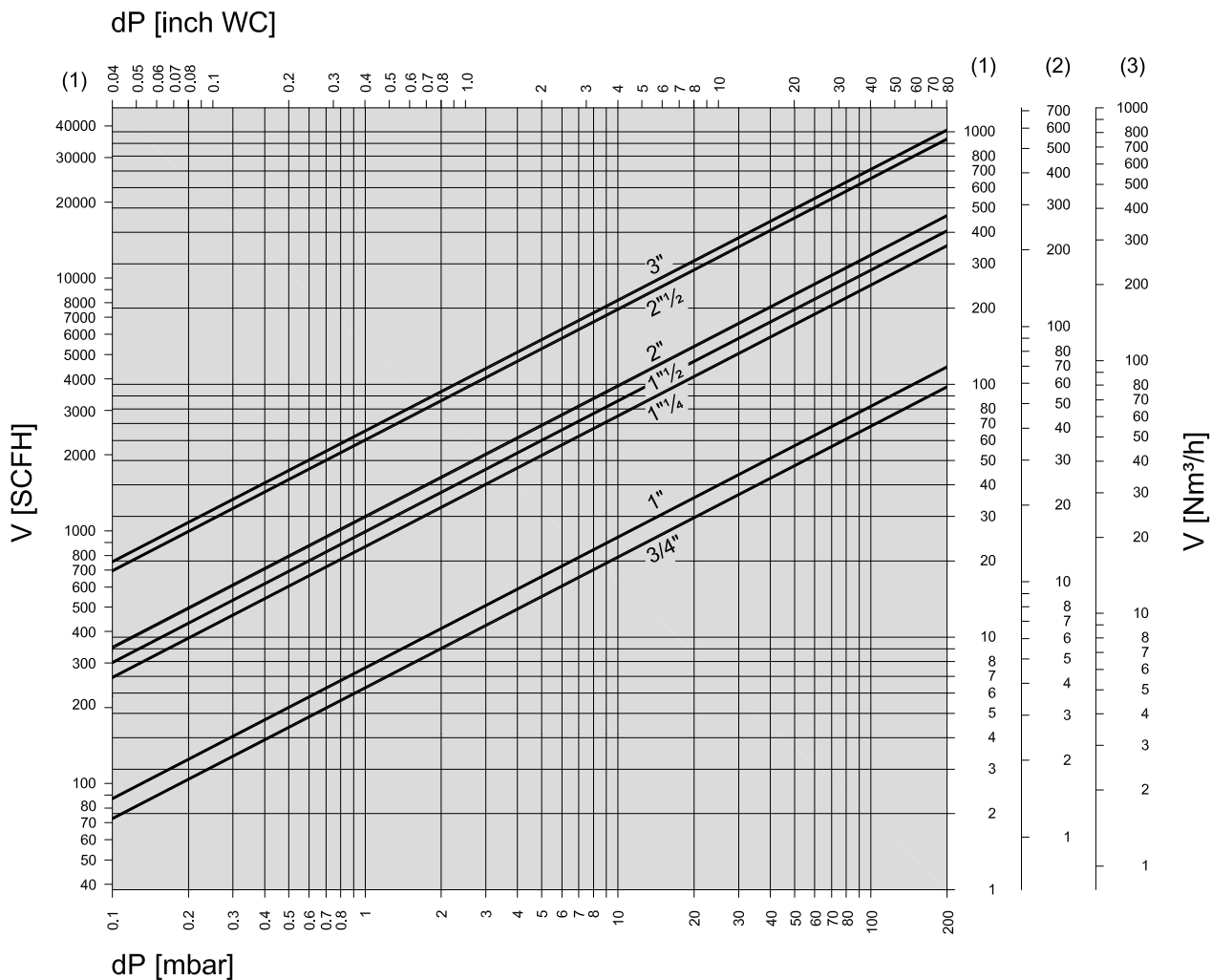


Fig. 4

**Formula of conversion  
from air to other gases**

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

Tab. 3

Gas type	Specific gravity $\rho$ [Kg/m³]	$k = \sqrt{\frac{1,25}{\rho_{GAS}}}$
(1) Natural gas	0,80	1,25
(2) LPG	2,08	0,77
(3) Air	1,25	1,00

15°C, 1013 mbar, dry

When the flow read on the diagram is referred to operating pressure instead of standard conditions, the pressure drop  $\Delta p$  read on the diagram must be multiplied for the factor:  $(1 + \text{relative pressure in bar})$

*Example:*

In the 2" solenoid valve with an air flow of 60 Nm<sup>3</sup>/h there is a pressure drop  $\Delta p = 6$  mbar. If we consider that 60 m<sup>3</sup>/h is the flow at 200 mbar of inlet pressure, then the pressure drop to be consider is:

$$\Delta p = 6 \times (1 + 0,2) = 7,2 \text{ mbar}$$

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

Tab. 4

	Kvs [m <sup>3</sup> /h]		
	Main valve	Bypass 1/2"	Bypass 1"
3/4"	6,0	4,6	-
1"	7,0	4,6	-
1 1/4"	21,5	6,0	9,0
1 1/2"	25,0	6,0	9,0
2"	27,4	6,0	9,0
DN65	59,0	6,0	9,0
DN80	61,0	6,0	9,0

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 [Nm<sup>3</sup>/h]
- Kv = flow factor [m<sup>3</sup>/h]
- $\rho$  = density [Kg/m<sup>3</sup>]
- $p_1$  = absolute inlet pressure [bar]
- $p_2$  = absolute outlet pressure [bar]
- $\Delta p$  = differential pressure  $p_1 - p_2$  [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

	<b>VMM</b>	<b>50</b>	<b>2</b>	<b>A</b>	<b>S</b>	<b>1</b>	<b>0</b>	<b>.J</b>	
<b>Valve type</b>									
<b>Connections size</b>									
20 = 3/4"									
25 = 1"									
32 = 1 1/4"									
40 = 1 1/2" DN40 (1)									
50 = 2" DN50 (1)									
65 = DN65									
80 = DN80									
<b>Max. Operating pressure</b>									
2 = 200 mbar (3 psig)									
5 = 500 mbar (7 psig)									
<b>Supply voltage</b>									
A = 230V 50/60Hz									
B = 110V 50/60Hz									
C = 24V AC/DC									
G = 24V DC									
N = 120V 50/60Hz, NPT/ANSI									
<b>Second valve type</b>									
F = fast									
S = slow									
<b>By-pass valve on the Right side</b>									
(seen from the inlet)									
0 = none									
1 = 1/2" (DN15) Fast									
2 = 1/2" (DN15) Slow									
3 = 1" (DN25) Fast									
4 = 1" (DN25) Slow									
<b>By-pass valve on the Left side (special execution)</b>									
(seen from the inlet)									
0 = none									
1 = 1/2" (DN15) Fast									
2 = 1/2" (DN15) Slow									
3 = 1" (DN25) Fast									
4 = 1" (DN25) Slow									
<b>Special versions</b>									
L Low power (when not standard)									
D Execution with pilot valve 1/2"									
D1 Execution with pilot valve 1"									
P Proof of closure (POC)									
J Biogas									
K Coke oven gas (COG)									

(1) Optional kit

Tab.5

	200 mbar (3 psig)					500 mbar (7 psig)				
	230Vac	120Vac	110Vac	24Vac/dc	24Vdc	230Vac	120Vac	110Vac	24Vac/dc	24Vdc
<b>3/4"-1"</b>	●	●	●	●		●	●	●		
<b>1 1/4"-1 1/2"-2"</b>	●	●	●	●		●	●	●		
<b>2 1/2"-3"</b>	●	●	●		●	●	●			●

● Available

Tab.6



## Special versions

- The valves can be supplied in special versions for aggressive gases such as biogas (version J) and COG (version K), they are free of non-ferrous metals and provided with special seals.
- The valves are available with a proof-of-closure switch (POC), comply with NFPA 86 requirements (version P). A factory adjusted SPDT switch inside an enclosure mounted on the bottom of the valve, provides an electrical signal indicating the valve position. A two-colored led gives also a visual indication of the valve position (Red = valve open, Green = valve closed).
- All the valves with terminal box can be supplied with a special electronic board which provides full power for the opening stage, then it switches to low power consumption for the holding stage (standard from 1"¼ to 3").

## Optionals

- G1/8 connection on the bottom to fit a closed position indicator switch (PCS) or visual indicator (VI): on request from 3/4" to 2" (standard from 2"½ to 3").
- Enclosure class can be increased up to IP65. The valves will be provided with a sealed terminal box and cable set.
- All the valves can be provided with a special cable gland and Ex-proof marking for use in Zones 2 and 22, according to 2014/34/EU Directive (ATEX):

category	II 3 G,D
protection mode	Ex nA IIA T4 Gc X Ex tc IIIB T135°C Dc X or Ex tc IIIC T135°C Dc X (IP65)

- All the valves can be provided with transparent cover and LED which lights up when electrical power is supplied.
- All the valves can be provided with electrical connection made by a standard plug ISO 4400 (optional with LED indicator).
- All the valves can be provided with anodizing housing or epoxy coating to withstand the aggressive environments.
- The threaded models 1"½ and 2" can be provided with flanged connections using an optional kit.

## 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 coil in horizontal or vertical position, not upside down. Coil may be oriented 360 degrees in any direction.
- ✓ 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.
- ✓ Ensure that installing area is protected from rain and water splashes or drops.
- ✓ Perform leak and functional tests after mounting.
- ✓ The continuous service (100% ED) causes inevitable coil heating, depending on working environment. Never install the valve close to walls or other equipments. To improve the coil 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 the valve replacement after 10 years from the date of manufacture stamped on the product. The heavy 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 product complies with the essential requirements of the following European Directives and their amendments:



2009/142/EC (Gas Appliances Directive)  
2014/34/EU (ATEX) when shown upon the product  
2014/30/EU (Electromagnetic Compatibility)  
2014/35/EU (Low Voltage Directive)  
2011/65/EU (RoHS II)

**CE-Reg.-No. 0063AQ1350**



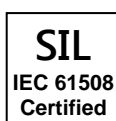
The product is suitable for applications comply with NFPA 86 (Class 7400).

Approval by Factory Mutual: IN PROGRESS



The product complies with the Technical Regulation TP TC 004/2011-016/2011-020/2011-032/2013 of Russia, Belarus and Kazakhstan.

**Certificate No.: TC № RU Д-IT.PA01.B.21942**



The valves meet the requirements of functional safety of electrical systems according to the European standard IEC EN 61508 and are certified for systems up to SIL3.

**Certificate No.: C-IS-248034-01**

**Quality Management System is certified according to UNI EN ISO 9001.**



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The information in this document contains general descriptions of technical options available and based on current specifications.

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