VMM

Multiple safety solenoid valve for gas regulating trains DN20 … DN80

VMM

Multiple safety solenoid valve for gas regulating trains

Contents

Description 2
Features 2
Functioning and application 3
Technical specifications 4
Gas flow chart (pressure drop) 6
Ordering information 8
Special versions and options 9
Design, installation and servicing 10
Standards and approvals 11

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

VMM 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 third valve with capacity of DN15 or DN25 can be fitted to by-pass the second one and have a low fire stage or a second outlet for pilot burner (pilot execution).

The normally open vent valve VMRNA can be integrated in VMM from 1"¼ to 3"; dimensions and piping are the same of third pilot valve. See VMRNA datasheet for other details.

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

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.

A proof of closure switch or a visual indicator can be installed (see PCS-VI datasheet for details); in this case the valve has to be equipped with 1/8" connection on the bottom (optional).
Models from 2"½-3" have this features as standard.

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

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

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.

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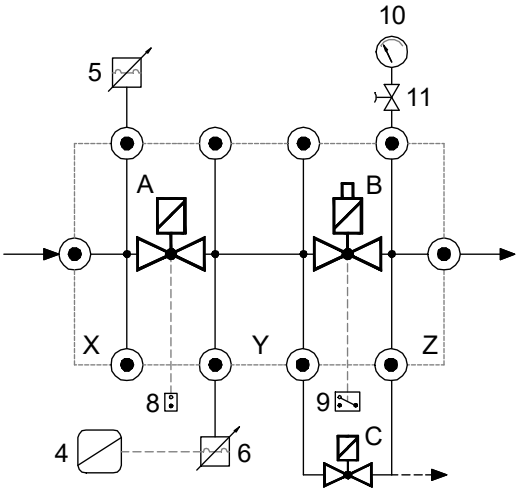
Functioning and application

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. In the inlet chamber there is the gas line pressure which forces on the disc, increasing the closing function and 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 low fire stage or to obtain a second fast (slow) stroke or both.



1 = Ball valve
2 = Filter
3 = Pressure regulator
4 = Tightness control
5 = Minimum gas pressure switch
6 = Tightness control pressure switch
7 = Multiple solenoid valve
8 = Valve position visual indicator
9 = Closed position indicator switch
10 = Burner pressure gauge
11 = Push button valve

A = First valve
B = Second valve
C = By-pass valve (pilot)
X = Inlet chamber
Y = Middle chamber
Z = Outlet chamber

(The above scheme refers to size 1 "¼-2" with third valve as by-pass)

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.

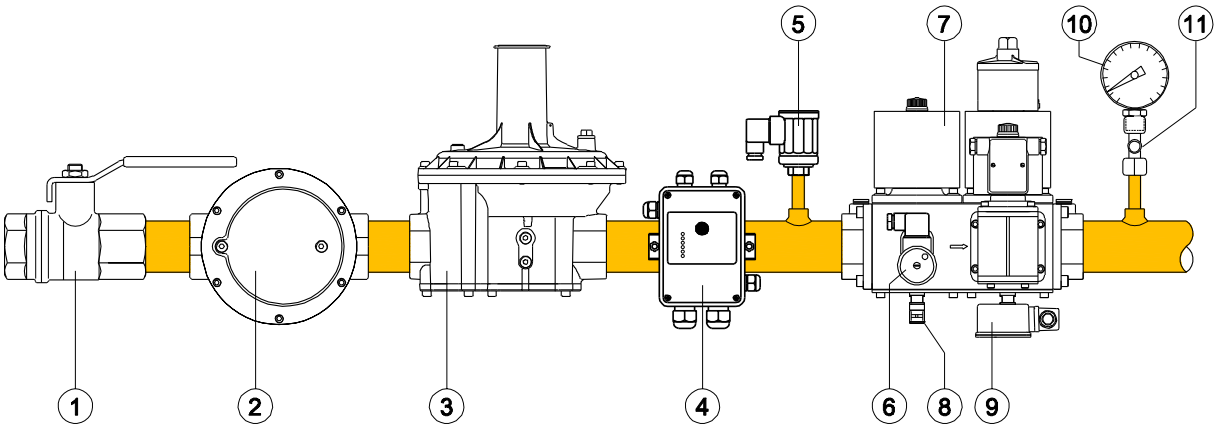


Fig.2

Technical specifications

Tab. 1

Connections	Internal threaded EN 10226-1 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"
By-pass size	DN15 or DN25
Voltage rating	230 VAC 50/60 Hz 120 VAC 50/60 Hz 110 VAC 50/60 Hz 24 VAC/DC
Voltage tolerance	-15% / +10%
Power consumption	70W for 3/4" – 1" 90W (working) for 1"¼ -3" by-pass 1/2" 25W by-pass 1" 35W
Ambient temperature **Media temperature**	-15°C / +60°C (+5°F to +140°F)
Max. operating pressure	200 mbar (3 psig) 500 mbar (5 psig)
Max test pressure	1 bar (15 psig)
Flow capacity	see charts
Closing time	< 1 second
Opening time	Adjustable
Pressure ports	G1/4 (additional G1/8 onto flanged models)
Gas strainer	600 µm (0.02 in), metal mesh
Enclosure	IP54 (NEMA 3) optional IP65 with cable (NEMA 4)
Cable gland	M20x1,5 for terminal box PG 9 for ISO plug
Wires cross-section	2,5 mm^2 max. (AWG 12) for terminal board 1,5 mm^2 max. (AWG 14) for ISO plug
Electrical safety	Class I (EN 60335-1)
Coil winding insulation	Class H (200°C, 392°F)
Coil thermal resistance	Class F (155°C, 311°F)

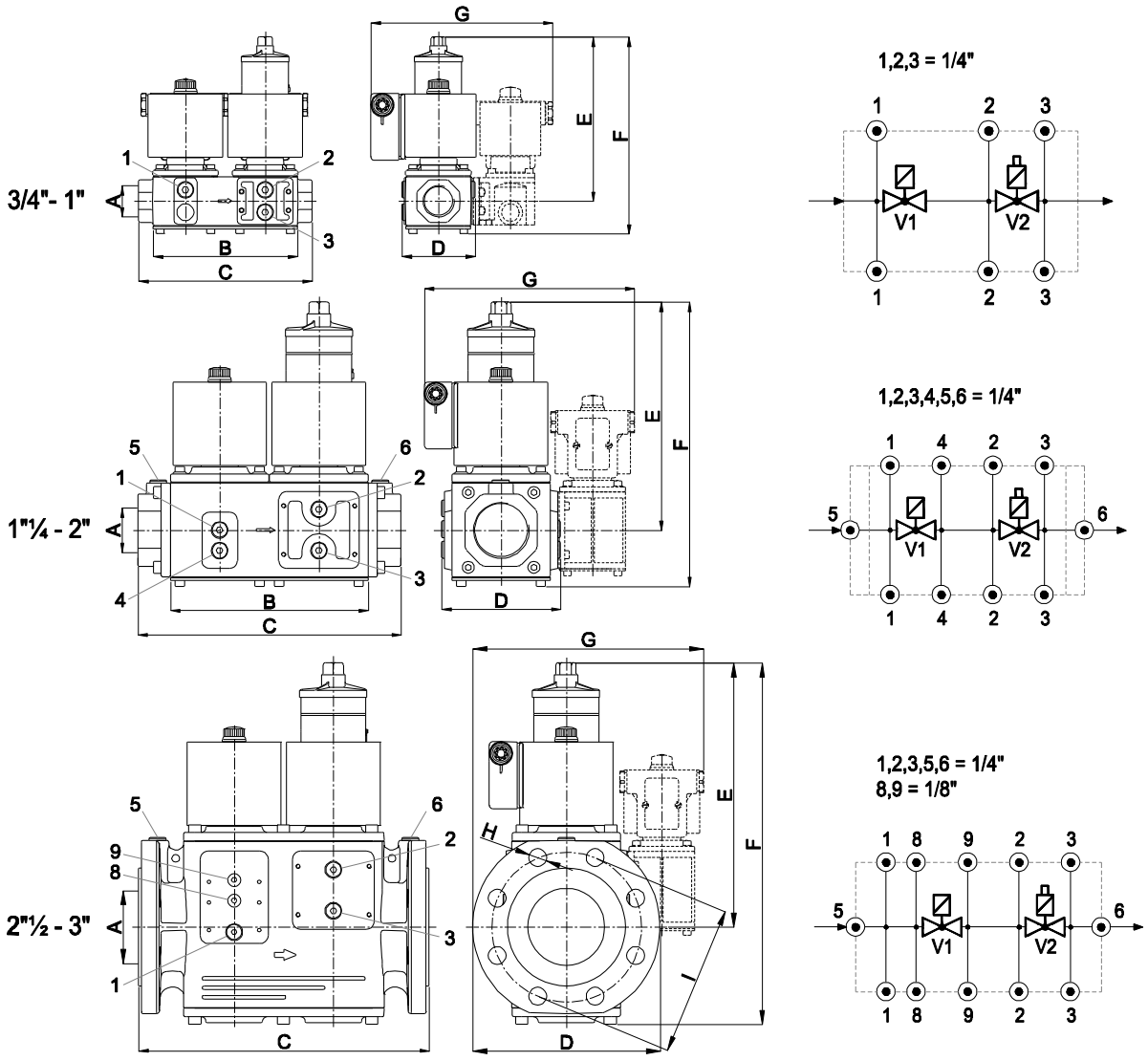


Fig.3

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 **Rp1** 1"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		154/6,06	185/7,28	78/3,07	186/7,32	221/8,70	194/7,64	-	-	7,5/16,5
VMM….F00	**Rp1¼** 1"¼NPT **Rp1½** 1"½NPT **Rp2** 2"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		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"½ANSI **DN80** 3"ANSI	-	310/12,20	200/7,87	213/8,39	317/12,48	200/7,87	**4x18** 4x¾ **8x18** 4x¾	**145** 5,50 **160** 6,00	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			19,8/43,7
VMM….S20		-	310/12,20	200/7,87	288/11,34	388/15,28	250/9,84			20,0/44,1
VMM….S30		-	310/12,20	200/7,87	288/11,34	388/15,28	250/9,84			20,8/45,9
VMM….S40		-	310/12,20	200/7,87	288/11,34	388/15,28	250/9,84			21,0/46,3

(*) Flanged model: 332 mm

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Gas flow chart
(Pressure drop)

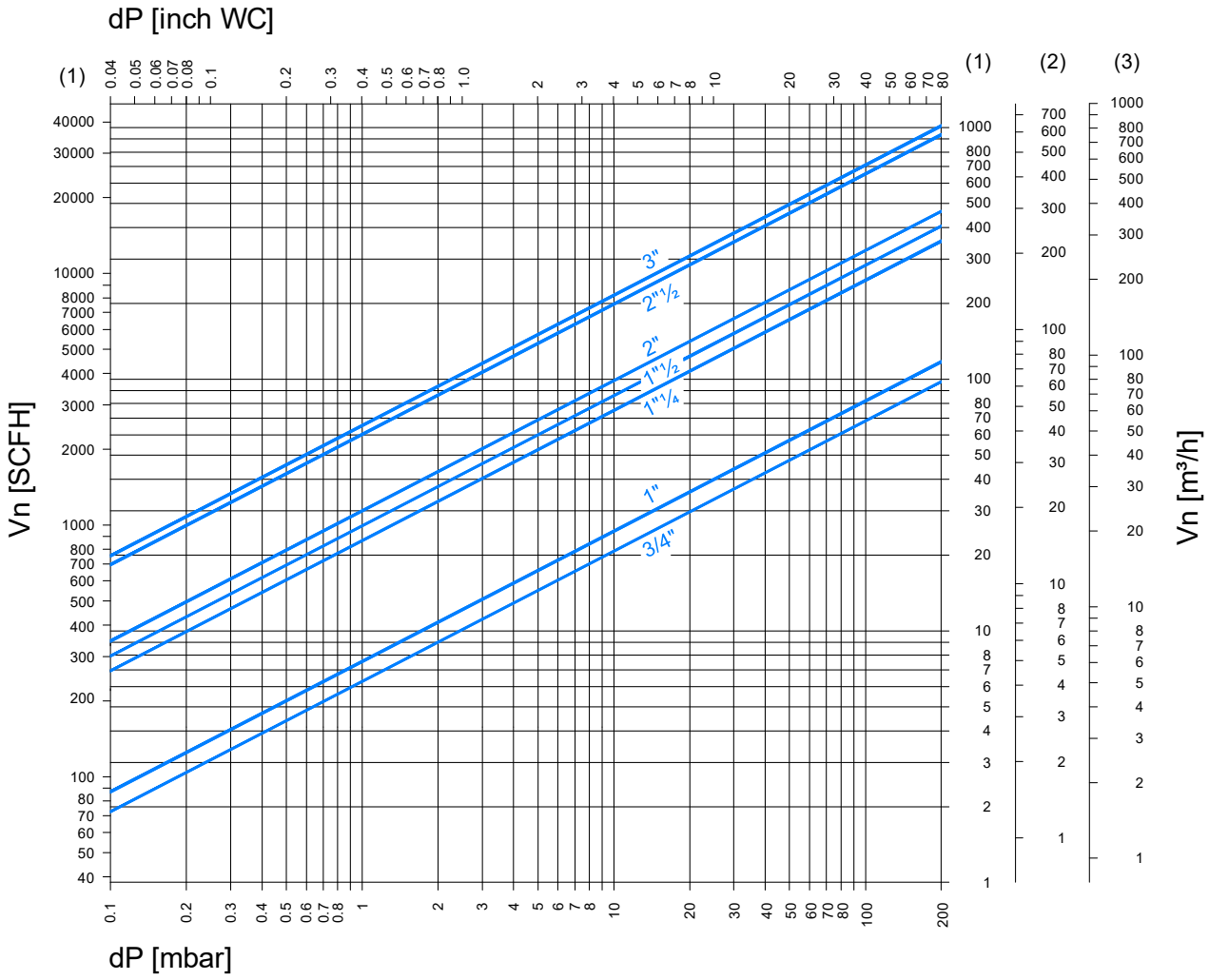

Fig. 4

Formula of conversion from air to other gases

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

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

Tab. 3

Gas type	Density ρ [Kg/m³]
(1) Natural gas	0,80
(2) LPG	2,00
(3) Air	1,225

15°C, 1013 mbar, dry

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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 60 m^3/h at standard conditions there is a pressure drop Δp = 6 mbar.
If we consider that 60 m^3/h is the flow at 200 mbar of inlet pressure, then the pressure drop to be consider is:

Δp = 6x(1+0,2) = 7,2 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^3/h]		
	Main valve	Bypass 1/2"	Bypass 1"
3/4"	6,0	4,6	-
1"	7,0	4,6	-
1"¼	21,5	6,0	9,0
1"½	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:

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

where

Vn = flow rate at standard conditions [m^3/h]
Kv = flow factor [m^3/h]
ρ = density [Kg/m^3]
p_1 = absolute inlet pressure [bar]
p_2 = absolute outlet pressure [bar]
Δp = 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 unadvisable
- Flow velocities w ≤ 15 m/s are recommended and w > 50 m/s are always unadvisable.

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Ordering information

Tab.5

	VMM	50	2	A	S	1	0	.J

Valve type

Connections size

20	3/4”	
25	1”	
32	1”¼	
40	1”½	DN40 ([1])
50	2”	DN50 ([1])
65	DN65	
80	DN80	

Max. Operating pressure

2	200 mbar (3 psig)
5	500 mbar (7 psig)

Supply voltage

A	230V 50/60Hz
B	110V 50/60Hz
C	24V AC/DC
G	24V DC
N	US market version (120V 50/60Hz, FM appr., NPT thread/ANSI flange)

Second valve type

F	fast
S	slow

By-pass valve on the Right side

(seen from the inlet)

0	none		
1	½” (DN15) Fast	**3**	1” (DN25) Fast
2	½” (DN15) Slow	**4**	1” (DN25) Slow

By-pass valve on the Left side (special execution)

(seen from the inlet)

0	none		
1	½” (DN15) Fast	**3**	1” (DN25) Fast
2	½” (DN15) Slow	**4**	1” (DN25) Slow

Special versions (some may be present concurrently)

L	Low power (when not standard)
D	Execution with pilot valve 1/2”
D1	Execution with pilot valve 1”
D2	Execution with NO vent valve 1”
P	Proof of closure (POC) for US market only
J	Biogas
K	Coke oven gas (COG)
HF	Hydrogen
Y	NPT thread / ANSI flange
I	Electrical connection with ISO 4400 plug
M	Bottom connection for disc position indicator (for valve till 2”)
T	Transparent cover to see led on electronic board
T1	Transparent cover and ISO 4400 plug
O	IP65 protection with 1.5 m cable
O1	IP65 protection with ISO 4400 plug
X	Ex execution for zone 2 and 22 (see optional paragraph for details)
Z	Anodization of housing and external aluminum parts
Z1	Epoxy body coating and anodization of inner aluminum parts

([1]) Optional kit

Tab.6

	200 mbar (3 psig)					500 mbar (7 psig)				
	230Vac	120Vac	110Vac	24Vac/dc	24Vdc	230Vac	120Vac	110Vac	24Vac/dc	24Vdc
3/4”-1”	●	●	●	●		●	●	●		
1”¼-1”½-2”	●	●	●	●		●	●	●		
2”½-3”	●	●	●		●	●	●	●		●

● Available

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Special versions and options

- **L**: valves with terminal box and size 3/4”-1” can be supplied with 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”).
- **D**: the third valve can be fitted to have a separate line for a pilot burner.

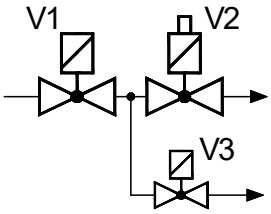

Fig.5

- **P**: valves are available with proof-of-closure switch (POC), complying with NFPA 86 requirements. A factory adjusted SPDT switch inside an enclosure mounted on the bottom of the second valve, provides an electrical signal indicating valve position. A two-colored led gives also a visual indication of the valve position (Red = valve open, Green = valve closed).
- **J**: valves can be supplied in special version for aggressive gases such as biogas. They are free of brass and NBR. In this case customer shall check compatibility between valve materials and gas contents.
- **K**: valves can be supplied in special version for aggressive and dirty gases such as COG. They are free of brass and NBR and have additional protection of internal mechanism. As these gases usually have high content of hydrogen, tightness test is performed with helium. In this case customer shall check compatibility between valve materials and gas contents.
- **HF**: valves can be manufactured with additional treatment and tightness test with helium, so that they are suitable to be used with hydrogen.
- **Y**: valves can be provided with NPT threads or ANSI flanges instead of Rp thread or PN 16 flanges.
- **I:** valves can be provided with electrical connection made by a standard plug ISO 4400.
- **M**: valves from 3/4" to 2" can be equipped with G1/8 connection on the bottom to fit a closed position indicator switch (PCS) or visual indicator (VI) (standard from DN65 to DN80).
- **T**: valves can be provided with transparent cover and LED which lights up when electrical power is supplied.
- **T1**: valves can be provided with transparent cover to see LED light when coil is powered and connection with standard plug ISO 4400.
- **O**: enclosure class can be increased up to IP65. The valves will be provided with a sealed terminal box and cable set.
- **O1**: enclosure class of connection with standard plug ISO 4400 can be increased up to IP65 with additional sealing.
- **X**: valves can be provided with EX execution for use in Zones 2 and 22, according to 2014/34/EU Directive (ATEX):

category	II 3 G,D
protection mode	Ex ec IIA T4 Gc X or Ex ec IIB+H2 T4 Gc X (HF version) Ex tc IIIB T135°C Dc X or Ex tc IIIC T135°C Dc X (IP65 version)
ambient temperature	-15 / +40 °C

- **Z**: aluminum valves can be supplied with anodized housing and external components, to withstand aggressive environments.
- **Z1**: aluminum valves can be supplied with epoxy body coating and anodized inner components, to withstand aggressive gases.

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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.

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Standards and approvals

The product complies with the essential requirements of the following European Directives and their amendments:

2016/426/EU (Gas Appliances Regulation) **CE-Reg.-No. 0063AQ1350**
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)

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

Declaration of Conformity: **№ RU Д-IT.PA01.B.08271/18**

The product is approved for Australia, certificate **GMK 10624** issued by IAPMO R&T Oceana on the basis of norm AS 4629.

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.: **TUV IT 22 SIL 0118**

The product (*) is suitable for applications comply with NFPA 86 (Class 7400).
Factory Mutual Approval Identification: **0003061781**

(*) Notice: special version applies.

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

The information in this document contains general descriptions of technical options available and based on current specifications.
The company reserves the right to make changes in specifications and models as design improvements are introduced, without prior notice.
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