M&M International s.r.l. – via Portico 17 – 24050 Orio al Serio (Bg) Italia – tel. +39 035 53 12 98 – fax +39 035 53 17 63
www.mminternational.net – mm@mminternational.net

M&M International Piston Actuated Valves user, installation and maintenance instruction manual

DESCRIPTION

A 2-port angle seat pneumatic piston actuated on / off valve for use on steam, water, air and gas applications.
WARNING! To prevent waterhammer on valve closure for liquid flow applications above 2 barg or for applications that may be subject to waterhammer a bi-directional valve is recommended (identified by a B-prefix, see M&M literature).

USE, INSTALLATION, MAINTENANCE SAFETY WARNINGS

- This product is a pressurized device. Misuse may result in catastrophic events, loss of life or severe injury and damage to people and things. Always follow the manufacturer's instruction before installation, start - up and servicing.
- Check for temperature and pressure limits and flow direction on product label and literature before installation, start - up and servicing.
- Read manual before installation, start - up and servicing.
- Maintenance shall be carried out by qualified personnel only, capable of operating according to the manufacturer's instructions.
- Always release the internal fluids pressures before servicing.
- The actuator contains a pre-loaded springs: when disassembling the actuator take care that the sudden release of the springs does not result in hazard for people or things.
- Use only M&M original spare parts.
- Do not exceed pressure / temperature limit ratings indicated in the label.
- Check for compatibility with the controlled and pilot fluids before start - up. In case of doubt about compatibility between the fluid and the valve, contact your local dealer or the manufacturer.
- Do not use pipes as grounding conductors of electric devices.
- Installation of hot or frozen fluids carrying piping components should be done in such a way to prevent accidental contacts with them.
- Max. torque on pilot fluid ports threads is 5 Nm.
- Do not use the pilot fluid ports threads or any other part of the valve to support anything. The pilot fluid ports on the actuator shall be used only for pilot fluid supply – exhaust.
- Do not shut the pilot fluid outlet.
- Piping shall not transmit mechanical stresses or loads to the valve body.
- All plastic parts are in self-extinguishing materials. Exposure to fire or to temperature or pressure exceeding the ratings given by the manufacturer may permanently damage the valve.
- This product is not a safety device and shall not be used as a safety device. It is not intended, and shall not be used, to prevent over/underpressurization of vessels and piping, or as sole containment device to avoid release of dangerous fluids into the atmosphere. For such purposes, specific safety devices shall be fitted according to PED, to all applicable safety requirements, laws, rules and standards, and to the state of the art.
- Suitable devices should be installed upstream the valve to prevent waterhammer and consequent valve damage or failure. Some M&M valves are "antiwaterhammer", i.e. are able to prevent waterhammer by themselves (see "Available types" chapter on this manual). Check for waterhammer hazard and prevention before installation and start - up.
M&M International shall not be held responsible for misuse, negligence, faults or damages caused by other products, improper maintenance, unauthorized alterations or changes to the product, natural events, and for installation, use and servicing in contrast with this manual.

GENERAL SAFETY RECOMMENDATIONS

Safe operation of these products can be guaranteed only if they are properly installed, commissioned, used and maintained by qualified personnel in compliance with this manual. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment, must also be complied with.
Intended use:
Referring to the Installation and Maintenance Instructions, valve name-plate and technical information sheet, check that the product is suitable for the intended use/application. The products listed below comply with the requirements of the European Pressure Equipment Directive 97/23/EC and carry the CE mark when required. The products fall within the following Pressure Equipment Directive categories:

Valve type	Bodies	Group 1 gases	Group 1 liquids and Group 2 other fluids
Stainless steel	DN15 ÷ DN25 (PN40)	SEP	SEP
	DN32 ÷ DN40 (PN25)	Cat. 1	SEP
	DN50 (PN16)	Cat. 1	SEP
Bronze	DN15 ÷ DN25 (PN25)	SEP	SEP
	DN32 ÷ DN40 (PN25)	not suitable	SEP
	DN50 (PN16)	not suitable	SEP

WARNING! TABLE 1
According to the European Pressure Equipment Directive 97/23/EC, liquids whose saturated vapour pressure at the maximum allowable temperature is more than 0,5 barg shall be considered as gases.

- The products have been specifically designed for use on steam, water, compressed air, inert industrial gases. The products' use on other fluids may be possible but, if this is contemplated, M&M International should be contacted to confirm the suitability of the product for the application being considered.
- Check material suitability, pressure and temperature and their maximum and minimum values.
If the maximum operating limits of the product are lower than those of the system in which it is being fitted, or if malfunction of the product could result in a dangerous overpressure or overtemperature occurrence, ensure a safety device is included in the system to prevent such over-limit situations.
- Determine the correct installation situation and direction of fluid flow.
- M&M International products are not intended to withstand external stresses that may be induced by any system to which they are fitted. It is the responsibility of the installer to consider these stresses and take adequate precautions to minimise them.
- Remove protective covers from all connections before installation.
Access:
Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product. Arrange suitable lifting gear if required.
Lighting:
Ensure adequate lighting, particularly where detailed or intricate work is required.
Hazardous liquids or gases in the pipeline:
Consider what is in the pipeline or what may have been in the pipeline at some previous time. Consider flammable materials, substances hazardous to health, extremes of temperature.
Hazardous environment around the product:
Consider: explosion risk areas, lack of oxygen (e.g. tanks, pits), dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery.
The system:
Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolation valves, electrical isolation) put any other part of the system or any personnel at risk? Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.
Pressure systems:
Ensure that any pressure is isolated and safely vented to atmospheric pressure.
Consider double isolation (double block and bleed) and the locking or labelling of closed valves. Do not assume that the system has depressurised even when the pressure gauge indicates zero.
Temperature:
Allow time for temperature to normalise after isolation to avoid danger of burns.
Tools and consumables:
Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine M&M International replacement parts.
Protective clothing:
Consider whether you and/or others in the vicinity require any protective clothing against the hazards of, for example, chemicals, high/low temperature, radiation, noise, falling objects, and dangers to eyes and face.
Permits to work:
All work must be carried out or be supervised by a suitably competent person.
Installation and operating personnel should be trained in the correct use of the product according to this manual.
Where a formal 'permit to work' system is in force it must be complied with.
Where there is no such system, it is recommended that a responsible person should know what work is going on and, where necessary, arrange to have an assistant whose primary responsibility is safety. Post 'warning notices' if necessary.
Handling:
Manual handling of large and/or heavy products may present a risk of injury.
Lifting, pushing, pulling, carrying or supporting a load by bodily force can cause injury particularly to the back. You are advised to assess the risks taking into account the task, the individual, the load and the working environment and use the appropriate handling method depending on the circumstances of the work being done.
PTFE - Handling precautions:
Within its working temperature range PTFE is a completely inert material, but when heated to its sintering temperature it gives rise to a gaseous decomposition product or fumes which can produce unpleasant effects if inhaled. The inhalation of these fumes is easily prevented by applying local exhaust ventilation to atmosphere as near to their source as possible.Smoking should be prohibited in workshops where PTFE is handled because tobacco contaminated with PTFE will during burning give rise to polymer fumes. It is therefore important to avoid contamination of clothing, especially the pockets, with PTFE and to maintain a reasonable standard of personal cleanliness by washing hands and removing any PTFE particles lodged under the fingernails.

Residual hazards:
In normal use the external surface of the product may be very hot. If used at the maximum permitted operating conditions the surface temperature of some products may reach dangerous temperatures. Many products are not self-draining. Take due care when dismantling or removing the product from an installation.
Freezing:
Provision must be made to protect products which are not self draining against frost damage in environments where they may be exposed to temperatures below freezing point.
Disposal:
This product is recyclable and no ecological hazard is anticipated with its disposal providing due care is taken.
Returning Products:
Customers and stockists are reminded that under EC Health, Safety and Environment Law, when returning products to M&M International they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk. This information must be provided in writing including Health and Safety data sheets relating to any substances identified as hazardous or potentially hazardous.

AVAILABLE TYPES

Operation mode	Normally closed or Bi-directional (B-prefix) anti – waterhammer types (with flow 2 → 1)
	Normally open (R-prefix)
	Double effect (D-prefix)
Body Material	AISI 316 L Stainless Steel
	Bronze (only threaded connections)
DN	15 to 50 (1/2" to 2")
Connections	▪ **ISO 228 (GAS) or NPT female thread** ▪ **Buttwelding ends** to DIN 11850, ISO 4200, ISO 65 / ANSI B36.10 ✶ ▪ **Socket welding** to ISO 65 / ANSI B36.10 ✶ ▪ **Flanges** to EN1092-1 or ANSI B16.5 class 150 ✶ ▪ **Clamp** to ISO 2852, ASME BPE ✶
Actuator Ø	45 mm, 63 mm, 90 mm
Manual angle seat valve (E.g. code PG2050TW00)	

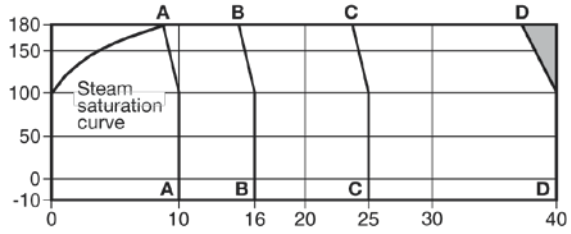
✶ **Only for stainless steel bodies** TABLE 2

TECHNICAL DATA

Leakage	PTFE soft seal ANSI class VI
Flow direction	see available types or refer to product label
Pilot media	Instrument air or inert gases (MAX 60°C ▪ 140°F) ✖
Pilot connections	1/8" female ISO 228 (actuator Ø 45 mm) 1/4" female ISO 228 (act. Ø 63 and Ø 90 mm)
Ambient temperature	-10 to 60°C ▪ 14 to 140°F **(standard and high temp. version)**
Media temperature	-10 to 180°C ▪ 14 to 356°F **(standard version)**
	-10 to 200°C ▪ 14 to 392°F **(high temp. version)**
Vacuum operation (10^{-2} mbar)	Standard for SS bodies Standard for bronze bodies with 45 mm actuator Upon request for other bronze bodies
Other standard features	Red position indicator
	Actuator housing rotation 360°
	Exhaust silencer

✖ **Before using other pilot fluids please contact M&M International Sales Dept.** TABLE 3

BODY PRESSURE RATINGS



A	Maximum operating pressure on saturated steam, all models	9 barg
B	Pressure on body DN 50	16 barg
C	Stainless Steel DN 32 ÷ DN 40, bronze DN 15 ÷ 40	25 barg
D	Stainless Steel DN 15 ÷ DN 25	40 barg

TABLE 4

❶ Steam: max working pressure 9 barg or lower (according to working pressure on the label of the valve).
❷ PN10 for all sizes for Clamp end versions.

The product must not be used in this region or beyond the body design conditions (PN) quoted in the **TABLE 1** as damage to the internals will occur.

OPTIONS (available from factory only)

Travel switch	for 63 and 90 mm actuators
Manual override	
Stroke regulator	
Vacuum operation	Bronze bodies, actuators 63 and 90 mm Ø

TABLE 5

OPTIONS (available separately on request)

Pilot solenoid valves	Type **B356** for 45 mm actuators
	Type **B326** for 63 mm actuators
	Type **D326** for 90 mm actuators

TABLE 6

FLUID COMPATIBILITY

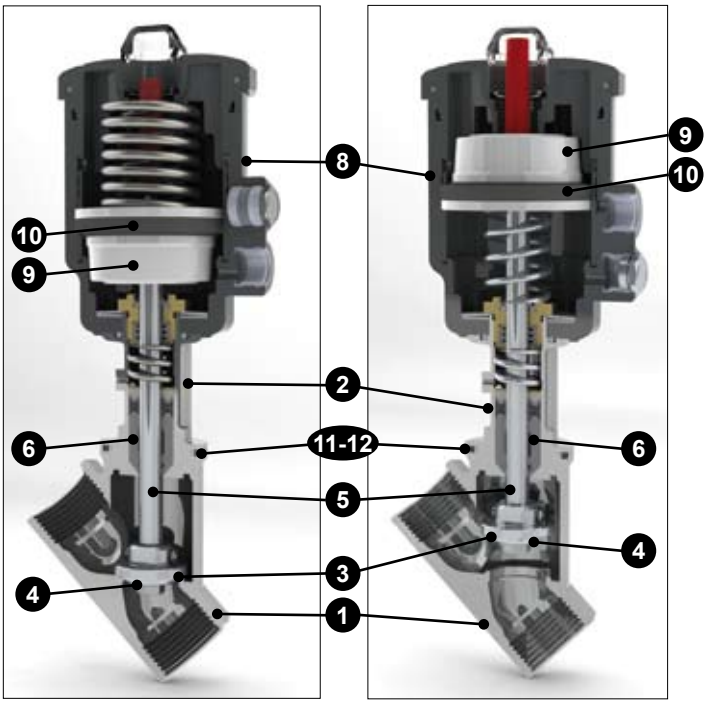
WARNING ! Compatibility with fluids not mentioned in the TABLE below must be checked by the user on the basis of the nature and concentration of the fluid itself and of applicable laws, rules and standards. In case of doubt, contact your local dealer or the manufacturer.

FLUIDS	Compatibility		
	stainless steel bodies	bronze bodies up to DN25	bronze bodies DN32 and more
Steam Water Compressed air Inert industrial gases	yes	yes	yes
Hydraulic fluids	yes	yes	**see note ❸**

TABLE 7

❸ **WARNING !** According to the European Pressure Equipment Directive 97/23/EC, valves complying with SEP above DN25 cannot be used with hydraulic fluids at temperatures above their boiling point at atmospheric pressure. Provide suitable safety devices to avoid overtemperature or use stainless steel valves which are in Category 1.

PARTS AND MATERIALS



N.	Part	Stainless Steel versions	Bronze versions
1	Body	AISI 316 L Stainless Steel	Bronze
2	Bonnet	AISI 316 L Stainless Steel	Brass / Bronze
3	Plug holder	AISI 316 L Stainless Steel	
4	Plug seal	TFM 1600	
5	Valve stem	AISI 316 L Stainless Steel	
6	Stem seals	FKM chevrons - graphite filled PTFE	
7	Stem O-ring *	FKM	
8	Actuator housing	Glass filled Polyamide	
9	Piston	Glass filled Polyamide	
10	Piston lip seal	NBR (Ø 63-90) - FKM (Ø 45)	
11	Gasket	PTFE	Graphite
12	O-ring	FKM	--

*** not shown** TABLE 8

INSTALLATION

1. Connecting pipework should be supported to prevent stresses being applied to the valve body.
2. CAUTION: welding end valves must have the actuator and valve stem removed prior to welding the body into the pipeline (to prevent damages to the internals during welding). Disconnect actuator following instructions in section "AVAILABLE SPARES, point 4".
The seal(s) between the body and the bonnet shall be removed too. Re-assemble all parts after the body has come to complete cooling, paying attention to install new body/bonnet seal(s) supplied with the product.
To re-assemble, use proper sized tooling and fasten to the torque as per TABLE **9**.

3. The valve can be mounted in any orientation. The actuator can be rotated 360° in the direction indicated on the product label to facilitate easy pilot mounting and connection.
4. Ensure that the connecting pipework is isolated and free from scale, dirt etc. Any loose material entering the valve body may damage the TFM 1600 head seal preventing tight shut-off.
5. Do not exceed the performance rating of the valve.
6. Refer to the limiting conditions and the product label details for limitations of pilot pressure and operating temperatures.
7. Refer to the limiting conditions and the valve body markings for limitation of body working pressure and operating temperature.
8. Ensure that the valve is mounted correctly for the flow direction required, as detailed on the product label.
9. A red travel indicator will appear in the actuator top cover when the valve is fully open (not with travel switch models).

ANTI-WATERHAMMER TYPES

The conditions under which waterhammer may take place are:
- liquid fluid
- pressure drop across the valve of 2 bars or more
- quick valve closure

To prevent waterhammer, it is recommended to use BPG or BCG types with flow direction from 2 to 1. These valves, installed in such a way, provide soft closure and avoid waterhammer in most conditions.

STROKE REGULATOR OPTION NORMALLY CLOSED VALVES

1. Isolate the primary upstream and downstream valves.
2. Undo the stroke regulator lock-nut.
3. Rotate the manual handle clockwise until the valve is fully closed. A red indicator will appear in the top of the handle.
4. Apply sufficient pilot pressure required to overcome the maximum differential pressure condition.
5. Open the primary upstream and downstream valves.
6. Gradually open the valve until the desired maximum flow rate is achieved.
7. Tighten the stroke regulator lock-nut.
8. Exhaust the pilot media pressure to check for valve tight shut-off.
9. Apply pilot pressure again to check maximum flow condition.

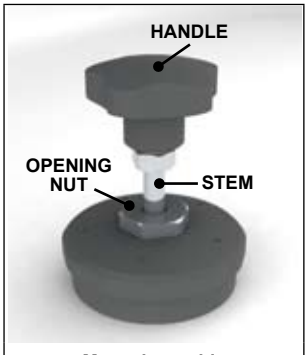
Stroke regulator (and manual override for NO valves)

STROKE REGULATOR OPTION AND MANUAL OVERRIDE FOR NORMALLY OPEN VALVES

1. Ensure that the stroke regulator is fully open. Undo the stroke regulator lock-nut.
2. With the primary medium flowing gradually close the valve using the flow regulator until the desired flow rate is achieved.
3. Tighten the stroke regulator lock-nut.
4. Apply sufficient pilot media pressure to ensure the valve achieves tight shut-off.
5. Supply the pilot pressure to check maximum flow once again - adjust if necessary.
6. This option provides also manual closing function on normally open valves.

MANUAL OVERRIDE OPTION NORMALLY CLOSED VALVES

1. Push the handle towards the actuator so that the stem enters the actuator.
2. Turn the handle clockwise so that the stem engages completely the inner thread.
3. Undo the opening nut to upper end of stroke to open the valve. A red indicator will appear to show the valve is manually open.



Manual override

TRAVEL SWITCH OPTION

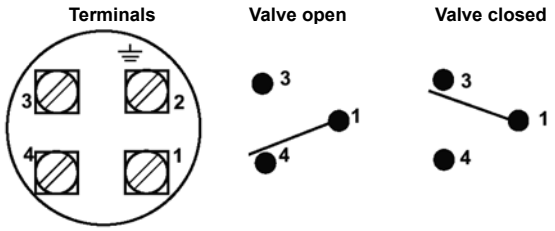
This provides an electrical signal to indicate the open position of the valve. The signal is provided by a magnetic sensor with a free NO/NC switch.

MAXIMUM RATING:

Voltage = 500 V
Current MAX = 0,5 A
Power MAX = 30 W / VA

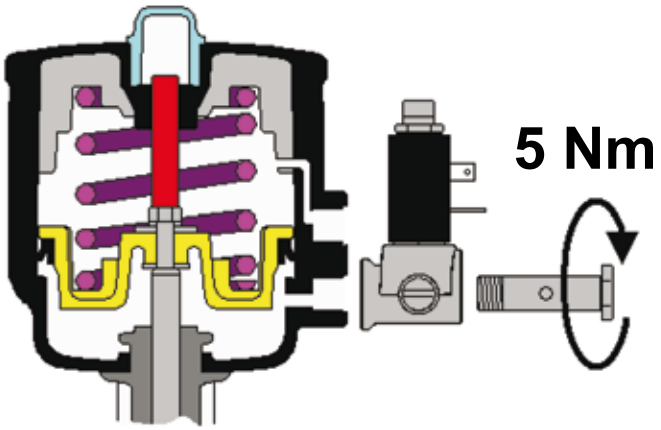

Travel switch

Wiring Connections



PILOT SOLENOID VALVES OPTION

Pilot solenoid valves should be mounted onto the piston actuator as shown below. To fit a solenoid valve onto a normally closed valve use the pilot connection marked 'NC', for normally open valves use the 'NO' connection.



AVAILABLE SPARES

A spare seal kit is available including: stem/piston 'O' ring, piston lip seal, bonnet/actuator 'O' ring, head seal, body seal, body 'O' ring (only for SS valves).
To replace these items proceed as follows:
1. Isolate upstream and downstream valves.
2. Vent pilot pressure from actuator and disconnect pilot pipework / solenoid valve.
3. Remove piston actuated valve from the pipeline.
4. Remove the valve body and inspect the TFM 1600 head seal. Replace if necessary.
Note: Before removing the valve body on normally closed valves, the spring pressure acting down onto the head seal should be relaxed to prevent damage to the head seal. This can be carried out in two ways:
I - Whilst retaining the valve body, undo the actuator cover to relax the spring force or
II - Apply air pressure at the inlet port of the actuator to compress the spring and remove the spring force acting down on the head seal.
If a replacement head seal ❹ is required, remove the retaining cap nut whilst holding the valve head firmly (two flats are provided on the valve head for this purpose).
Fit a new TFM 1600 head seal and refit cap nut applying LOCTITE 620 to the threaded portion of the stem. Tighten cap nut to 13 Nm.
Replace the valve body and tighten to the recommended torque as specified in **Table 9**.

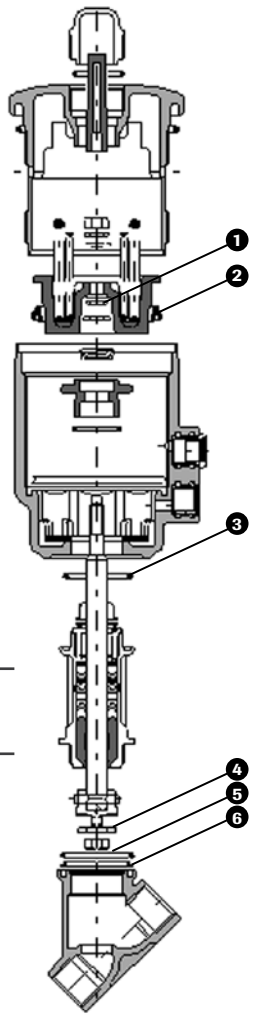
5. To inspect or replace the stem 'O' ring ❶ or piston lip seal ❷, remove the actuator housing cover whilst holding the actuator cylinder firmly.
WARNING! The internal spring is under compression. Also remove the valve body as previously described in Step 4, above.
6. Whilst holding the valve head, unscrew the red travel indicator and stem lock-nut and remove together with the two washers.
7. Remove the piston, the stem 'O' ring ❶ and washer. Inspect the piston lip seal ❷ and 'O' ring and replace if required.
8. Clean out any dirt or waste deposits from inside the piston housing area and carefully apply NBR compatible inert grease to the 'O' ring ❶ and piston lip seal ❷.
9. Reassemble in reverse order referring to the drawings showing correct location of components. Whilst holding the valve head, tighten the stem lock-nut. Replace the red travel indicator and tighten.
10. Refit the actuator cover and tighten to 18 ÷ 22 Nm for 45 mm actuators NC version, 10 Nm for 45 mm actuators NO-DA versions, 56 ÷ 60 Nm for 63/90 mm actuators (all versions).
11. Refit the valve body replacing the body seal ❺ and body 'O' ring ❻ and tighten to the recommended torque as specified in **Table 9**.

Body to bonnet torque rating (Nm) and hex. wrench size

STAINLESS STEEL versions				BRONZE versions			
Valve size	**Actuator Ø**	**Wrench size [mm]**	**Torque [Nm]**	**Valve size**	**Actuator Ø**	**Wrench size [mm]**	**Torque [Nm]**
DN 15 (½")	45	**Hex 24**	55	DN 15 (½")	45-63	**Hex 27**	55
DN 15 (½")	63-90	**Hex 30**		DN 20 (¾")	45-63		
DN 20 (¾")	45	**Hex 24**		DN 25 (1")	45-63-90		80
DN 20 (¾")	63-90	**Hex 30**		DN 32 (1¼")	63-90		
DN 25 (1")	63-90	**Hex 30**	80	DN 40 (1½")	63-90		110
DN 32 (1¼")	63-90	**Hex 32**		DN 50 (2")	63-90		
DN 40 (1½")	63-90	**Hex 41**	110				
DN 50 (2")	63-90	**Hex 50**					

Table 9

SPARE PARTS KITS



MAIN SEALS KIT

- ❶ **Stem/piston O-Ring**
- ❷ **Lip seal**
- ❸ **Bonnet/actuator O-Ring**
- ❹ **Plug seal**
- ❺ **Body seal**
- ❻ **Body O-Ring** (only stainless steel version)

STEM CHEVRON SEALS (not included)

How to order spare seal kits

Always order spares by specifying the valve size, type and date code (given on actuator label e.g. 12/10 = month 12, year 2010).

Example: 1 - seal kit for 1" PG207STY00, date code 12/10

DECLARATION OF CONFORMITY TO CE

M&M international
A Spirax-Sarco Engineering plc company

DECLARATION OF CONFORMITY CE

We, M&M International S.r.l. registered office via A. Appiani 12 – 20121 Milano - Italy, declare under our sole responsibility that the products:

Piston Actuated Valves type PG, PN, CG, CN, PS, PB, PW, PH, PA, PF, PD, PC, PR (sizes DN15 to DN50)

and all derived versions (prefix "B", "R", "D" and "Z")

to which this declaration relates are in conformity with the following standards or other normative documents

No harmonized or other technical standards are applicable to these products

following the provisions of **97/23/EC Pressure Equipment Directive**

Series	Sizes	Requirements met	Module	Notified Body	Certificate No.
CG, CN and derived versions	All sizes	Art. 3.3	N/A	N/A	N/A
PG, PN, PS, PB, PW, PH, PA, PF, PD, PC, PR and derived versions	DN15 to DN25	Art. 3.3	N/A	N/A	N/A
	DN32 to DN50	Category I	A (Internal Production Control)	N/A	N/A

Orio al Serio, Italy, April 2012

The General Manager
Maurizio Torno

ATTENTION!

The attention of the purchaser, installer or user is drawn to special measures and limitations to use that must be observed when the product is used, installed or taken into service. Details of these special measures and limitations to use are available on request and are also contained in the product label and in the Installation, Maintenance and User Instructions provided together with the product.

M & M INTERNATIONAL Srl – Direzione, Uffici e Stabilimento: I – 24050 ORIO AL SERIO (BG) Via Portico, 17
Phone: ++39 / 035 / 531298 • Fax: ++39 / 035 / 531763 • Sede legale: I – 20121 MILANO (MI) – Via A. Appiani, 12
Cap.Soc.: € 2.000.000,00 i.v. - C.F.: 0249760 016 9 P.IVA: 0322288 096 9 – Int'l VAT N. IT03222880969 • R.E.A. MILANO n. 1658695 — Iscr. Registro Imprese Milano al n. 02497600169
Società soggetta all'attività di direzione e coordinamento di Spirax-Sarco Engineering plc

Declarations of Conformity of all our products can be downloaded from our website www.mminternational.net

171132UC0 - Printed in Italy, May 2012