Installation and Maintenance Manual

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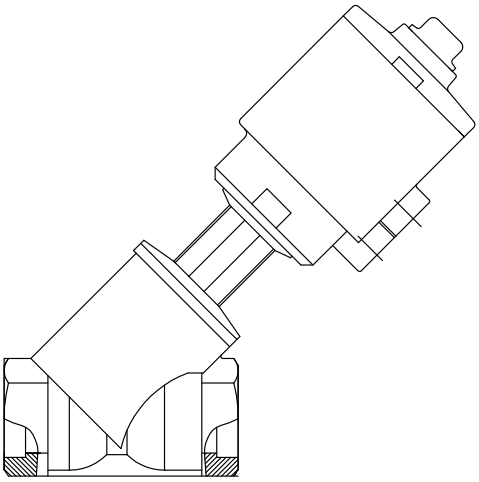
Forbes Marshall Piston Actuated Valve

FMPAV



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PLEASE NOTE - Throughout this manual this cautionary symbol is used to describe a potential damage or injury that might occur if the safety considerations are overlooked. This symbol denotes CAUTION, WARNING or DANGER.

1. Preface:

This manual is intended for anyone using, commissioning, servicing, or disposing the below mentioned products safely and efficiently.

Forbes Marshall Piston Actuated Valve [FMPAV]

Sizes: DN15 (1/2"), DN20 (3/4"), DN25 (1"), DN40 (1 ½ "), DN50 (2") with 63mm diameter/ 90mm diameter actuator.

PLEASE NOTE:

Throughout this manual the following cautionary symbol is used to describe a potential damage or injury that might occur if the safety considerations are overlooked.

2. Important Safety Notes:

Read this section carefully before installing/operating/maintaining the product. The precautions listed in this manual are provided for personnel and equipment safety. Furthermore, Forbes Marshall accepts no responsibility for accidents or damage occurring as a result of failure to observe these precautions. Note that the product is designed to perform for non-contaminated fluids only. A contamination in the form of chemical, foreign particle etc. can lead to problem with product performance and life of the product.

If these products in compliance with the operating instructions are, properly installed, commissioned, maintained and installed by qualified personnel (refer Section 2.7) the safety operations of these products can be guaranteed. General instructions for proper use of tools and safety of equipments, pipeline and plant construction must also be complied with.

2.1 Intended use:

Check if the product is suitable for intended use/ application by referring to the installation and maintenance instructions, name plates and technical information sheets.

i) The product is suitable for use as defined in the technical information sheet. In case the need arises to use the product on any other fluid please contact Forbes Marshall for assistance.

ii) Check for the suitability in conformance to the limiting conditions specified in technical information sheet of the product.

iii) The correct installation and direction of fluid flow has to be determined.

iv) Forbes Marshall products are not intended to resist external stresses, hence necessary precautions to be taken to minimize the same.

2.2 Accessibility and Lighting:

Safe accessibility and working conditions are to be ensured prior to working on the product.

2.3 Hazardous environment and media:

The product has to be protected from hazardous environment and check to ensure that no hazardous liquids or gases pass through the product.

2.4 Depressurizing of systems and normalizing of temperature:

Ensure isolation and safety venting of any pressure to the atmospheric pressure. Even if the pressure gauge indicates zero, do not make an assumption that the system has been depressurized.

To avoid danger of burns allow temperature to normalize after isolation.

2.5 Tools and consumables:

Ensure you have appropriate tools and / or consumables available before starting the work. Use of original Forbes Marshall replacement parts is recommended.

2.6 Protective clothing:

Consider for the requirement of any protective clothing for you/ or others in the vicinity for protection against hazards of temperature (high or low), chemicals, radiation, dangers to eyes and face, noise and falling objects.

2.7 Permits to work:

All work to be carried out under supervision of a competent person. Training should be imparted to operating personnel on correct usage of product as per Installation and Maintenance instruction. "Permit to work" to be complied with (wherever applicable), in case of absence of this system a responsible person should have complete information and knowledge on what work is going on and where required, arrange to have an assistant with his primary goal and responsibility being safety. "Warning Notices" should be posted wherever necessary.

2.8 Handling:

There is a risk of injury if heavy products are handled manually. Analyze the risk and use appropriate handling method by taking into consideration the task, individual, the working environment and the load.

2.9 Freezing:

Provision should be made to protect systems which are not self-draining, against frost damage (in environment where they may be exposed to temperatures below freezing point) to be made.

2.10 Disposal and returning the products:

While disposing the following, please take care that:

Viton:

- If in compliance with National and Local regulations, it can be disposed underground.

- Can be burned (Incineration) but Hydrogen Fluoride evolved from the product should be removed (in compliance with local and national regulations)

- Viton is insoluble in water

PTFE:

- Cannot be incinerated

- Keep PTFE in a separate vessel without mixing it with other materials for disposal. Consign it to a landfill site.

-PTFE gives rise to gaseous decomposition or fumes, if heated above its sintering temperature, which produces unpleasant effects if inhaled. Hence it is recommended to have good local ventilation around the system.

-In workshop where the PTFE is handled, smoking should be prohibited because the reaction of tobacco with PTFE will give rise to polymer fumes. Hence it is advised to avoid contamination of clothes with PTFE and to maintain personal cleanliness by washing hands after working with PTFE.

Customers and Stockist are reminded that, when returning products to Forbes Marshall 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.

3. Brief Product Information:

3.1 Description:

The Forbes Marshall Piston Actuated Valve, FMPAV, is a 2-port pneumatically actuated on/off stainless steel valve for use on steam, water, air, oil and gases.
A pneumatic signal acts on the actuator piston to open or close the valve with a spring return action. The valve plug has a PTFE soft seal to provide a tight shut off. A valve position indicator is included on standard and flow regulator models.

1. **NC (Normally Closed):**
   These valves are designed for flow over the seat (port 1 to 2)
   Caution: Not recommended for water hammer prevention.
2. **NO (Normally Open):**
   These valves are designed for flow under the seat (port 2 to1) Can be used to prevent water hammer on valve closure in liquid applications
3. **BD (Bi-directional Normally Closed):**
   These valves are designed for special applications that require flow in both directions and incorporates an anti-waterhammer design for liquid applications flowing under the seat (port 2 to 1)
   Note: To help prevent the possibility of water hammer on liquid applications flowing over the seat (port 1 to 2) the pressure should not exceed 1 bar g.

Options:

1. **Flow Regulator:**
   Limits valve lift to regulate maximum flow.
2. **Pilot Solenoids:**
   3/2 way solenoid valve for 230 VAC, 110 VAC and 24 VAC and 24 VDC
3. **Travel Switch:**
   Relays an electrical signal to indicate open or closed position of the valve.

Material:

Sr.No.	Part	Material	Standard
1.	Body	Stainless Steel	AISI 316 L
2.	Bonnet	Stainless Steel	AISI 316 L
3.	Plug	Stainless Steel	AISI 316 L
4.	Plug Seal	PTFE	
5.	Valve Steam	Stainless Steel	AISI 316
6.	Stem seal	PTFE chevrons	
*7.	Stem O ring	Viton	
8.	Actuator housing	Glass filled polyamide	
9.	Piston	Glass filled polyamide	
10.	Piston lip seal	Nitrile	
#11.	Gasket	PTFE	
#12.	"O" ring	Viton	

* Not Shown
# Sanitary tube ends ASME BPE: Aramide NBR Gasket

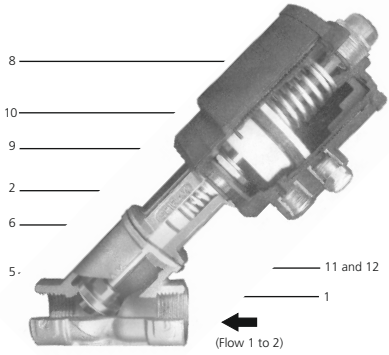


Figure 1: Forbes Marshall Piston Actuated Valve - Normally closed

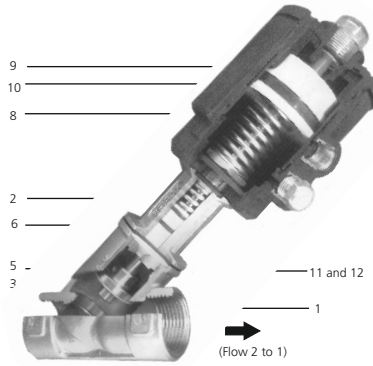


Figure 2: Forbes Marshall Piston Actuated Valve - Normally Open

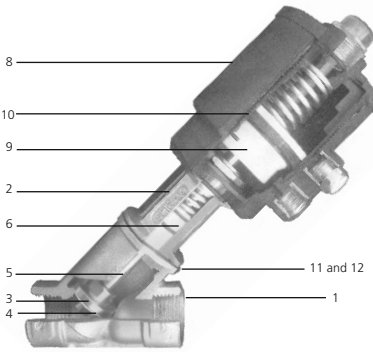


Figure 3: Forbes Marshall Piston Actuated Valve- Bi-Directional (Normally Closed)

3.2 Sizes and Pipe Connection:

Available Range : Sizes DN 15,20,25,40 and 50 Sizes are available with 63 mm Actuator

Valve Action	Screwed BSPT	Screwed NPT	Butt Weld to ANSI B 36.10	Socket Weld ANSI B 36.10	*Sanitary Clamp to ISO 2852	Flanged to ANSI 150
NC-Normally Closed (Flow over seat)	FMPAV-NC-A	FMPAV-NC-B	FMPAV-NC-W	FMPAV-NC-I	FMPAV-NC-S	FMPAV-NC-Q
NO-Normally Open (Flow under seat)	FMPAV-NO-A	FMPAV-NO-B	FMPAV-NO-W	FMPAV-NO-I	FMPAV-NO-S	FMPAV-NO-Q
BD-Bi-directional Normally Closed (Flow under or over seat)	FMPAV-BD-A	FMPAV-BD-B	FMPAV-BD-W	FMPAV-BD-I	FMPAV-BD-S	FMPAV-BD-Q

*All options available with DN 40 and 50 FMPAV 90.
***Note:** Clamp ends are not included.

3.3 Limiting Conditions:

Body design conditions Screwed, butt and socket weld	DN 15 to 25 DN 40 & 50	PN 25 PN 16
Flanged ANSI	DN 15-50	Class 150
Sanitary Clamp and tube compatible connections	DN 15-50	PN 10
Maximum design temperature	180°C	
Maximum design temperature	10°C	
Maximum saturated steam pressure		9 bar g
Maximum differential pressure	See table below	

Differential pressure for FMPAV-NC (Normally closed):

Valve Size DN	Actuator diameter	Flow Direction (1 to 2)	*Maximum differential pressure (bar g)	Pilot pressure min. (bar g)	Pilot pressure max. (bar g)
15	63	Over seat	20	1.5	10
20	63	Over seat	20	1.5	10
25	63	Over seat	20	1.5	10
40	63	Over seat	16	2.8	10
50	63	Over seat	11	2.8	10
40	90	Over seat	16	2.7	8
50	90	Over seat	16	2.7	8

Note: Maximum differential pressure with saturated steam is 9 bar g (180°C)

Differential pressure for FMPAV-NO (Normally open):

Valve Size DN	Actuator diameter	Flow Direction (1 to 2)	*Maximum differential pressure (bar g)	Pilot pressure min. (bar g)	Pilot pressure max. (bar g)
15	63	Under seat	16	1.5	10
20	63	Under seat	16	1.5	10
25	63	Under seat	16	1.5	10
40	63	Under seat	16	1.5	10
50	63	Under seat	12	1.5	10
40	90	Under seat	16	1.2	8
50	90	Under seat	16	1.2	8

Note: Maximum differential pressure with saturated steam is 9 bar g (180°C)

Differential Pressure for FMPAV-BD (Bi-directional normally closed) :

Valve Size DN	Actuator diameter	Flow Direction (1 to 2)	*Maximum differential pressure (bar g)	Flow direction (2 to 1)	Maximum differential pressure (bar g)	Pilot pressure min. (bar g)	Max (bar g)
15	63	Over Seat	16	Under seat	16	3.8	10
20	63	Over Seat	16	Under seat	16	3.8	10
25	63	Over Seat	16	Under seat	11	3.8	10
40	63	Over Seat	12	Under seat	4	3.8	10
50	63	Over Seat	8	Under seat	2.5	3.8	10
40	90	Over Seat	16	Under seat	8.5	3.1	8
50	90	Over Seat	16	Under seat	6	3.1	8

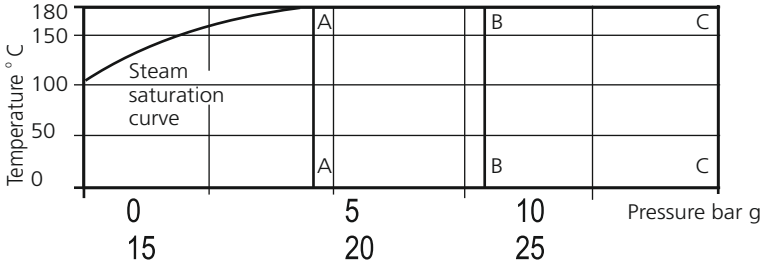
*Maximum differential pressure for all media pressures

Note: Maximum differential pressure with saturated steam is 9 bar g (180°C)

3.4 Technical Details:

Leakage	PTFE soft seal	ANSI Class VI
Flow Characteristics	Fast opening	On/off
Flow direction	NC flow over seat NO Flow underseat BD Flow overseat Flow underseat	Port 1 to 2 Port 2 to 1 Port 1 to 2 Port 2 to 1
Pilot media for *(water-a suitable drain line should be provided)	Air/water*	+60°C (140°F) max
Actuator housing (Clockwise-see sticker on actuator)	360°rotation	
Actuator size 63mm (2½")diameter 90mm (3½") diameter	Pilot connection ¼"BSP ¼"BSP	Max. pilot pressure 10 bar g (145 psi g) 8 bar g (116 psi g)

3.5 Operating range:



End Connections:

Screwed, Butt and Socket Weld		
A-A Max. operating pressure on saturate steam		9 bar g (130 psi g)
B-B Max. operating pressure	DN 40 and 50	16 bar g (232 psi g)
C-C Max. operating pressure	DN 15 to 25	25 bar g (360 psi g)
Flanged ANSI	DN 15-50	Class 150
Sanitary Clamp and Tube Ends	DN 15-50	FMPAV10

Kv Values:

Size	**DN15**	**DN20**	**DN25**	**DN 40**	**DN 50**
Kvs	4.2	7.8	18.6	42	51.6

For conversion Cv (UK)=Kv x 0.97 Cv (US)=1.17

3.6 Product Dimension and Drawing:
Dimensions / weights (approximate) in mm and Kg:

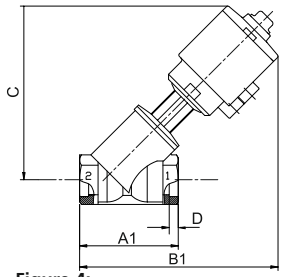


Figure 4: Dimensional drawing of FM PAV-screwed Butt & socket weld ends

FMPAV-screwed, Butt & socket weld ends

Valve Size DN	Actuator bore	A1	B1	C	D	Weight
15	63	65	186	155	5	1.2*
20	63	75	192	170	7	1.3*
25	63	90	206	180	8	1.5*
40	63	120	224	198	12	2.4*
50	63	150	243	202	16	2.9*
40	90	120	249	218	12	2.9*
50	90	150	269	228	16	3.7*

*Plus 0.2 kg for travel switch or flow regulator option
Dimensions "D" is the socket weld connections only

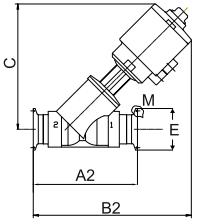


Figure 5: Dimensional drawing of FMPAV- Sanitary clamp ends ISO:2852

FMPAV-Sanitary clamp ends ISO:2852:

Valve Size DN	Actuator bore	A2	B2	C	E	Weight
15	63	102	205	165	34	1.3*
20	63	114	212	170	34	1.5*
25	63	129	226	180	50.5	1.8*
40	63	159	243	193	50.5	2.8*
50	63	190	263	202	64	3.6*
40	90	159	269	218	50.5	3.3*
50	90	190	288	228	64	4.4*

*Plus 0.2 kg for travel switch or flow regulator option

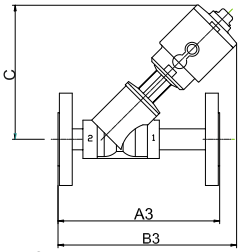


Figure 6: Dimensional drawing of FMPAV- ANSI Flanged Ends

FMPAV-ANSI 150 FLANGED ENDS:

Valve Size DN	Actuator bore	A3	B3	C	Weight
15	63	140	191	165	2.3*
20	63	152	200	170	2.7*
25	63	165	213	180	3.5*
40	63	203	232	193	6.2*
50	63	229	250	202	8.4*
40	90	203	258	218	6.7*
50	90	229	276	228	9.2*

*Plus 0.2 kg for travel switch or flow regulator option

FMPAV-Sanitary tube ends ASME BPE:

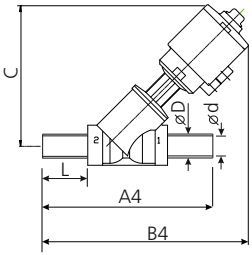


Figure 7: Dimensional drawing of FMPAV- Sanitary tube ends ASME BPE

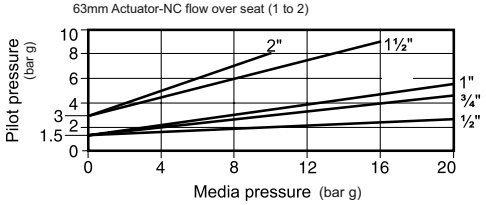
Valve Size (DN)	Actuator bore	A3	B3	C	L	ØD	Ød	Weight
15	63	132	213	165	38	12.7	9.4	1.5*
20	63	140	218	170	38	19.05	15.75	1.7*
25	63	150	229	180	38	25.4	22.1	1.9*
40	63	176	245	193	38	38.1	34.8	3.4*
50	63	187	255	202	38	50.8	47.5	4.3*
40	90	176	270	218	38	38.1	34.8	3.9*
50	90	187	280	227	38	50.8	47.5	5.1*

*Plus 0.2 kg for travel switch or flow regulator option

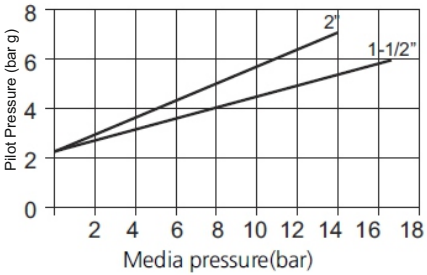
3.7 Pilot / Media Pressure Relationship:

FMPAV (NC) - flow over seat (1 to 2)

63 mm actuator

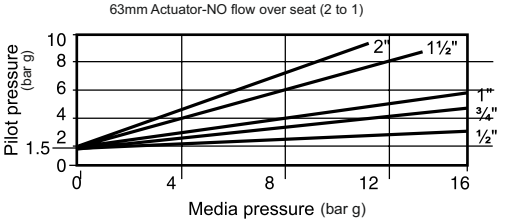


90 mm actuator

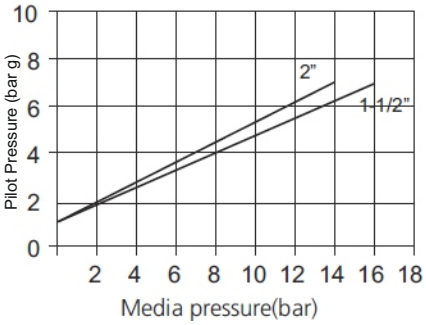


FMPAV (NO) - flow under seat (2 to 1)

63 mm actuator

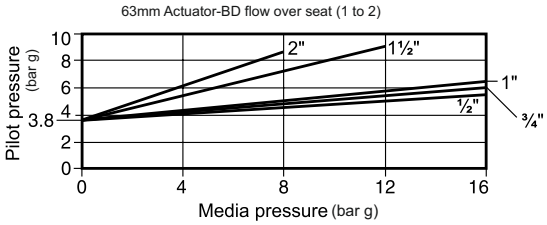


90 mm actuator

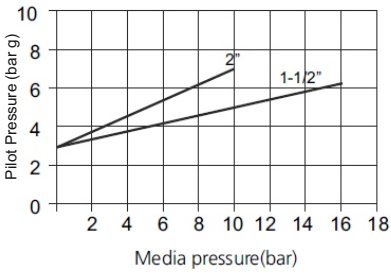


FMPAV (BD) - flow over seat (1 to 2)

63 mm actuator



90 mm actuator



4. Product Working Principle:

The Forbes Marshall piston actuated valve is a two port pneumatically actuated on/off valve. They are made up of stainless steel and can be used on steam, water, air, oil and gases.

A pneumatic signal is given to the actuator piston for either opening or closing the valve using the spring return action. There is a PTFE seal to give the valve a tight shut off against any leakages. A valve position indicator indicates the position of the valve.

5. Installation Guidelines:

Note: Before implementing any installations observe the 'Important Safety notes" in section 2. Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended installation.

1. There should be proper support to the connecting pipework to prevent any stress on the valve body
2. The Forbes Marshall Piston Actuated Valve can be installed in any orientation; the actuator can be rotated full 360 in the direction as shown in the label.
3. Ensure that the valve is mounted correctly for the flow direction required. The flow direction should be from 1 to 2 (over the seat) for normally closed and Bi-directional applications and 2 to 1 (under the seat) for normally open applications **(Refer to Figure 1,2,3)**. A Bi-directional FMPAV is a normally closed FMPAV with two actuating springs.
4. It should be ensured that the connecting pipework is isolated. Make sure no loose material enters the valve body, as that may damage the PTFE seal. For the same reason keep the pipework also free from scale and dirt.
5. Make sure not to exceed the performance rating of the valve.
6. When valve is fully open, a red travel indicator appears on the actuator top cover (not with flow regulator and travel switch models).

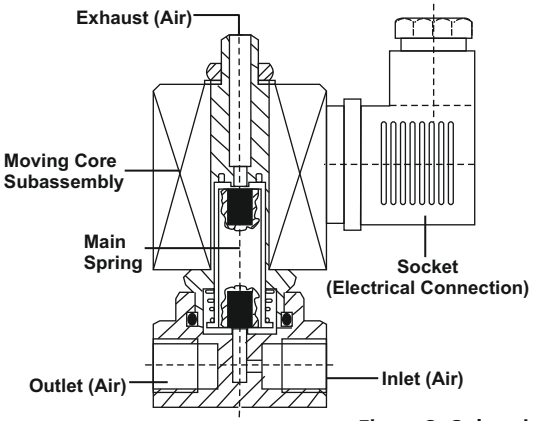
Caution: Butt weld and Socket weld versions must have the actuator removed prior to welding the body into the pipeline. This can be carried out as follows:

1) In case of NC and BD type FMPAV apply air pressure at the inlet port of the actuator, which will compress the spring and remove the downward force, then remove the actuator and valve stem.
2) In case of NO the actuator can be directly removed.

Accessories Available:

5.1 Solenoid Valves: (Refer to Figure 8 and 9)

Refer to figure 6 for proper mounting of the solenoid valve onto the actuator. Use the pilot connection marked 'NC' for a normally closed valve and similarly 'NO' for normally open valve. When using water instead of air as the pilot media remove the cap from the exhaust connection and add a drain line.



Ambient Temperature	60°CMax.	
Medium	Filtered compressed air	
Orifice (NW)	2	
Operating pressure (bar)	0-10	
Electric		
Voltage (V) ±10%	AC(50Hz)	DC
	220	24
Power Consumption	10VA	
Duty cycle	Continuous	
Type of coil protection	Ip65	
Class of insulation	Class F	
Materials of construction	Aluminium	

Figure8: Solenoid Valve

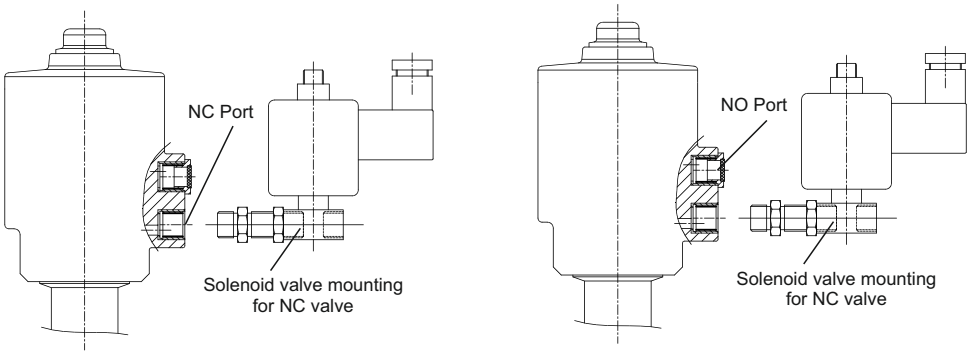


Figure 9: Solenoid valve mounting on FMPAV

Note: Make sure the power supply (AC or DC) given to the solenoid valve is in accordance to the specifications mentioned on solenoid valve.

5.2 Flow Regulator: (Ref. toFigure 10)

It is used to regulate the maximum flow of NC or NO valves. The regulator can also be used as a manual override on NO (normally open) valves.

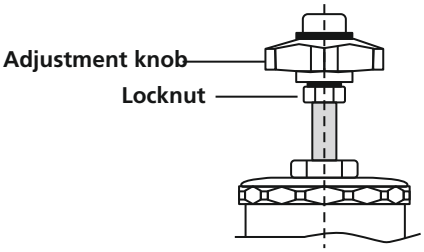


Figure10: Flow Regulator

5.3 Travel Switch : (Refer to Figure 11)

Travel switch provides an change over contact which can be used for indicating the position of the valve and this signal is provided by a magnetic sensor and a non-contact switch.

Type: 1Change over

Maximum rating:

1. Voltage (V) = 250 V **2.** Current (I) = 1 A **3.** Power (P) = 25 V

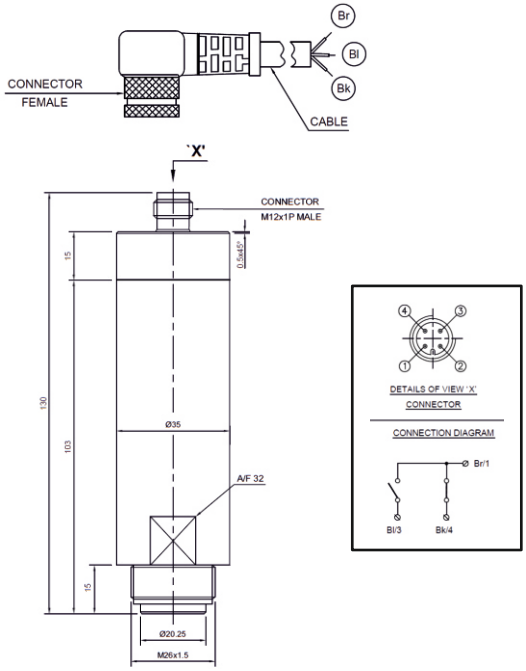


Figure 11: Travel Switch connection diagram

6. Start-up and Commissioning:

6.1 Flushing of lines:

As part of pre-installation all fluid handling equipment particularly piping should be thoroughly cleaned of scale and the internal debris which accumulates during construction. This is accomplished by blowing or flushing with air, steam, water and other suitable medium.

Note: For a detailed procedure on flushing of lines please visit Forbes Marshall website.

6.2 Commissioning of valve with solenoid:

1. Make sure the power supply (AC or DC) given to the solenoid valve is in accordance to the specifications mentioned.
2. Refer Capacity chart to select the required pilot pressure corresponding to given pressure media.
3. Observe the valve operation.

6.3 Commissioning of valve with flow regulator: (Refer to Figure 12)

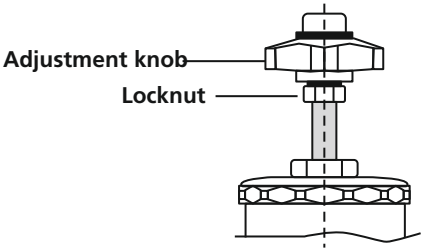


Figure12: Flow regulator

NC valves/BD valves:

1. Isolate the primary upstream and downstream valves and loosen the flow regulate lock nut.
2. Fully close the valve by rotating the adjustment knob clockwise.
3. Apply pilot pressure just sufficient to overcome the max differential pressure.
4. Open the primary upstream and downstream valves.
5. Now gradually open the valve by rotating the adjustment knob in anti-clockwise direction. Do so till the desired maximum flowrate is obtained and tighten the locknut of the regulator.
6. Now exhaust the media pressure to check for tight shut off and after that again apply the media pressure to check max flow conditions.

NO valves:

1. Fully open the flow regulator and loosen the regulator locknut.
2. With the primary media flowing gradually keep closing the valve using the regulator until the desired maximum flowrate is achieved.
3. Now tighten the locknut and apply sufficient pressure through pilot media to achieve tight shut off.
4. Exhaust the media pressure to check maximum desired flow conditions once again.

7. Maintenance Guidelines:

Before undertaking any maintenance on the product it must be isolated from both supply line and return line and any pressure should be allowed to safely normalize to atmosphere. The product should then be allowed to cool. With suitable isolation repairs can be carried out with the valve in the line.

7.1 Routine and Preventive Maintenance:

Sr. No.	Parameters to be checked	Frequency for checking and maintaining						
	Forbes Marshall Piston Actuated Valve	Immediately	Daily	weekly	Monthly	Quarterly	Half yearly	Annually
1	Test Pilot pressure		Y					
2	Clean internals of FMPAV							Y
3	Visual inspection for leakages		Y					
4	Arresting air/steam leaks	Y						

7.2 Tool Kit:

Component	Tool	Size
Retainer	box spanner	30 mm (A/F)
Actuator cylinder top lid	box spanner (custom made)	80 mm (A/F)
Actuator Housing Assembly	Actuator cap spanner	
Indicator pin	open spanner	8mm (A/F)
M6 Hex nut for piston and lip seal assembly	open spanner	15mm (A/F)
Top lid tightening	box spanner	27 mm (A/F)
Cap nut	Torque wrench 60-134 Loctite 620	
Bonnet to body tightening	box spanner	30 mm (A/F)
Stem spacer ring assembly	open spanner	16 / 17 mm (A/F)
M8 nut	open spanner	13 mm (A/F)
	Loctite 620 on threads for plug upper and valve stem.	-
	Bonnet holding unit	-
	Torque wrench QL - 200	-

7.3 Torques:

Component	Torque Range
Retainer	50Nm
Actuator Housing Assembly	50Nm
Cap nut	15Nm
Bonnet to body tightening	DN15-35Nm
	DN20- 45Nm
	DN25-50Nm
	DN40- 60Nm
	DN50-70Nm

7.4 Maintenance/Replacement Procedure: (Refer to Figures 13 and 14)

To replace any of the spare parts of the product, proceed as follows:

1. Isolate the upstream and the downstream valves.
2. Vent off all the pilot pressure from actuator
3. Disconnect the pilot pipe and remove the solenoid valve.
4. Remove the piston actuated valve from the pipe.
5. Remove the valve body and check if the PTFE head seal is damaged or broken. Replace if necessary.

   Note: In the normally closed valves, relieve the spring pressure acting on the head seal before removing the valve body to ensure no damage to the head seal. This can be carried out in following two ways:

   i) Retain the valve body and undo the actuator cover to relax the spring force, or

   ii) Apply pressure by air at the inlet port of the actuator so as to compress the spring **(6)** and remove the spring force acting down on the head seal **(7)**.

   For replacing the head seal **(7)**, hold the valve head **(7)** tightly and remove the retaining cap. Fit a new PTFE seal and refit cap nut **(11)** applying Loctite 620 to the threaded portion. Tighten the cap nut **(11)** to 15Nm. Replace the valve body **(5)**.

6. For inspecting or replacing the stem 'O' ring **(1)** or piston lip seal **(2)**, hold the valve body **(5)** tightly and remove the actuator housing. Remember that the internal spring **(6)** is under compression.

   Also remove the valve body **(5)** as described in the previous steps.

7. Hold the valve head **(7)**, unscrew the red travel indicator **(3)** and stem lock nut **(4)** and remove along with the two washers **(8, 12)**.

8. Remove the piston stem 'O' ring **(1)** and the washer **(9)**. Check the piston lip seal **(2)** and 'O' ring **(1)**, replace if required.

9. Clean any dirt or waste deposits present on the inside of the piston housing area. Apply Viton compatible inert grease to the 'O' ring **(1)** and piston lip seal **(2)**.

10. Reassemble in reverse order.

11. Refit the actuator cover and tighten to 50Nm for 63 mm actuator.

12. Refit the valve body **(5)** replacing the body seal **(10)** and body 'O' ring **(13)** and tighten to the recommended torque as specified in section 7.3

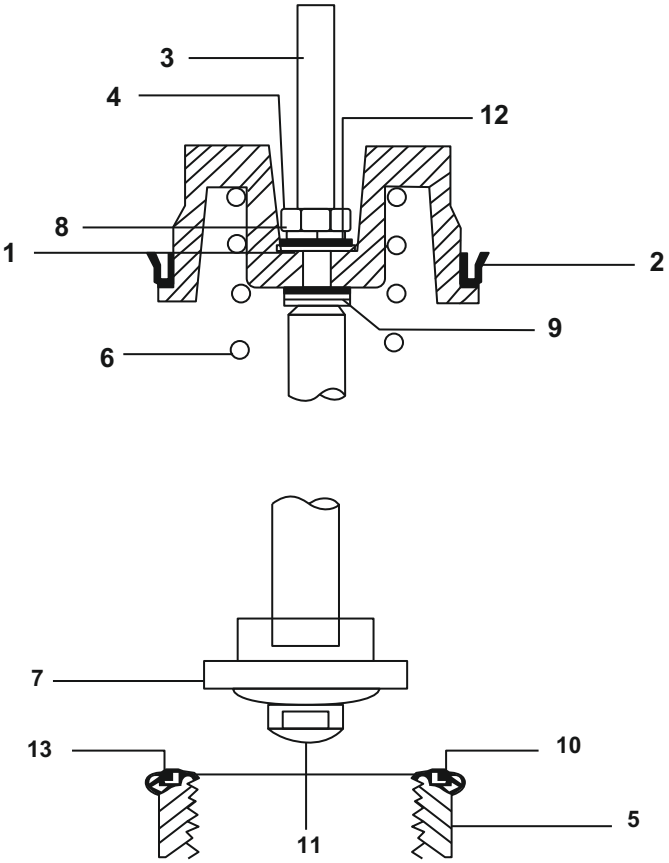


Figure 13: Normally open valves

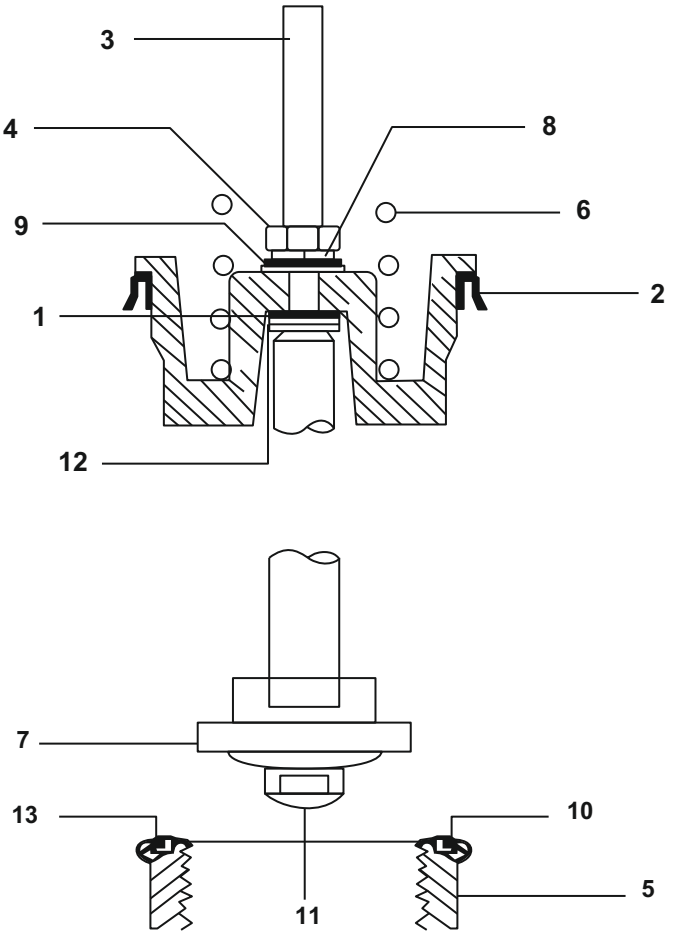


Figure 14: Normally closed/Bi-directional Normally Closed valves

8. Troubleshooting:

If the expected performance is unachievable after the installation of Forbes Marshall piston actuated valve, check the following points for appropriate corrective measure.

Failure Mode	Possible Cause	Remedy
FMPAV getting stuck	FMPAV getting stuck	1. Check the capacity charts (media and pilot pressures)
		2. Check for the FMPAV direction, for NC it should be from port 1 to 2, and for NO it should be from port 2 to 1
		3. Check solenoid valve power supply
Air Leakages	Air leakage from the plugged port	1. Check for lip seal damage or whether it is shifted.
		2. Check the top O- ring on the stem for damage. Replace if found damaged.
		3. Check the bottom O-ring for shifting or damage. If found damaged replace it
		4. Check the indicator O-ring for shifting or damage. If found damaged replace it
		5. Check the stem O-ring for shifting or damage. If found damaged replace it
Body-Bonnet steam leakage	Gasket and O ring damaged	1. Replace the body-bonnet gasket
Leakage through the main valve	Seat/PTFE head damaged	1. Check the pressure. It should not exceed 9 barg
		2. Check for deposition of foreign particle between body and plug seal.
		3. If damaged replace with new one.

9. Available Spares:

SPARE CODE	SPARE NAME
S2039646	Spare Seal Kit (DN15)
S2039647	Spare Seal Kit (DN20)
S2039648	Spare Seal Kit (DN25)
S2039649	Spare Seal Kit (DN40)
S2039650	Spare Seal Kit (DN50)
S2039651	Spare Seal Kit (DN40) FMPAV90
S2039652	Spare Seal Kit (DN50) FMPAV90
S20102957	Spare Piston with seals (Lip seal and actuator O ring) FMPAV63 all sizes

How to Order

Valve Selection Guide

025	FMPAV	63	NC	-	A	S	N	E
1	2	3	4		5	6	7	8

1. Valve Size (DN) : 15,20,25,40,50
2. Valve Type : FMPAV Forbes Marshall Piston Actuated Valve
3. Actuator Size : 63 mm diameter / 90mm diameter
4. Valve Position : NC Normally closed
   NO Normally open
   BD Bi directional
5. Connection : A-BSPT (screwed)
   B-NPT (screwed)
   W-Butt weld

   Note : Pipeline connection as per ANSI B 36.10
   I-Socket Weld

   Note : Pipeline connections as per ANSI B 36.10
   S-Sanitary ISO2852

   Note : Clamp and Clamp gaskets are not included
   X-Sanitary Tube ends to ASME BPE
   Q- Flanged ANSI 150
6. Options : S - Standard version with visual indicator.
   F - Flow regulator
   R - REED switch 250V, 1 amp, 1 change over type standard
7. N : NON – IBR
8. Blank : without solenoid valve

"E" Standard Solenoid valve, 3/2 way, 230V, with bulkhead connector. Solenoid valve with 110, 24 Vac and 24 Vdc as option.

How to Order Spares:

Always order spares by specifying the valve size, type and date code (given on actuator calendar i.e. 906= month September, year 2006) **Example:** Seal kit 025 FMPAV as per part no S2039648 for code, refer User Manual. ## Sanitary tube ends ASME BPE: Aramide, NBR gasket.

10. Warranty Period:

As per the ordering information and agreement in the contract.

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Forbes Marshall
Trusted Partners.
Innovative Solutions.

Forbes Marshall
B-85, Phase II, Chakan Indl Area
Sawardari, Chakan
Tal. Khed, Dist. Pune 410501. INDIA.
Tel : +91 02135 393400

Forbes Marshall Steam Systems Pvt. Ltd.
(Formerly Spirax Marshall Pvt. Ltd.)
Opp 106th Milestone
Bombay Poona Road, Kasarwadi,
Pune 411 034. INDIA.
Tel.: 91(0)20-27145595, 39858555
CIN No : U27109PN1959PTC011334

Email : seg@forbesmarshall.com

www.forbesmarshall.com