Forbes Marshall

ARCA

TÜV CERT ISO 9001:2000 Certificate: 04100 94 0422-E3 TÜV NORD

## Control and On/Off Valves

# Quality Engineered Control Valves

*Specialists in Process Efficiency and Energy Conservation*

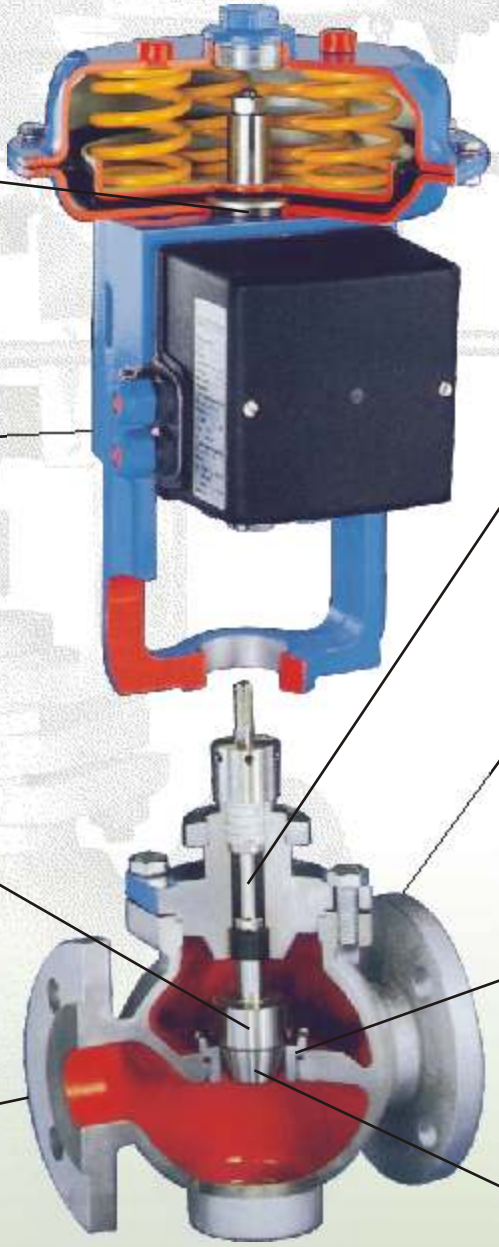
# Maximum technology, minimum maintenance

*For over five decades Forbes Marshall has manufactured and provided advanced quality instrumentation products for various industries such as Power, Oil & Gas, Food & Beverages, Pharmaceuticals, Pulp & Paper, Chemicals and HVAC.*

*Forbes Marshall control valves and actuators are designed to cater to a variety of industrial control applications like steam, liquids and gases.*

*Forbes Marshall valves are modular in design and versatile in construction. They are designed and manufactured using advanced CNC machinery thus making them virtually trouble free to operate with minimum maintenance. Coupled with single spring and multi spring diaphragm actuators, control valve series 100, 140 and 160 provide complete control solutions to most critical service conditions.*

*Our well-trained representatives are ready to help you select, size and install the most appropriate valve for your service.*



Air to open or air to close Actuator

- Low profile compact Multi Spring Actuator
- Rolling diaphragm design
- Field reversible

Namur Mounted
- Pneumatic/Electropneumatic positioner
- Limit Switches
- Solenoid Valves
- Feed back position transmitter

Stem ground, roller burnished for optimal matching with packing

- Standard parabolic plug
- Multistep perforated plug for high differential pressure
- Pressure balanced plug for high actuator thrust forces
- 3 way plug for flow mixing/dividing

Soft seat option for bubble tight shut off to Class VI.

Replaceable screwed seat for ease of maintenance

ANSI 150 - ANSI 900
Ends Flanged/Butt Weld

Linear, Equal Percentage, and ON/OFF characterised plugs as standard options.

Soft seat option for bubble-tight (Class VI) shut-off available upon request.

# What is a control valve ?

*Process plants consist of hundreds or even thousands of control loops all networked together to produce a product to be offered for sale. Each of these control loops is designed to keep some important process variable such as pressure, flow, level, temperature, etc, within a required operating range to ensure quality of the end product. Each of these loops receives and internally creates disturbances that detrimentally affect the process variable and interaction from other loops of the network provides disturbances that influence the process variable.*

*To reduce the effect of these load disturbances, sensors and transmeitters collect information about the process variable and its relationship to some desired set point. A controller then processes this information and decides what must be done to get the process variable back to where it should be after the load disturbance occurs. When all the measuring, comparing and calculating are done, some type of final control element must implement the strategy selected by the controller.*

*The most common final control element in the process control industries is the control valve. The control valve manipulates a flowing fluid such as gas, steam, water, chemical compound to compensate for the load disturbance and keep the regulated process variable as close as possible to the desired set point.*

## Series 100

### Applied for decades

The series 100 is the standard globe design control valve with pneumatic or electric actuator with a lot of extension possibilities and a wide range of application. The basic equipment is fitted with a parabolic plug and strong high capacity shaft guiding and serves at the same time as basis for multiple types of execution.

The present generation of the series 100 has been updated as a result of decades of development. The worth and flexibility of the series 100 remain unchanged. Production on most modern CNC machining centres guarantees the highest precision and simple exchange of parts. The body design is optimized to flow conditions with large volume and possibility to install low noise trims

Saves cost for maintenance and installation. Exchanging of seat and plug within 15 minutes

Capacity can easily be adapted to any modification and extensions due to modular design. During maintenance the valve remains in the pipeline. The seats are not welded and can be unscrewed and serviced even after years of operation

## Applicable standards

| | |
|---|---|
| Design | ANSI B16.34 |
| Flanges | ANSI B16.5 |
| F/F Distance | ANSI B16.10 |
| Leakage Class | ANSI B16.104<br>FCI70.2 |

## Series 110/120

### For high pressure control and flow control application

Forbes Marshall –Series 110/120 valves are designed for use in application with high Pressure and high differential applications.

Series 110/120 valves with multi-step perforated plugs make these valves suitable for use in super-critical pressure drops. The trim designs ensures reduced cavitation effects

With sub-critical pressure reduction.

Pressure balance trims and anti-cavitation trims are a part of these valves.

Series 110/120 valves can be fitted with a variety of actuator options including MSA and U series pneumatic actuators.

## Series 140 /160

### For critical applications

The series 140 is applied where high differential pressure and critical operating conditions require a double guided valve. The standard series 140 valve comprises of the parabolic plug with high loadable shaft guiding on both sides. The plug thereby remains balanced at high differential pressures. Further the modular construction allows the mounting of pneumatic or electric actuators.

Exchangeable trims, parabolic or perforated by choice during sizing or selection, single or multistep on request

## Valve Technical Information

| | |
|---|---|
| Body / Bonnet | Carbon steel, alloy steel, stainless steel. Other materials such as monel, hastalloy, alloy - 20, Aluminimum Bronze etc available on request |
| Plug | Stainless steel - AISI 410, 316, 304, 316L, 304L and others available on request |
| Seat | Stainless steel - AISI 410, 316, 304, 316L, 304L and others available on request |
| Spindle | Stainless steel - AISI 410, 316, 304, 316L, 304L and others available on request |
| Nitriding / Stelliting | Standard for high differential pressure applications |
| Gland rings | Graphite (above 180 Deg C) for steam applications; PTFE for liquid applications |
| Bonnet Gasket | Graphite (upto ANSI Classes 150 and 300)SS304; Spiral wound (Class 600, 900 and 1500) |
| Leakage Class | As per ANSI B16.104 / FCI 70.2 |
| Standard Finish | Leakage class IV, 0.01% of rated Kv |
| Ground Finish | Leakage class V, 0.005% of rated Kv |
| Soft seating | Leakage Class VI, 0.0001% of rated Kv |
| Flow characteristics | Linear, equal percentage, modified linear. Other specials available on request |
| Extended Bonnet | Temperatures ≥ 300° C |
| | |

# Series 100: #150/#300, 3 flanged control valve body.

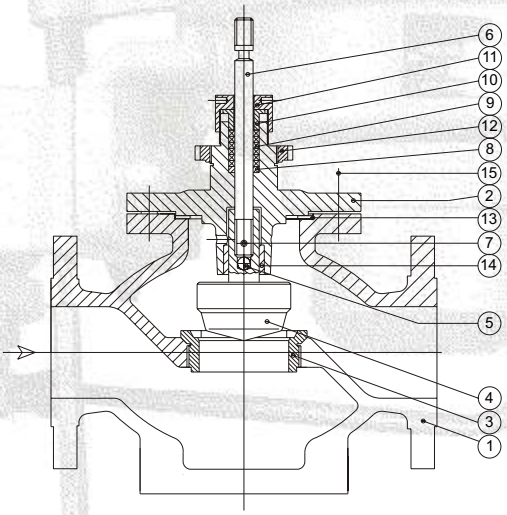
***- For all standard flow control, pressure control and ON/OFF applications.***

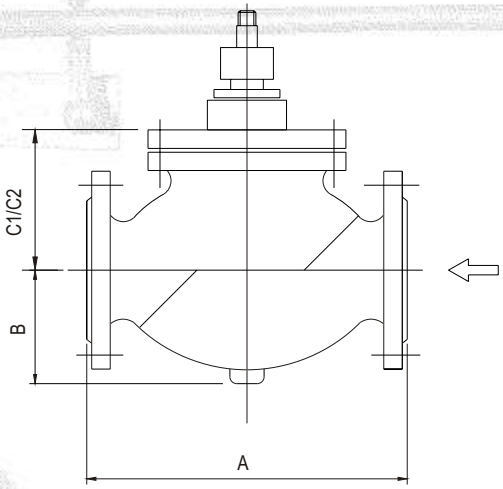
*Forbes Marshall series 100 valve bodies are designed for all standard industrial control applications in Carbon steel, Alloy steel and Stainless steel materials. They are manufactured using advanced automatic forming and casting techniques to ensure high quality and precision.*

*Basic valves are equipped with parabolic plugs and high capacity shaft guiding. Cage guided perforated plug and silencer baskets are offered for critical pressure drops.*

*Series 100 valve bodies can be fitted with MSA and U series pneumatic actuators for a variety of applications.*

| Sr No. | Description |
|---|---|
| 1 | Valve Body (3 Flange) |
| 2 | Top Flange |
| 3 | Seat |
| 4 | Plug |
| 5 | Ball |
| 6 | Spindle |
| 7 | Spring Dowell Pin |
| 8 | Bottom Ring |
| 9 | Gland Packing Rings |
| 10 | Gland Follower |
| 11 | Gland Nut |
| 12 | Slotted Nut |
| 13 | Gasket Top |
| 14 | Guide Bush |
| 15 | Stud & Nut |




*C1 - with cooling fins
*C2 - without cooling fins

***Features :***

- *Design as per ANSI B 16.34.*
- *Flow optimized design with optional low noise trims.*
- *Flanged, butt welded and socket welded end connections.*
- *Soft seating options to ensure leakage class VI.*

# Series 110: ANSI #900 Series 120: ANSI #1500, Single Seat Control valve body: (Size 25NB, 50NB: 3 flange body, 80NB,100NB: #900, 4 flange body) (Size 25NB, 50NB: 3 flange body, 80NB,150NB: #1500, 4 flange body)

***For high pressure control and flow control application***

*Forbes Marshall –Series 110/120 valves are designed for use in application with high Pressure and high differential applications.*

*Series 110/120 valves with multi-step perforated plugs make these valves suitable for use in super-critical pressure drops. The trim designs ensures reduced cavitation effects*

*With sub-critical pressure reduction.*

*Pressure balance trims and anti-cavitation trims are a part of these valves.*

*Series 110/120 valves can be fitted with a variety of actuator options including MSA and U series pneumatic actuators.*

# Series 140: # 300, 4 flanged control valve body
# Series 160: # 600, 4 flanged control valve body

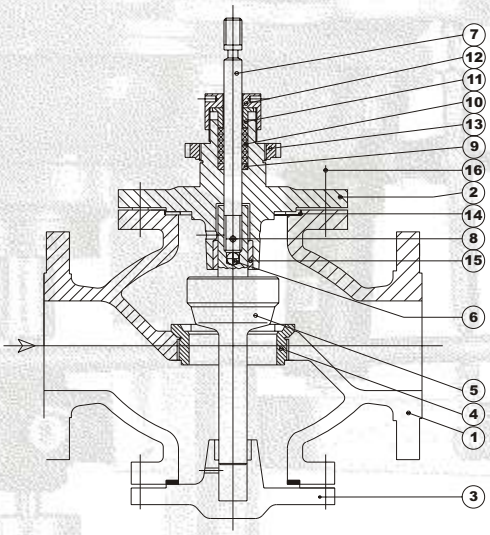
***- For critical presure control and flow control applications.***

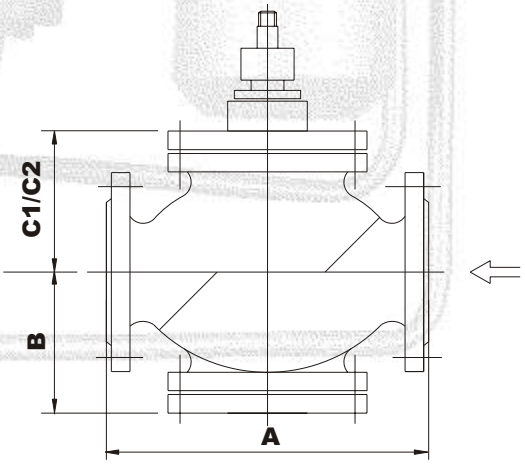
*Forbes Marshall - Series 140 / 160 valves are designed for use in applications with high pressure drops and critical operating conditions. Its parabolic plug with high loadable shaft guiding on top and bottom makes it suitable for extreme operating conditions.*

*Optional cage guided multi-step perforated plugs and low noise silencer baskets make these valves suitable for use in super-critical pressure drops. This trim design ensures cavitation free operation with sub-critical pressure reduction.*

*Series 140/160 valves can be fitted with a variety of actuator options including MSA and U series pneumatic actuators. Electric actuators can also be custom built with these valves for your application needs.*

| Sr No. | Description |
|---|---|
| 1 | Valve Body (4 Flange) |
| 2 | Top Flange |
| 3 | Bottom Flange |
| 4 | Seat |
| 5 | Plug |
| 6 | Ball |
| 7 | Spindle |
| 8 | Spring Dowell Pin |
| 9 | Bottom Ring |
| 10 | Gland Packing Rings |
| 11 | Gland Follower |
| 12 | Gland Nut |
| 13 | Slotted Nut |
| 14 | Gasket Top |
| 15 | Guide Bush |
| 16 | Stud & Nut |




*C1- with cooling fins
*C2 - without cooling fins

***Features :***

- Roller burnished stem for optimal match with packing
- Replaceable screwed seat for easy maintenance
- Multi-step perforated plug option for critical pressure drops.
- High rangeability 40 : 1
- Carbon steel, Alloy steel and Stainless steel bodies.

| SR | ANSI CLASS VALVE SIZE (MM) | #150 | | | | #300 | | | | #600 | | | | #900 | | | | #1500 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A | B | C | WT | A | B | C | WT | A | B | C | WT | A | B | C | WT | A | B | C | WT |
| 1 | 15NB | — | — | — | — | 190 | 52 | 82 | 7 | — | — | — | — | — | — | — | — | — | — | — | — |
| 2 | 25NB | 184 | 58 | 82 | 6 | 197 | 68 | 82 | 8 | 210 | 68 | 144 | 18 | 273 | 75 | 144 | 24 | 273 | 75 | 144 | 34 |
| 3 | 40NB | 222 | 68 | 82 | 17 | 235 | 80 | 97 | 22 | — | — | — | — | — | — | — | — | — | — | — | — |
| 4 | 50NB | 254 | 105 | 120 | 19 | 267 | 105 | 120 | 31 | 286 | 134 | 132 | 44 | 375 | 89 | 132 | 50 | — | — | — | — |
| 5 | 80NB | 298 | 105 | 140 | 25 | 317 | 105 | 141 | 50 | 337 | 182 | 196 | 80 | 381 | 182 | 195 | 95 | 470 | 157 | 210 | 117 |
| 6 | 100NB | 352 | 130 | 151 | 35 | 368 | 134 | 151 | 71 | 394 | 219 | 228 | 149 | 457 | 219 | 228 | 180 | — | — | — | — |
| 7 | 150NB | 406 | 180 | 203 | 90 | 473 | 184 | 203 | 132 | 508 | 239 | 275 | 315 | 610 | 220 | 275 | 365 | 787 | 280 | 325 | 380 |
| 8 | 200NB | 543 | 225 | 240 | 125 | 568 | 225 | 240 | 200 | 610 | 313 | 307 | 530 | — | — | — | — | — | — | — | — |
| 9 | 250NB | — | — | — | — | 708 | 320 | 310 | 450 | 787 | 304 | 398 | 1050 | — | — | — | — | — | — | — | — |
| 10 | 300NB | — | — | — | — | 775 | 374 | 390 | 850 | — | — | — | — | — | — | — | — | — | — | — | — |
| 11 | 350NB | — | — | — | — | 928 | 452 | 457 | 1515 | — | — | — | — | — | — | — | — | — | — | — | — |
| 12 | 400NB | — | — | — | — | 1057 | 430 | 508 | 1825 | — | — | — | — | — | — | — | — | — | — | — | — |

Note: Weight in Kg's

# Technical data: Series 100, 110, 120, 140 & 160

## KV Chart For Parabolic Plugs

| Sr. No. | Valve Size (mm) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 15 | 25 | 40 | 50 | 80 | 100 | 150 | 200 | 250 |
| 1 | 0.1 | 0.1 | 11 | 18 | 26 | 43 | 68 | 100 | 150 |
| 2 | 0.16 | 0.16 | 18 | 26 | 43 | 68 | 100 | 150 | 260 |
| 3 | 0.25 | 0.25 | 26 | 43 | 68 | 100 | 150 | 260 | 380 |
| 4 | 0.4 | 0.4 | — | — | — | — | — | — | — |
| 5 | 0.63 | 0.63 | — | — | — | — | — | — | — |
| 6 | 1 | 1 | — | — | — | — | — | — | — |
| 7 | 1.6 | 1.6 | — | — | — | — | — | — | — |
| 8 | 2.5 | 2.5 | — | — | — | — | — | — | — |
| 9 | 4 | 4 | — | — | — | — | — | — | — |
| 10 | — | 7 | — | — | — | — | — | — | — |
| 11 | — | 11 | — | — | — | — | — | — | — |

## Valve size, Parabolic Plug KV and Silencer basket KV data

| Sr No | Valve Size NB | Parabolic Kvs | Single fold silencer LK1 Kvs | Double fold silencer LK2 Kvs |
|---|---|---|---|---|
| 1 | 25 | 11 | | |
| 2 | 25 | 7 | | |
| 3 | 25 | 4 | 3.9 | |
| 4 | 40 | 11 | 10.9 | |
| 5 | 50 | 41 | 41 | |
| 6 | 50 | 25 | 25 | 23.8 |
| 7 | 50 | 17.8 | 17.8 | 17.2 |
| 8 | 80 | 100 | | |
| 9 | 80 | 68 | 63 | |
| 10 | 80 | 43 | 41 | 39 |
| 11 | 100 | 150 | 132 | |
| 12 | 100 | 100 | 94 | 86 |
| 13 | 100 | 68 | 66 | 63 |
| 14 | 150 | 380 | 317 | 250 |
| 15 | 150 | 260 | 237 | 205 |
| 16 | 150 | 150 | 145 | 137 |
| 17 | 200 | 650 | 556 | 512 |
| 18 | 200 | 380 | 358 | 329 |
| 19 | 200 | 260 | 253 | 242 |
| 20 | 250 | 380 | 358 | 329 |

Notes :

- Noise reduction same as that of perforated trims. However more economical
- Application of Roboter (pneumatic pressure reducer) possible with silencer baskets
- Applicable for pressure ratings of ANSI 150 and 300 only

## KV value perforated trim

| Sr No | Valve Size (NB) | Lift (mm) | Seat Diameter (mm) | L1-1step =% | L1-1step Linear | L2-2step Linear | L3-3step Linear |
|---|---|---|---|---|---|---|---|
| 1 | 15 | 20 | 16 | 2.7 | 2.2 | 2.1 | |
| | | 20 | 19 | 3.9 | 4.5 | 4.1 | 4.1 |
| 2 | 25 | 20 | 24 | 5.5 | 6.7 | 6.1 | |
| | | 20 | 32 | 8.1 | 13.5 | 10.8 | |
| 3 | 40 | 20 | 37 | 10.9 | 17.9 | 14 | |
| | | 30 | 32 | 15 | 15 | 13.8 | 8.4 |
| | | 30 | 37 | 17.8 | 20 | 17.9 | 9.7 |
| 4 | 50 | 30 | 48 | 25 | 40 | 23.5 | |
| | | 30 | 62 | 36 | 60 | 30.6 | 18.2 |
| 5 | 80 | 30 | 71 | 42 | 70 | 35.3 | |
| 6 | 100 | 30 | 90 | 52 | 85 | 47.1 | |
| | | 60 | 71 | 90 | 105 | 67.5 | 67 |
| | | 60 | 90 | 125 | 160 | 103 | 88 |
| 7 | 150 | 60 | 113 | 159 | 240 | 132 | 107 |
| | | 60 | 143 | 200 | 320 | 171 | |
| 8 | 200 | 60 | 172 | 250 | 400 | 209 | |
| | | 100 | 143 | 333 | 420 | 270 | |
| | | 100 | 172 | 485 | 560 | 395 | |
| 9 | 250 | 100 | | | | | |
| 10 | 300 | 100 | 285 | | | 560 | |
| 11 | 400 | 100 | 400 | | 2500 | | |

Notes :

- For calculations and selection of summary KV values, it is necessary to apply the correct x values in the calculation
- The KV values mentioned in the chart are the maximum values for a particular seat diameter
- Intermediate KV values shall be applicable based on customer specifications

# Multi Spring Actuator MSA

## Pneumatic diaphragm actuator

*The Forbes Marshall multi spring actuator model MSA is designed to be used with Series 100, 140 & 160 control valve bodies. The MSA series comes with a wide range of thrust values and the actuator is field reversible to suit your control action.*

*Its rolling diaphragm design offers high reliability, power and actuator speed with negligible friction. MSA actuators are compact, easy to install even in places with limited space and has a low volume air chamber that shortens response time.*

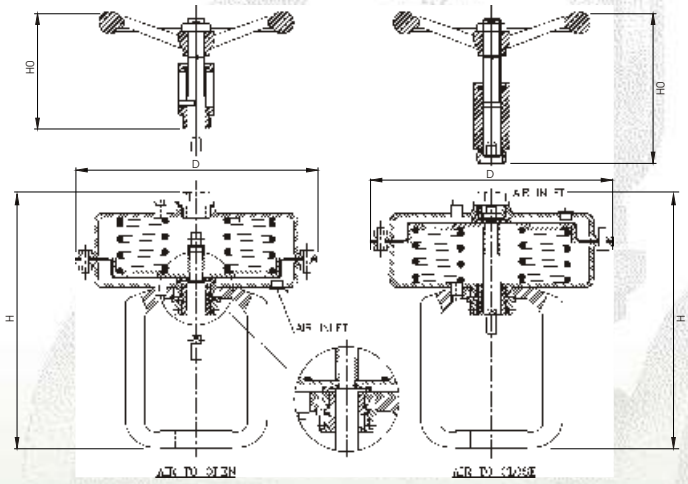
### Actuator Technical Information

| | |
|---|---|
| Temperature range | -13ºC to 90ºC |
| Maximum operating pressure | 6 bar |
| Linearity | < 2% |
| Hysterisis | Max. 3% |
| Air supply connection | ¼" NPT* |

*Others available on request

### Materials

| | |
|---|---|
| Diaphragm housing | Mild Steel |
| Diaphragm | Purbunan Rubber |
| Springs | Stainless Chrome Steel |
| Spindle | Stainless Chrome Steel |
| Yoke | Carbon Steel |




**Thrust force (Kgs) - Air to Open**

| Actuator Model | Spring Range (Bar g) From | To | Air to Open Spring to Close Thrust Force (Kgs) | Air to Close Spring to Open Thrust Force (Kgs) |
|---|---|---|---|---|
| MSA1-20 | 0.2 | 1 | 59 | 1516 |
| MSA1-20 | 0.3 | 1.3 | 79 | |
| MSA1-20 | 0.4 | 2 | 119 | |
| MSA1-20 | 0.5 | 1 | 136 | |
| MSA1-20 | 0.6 | 1.3 | 182 | |
| MSA1-20 | 0.8 | 1.6 | 244 | |
| MSA1-20 | 0.9 | 2 | 272 | |
| MSA1-20 | 1.1 | 2.1 | 325 | |
| MSA1-20 | 1.3 | 2.1 | 396 | |
| MSA1-20 | 1.6 | 3.1 | 489 | |
| MSA1-20 | 1.8 | 2.8 | 528 | |
| MSA1-20 | 2.6 | 4.2 | 792 | |
| MSA1-30 | 0.2 | 1 | 57 | 1516 |
| MSA1-30 | 0.3 | 1.3 | 76 | |
| MSA1-30 | 0.4 | 2 | 113 | |
| MSA1-30 | 0.4 | 1.6 | 133 | |
| MSA1-30 | 0.6 | 2.1 | 177 | |
| MSA1-30 | 0.9 | 3.1 | 266 | |
| MSA1-30 | 1 | 2.1 | 279 | |
| MSA1-30 | 1.3 | 2.8 | 372 | |
| MSA1-30 | 1.9 | 4.2 | 558 | |

| Air Pressure | Thrust force (Kgs) - Air to Close |
|---|---|
| | MSA1 |
| 4 | 956 |
| 4.5 | 1116 |
| 5 | 1276 |
| 5.5 | 1436 |

***Features :***

- Field reversible- Flexible control action
- Rolling diaphragm design-High reliability
- Compact - Saves installation space
- Low volume air chamber - High positioning speed and short response time

# Universal Diaphragm Actuator - Series UI,UIII & UV

## - high actuating power at affordable cost

*Forbes Marshall universal diaphragm actuator series UI, UIII & UV features a pneumatic actuator designed for applications that demand high actuating power. Its optional reinforced spring with compact air chamber delivers up to 14000 lbf thrust force for extreme pressure control applications.*

*These diaphragm actuators can be fitted with standard accessories like positioner, feed back transmitter, limit switches and air filter regulator. Optional hand wheel is provided for emergency operations.*

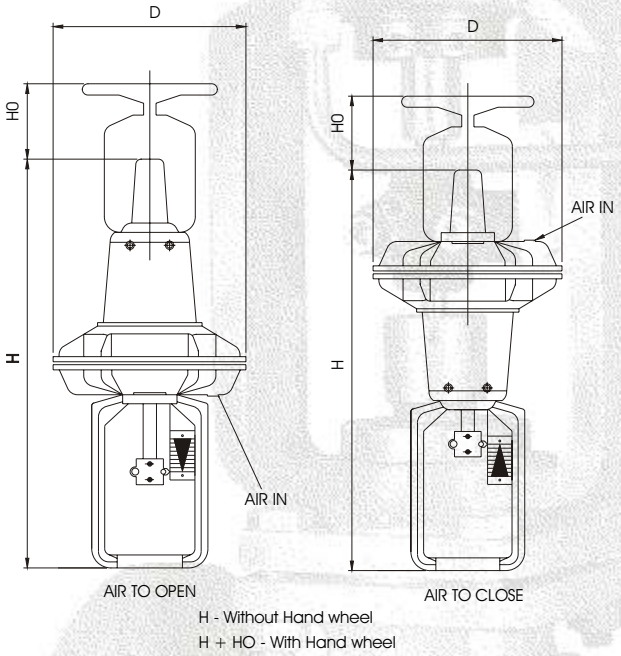
**Actuator Technical Information**

| | |
|---|---|
| Temperature range | -13ºC to 90ºC |
| Maximum operating pressure | 6 bar |
| Linearity | < 2% |
| Hysterisis | Max. 3% |
| Air supply connection | ¼" NPT* |

*Others available on request

**Materials**

| | |
|---|---|
| Diaphragm housing | Diecast Aluminium |
| Diaphragm | Purbunan Rubber |
| Springs | Stainless Chrome Steel |
| Spindle | Stainless Chrome Steel |
| Yoke | Carbon Steel |




H - Without Hand wheel
H + HO - With Hand wheel

***Features :***

- Field reversible - Flexible control action
- High thrust forces - Usable in extreme pressure reductions
- Low maintenance - Less inventory
- Cast aluminum housing - Light weight & corrosion resistance

| Air Supply Range Bar | Standard UI-20 UI-30 0.2-1.0 Bar | Standard UIII-30 UIII-60 0.2-1.0 Bar Forces in KG | Standard UV-60 UV-100 0.2-1.0 Bar |
|---|---|---|---|
| 2.8 | 560 | 1270 | 2540 |
| 3.0 | 620 | 1410 | 2820 |
| 3.5 | 776 | 1760 | 3525 |
| 4.0 | 930 | 2115 | 4230 |
| 4.5 | 1085 | 2470 | 4935 |
| 5.0 | 1240 | 2820 | 5640 |
| 5.5 | 1395 | 3170 | 6345 |
| 6.0 | 1550 | 3525 | 7050 |

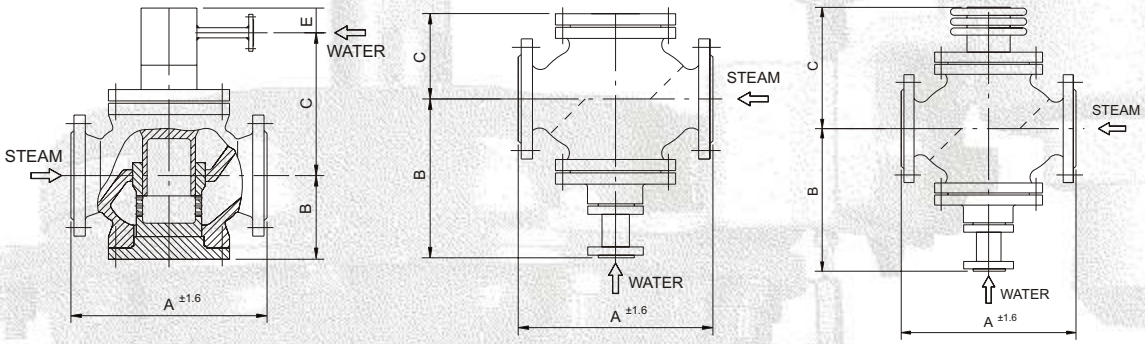
**Thrust force (Kgs) - Air to Open**

| Actuator Model | Spring Range (Kgs) | | Air to Open Spring to Close Thrust Force (Kgs) | Air to Close Spring to Open Thrust Force (Kgs) |
|---|---|---|---|---|
| | From | To | | |
| UI-20.n | 0.2 | 1 | 60 | 1550 |
| UI-20.n | 0.4 | 1.2 | 125 | |
| UI-20.n | 0.6 | 1.4 | 185 | |
| UI-20.n | 0.8 | 1.6 | 250 | |
| UI-20.n | 1 | 1.8 | 310 | |
| UI-20.v | 1.2 | 2.25 | 370 | |
| UI-20.v | 1.4 | 2.45 | 435 | |
| UI-20.v | 1.6 | 2.65 | 500 | |
| UI-20.v | 1.8 | 2.25 | 560 | |
| UI-30.n | 0.2 | 1 | 60 | 1550 |
| UI-30.n | 0.4 | 1.2 | 125 | |
| UI-30.n | 0.6 | 1.4 | 185 | |
| UI-30.n | 0.8 | 1.6 | 250 | |
| UI-30.n | 1 | 1.8 | 310 | |
| UI-30.v | 1.2 | 2.8 | 370 | |
| UI-30.v | 1.4 | 3 | 435 | |
| UIII-30.n | 0.2 | 1 | 140 | 3525 |
| UIII-30.n | 0.4 | 1.2 | 280 | |
| UIII-30.n | 0.6 | 1.4 | 425 | |
| UIII-30.n | 0.8 | 1.6 | 565 | |
| UIII-30.n | 1 | 1.8 | 705 | |
| UIII-30.v | 1.2 | 2 | 845 | |
| UIII-30.v | 1.4 | 2.2 | 985 | |
| UIII-30.v | 1.6 | 2.4 | 1130 | |
| UIII-30.v | 1.8 | 2.6 | 1270 | |
| UIII-30.v | 2 | 2.8 | 1410 | |
| UIII-30.v | 2.2 | 3 | 1550 | |
| UIII-60.n | 0.2 | 1 | 140 | 3525 |
| UIII-60.n | 0.4 | 1.2 | 280 | |
| UIII-60.n | 0.6 | 1.4 | 425 | |
| UIII-60.n | 0.8 | 1.6 | 565 | |
| UIII-60.v | 1 | 2.6 | 705 | |
| UIII-60.v | 1.2 | 2.8 | 845 | |
| UIII-60.v | 1.4 | 3 | 990 | |
| UV-60.n | 0.2 | 1 | 280 | 7050 |
| UV-60.n | 0.4 | 1.2 | 565 | |
| UV-60.n | 0.6 | 1.4 | 845 | |
| UV-60.n | 0.8 | 1.6 | 1130 | |
| UV-60.n | 1 | 1.8 | 1410 | |
| UV-60.v | 1.2 | 2.45 | 1690 | |
| UV-60.v | 1.4 | 2.65 | 1975 | |
| UV-60.v | 1.6 | 2.85 | 2255 | |
| UV-60.v | 1.75 | 3 | 2465 | |
| UV-60.v | 2.4 | 4.5 | 2800 | |
| UV-60.v | 2.9 | 4.55 | 3000 | |
| UV-100.n | 0.2 | 1 | 280 | 7050 |
| UV-100.n | 0.4 | 1.2 | 1975 | |
| UV-100.n | 0.6 | 1.4 | 845 | |
| UV-100.v | 0.8 | 2.8 | 1130 | |
| UV-100.v | 1 | 3 | 1410 | |

# Combined Pressure Reducing & Desuperheating Valve

*Both steam pressure reduction & temperature reduction (Desuperheating) are done in a single valve making it an extremely efficient, cost effective and compact solution.*

- Compact design
- High rangeability 40:1
- Reduced noise level
- Efficient cooling water atomization
- Reduced straight runs for pressure & temperature measurements
- Better control over change in flow




**Combined PRDS valve - water entry through bottom**

| Sr | Ansi Class → | #150 | | | | #300 | | | | #600 | | | | #900 | | | | #1500 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Valve Size (mm) ↓ | A | B | C | WT | A | B | C | WT | A | B | C | WT | A | B | C | WT | A | B | C | WT |
| 1 | 15NB | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 2 | 25NB | — | — | — | — | 197 | 220 | 82 | 14 | 210 | 185 | 144 | 24 | 273 | 190 | 144 | 34 | 273 | 190 | 144 | 38 |
| 3 | 40NB | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 4 | 50NB | — | — | — | — | 267 | 252 | 120 | 37 | 286 | 260 | 132 | 51 | 375 | 194 | 132 | 62 | — | — | — | — |
| 5 | 80NB | — | — | — | — | 317 | 262 | 141 | 58 | 337 | 255 | 196 | 91 | — | — | — | — | — | — | — | — |
| 6 | 100NB | — | — | — | — | 368 | 273 | 151 | 79 | 394 | 335 | 228 | 161 | — | — | — | — | — | — | — | — |
| 7 | 150NB | — | — | — | — | 473 | 361 | 203 | 144 | 508 | 348 | 275 | 330 | — | — | — | — | — | — | — | — |
| 8 | 200NB | — | — | — | — | 568 | 355 | 240 | 217 | — | — | — | — | — | — | — | — | — | — | — | — |
| 9 | 250NB | — | — | — | — | 708 | 425 | 313 | 467 | — | — | — | — | — | — | — | — | — | — | — | — |
| 10 | 300NB | — | — | — | — | 775 | 555 | 390 | 867 | — | — | — | — | — | — | — | — | — | — | — | — |
| 11 | 350NB | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 12 | 400NB | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

Note: Weight in Kg's.

**Combined PRDS valve - water entry through top**

| Sr | Ansi Class → | #150 | | | | #300 | | | | #600 | | | | #900 | | | | #1500 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Valve Size (mm) ↓ | A | B | C | WT | A | B | C | WT | A | B | C | WT | A | B | C | WT | A | B | C | WT |
| 1 | 15NB | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 2 | 25NB | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 3 | 40NB | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 4 | 50NB | — | — | — | — | 267 | 235 | 120 | 38 | 286 | 134 | 235 | 52 | 375 | 89 | 235 | 59 | — | — | — | — |
| 5 | 80NB | — | — | — | — | 317 | 154 | 278 | 58 | 337 | 182 | 266 | 90 | 381 | 182 | 266 | 105 | 470 | 157 | 283 | 129 |
| 6 | 100NB | — | — | — | — | 368 | 164 | 280 | 81 | 394 | 219 | 285 | 161 | 457 | 179 | 285 | 191 | — | — | — | — |
| 7 | 150NB | — | — | — | — | 473 | 209 | 375 | 144 | 508 | 240 | 400 | 327 | 610 | 220 | 437 | 380 | 787 | 280 | 437 | 395 |
| 8 | 200NB | — | — | — | — | 568 | 250 | 375 | 215 | 610 | 337 | 447 | 545 | — | — | — | — | — | — | — | — |
| 9 | 250NB | — | — | — | — | 708 | 315 | 510 | 468 | 787 | 304 | 672 | 1080 | — | — | — | — | — | — | — | — |
| 10 | 300NB | — | — | — | — | 775 | 374 | 610 | 728 | — | — | — | — | — | — | — | — | — | — | — | — |
| 11 | 350NB | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 12 | 400NB | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |

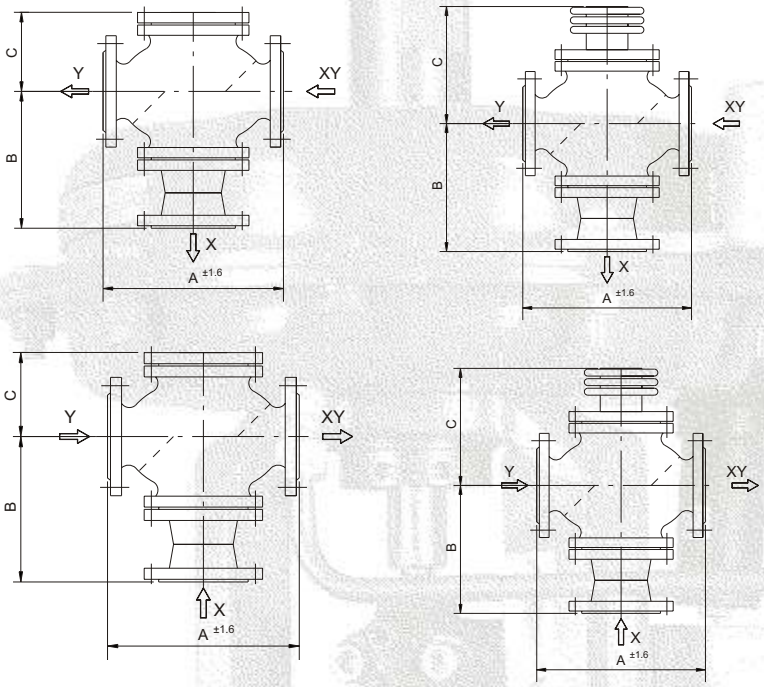
Note: Weight in Kg's.

# Three -way valves

*For control & on/off function mixing and flow dividing.*

*Applications:*

- All thermodynamic processes
- Cooling system of motor ships
- Heating and cooling systems for plate pressing, vulcanizing and other presses
- Attemperator application




| SR | ANSI CLASS VALVE SIZE (mm) | #300 A | B | C | WT |
|---|---|---|---|---|---|
| 1 | 15NB | | | | |
| 2 | 25NB | 197 | 155 | 82 | 18 |
| 3 | 40NB | — | — | — | — |
| 4 | 50NB | 267 | 195 | 120 | 42 |
| 5 | 80NB | 317 | 230 | 141 | 64 |
| 6 | 100NB | 368 | 250 | 151 | 85 |
| 7 | 150NB | 473 | 460 | 203 | 149 |
| 8 | 200NB | 568 | 418 | 240 | 222 |
| 9 | 250NB | 708 | 418 | 310 | 478 |
| 10 | 300NB | — | — | — | — |
| 11 | 350NB | — | — | — | — |
| 12 | 400NB | — | — | — | — |

# Valve mounted pressure controller model 902

*The model 902 is a valve mounted pneumatic controller used with Forbes Marshall control valves for pressure control or over flow control application. The controller comes pre-assembled making it simple for the user to install and operate with very little modification to the existing set up.*

**Features:**

- Save installation cost : Controller comes pre-assembled on the valve
- Saves loop cost: Eliminates the need of separate sensor, transmitter, I/P, controller and positioner
- Low maintenance

**Technical data**

| | | |
|---|---|---|
| Supply air pressure | : | 1.2 to 3 bar |
| Sensitivity | : | < 0.02% of set point |
| Hysterisis | : | < 1.0% of set point |
| Air consumption | : | 0.3 Nm³/hr |

Notes :

- Recommended distance of sensing point 4.5 feet
- Not recommended with perforated trims
- Maximum air supply pressure 45 psig

# Positioner

**Nomenclature**

| Description | Model Number |
|---|---|
| Pneumatic Weatherproof | 820-PP |
| Electro pneumatic Weatherproof | 830-WP |
| Electropneumatic with feedback - 831-WP | 831-WP |
| Electropneumatic with limit switch | 832-WP |
| Electro pneumatic Ex. proof | 830-EX |
| Electro pneumatic Ex. proof with feedback - 831-EX | 831-EX |
| Electro pneumatic Ex. proof with limit switch - 832 -EX | 832-EX |

**Technical Information**

| Type | 820-PP Pneumatic | 830-WP Electro pneumatic |
|---|---|---|
| Input | 0.2 - 1 Bar | 4 -20 mA |
| Working resistance | NA | Approx -200 Ohms |
| Impedence | NA | 250 (+/-) 15 Ohms |
| Supply pressure | 1.4 - 6 kg/cm2 | 1.4 - 6 kg/cm2 |
| Air consumption | 3 Litres/min at 1.4 bar | 3 Litres/min at 1.4 bar |
| Air flow capacity | 80 Litres/min at 1.4 bar | 80 Litres/min at 1.4 bar |
| Linearity | (+/-) 1% of FS | (+/-) 1% of FS |
| Hysterisis | (+/-) 1% of FS | (+/-) 1% of FS |
| Repeatability | (+/-) 0.5% of FS | (+/-) 0.5% of FS |
| Air connection | ¼" NPT (F) | ¼" NPT (F) |
| Gauge connection | 1/8" NPT (F) | 1/8" NPT (F) |
| Ambient temperature | (-) 20º C to 70º C | (-) 20º C to 70º C |
| Protection class | IP 66 | IP 66 |
| Weight | 2.2 Kg | 2.8 Kg |
| Ex proof certification | NA | IIB / IIC |
| Electric connection | NA | G ½ (PF ½) |

# Pressure Reducing and Desuperheating Stations

Forbes Marshall pressure reducing station & PRDS station are engineered and factory assembled units. They are designed inline with good steam engineering practices using our proprietary software. FM manufactures all the components including instrumentation which enables stringent quality control for each component. Every component is tested on live steam and the entire assembly is hydro tested and ready to mount on your existing piping.

# Desuperheating valves - variable & fixed nozzle

*Dynamic Temperature Control for your entire system*

### VARIABLE NOZZLE DESUPERHEATER

- Turndown upto 25 : 1 and higher available on request
- No separate water control valve necessary. Saves total installed cost
- Available in 6 & 9 nozzle design
- For use on all pipes 4" and above

### FIXED NOZZLE DESUPERHEATER

- Single nozzle Kv as low as 0.0162 and as High as 1.6
- Number of nozzle limited only by pipeline dia
- For use on all pipes 6" and above
- Turndown upto 4 : 1
- Ideal for use in conjunction with Forbes Marshall water control valve

### MINICOOLER DESUPERHEATER

- For use with pipe sizes 1" through 4"
- Single nozzle Kv as low as 0.0162 and as High as 1.6
- Turndown ratio upto 4 : 1
- Ideal for use in conjunction with Forbes Marshall water control valve

## Your local Forbes Marshall representative would be happy to provide you with any help and advice you might need

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Kanpur
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