

Actuators are light weight and compact

Reverse and direct acting multi-spring actuators

Reinforced rolling diaphragm provides constant effective area throughout the stroke cycle allowing for the most accurate control

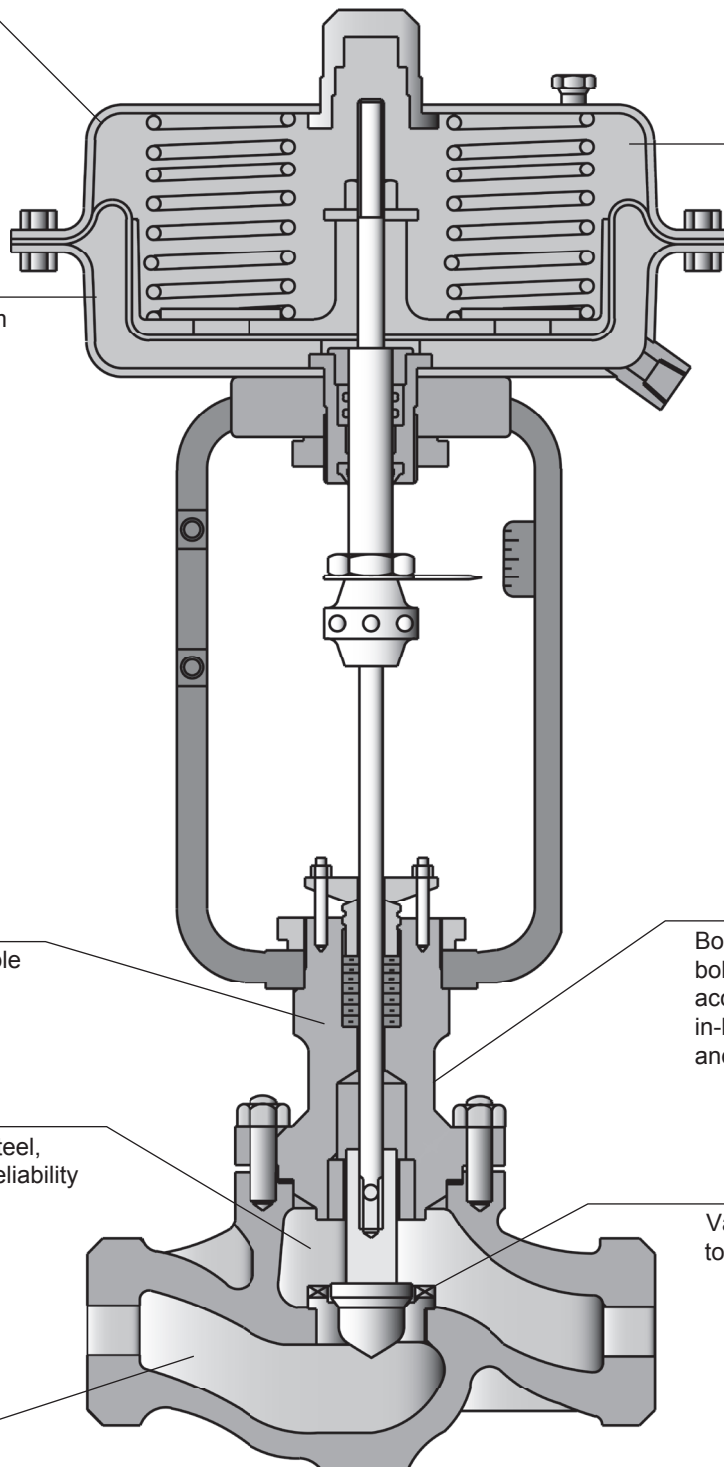
Low friction package available in teflon or graphoil

All trim parts are stainless steel, which means long life and reliability

Carbon steel body construction

Body with top entry trim and bolted bonnet facilitates easy access to all internal parts for in-line inspections, maintenance and trim replacement

Variety of trim options available to satisfy vast application range including reduced port trims, enabling nearest accurate selection for precise control requirements



## Python® - 1100 Series Control Valves

When accurate control is desired from your steam or water applications the Armstrong Python® 1100 Series Control Valve will squeeze every bit of performance out of your system and deliver precise control. With a wide range of materials, sizes, trim, and other features, you are sure to find the Python® can accurately control your system. The Python® 1100 Series Control Valve is constructed and equipped with state of the art materials and is designed to meet the most stringent budget.

### Product Features

- Series 1100 valves are Globe two-way single seated body design valves, which satisfy the majority of control applications for HVAC, industrial and commercial markets.
- Body with top entry trim and bolted bonnet facilitates easy access to all internal parts for in-line inspection, maintenance and trim replacement.
- Stream line flow path provides large flow capacity.
- Variety of trim options are available to satisfy a vast application range including reduced port trims enabling nearest accurate selection for precise control requirements.
- Trims with top bush guided plugs are available with simple construction for stable operation, assuring high rangeability and turndown ratios.
- Micro trims available for control of minute flow rates.
- Trims with large guide plugs are available for full pressure balancing effect providing an economical choice for high pressure applications.
- All parts are renewable in-line.
- Carbon steel or stainless steel body construction.
- Reverse and direct acting multi-spring actuators.
- Available in 1/2" - 2" NPT and 1/2" - 8" ANSI flange design.
- Rated for class IV shut-off.

### Accessories

- Pneumatic Valve Positioner
- Electro-Pneumatic (E/P) Valve Positioner
- Digital Valve Positioners
- Pressure/Temperature Controllers
- Air Filter Regulator



Python® Series 1100  
Control Valve



Python® Series 1100  
Control Valve with Positioner

**Control Valves - 1100 Series List of Materials**

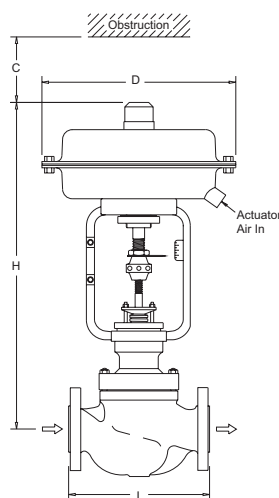
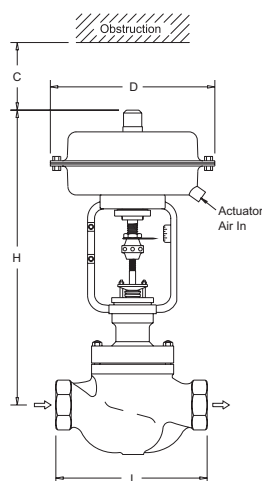
|                    |                                                        |
|--------------------|--------------------------------------------------------|
| Valve Body*        | Carbon Steel A216 Gr. WCB                              |
| Bonnet*            |                                                        |
| Valve/Valve Seat   | Stainless Steel AISI 431                               |
| Valve Stem         | Stainless Steel 316                                    |
| Gland Packing      | V-Teflon - option 1 (366°F Max.)<br>Grafoil - option 2 |
| Yoke               | S.G. Iron                                              |
| Actuator Spring    | Chrome Vanadium/Spring Steel                           |
| Actuator Diaphragm | Nitrile Reinforced with Nylon Fiber                    |

\*Stainless steel available.

**Control Valves - 1100 Series Specifications**

|                     |              |                    |
|---------------------|--------------|--------------------|
| Flow                |              | Equal Percentage   |
| Leakage             |              | ANSI Class IV      |
| Rangeability        |              | 50:1               |
| Travel              | 1/2" to 1"   | 11/16" (18 mm)     |
|                     | 1-1/2" to 2" | 1-1/8" (28 mm)     |
|                     | 2-1/2" to 4" | 1-1/2" (38 mm)     |
|                     | 6" to 8"     | 2-1/4" (58 mm)     |
| Maximum Temperature |              | 450°F (232°C)*     |
| Maximum Pressure    |              | 300 psig (20 bar)* |

\*Higher pressure and temperature valves available.


**Control Valves - 1100 Series Dimensions and Weights**

| Size  |     | Face-to-Face “L” |     |        |     |        |     | “C” |     | “D”     |     | “H”     |      | Weight |    |      |     |      |     |
|-------|-----|------------------|-----|--------|-----|--------|-----|-----|-----|---------|-----|---------|------|--------|----|------|-----|------|-----|
| in    | mm  | NPT              |     | 150#   |     | 300#   |     |     |     |         |     |         |      | NPT    |    | 150# |     | 300# |     |
|       |     | in               | mm  | in     | mm  | in     | mm  | in  | mm  | in      | mm  | in      | mm   | lb     | kg | lb   | kg  | lb   | kg  |
| 1/2   | 15  | 6-1/2            | 165 | 7      | 178 | —      | —   | 4   | 102 | 9-7/16  | 240 | 18-1/2  | 470  | 31     | 14 | 34   | 15  | —    | —   |
| 3/4   | 20  | 6-1/2            | 165 | 7-1/8  | 181 | —      | —   | 4   | 102 | 9-7/16  | 240 | 18-1/2  | 470  | 31     | 14 | 34   | 15  | —    | —   |
| 1     | 25  | 7-3/4            | 197 | 7-1/4  | 184 | 7-3/4  | 197 | 4   | 102 | 9-7/16  | 240 | 18-1/2  | 470  | 33     | 15 | 36   | 16  | 40   | 18  |
| 1-1/2 | 40  | 9-1/4            | 235 | 8-3/4  | 222 | 9-1/4  | 235 | 5   | 127 | 11-7/16 | 290 | 20-9/32 | 515  | 51     | 23 | 55   | 25  | 60   | 27  |
| 2     | 50  | 10-1/2           | 267 | 10     | 254 | 10-1/2 | 267 | 5   | 127 | 11-7/16 | 290 | 20-9/32 | 515  | 60     | 27 | 65   | 30  | 71   | 32  |
| 2-1/2 | 65  | —                | —   | 10-7/8 | 276 | 11-1/2 | 292 | 6   | 127 | 15      | 380 | 25-3/16 | 640  | —      | —  | 120  | 54  | 135  | 61  |
| 3     | 80  | —                | —   | 11-3/4 | 299 | 12-1/2 | 318 | 6   | 152 | 15      | 380 | 25-3/16 | 640  | —      | —  | 135  | 61  | 154  | 70  |
| 4     | 100 | —                | —   | 13-7/8 | 353 | 14-1/2 | 368 | 6   | 152 | 15      | 380 | 26-3/8  | 670  | —      | —  | 176  | 80  | 220  | 100 |
| 6     | 150 | —                | —   | 17-3/4 | 451 | 18-5/8 | 473 | 7   | 175 | 17-5/8  | 448 | 43-1/2  | 1105 | —      | —  | 330  | 150 | 396  | 180 |
| 8     | 200 | —                | —   | 21-3/8 | 543 | 22-3/8 | 568 | 7   | 175 | 17-5/8  | 448 | 45-1/4  | 1150 | —      | —  | 551  | 250 | 650  | 295 |

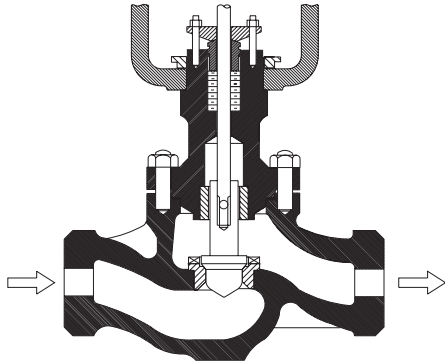
Note: Additional sizes up to 20" available upon request.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

# Python® - 1100 Series Control Valves

## Contour Top Guided

The Contour Top Guided trims are the preferred choice for a variety of control applications due to their simple construction. Heavy top guided trim provides maximum support to impart complete stability. The plug shank is guided at the lowest portion of the bonnet minimizing the effect of side thrust on the valve plug and eliminating trim vibration.



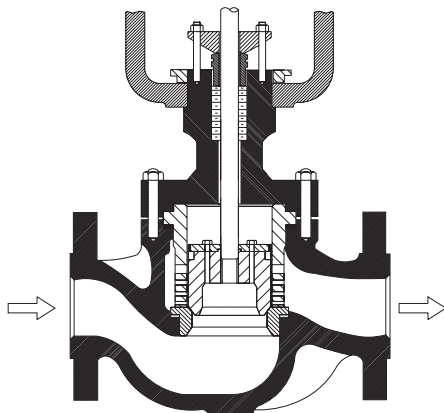
Contoured Top Guided Trim (Unbalanced)

## Multi-Hole Cage Guided - Pressure Balanced

The large guide trims with pressure balancing effect enable the valve to handle higher  $\Delta P$  shut off without employing high power actuators. The flow characteristic is achieved through plug contour. Equalizing holes are opened in the plug which effectively cancel out the unbalanced force impressed on the top and bottom of the valve plug.

Pressure balance sealing is attained; 1) At seating surface  
2) Through pressure balance seal rings which are fitted on the plug seal applying pressure along the inner wall of the large guide having a ground, honed and chrome plated surface.

This multi-hole trim also helps with noise attenuation.



Multi-Hole Cage Guided  
Pressure Balanced Trims

## Contoured Top Guided Cv Values

| Valve Size          |                    | Trim Size |     | Cv  |
|---------------------|--------------------|-----------|-----|-----|
| in                  | mm                 | in        | mm  |     |
| *1/2,<br>*3/4,<br>1 | *15,<br>*20,<br>25 | 1         | 25  | 13  |
|                     |                    | 3/4       | 20  | 9   |
|                     |                    | 1/2       | 15  | 5   |
|                     |                    | 5/16      | 8   | 3   |
|                     |                    | 1/4       | 6   | 2   |
|                     |                    | 1/8       | 3   | 1   |
| 1-1/2               | 40                 | 1-1/2     | 40  | 30  |
|                     |                    | 1-1/4     | 32  | 20  |
|                     |                    | 1         | 25  | 13  |
| 2                   | 50                 | 2         | 50  | 50  |
|                     |                    | 1-1/2     | 40  | 30  |
|                     |                    | 1-1/4     | 32  | 20  |
| 2-1/2               | 65                 | 2-1/2     | 65  | 80  |
|                     |                    | 2         | 50  | 50  |
|                     |                    | 1-1/2     | 40  | 30  |
| 3                   | 80                 | 3         | 80  | 110 |
|                     |                    | 2-1/2     | 65  | 80  |
|                     |                    | 2         | 50  | 50  |
| 4                   | 100                | 4         | 100 | 200 |
|                     |                    | 3         | 80  | 110 |
|                     |                    | 2-1/2     | 65  | 80  |
| 6                   | 150                | 6         | 150 | 400 |
|                     |                    | 5         | 125 | 300 |
|                     |                    | 4         | 100 | 200 |
| 8                   | 200                | 8         | 200 | 640 |
|                     |                    | 6         | 150 | 400 |
|                     |                    | 5         | 125 | 300 |

**Note:** Additional sizes up to 20" available upon request.

\* The trim size must be less than or equal to the valve size.

## Multi-Hole Cage Guided Cv Values

| Valve Size |     | Trim Size |     | Cv  |
|------------|-----|-----------|-----|-----|
| in         | mm  | in        | mm  |     |
| 1-1/2      | 40  | 1-1/2     | 40  | 24  |
|            |     | 1-1/4     | 32  | 16  |
|            |     | 1         | 25  | 10  |
| 2          | 50  | 2         | 50  | 40  |
|            |     | 1-1/2     | 40  | 24  |
|            |     | 1-1/4     | 32  | 16  |
| 2-1/2      | 65  | 2-1/2     | 65  | 64  |
|            |     | 2         | 50  | 40  |
|            |     | 1-1/2     | 40  | 24  |
| 3          | 80  | 3         | 80  | 90  |
|            |     | 2-1/2     | 65  | 64  |
|            |     | 2         | 50  | 40  |
| 4          | 100 | 4         | 100 | 160 |
|            |     | 3         | 80  | 90  |
|            |     | 2-1/2     | 65  | 64  |
| 6          | 150 | 6         | 150 | 320 |
|            |     | 5         | 125 | 240 |
|            |     | 4         | 100 | 160 |
| 8          | 200 | 8         | 200 | 510 |
|            |     | 6         | 150 | 320 |
|            |     | 5         | 125 | 240 |

**Note:** Additional sizes up to 20" available upon request.





### Multi-Spring Actuators: Series M

The "M" Series control valve actuators are diaphragm actuators with pre-compressed multi-spring construction. They are compact (fewer parts), easy to maintain and quickly reversible. The actuators are suitable for regulating and on/off applications. Various models are available covering small to larger thrust requirements.

The increasing air pressure supply moves the diaphragm and actuator stem opposing the spring force. With decreasing air pressure supply, the spring force moves the diaphragm in the opposite direction and back to the normal position. To get various loading capacities the number of springs are altered.

### Specifications

- Maximum Diaphragm Pressure:  
50 psi (3.5 bar) for Model M and Mp
- Actuator travel:  
11/16", 1-1/8", 1-1/2", 2-1/4"  
(18, 28, 38, 58 mm)
- Diaphragm:  
Nitrile reinforced with Nylon fiber
- Operating Temperature Range:  
-40° to 176°F (-40° to 80°C)
- Connections:  
1/4" NPT (F) for Models 00 and 11  
3/8" NPT (F) for Models 22 and 33
- Permissible Linearity and Hysteresis:  
±5% of Signal Pressure Range

### Features:

- Utility - Applicable for regulating and on-off applications
- High Power - Variety of models provide choice for low and high thrust requirements
- Construction - Due to multi-spring arrangement the actuators are lightweight and compact
- Reversible - The actuators are field reversible without demanding addition or deletion of parts
- Long Service Life - Rigid construction and durable components provide a long lasting service life
- Minimum Maintenance - The actuators are virtually maintenance free
- Accuracy - Rolling diaphragm construction provides constant effective area throughout the stroke

### Direct Acting Actuators (Fail Open)

The actuator stem moves downward with increasing diaphragm pressure. When this pressure is reduced the opposing spring force moves the actuator stem upward. On air failure, the actuator stem is pulled to the extreme upward position by spring force.

#### This actuator is suitable for the following:

Fail Open - For valves with plugs that push down to close

Fail Close - For valves with plugs that push down to open

### Reverse Acting Actuators (Fail Close)

The actuator stem moves upward with increasing diaphragm pressure. When this pressure is reduced the opposing spring force moves the actuator stem downward. On air failure, the actuator stem is pushed to extreme downward position by spring force.

#### This actuator is suitable for the following:

Fail Close - For valves with plugs that push down to close

Fail Open - For valves with plugs that push down to open

#### Air Volume Required Per Stroke.

| Model Number | Cubic Feet/Stroke |
|--------------|-------------------|
| M-00, Mp-00  | 0.012             |
| M-11, Mp-11  | 0.035             |
| M-22, Mp-22  | 0.082             |
| M-33, Mp-33  | 0.185             |

# Python® - 1100 Series Control Valve

| Contoured Top Guided Shut Off Pressure |                            |                        |                         |             |                                                                    |              |      |      |     |        |        |     |        |     |    |    |    |
|----------------------------------------|----------------------------|------------------------|-------------------------|-------------|--------------------------------------------------------------------|--------------|------|------|-----|--------|--------|-----|--------|-----|----|----|----|
| Model No.                              | Air Supply Pres. to Diaph. | Spring Setting Range   |                         | Diaph. Area | Maximum Differential Pressure (PSI) $\Delta P$ / Shut Off Pressure |              |      |      |     |        |        |     |        |     |    |    |    |
|                                        |                            | Direct Acting Actuator | Reverse Acting Actuator |             | Trim Size                                                          |              |      |      |     |        |        |     |        |     |    |    |    |
|                                        |                            | PSI                    | PSI                     |             | 1/8"                                                               | 1/4" - 5/16" | 1/2" | 3/4" | 1"  | 1-1/4" | 1-1/2" | 2"  | 2-1/2" | 3"  | 4" | 6" | 8" |
| M-00                                   | 20                         | 3 - 15                 | 3 - 15                  | 30          | 300                                                                | 300          | 206  | 134  | 94  | —      | —      | —   | —      | —   | —  | —  | —  |
|                                        | 23                         |                        | 6 - 18                  |             | 300                                                                | 300          | 300  | 300  | 222 | —      | —      | —   | —      | —   | —  | —  | —  |
|                                        | 34                         | 6 - 30                 | 6 - 30                  |             | 300                                                                | 300          | 300  | 300  | 222 | —      | —      | —   | —      | —   | —  | —  | —  |
|                                        | 37                         |                        | 9 - 32                  |             | 300                                                                | 300          | 300  | 300  | 300 | —      | —      | —   | —      | —   | —  | —  | —  |
|                                        | 40                         |                        | 12 - 35                 |             | 300                                                                | 300          | 300  | 300  | 300 | —      | —      | —   | —      | —   | —  | —  | —  |
| M-11                                   | 20                         | 3 - 15                 | 3 - 15                  | 55          | —                                                                  | —            | —    | —    | —   | 121    | 78     | 43  | —      | —   | —  | —  | —  |
|                                        | 23                         |                        | 6 - 18                  |             | —                                                                  | —            | —    | —    | —   | 269    | 178    | 102 | —      | —   | —  | —  | —  |
|                                        | 34                         | 6 - 30                 | 6 - 30                  |             | —                                                                  | —            | —    | —    | —   | 269    | 178    | 102 | —      | —   | —  | —  | —  |
|                                        | 37                         |                        | 9 - 32                  |             | —                                                                  | —            | —    | —    | —   | 300    | 279    | 162 | —      | —   | —  | —  | —  |
|                                        | 40                         |                        | 12 - 35                 |             | —                                                                  | —            | —    | —    | —   | 300    | 300    | 222 | —      | —   | —  | —  | —  |
| M-22                                   | 20                         | 3 - 15                 | 3 - 15                  | 95          | —                                                                  | —            | —    | —    | —   | —      | —      | —   | 51     | 35  | 16 | —  | —  |
|                                        | 23                         |                        | 6 - 18                  |             | —                                                                  | —            | —    | —    | —   | —      | —      | —   | 114    | 80  | 38 | —  | —  |
|                                        | 34                         | 6 - 30                 | 6 - 30                  |             | —                                                                  | —            | —    | —    | —   | —      | —      | —   | 114    | 80  | 38 | —  | —  |
|                                        | 37                         |                        | 9 - 32                  |             | —                                                                  | —            | —    | —    | —   | —      | —      | —   | 178    | 125 | 62 | —  | —  |
|                                        | 40                         |                        | 12 - 35                 |             | —                                                                  | —            | —    | —    | —   | —      | —      | —   | 240    | 172 | 85 | —  | —  |
| M-33                                   | 20                         | 3 - 15                 | 3 - 15                  | 140         | —                                                                  | —            | —    | —    | —   | —      | —      | —   | —      | —   | —  | 10 | 5  |
|                                        | 23                         |                        | 6 - 18                  |             | —                                                                  | —            | —    | —    | —   | —      | —      | —   | —      | —   | —  | 27 | 14 |
|                                        | 34                         | 6 - 30                 | 6 - 30                  |             | —                                                                  | —            | —    | —    | —   | —      | —      | —   | —      | —   | —  | 27 | 14 |
|                                        | 37                         |                        | 9 - 32                  |             | —                                                                  | —            | —    | —    | —   | —      | —      | —   | —      | —   | —  | 42 | 25 |
|                                        | 40                         |                        | 12 - 35                 |             | —                                                                  | —            | —    | —    | —   | —      | —      | —   | —      | —   | —  | 60 | 32 |

Do not exceed 50 PSIG air pressure to the actuator.

| Multi-Hole Cage Guided Shut Off Pressure |                            |                        |                         |             |                                                            |     |        |     |     |     |     |
|------------------------------------------|----------------------------|------------------------|-------------------------|-------------|------------------------------------------------------------|-----|--------|-----|-----|-----|-----|
| Model No.                                | Air Supply Pres. to Diaph. | Spring Setting Range   |                         | Diaph. Area | Maximum Differential Pressure (PSI) ΔP / Shut Off Pressure |     |        |     |     |     |     |
|                                          |                            | Direct Acting Actuator | Reverse Acting Actuator |             | Trim Size                                                  |     |        |     |     |     |     |
|                                          | PSI                        | PSI                    | PSI                     | inch²       | 1-1/2"                                                     | 2"  | 2-1/2" | 3"  | 4"  | 6"  | 8"  |
| M-11                                     | 20                         | 3 - 15                 | 3 - 15                  | 55          | 257                                                        | 150 | —      | —   | —   | —   | —   |
|                                          | 23                         |                        | 6 - 18                  |             | 300                                                        | 300 | —      | —   | —   | —   | —   |
|                                          | 34                         | 6 - 30                 | 6 - 30                  |             | 300                                                        | 300 | —      | —   | —   | —   | —   |
|                                          | 37                         |                        | 9 - 32                  |             | 300                                                        | 300 | —      | —   | —   | —   |     |
|                                          | 40                         |                        | 12 - 35                 |             | 300                                                        | 300 | —      | —   | —   | —   |     |
| M-22                                     | 20                         | 3 - 15                 | 3 - 15                  | 95          | —                                                          | —   | 298    | 190 | 97  | —   | —   |
|                                          | 23                         |                        | 6 - 18                  |             | —                                                          | —   | 300    | 300 | 300 | —   | —   |
|                                          | 34                         | 6 - 30                 | 6 - 30                  |             | —                                                          | —   | 300    | 300 | 300 | —   | —   |
|                                          | 37                         |                        | 9 - 32                  |             | —                                                          | —   | 300    | 300 | 300 | —   | —   |
|                                          | 40                         |                        | 12 - 35                 |             | —                                                          | —   | 300    | 300 | 300 | —   | —   |
| M-33                                     | 20                         | 3 - 15                 | 3 - 15                  | 140         | —                                                          | —   | —      | —   | —   | 133 | 21  |
|                                          | 23                         |                        | 6 - 18                  |             | —                                                          | —   | —      | —   | —   | 300 | 258 |
|                                          | 34                         | 6 - 30                 | 6 - 30                  |             | —                                                          | —   | —      | —   | —   | 300 | 258 |
|                                          | 37                         |                        | 9 - 32                  |             | —                                                          | —   | —      | —   | —   | 300 | 300 |
|                                          | 40                         |                        | 12 - 35                 |             | —                                                          | —   | —      | —   | —   | 300 | 300 |

Do not exceed 50 PSIG air pressure to the actuator.

# Python® - Electric Actuators

When accurate control of your steam or water application is desired and air is not available, the Python® AEL Electric Control Valve will deliver precise control. The electric version of the popular 1100 series control valve is built to out perform and deliver accurate control. The AEL Series Electric Control Valve is constructed and equipped with state of the art industrial materials combined with the standard 1100 series main valve.

## Product Features:

- Power: 24v AC (120v AC or 240v AC available)
- Terminal board connection
- Pillar mechanical connection
- Auto/Manual control
- Control signal 4-20 ma, 0-10 volts
- Protection class IP 67
- High thrust capabilities
- Electronic position control
- Metal internal gears
- Compact design
- Mounts to the standard 1100 Series valve body
- Actuators available from 1/2" to 4"



Python® Series 1100  
AEL Electric Actuator

## List of Materials

|                  |                                |
|------------------|--------------------------------|
| Valve Body*      | Carbon Steel A216 GR. WCB      |
| Bonnet*          |                                |
| Valve/Valve Seat | Stainless Steel AISI 410       |
| Valve Stem       | Stainless Steel 316            |
| Gland Packing    | V-Teflon- Option 1 (366°F max) |
| Yoke             | Grafoil-Option 2               |
| Actuator Housing | S.G. Iron                      |
|                  | Aluminum                       |

\*Stainless steel available.

## Technical Data

|                     |                   |               |
|---------------------|-------------------|---------------|
| Flow                | Equal Percentage  |               |
| Leakage             | ANSI Class IV     |               |
| Rangeability        | 50:1              |               |
| Travel              | 1/2" to 1"        | 11/16" (18mm) |
|                     | 1-1/4" to 2"      | 1-1/8" (28mm) |
|                     | 2-1/2" to 4"      | 1-1/2" (38mm) |
|                     | 6" to 8"          | 2-1/4" (58mm) |
| Maximum Temperature | 450°F (232°C)     |               |
| Maximum Pressure    | 300 psig (20 bar) |               |
| Voltage             | 24v Power Supply  |               |

## Dimensions and Weights

| Size  |     | Face-to-Face “L” |     |        |     |        |     | “C”    |     | “D”   |     | “H”      |     | Weight |    |      |     |      |     |
|-------|-----|------------------|-----|--------|-----|--------|-----|--------|-----|-------|-----|----------|-----|--------|----|------|-----|------|-----|
| in    | mm  | NPT              |     | 150#   |     | 300#   |     |        |     |       |     |          |     | NPT    |    | 150# |     | 300# |     |
|       |     | in               | mm  | in     | mm  | in     | mm  | in     | mm  | in    | mm  | in       | mm  | lb     | kg | lb   | kg  | lb   | kg  |
| 1/2   | 15  | 6-1/2            | 165 | 7      | 178 | —      | —   | 7-7/8  | 200 | 5     | 127 | 14-9/16  | 370 | 22     | 10 | 34   | 15  | —    | —   |
| 3/4   | 20  | 6-1/2            | 165 | 7-1/8  | 181 | —      | —   | 7-7/8  | 200 | 5     | 127 | 14-9/16  | 370 | 22     | 10 | 34   | 15  | —    | —   |
| 1     | 25  | 7-3/4            | 197 | 7-1/4  | 184 | —      | —   | 7-7/8  | 200 | 5     | 127 | 24-15/16 | 633 | 24     | 11 | 36   | 16  | —    | —   |
| 1-1/4 | 32  | 9-1/4            | 235 | 8-3/4  | 222 | —      | —   | 6-5/16 | 160 | 7-1/4 | 183 | 26-1/8   | 664 | 39     | 18 | 55   | 25  | —    | —   |
| 1-1/2 | 40  | 9-1/4            | 235 | 8-3/4  | 222 | —      | —   | 6-5/16 | 160 | 7-1/4 | 183 | 26-1/8   | 664 | 39     | 18 | 55   | 25  | —    | —   |
| 2     | 50  | 10-1/2           | 267 | 10     | 254 | 10-1/2 | 267 | 6-5/16 | 160 | 7-1/4 | 183 | 26-11/16 | 678 | 48     | 22 | 65   | 30  | 71   | 32  |
| 2-1/2 | 65  | —                | —   | 10-7/8 | 276 | 11-1/2 | 292 | 6-5/16 | 160 | 7-1/4 | 183 | 26-5/16  | 668 | —      | —  | 120  | 54  | 135  | 61  |
| 3     | 80  | —                | —   | 11-3/4 | 299 | 12-1/2 | 318 | 6-5/16 | 160 | 7-1/4 | 183 | 28-1/2   | 724 | —      | —  | 135  | 61  | 150  | 68  |
| 4     | 100 | —                | —   | 13-7/8 | 353 | 14-1/2 | 368 | 6-5/16 | 160 | 7-1/4 | 183 | 31-5/8   | 803 | —      | —  | 176  | 80  | 210  | 95  |
| 6     | 150 | —                | —   | 17-3/4 | 451 | 18-5/8 | 473 | 6-5/16 | 160 | 7-1/4 | 183 | 34-1/4   | 870 | —      | —  | 322  | 146 | 380  | 172 |
| 8     | 200 | —                | —   | 21-3/8 | 543 | 22-3/8 | 568 | —      | —   | —     | —   | —        | —   | —      | —  | 540  | 245 | 630  | 286 |

\*Refer to images on page 321.

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.

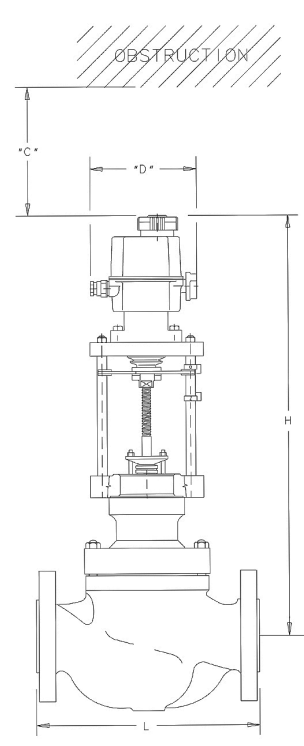
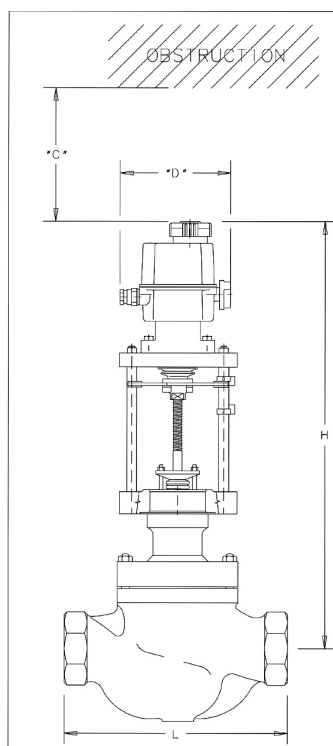
# Python® - Electric Actuators

## Top Guided

| Size of Valve |     | NPT                   |                |                  |              | 150# Flg              |                |                  |              |        |
|---------------|-----|-----------------------|----------------|------------------|--------------|-----------------------|----------------|------------------|--------------|--------|
| IN            | MM  | Switch-off thrust (N) | Speed (mm/min) | Modulating Model | ON/OFF Model | Switch-off thrust (N) | Speed (mm/min) | Modulating Model | ON/OFF Model | Stroke |
| 1/2"          | 15  | 1900                  | 28             | AEL1430          | AEL1490      | 1900                  | 28             | AEL1430          | AEL1490      | 18mm   |
| 3/4"          | 20  | 1900                  | 28             | AEL1430          | AEL1490      | 1900                  | 28             | AEL1430          | AEL1490      | 18mm   |
| 1"            | 25  | 1900                  | 28             | AEL1430          | AEL1490      | 1900                  | 28             | AEL1430          | AEL1490      | 18mm   |
| 1-1/4"        | 32  | 3600                  | 48             | AEL1438          | AEL1498      | 1900                  | 48             | AEL1438          | AEL1498      | 28mm   |
| 1-1/2"        | 40  | 4600                  | 48             | AEL1438          | AEL1498      | 3600                  | 48             | AEL1438          | AEL1498      | 28mm   |
| 2"            | 50  | 7200                  | 48             | AEL1438          | AEL1431      | 4600                  | 48             | AEL1438          | AEL1498      | 28mm   |
| 2-1/2"        | 65  | —                     | —              | —                | —            | 4600                  | 48             | AEL1438          | AEL1498      | —      |
| 3"            | 80  | —                     | —              | —                | —            | 4600                  | 48             | AEL1438          | AEL1498      | —      |
| 4"            | 100 | —                     | —              | —                | —            | 4600                  | 48             | AEL1438          | AEL1498      | —      |

## Multi-Hole

| Size of Valve |     | 150# Flg              |                |                  |              | 300# Flg              |                |                  |              |        |
|---------------|-----|-----------------------|----------------|------------------|--------------|-----------------------|----------------|------------------|--------------|--------|
| IN            | MM  | Switch-off thrust (N) | Speed (mm/min) | Modulating Model | ON/OFF Model | Switch-off thrust (N) | Speed (mm/min) | Modulating Model | ON/OFF Model | Stroke |
| 1-1/2"        | 40  | 1900                  | 48             | AEL1438          | AEL1498      | 1900                  | 48             | AEL1438          | AEL1498      | 28mm   |
| 2"            | 50  | 1900                  | 48             | AEL1438          | AEL1498      | 1900                  | 48             | AEL1438          | AEL1498      | 28mm   |
| 2-1/2"        | 65  | 3600                  | 48             | AEL1438          | AEL1498      | 3600                  | 48             | AEL1438          | AEL1498      | 38mm   |
| 3"            | 80  | 3600                  | 48             | AEL1438          | AEL1498      | 3600                  | 48             | AEL1438          | AEL1498      | 38mm   |
| 4"            | 100 | 3600                  | 48             | AEL1438          | AEL1498      | 3600                  | 48             | AEL1438          | AEL1498      | 38mm   |
| 6"            | 150 | 4600                  | 48             | AEL1431          | AEL1491      | 5800                  | 48             | AEL1438          | AEL1431      | 58mm   |



Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.



## Armstrong® Python® - 1100 Series Control Valve

## Capacities for Saturated Steam Service

| Contoured Top Guided Trim |         |                              |       |       |       |       |       |        |        |        |        |        |         |         |
|---------------------------|---------|------------------------------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|---------|---------|
| Inlet                     | Outlet  | lb/hr                        |       |       |       |       |       |        |        |        |        |        |         |         |
|                           |         | Trim Size and C <sub>v</sub> |       |       |       |       |       |        |        |        |        |        |         |         |
|                           |         | in                           |       |       |       |       |       |        |        |        |        |        |         |         |
| (psig)                    |         | 1/8                          | 1/4   | 5/16  | 1/2   | 3/4   | 1     | 1-1/4  | 1-1/2  | 2      | 2-1/2  | 3      | 4       | 6       |
| C <sub>v</sub> Factor     |         | 1.0                          | 2.0   | 3.0   | 5.0   | 9.0   | 13.0  | 20.0   | 30.0   | 50.0   | 80.0   | 110.0  | 200.0   | 400.0   |
| 5                         | 3       | 18                           | 36    | 54    | 91    | 163   | 236   | 363    | 545    | 908    | 1,453  | 1,998  | 3,632   | 7,265   |
|                           | 0 - 2   | 32                           | 64    | 97    | 161   | 290   | 418   | 643    | 965    | 1,609  | 2,574  | 3,539  | 6,434   | 12,868  |
| 10                        | 5       | 31                           | 63    | 94    | 156   | 282   | 407   | 626    | 939    | 1,564  | 2,503  | 3,442  | 6,258   | 12,516  |
|                           | 0 - 4   | 40                           | 81    | 121   | 202   | 363   | 524   | 807    | 1,210  | 2,017  | 3,227  | 4,437  | 8,067   | 16,134  |
| 15                        | 10      | 35                           | 69    | 104   | 173   | 312   | 450   | 693    | 1,039  | 1,732  | 2,771  | 3,810  | 6,927   | 13,854  |
|                           | 0 - 6   | 49                           | 97    | 146   | 243   | 437   | 631   | 970    | 1,455  | 2,425  | 3,880  | 5,335  | 9,700   | 19,400  |
| 20                        | 15      | 38                           | 75    | 113   | 188   | 339   | 490   | 754    | 1,130  | 1,884  | 3,015  | 4,145  | 7,537   | 15,073  |
|                           | 0 - 8   | 57                           | 113   | 170   | 283   | 510   | 737   | 1,133  | 1,700  | 2,833  | 4,533  | 6,233  | 11,333  | 22,666  |
| 30                        | 20      | 59                           | 118   | 178   | 296   | 533   | 769   | 1,183  | 1,775  | 2,959  | 4,734  | 6,509  | 11,835  | 23,670  |
|                           | 0 - 12  | 73                           | 146   | 219   | 365   | 657   | 949   | 1,460  | 2,190  | 3,650  | 5,840  | 8,029  | 14,599  | 29,198  |
| 40                        | 30      | 66                           | 132   | 199   | 331   | 596   | 861   | 1,324  | 1,986  | 3,310  | 5,297  | 7,283  | 13,242  | 26,483  |
|                           | 25      | 79                           | 158   | 237   | 395   | 711   | 1,027 | 1,580  | 2,371  | 3,951  | 6,322  | 8,692  | 15,805  | 31,609  |
|                           | 0 - 16  | 89                           | 179   | 268   | 447   | 804   | 1,161 | 1,787  | 2,680  | 4,466  | 7,146  | 9,826  | 17,865  | 35,730  |
| 50                        | 40      | 73                           | 145   | 218   | 363   | 653   | 943   | 1,451  | 2,177  | 3,628  | 5,805  | 7,982  | 14,513  | 29,026  |
|                           | 30      | 98                           | 196   | 295   | 491   | 884   | 1,277 | 1,965  | 2,947  | 4,911  | 7,858  | 10,805 | 19,646  | 39,292  |
|                           | 0 - 20  | 106                          | 211   | 317   | 528   | 951   | 1,374 | 2,113  | 3,170  | 5,283  | 8,452  | 11,622 | 21,131  | 42,262  |
| 60                        | 50      | 78                           | 157   | 235   | 392   | 706   | 1,019 | 1,568  | 2,352  | 3,920  | 6,272  | 8,625  | 15,681  | 31,362  |
|                           | 35      | 117                          | 234   | 351   | 586   | 1,054 | 1,522 | 2,342  | 3,513  | 5,856  | 9,369  | 12,882 | 23,422  | 46,845  |
|                           | 0 - 24  | 122                          | 244   | 366   | 610   | 1,098 | 1,586 | 2,440  | 3,660  | 6,099  | 9,759  | 13,418 | 24,397  | 48,794  |
| 75                        | 65      | 86                           | 173   | 259   | 432   | 778   | 1,124 | 1,729  | 2,593  | 4,322  | 6,915  | 9,508  | 17,286  | 34,573  |
|                           | 50      | 130                          | 261   | 391   | 652   | 1,174 | 1,696 | 2,609  | 3,914  | 6,524  | 10,438 | 14,352 | 26,094  | 52,188  |
|                           | 0 - 30  | 146                          | 293   | 439   | 732   | 1,318 | 1,904 | 2,930  | 4,394  | 7,324  | 11,718 | 16,113 | 29,296  | 58,592  |
| 100                       | 75      | 150                          | 300   | 450   | 751   | 1,351 | 1,952 | 3,002  | 4,504  | 7,506  | 12,009 | 16,513 | 30,023  | 60,047  |
|                           | 60      | 183                          | 366   | 548   | 914   | 1,645 | 2,376 | 3,656  | 5,484  | 9,139  | 14,623 | 20,106 | 36,557  | 73,114  |
|                           | 0 - 40  | 187                          | 375   | 562   | 937   | 1,686 | 2,435 | 3,746  | 5,619  | 9,365  | 14,984 | 20,604 | 37,461  | 74,922  |
| 125                       | 100     | 167                          | 335   | 502   | 837   | 1,507 | 2,177 | 3,349  | 5,024  | 8,374  | 13,398 | 18,422 | 33,495  | 66,990  |
|                           | 75      | 225                          | 450   | 675   | 1,125 | 2,024 | 2,924 | 4,498  | 6,747  | 11,245 | 17,992 | 24,740 | 44,981  | 89,962  |
|                           | 0 - 50  | 228                          | 456   | 684   | 1,141 | 2,053 | 2,966 | 4,563  | 6,844  | 11,407 | 18,250 | 25,094 | 45,626  | 91,252  |
| 150                       | 125     | 183                          | 366   | 550   | 916   | 1,649 | 2,382 | 3,664  | 5,496  | 9,160  | 14,656 | 20,151 | 36,639  | 73,278  |
|                           | 100     | 248                          | 496   | 745   | 1,241 | 2,234 | 3,227 | 4,964  | 7,446  | 12,410 | 19,857 | 27,303 | 49,642  | 99,284  |
|                           | 0 - 60  | 269                          | 538   | 807   | 1,345 | 2,421 | 3,496 | 5,379  | 8,069  | 13,448 | 21,516 | 29,585 | 53,791  | 107,582 |
| 175                       | 150     | 198                          | 395   | 593   | 988   | 1,779 | 2,570 | 3,953  | 5,930  | 9,883  | 15,813 | 21,743 | 39,534  | 79,067  |
|                           | 110     | 300                          | 600   | 901   | 1,501 | 2,702 | 3,903 | 6,004  | 9,006  | 15,010 | 24,016 | 33,022 | 60,041  | 120,082 |
|                           | 0 - 70  | 310                          | 620   | 929   | 1,549 | 2,788 | 4,027 | 6,196  | 9,293  | 15,489 | 24,782 | 34,076 | 61,956  | 123,912 |
| 200                       | 150     | 289                          | 578   | 868   | 1,446 | 2,603 | 3,760 | 5,785  | 8,677  | 14,462 | 23,139 | 31,816 | 57,847  | 115,695 |
|                           | 125     | 342                          | 685   | 1,027 | 1,712 | 3,081 | 4,451 | 6,847  | 10,271 | 17,119 | 27,390 | 37,661 | 68,474  | 136,948 |
|                           | 0 - 80  | 351                          | 701   | 1,052 | 1,753 | 3,155 | 4,558 | 7,012  | 10,518 | 17,530 | 28,048 | 38,567 | 70,121  | 140,242 |
| 250                       | 200     | 325                          | 650   | 975   | 1,626 | 2,926 | 4,227 | 6,503  | 9,754  | 16,256 | 26,010 | 35,764 | 65,025  | 130,051 |
|                           | 150     | 413                          | 827   | 1,240 | 2,067 | 3,721 | 5,374 | 8,268  | 12,402 | 20,670 | 33,072 | 45,474 | 82,681  | 165,361 |
|                           | 0 - 100 | 432                          | 865   | 1,297 | 2,161 | 3,890 | 5,619 | 8,645  | 12,968 | 21,613 | 34,580 | 47,548 | 86,451  | 172,902 |
| 300                       | 250     | 357                          | 715   | 1,072 | 1,787 | 3,217 | 4,647 | 7,149  | 10,723 | 17,872 | 28,595 | 39,318 | 71,486  | 142,973 |
|                           | 200     | 483                          | 966   | 1,450 | 2,416 | 4,349 | 6,281 | 9,664  | 14,495 | 24,159 | 38,655 | 53,150 | 96,637  | 193,273 |
|                           | 0 - 120 | 514                          | 1,028 | 1,542 | 2,570 | 4,625 | 6,681 | 10,278 | 15,417 | 25,695 | 41,112 | 56,530 | 102,781 | 205,562 |

\*Capacities based on maximum C<sub>v</sub>. It is recommended to operate the valve between 15-85% of the valve opening. See chart on page 333.

# Python® - 1100 Series Control Valve

## Capacities for Saturated Steam Service

| Contoured Top Guided Trim |          |                              |     |     |       |       |       |       |       |        |        |        |        |        |
|---------------------------|----------|------------------------------|-----|-----|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|
| Inlet                     | Outlet   | kg/hr                        |     |     |       |       |       |       |       |        |        |        |        |        |
|                           |          | Trim Size and C <sub>v</sub> |     |     |       |       |       |       |       |        |        |        |        |        |
|                           |          | mm                           |     |     |       |       |       |       |       |        |        |        |        |        |
| (bar)                     |          | 3                            | 6   | 8   | 15    | 20    | 25    | 32    | 40    | 50     | 65     | 80     | 100    | 150    |
| C <sub>v</sub> Factor     |          | 1.0                          | 2.0 | 3.0 | 5.0   | 9.0   | 13.0  | 20.0  | 30.0  | 50.0   | 80.0   | 110.0  | 200.0  | 400.0  |
| 0.34                      | 0.21     | 8                            | 16  | 25  | 41    | 74    | 107   | 165   | 247   | 412    | 659    | 906    | 1,648  | 3,295  |
|                           | 0 - 0.14 | 15                           | 29  | 44  | 73    | 131   | 190   | 292   | 438   | 730    | 1,167  | 1,605  | 2,918  | 5,837  |
| 0.69                      | 0.34     | 14                           | 28  | 43  | 71    | 128   | 185   | 284   | 426   | 710    | 1,135  | 1,561  | 2,839  | 5,677  |
|                           | 0 - 0.28 | 18                           | 37  | 55  | 91    | 165   | 238   | 366   | 549   | 915    | 1,464  | 2,013  | 3,659  | 7,318  |
| 1.03                      | 0.69     | 16                           | 31  | 47  | 79    | 141   | 204   | 314   | 471   | 785    | 1,257  | 1,728  | 3,142  | 6,284  |
|                           | 0 - 0.41 | 22                           | 44  | 66  | 110   | 198   | 286   | 440   | 660   | 1,100  | 1,760  | 2,420  | 4,400  | 8,800  |
| 1.38                      | 1.03     | 17                           | 34  | 51  | 85    | 154   | 222   | 342   | 513   | 855    | 1,367  | 1,880  | 3,419  | 6,837  |
|                           | 0 - 0.55 | 26                           | 51  | 77  | 129   | 231   | 334   | 514   | 771   | 1,285  | 2,056  | 2,827  | 5,141  | 10,281 |
| 2.07                      | 1.38     | 27                           | 54  | 81  | 134   | 242   | 349   | 537   | 805   | 1,342  | 2,147  | 2,953  | 5,368  | 10,736 |
|                           | 0 - 0.83 | 33                           | 66  | 99  | 166   | 298   | 430   | 662   | 993   | 1,656  | 2,649  | 3,642  | 6,622  | 13,244 |
| 2.76                      | 2.07     | 30                           | 60  | 90  | 150   | 270   | 390   | 601   | 901   | 1,502  | 2,403  | 3,304  | 6,006  | 12,013 |
|                           | 1.72     | 36                           | 72  | 108 | 179   | 323   | 466   | 717   | 1,075 | 1,792  | 2,868  | 3,943  | 7,169  | 14,338 |
|                           | 0 - 1.10 | 41                           | 81  | 122 | 203   | 365   | 527   | 810   | 1,216 | 2,026  | 3,241  | 4,457  | 8,104  | 16,207 |
| 3.45                      | 2.76     | 33                           | 66  | 99  | 165   | 296   | 428   | 658   | 987   | 1,646  | 2,633  | 3,621  | 6,583  | 13,166 |
|                           | 2.07     | 45                           | 89  | 134 | 223   | 401   | 579   | 891   | 1,337 | 2,228  | 3,565  | 4,901  | 8,911  | 17,823 |
|                           | 0 - 1.38 | 48                           | 96  | 144 | 240   | 431   | 623   | 958   | 1,438 | 2,396  | 3,834  | 5,272  | 9,585  | 19,170 |
| 4.14                      | 3.45     | 36                           | 71  | 107 | 178   | 320   | 462   | 711   | 1,067 | 1,778  | 2,845  | 3,912  | 7,113  | 14,226 |
|                           | 2.41     | 53                           | 106 | 159 | 266   | 478   | 691   | 1,062 | 1,594 | 2,656  | 4,250  | 5,843  | 10,624 | 21,249 |
|                           | 0 - 1.65 | 55                           | 111 | 166 | 277   | 498   | 719   | 1,107 | 1,660 | 2,767  | 4,427  | 6,087  | 11,066 | 22,133 |
| 5.17                      | 4.48     | 39                           | 78  | 118 | 196   | 353   | 510   | 784   | 1,176 | 1,960  | 3,136  | 4,313  | 7,841  | 15,682 |
|                           | 3.45     | 59                           | 118 | 178 | 296   | 533   | 769   | 1,184 | 1,775 | 2,959  | 4,734  | 6,510  | 11,836 | 23,672 |
|                           | 0 - 2.07 | 66                           | 133 | 199 | 332   | 598   | 864   | 1,329 | 1,993 | 3,322  | 5,315  | 7,309  | 13,289 | 26,577 |
| 6.89                      | 5.17     | 68                           | 136 | 204 | 340   | 613   | 885   | 1,362 | 2,043 | 3,405  | 5,447  | 7,490  | 13,619 | 27,237 |
|                           | 4.14     | 83                           | 166 | 249 | 415   | 746   | 1,078 | 1,658 | 2,487 | 4,146  | 6,633  | 9,120  | 16,582 | 33,164 |
|                           | 0 - 2.76 | 85                           | 170 | 255 | 425   | 765   | 1,104 | 1,699 | 2,549 | 4,248  | 6,797  | 9,346  | 16,992 | 33,984 |
| 8.62                      | 6.89     | 76                           | 152 | 228 | 380   | 684   | 988   | 1,519 | 2,279 | 3,798  | 6,077  | 8,356  | 15,193 | 30,386 |
|                           | 5.17     | 102                          | 204 | 306 | 510   | 918   | 1,326 | 2,040 | 3,061 | 5,101  | 8,161  | 11,222 | 20,403 | 40,807 |
|                           | 0 - 3.45 | 103                          | 207 | 310 | 517   | 931   | 1,345 | 2,070 | 3,104 | 5,174  | 8,278  | 11,383 | 20,696 | 41,392 |
| 10.34                     | 8.62     | 83                           | 166 | 249 | 415   | 748   | 1,080 | 1,662 | 2,493 | 4,155  | 6,648  | 9,141  | 16,619 | 33,239 |
|                           | 6.89     | 113                          | 225 | 338 | 563   | 1,013 | 1,464 | 2,252 | 3,378 | 5,629  | 9,007  | 12,385 | 22,517 | 45,035 |
|                           | 0 - 4.14 | 122                          | 244 | 366 | 610   | 1,098 | 1,586 | 2,440 | 3,660 | 6,100  | 9,760  | 13,420 | 24,399 | 48,799 |
| 12.07                     | 10.34    | 90                           | 179 | 269 | 448   | 807   | 1,166 | 1,793 | 2,690 | 4,483  | 7,173  | 9,863  | 17,932 | 35,865 |
|                           | 7.58     | 136                          | 272 | 409 | 681   | 1,226 | 1,770 | 2,723 | 4,085 | 6,809  | 10,894 | 14,979 | 27,234 | 54,469 |
|                           | 0 - 4.83 | 141                          | 281 | 422 | 703   | 1,265 | 1,827 | 2,810 | 4,215 | 7,026  | 11,241 | 15,457 | 28,103 | 56,206 |
| 13.79                     | 10.34    | 131                          | 262 | 394 | 656   | 1,181 | 1,706 | 2,624 | 3,936 | 6,560  | 10,496 | 14,432 | 26,239 | 52,479 |
|                           | 8.62     | 155                          | 311 | 466 | 776   | 1,398 | 2,019 | 3,106 | 4,659 | 7,765  | 12,424 | 17,083 | 31,060 | 62,119 |
|                           | 0 - 5.52 | 159                          | 318 | 477 | 795   | 1,431 | 2,067 | 3,181 | 4,771 | 7,952  | 12,723 | 17,494 | 31,807 | 63,613 |
| 17.24                     | 13.79    | 147                          | 295 | 442 | 737   | 1,327 | 1,917 | 2,950 | 4,424 | 7,374  | 11,798 | 16,222 | 29,495 | 58,991 |
|                           | 10.34    | 188                          | 375 | 563 | 938   | 1,688 | 2,438 | 3,750 | 5,626 | 9,376  | 15,001 | 20,627 | 37,504 | 75,007 |
|                           | 0 - 10.3 | 196                          | 392 | 588 | 980   | 1,765 | 2,549 | 3,921 | 5,882 | 9,803  | 15,686 | 21,568 | 39,214 | 78,428 |
| 20.00                     | 17.24    | 162                          | 324 | 486 | 811   | 1,459 | 2,108 | 3,243 | 4,864 | 8,107  | 12,970 | 17,834 | 32,426 | 64,852 |
|                           | 13.79    | 219                          | 438 | 658 | 1,096 | 1,973 | 2,849 | 4,383 | 6,575 | 10,959 | 17,534 | 24,109 | 43,834 | 87,668 |
|                           | 0 - 8.28 | 233                          | 466 | 699 | 1,166 | 2,098 | 3,030 | 4,662 | 6,993 | 11,655 | 18,648 | 25,642 | 46,621 | 93,242 |

\*Capacities based on maximum C<sub>v</sub>. It is recommended to operate the valve between 15-85% of the valve opening. See chart on page 333.



## Capacities for Saturated Steam Service

| Multi-Hole Cage Guided Trim |         |                              |       |        |        |        |        |        |         |
|-----------------------------|---------|------------------------------|-------|--------|--------|--------|--------|--------|---------|
| lb/hr                       |         |                              |       |        |        |        |        |        |         |
| Inlet                       | Outlet  | Trim Size and C <sub>v</sub> |       |        |        |        |        |        |         |
|                             |         | in                           |       |        |        |        |        |        |         |
| (psig)                      |         | 1                            | 1-1/4 | 1-1/2  | 2      | 2-1/2  | 3      | 4      | 6       |
| C <sub>v</sub> Factor       |         | 10.0                         | 16.0  | 24.0   | 40.0   | 64.0   | 90.0   | 160.0  | 320.0   |
| 100                         | 75      | 1,501                        | 2,402 | 3,603  | 6,005  | 9,607  | 13,511 | 24,019 | 48,037  |
|                             | 60      | 1,828                        | 2,925 | 4,387  | 7,311  | 11,698 | 16,451 | 29,246 | 58,491  |
|                             | 0 - 40  | 1,873                        | 2,997 | 4,495  | 7,492  | 11,988 | 16,857 | 29,969 | 59,938  |
| 125                         | 100     | 1,675                        | 2,680 | 4,019  | 6,699  | 10,718 | 15,073 | 26,796 | 53,592  |
|                             | 75      | 2,249                        | 3,598 | 5,398  | 8,996  | 14,394 | 20,242 | 35,985 | 71,970  |
|                             | 0 - 50  | 2,281                        | 3,650 | 5,475  | 9,125  | 14,600 | 20,532 | 36,501 | 73,002  |
| 150                         | 125     | 1,832                        | 2,931 | 4,397  | 7,328  | 11,724 | 16,487 | 29,311 | 58,622  |
|                             | 100     | 2,482                        | 3,971 | 5,957  | 9,928  | 15,885 | 22,339 | 39,713 | 79,427  |
|                             | 0 - 60  | 2,690                        | 4,303 | 6,455  | 10,758 | 17,213 | 24,206 | 43,033 | 86,066  |
| 175                         | 150     | 1,977                        | 3,163 | 4,744  | 7,907  | 12,651 | 17,790 | 31,627 | 63,254  |
|                             | 110     | 3,002                        | 4,803 | 7,205  | 12,008 | 19,213 | 27,018 | 48,033 | 96,065  |
|                             | 0 - 70  | 3,098                        | 4,956 | 7,435  | 12,391 | 19,826 | 27,880 | 49,565 | 99,130  |
| 200                         | 150     | 2,892                        | 4,628 | 6,942  | 11,569 | 18,511 | 26,031 | 46,278 | 92,556  |
|                             | 125     | 3,424                        | 5,478 | 8,217  | 13,695 | 21,912 | 30,813 | 54,779 | 109,559 |
|                             | 0 - 80  | 3,506                        | 5,610 | 8,415  | 14,024 | 22,439 | 31,554 | 56,097 | 112,194 |
| 250                         | 200     | 3,251                        | 5,202 | 7,803  | 13,005 | 20,808 | 29,261 | 52,020 | 104,041 |
|                             | 150     | 4,134                        | 6,614 | 9,922  | 16,536 | 26,458 | 37,206 | 66,145 | 132,289 |
|                             | 0 - 100 | 4,323                        | 6,916 | 10,374 | 17,290 | 27,664 | 38,903 | 69,161 | 138,322 |
| 300                         | 250     | 3,574                        | 5,719 | 8,578  | 14,297 | 22,876 | 32,169 | 57,189 | 114,378 |
|                             | 200     | 4,832                        | 7,731 | 11,596 | 19,327 | 30,924 | 43,486 | 77,309 | 154,618 |
|                             | 0 - 120 | 5,139                        | 8,222 | 12,334 | 20,556 | 32,890 | 46,251 | 82,225 | 164,450 |

\*Capacities based on maximum C<sub>v</sub>. It is recommended to operate the valve between 15-85% of the valve opening. See chart on page 333.

| Multi-Hole Cage Guided Trim |          |                              |      |      |      |       |       |       |       |
|-----------------------------|----------|------------------------------|------|------|------|-------|-------|-------|-------|
| kg/hr                       |          |                              |      |      |      |       |       |       |       |
| Inlet                       | Outlet   | Trim Size and C <sub>v</sub> |      |      |      |       |       |       |       |
|                             |          | mm                           |      |      |      |       |       |       |       |
| (bar)                       |          | 25                           | 32   | 40   | 50   | 65    | 80    | 100   | 150   |
| C <sub>v</sub> Factor       |          | 10.0                         | 16.0 | 24.0 | 40.0 | 64.0  | 90.0  | 160.0 | 320.0 |
| 6.89                        | 5.17     | 681                          | 1089 | 1634 | 2724 | 4358  | 6128  | 10895 | 21790 |
|                             | 4.14     | 829                          | 1327 | 1990 | 3316 | 5306  | 7462  | 13266 | 26531 |
|                             | 0 - 2.76 | 850                          | 1359 | 2039 | 3398 | 5438  | 7646  | 13594 | 27188 |
| 8.62                        | 6.89     | 760                          | 1215 | 1823 | 3039 | 4862  | 6837  | 12155 | 24309 |
|                             | 5.17     | 1020                         | 1632 | 2448 | 4081 | 6529  | 9182  | 16323 | 32645 |
|                             | 0 - 3.45 | 1035                         | 1656 | 2483 | 4139 | 6623  | 9313  | 16557 | 33113 |
| 10.34                       | 8.62     | 831                          | 1330 | 1994 | 3324 | 5318  | 7479  | 13295 | 26591 |
|                             | 6.89     | 1126                         | 1801 | 2702 | 4503 | 7206  | 10133 | 18014 | 36028 |
|                             | 0 - 4.14 | 1220                         | 1952 | 2928 | 4880 | 7808  | 10980 | 19520 | 39039 |
| 12.07                       | 10.34    | 897                          | 1435 | 2152 | 3586 | 5738  | 8070  | 14346 | 28692 |
|                             | 7.58     | 1362                         | 2179 | 3268 | 5447 | 8715  | 12255 | 21788 | 43575 |
|                             | 0 - 4.83 | 1405                         | 2248 | 3372 | 5621 | 8993  | 12646 | 22482 | 44965 |
| 13.79                       | 10.34    | 1312                         | 2099 | 3149 | 5248 | 8397  | 11808 | 20991 | 41983 |
|                             | 8.62     | 1553                         | 2485 | 3727 | 6212 | 9939  | 13977 | 24848 | 49695 |
|                             | 0 - 5.52 | 1590                         | 2545 | 3817 | 6361 | 10178 | 14313 | 25445 | 50891 |
| 17.24                       | 13.79    | 1475                         | 2360 | 3539 | 5899 | 9439  | 13273 | 23596 | 47193 |
|                             | 10.34    | 1875                         | 3000 | 4500 | 7501 | 12001 | 16877 | 30003 | 60006 |
|                             | 0 - 10.3 | 1961                         | 3137 | 4706 | 7843 | 12548 | 17646 | 31371 | 62742 |
| 20.00                       | 17.24    | 1621                         | 2594 | 3891 | 6485 | 10376 | 14592 | 25941 | 51882 |
|                             | 13.79    | 2192                         | 3507 | 5260 | 8767 | 14027 | 19725 | 35067 | 70134 |
|                             | 0 - 8.28 | 2331                         | 3730 | 5595 | 9324 | 14919 | 20980 | 37297 | 74594 |

\*Capacities based on maximum C<sub>v</sub>. It is recommended to operate the valve between 15-85% of the valve opening. See chart on page 333.



# Python® - 1100 Series Control Valve

## Valve Sizing

To determine the size of valve you need, calculate the required Cv value for your application. Once you have calculated the required Cv, refer to the valve Cv charts on page 323 to determine the size and trim of valve. Globe style control valves have the best control in the midrange of the valve's capacity. It is best to pick a valve so the calculated Cv is between 15% and 85% of the valve opening, see page 332. See the formulas below for steam and water applications. Consult factory for other types of fluids.

## For Saturated Steam Service

### Subcritical Flow

When  $\Delta P < 0.81(P_1/2)$

$$C_v = \frac{W}{2.1\sqrt{\Delta P(P_{1A} + P_{2A})}}$$

### Critical Flow

When  $\Delta P \geq 0.81(P_1/2)$

$$C_v = \frac{W}{1.633(P_{1A})}$$

## For Liquid Service

$$C_v = \frac{(GPM) \sqrt{G}}{\sqrt{\Delta P}}$$

**Cv** = Valve flow coefficient  
**W** = Maximum flow capacity of steam, lbs/hr  
**P<sub>1A</sub>** = Inlet Pressure, psia (psig + 14.7)  
**P<sub>2A</sub>** = Outlet Pressure, psia (psig + 14.7)  
**ΔP** = Pressure drop (P<sub>1</sub> - P<sub>2</sub>) psi  
**GPM** = Maximum flow capacity of Liquid, GPM  
**G** = Specific Gravity

## Actuator Sizing

To determine the required actuator, you need to determine the differential pressure (shut off pressure). The shut off pressure for a pressure reduction application is the pressure difference between P<sub>1</sub> and P<sub>2</sub>. The shut off pressure for a temperature control application is the P<sub>1</sub> pressure.

Once you have calculated your shut off pressure, select the actuator model and spring setting range that exceeds your calculated shutoff pressure with the trim size previously selected. Select reverse acting for air to open (fail close) applications or direct acting for air to close (fail open) applications.

Make sure the required air pressure is available for the spring range selected.

## Sizing Example 1:

Fluid: Saturated Steam  
 P<sub>1</sub> = 140 psig  
 P<sub>2</sub> = 20 psig  
 Flow: 13,000 lbs/hr  
 Actuator: Air to open (Fail Close)

### Solution:

Valve Selection: Select the correct formula needed to calculate Cv. We need to use the critical flow formula since  $\Delta P > .81(P_1/2)$ .

$$C_v = \frac{13,000}{1.633(140 + 14.7)} = 52$$

Refer to the Cv charts on Page 4. Select a 2-1/2" Multi-hole cage guided with 2-1/2" Trim. Top bush guided would work as well, but multi-hole cage was chosen to help with noise attenuation.

**Actuator Selection:** Determine your shutoff pressure (ΔP).

$$\Delta P = 140 - 20 = 120 \text{ psi}$$

Refer to chart 6-2 (multi-hole cage guided) and go to the 2-1/2" trim size column. Follow the column until you get to a pressure greater than 120 psi, then follow the row horizontally to determine you need a Model M-22 with the 3-15 psi spring range.

Complete valve selection is 1100 series, 2-1/2" 150# Flange with 2-1/2" Multi-hole cage trim and M-22 actuator with 3-15 psi spring range.

## Sizing Example 2:

**Fluid:** Saturated Steam  
**Application:** Temperature Control  
**P<sub>1</sub>:** 125 psig  
**Flow:** 1750 lbs/hr  
**Actuator:** Air to open (Fail Close)

### Solution:

Since this is a temperature control application and we do not know the P<sub>2</sub> pressure, we will size the valve with a 30% pressure drop. We need to use the subcritical flow formula.

$$C_v = \frac{1750}{2.1\sqrt{(37)((125+14.7)+(88+14.7))}} = 8.8$$

Refer to the Cv charts on Page 4. Select a 1" Contoured top guided with full port trim. The 1" is chosen over the 3/4" because the valve will control best between 15% - 85% of maximum valve capacity. The 3/4" valve would be operating at 98% of valve capacity.

## Actuator Selection:

For temperature control applications, the shut off pressure is the P<sub>1</sub> pressure. Refer to chart 6-1 (Contoured Top Guided) and go to the 1" trim size column. Follow the column until you get to a pressure greater than 125 psi, then follow the row horizontally to determine you need a Model M-00 with a 6 - 18 psi spring range.

Complete valve selection is 1100 series 1" NPT with 1" contoured top guided trim and M-00 actuator with 6 - 18 psi spring range.



## Determine the percentage of 'valve open' at any calculated $C_v$

You must first solve for a required  $C_v$  with one of the formulas on page 331. Using sizing example 2, we calculated a  $C_v$  of 8.8 and we chose a 1" contoured top guided valve with a full 1" trim with a maximum  $C_v$  of 13.

Step 1: Locate selected valve trim size in the far right-hand column. The maximum  $C_v$  for this trim can be found by moving two columns to the left.

Step 2: Locate the calculated  $C_v$  (flow coefficient) on the far left side.

Step 3: Follow calculated  $C_v$  to the right until it intersects with the curve associated with the trim size found in step 1.

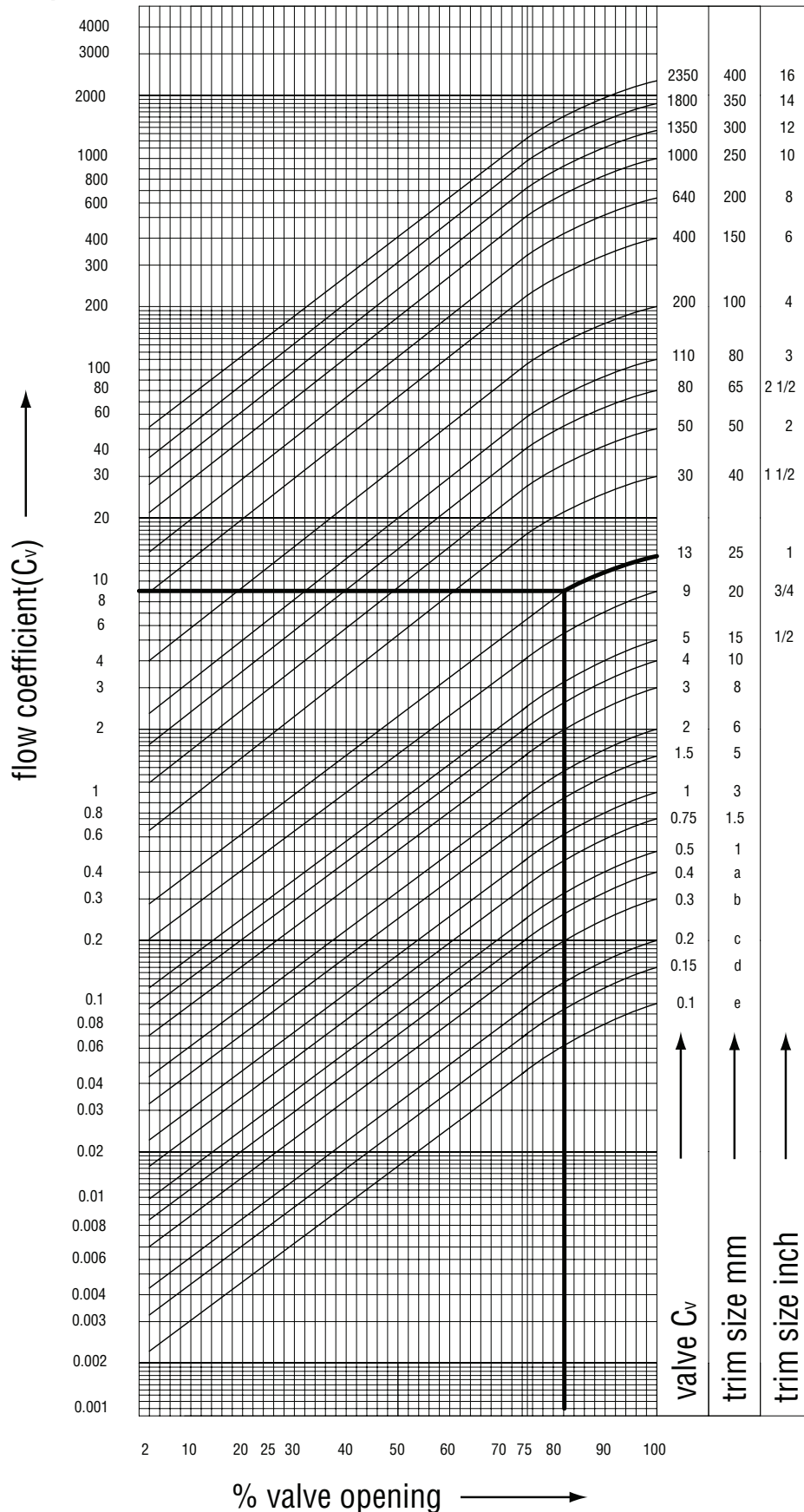
Step 4: From the point of intersection, travel vertically to the bottom of the chart.

This point indicates the percentage of valve open, at the calculated  $C_v$ . In this case the valve will operate at 83% of the valves maximum capacity.

The valve has the greatest control between 15 and 85% of the valve opening.

# Python® - 1100 Series Control Valve

Trim: Contoured Top Bush Guided



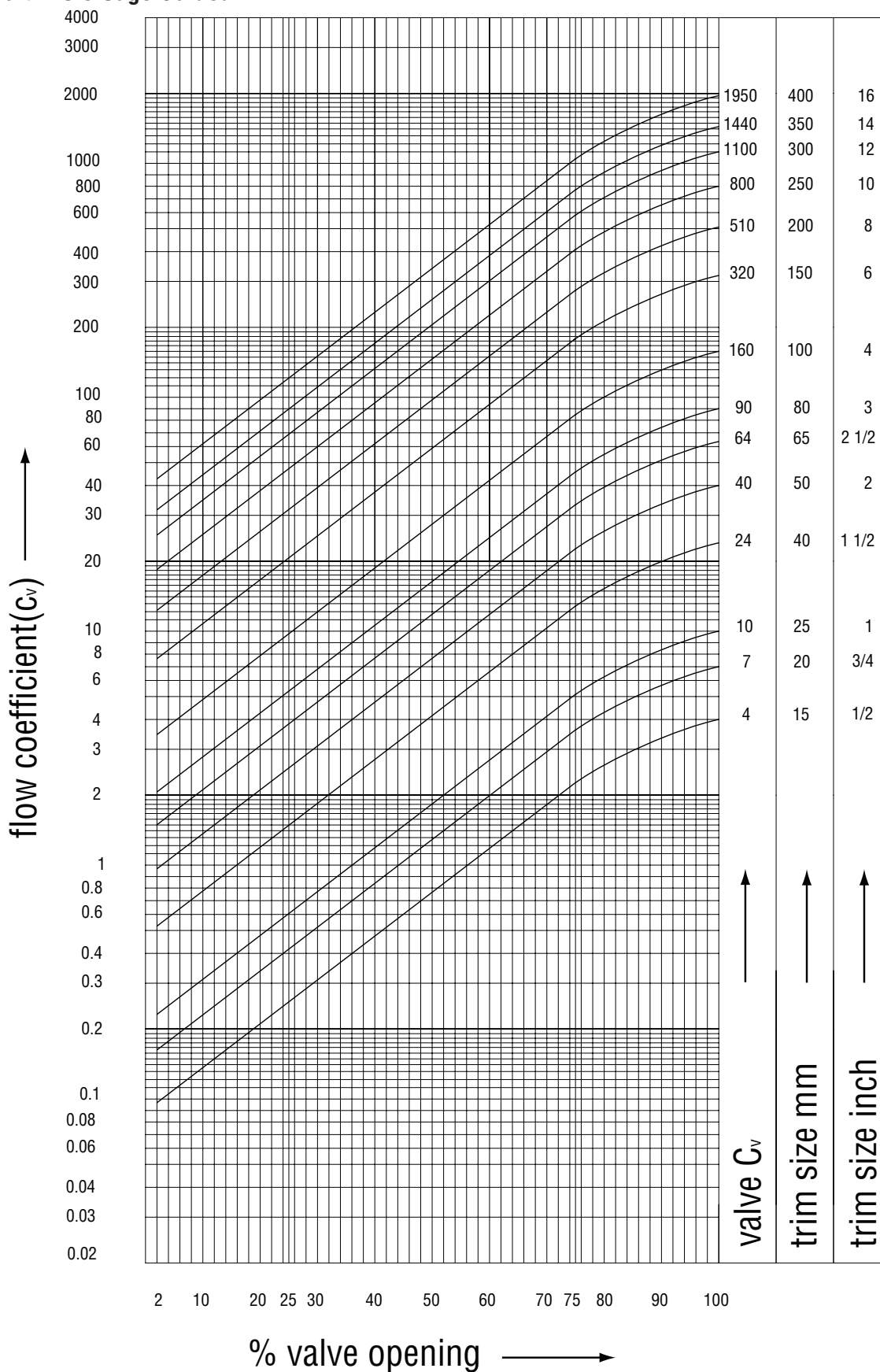
Pressure and  
Temperature Controls

Designs, materials, weights and performance ratings are approximate and subject to change without notice. Visit [armstronginternational.com](http://armstronginternational.com) for up-to-date information.



# Armstrong® Python® - 1100 Series Control Valve

Trim: Multi-Hole Cage Guided



# Python® - 1100 Series Control Valve

## SRP981 Pneumatic Positioner

The SRP981 positioner is designed to control pneumatic valve actuators with pneumatic control signals. It is used to reduce the adverse effects of valve friction, for higher thrust and shorter positioning time. It offers an easy adjustment by two mechanical screws.

### Input:

Signal range: 3 to 15 psig (0.2 to 1 bar) split range down to  $\Delta w$  3 psi (0.2 bar)

### Response characteristic:

Amplification: adjustable

Sensitivity: <0.1% F.S.

Non-linearity (terminal based adjustment): <1.0% F.S.

Hysteresis: <0.3% F.S.

Supply air dependency: <0.3% / 1.5 psi (0.1 bar)

Temperature effect: <0.5% / 10 K

Mechanical vibration: 10-60 Hz up to 0.14 mm  
60 - 500 Hz up to 2 g  
<0.25% of travel span

### Supply:

Supply air pressure: 20 to 50 psig (1.4 to 3.5 bar)

Supply air: free of oil, dust and water according to IEC 654-2

### Connection:

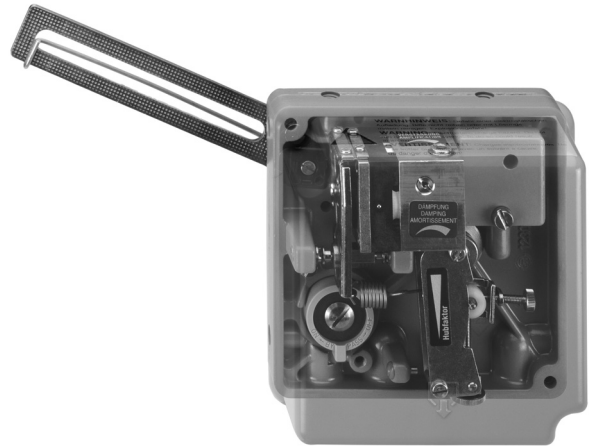
Pneumatic: Female threads G 1/8 according to ISO 228

### Materials:

Base Plate: Aluminum (Alloy No. 230) finished with DD varnish

## Features

- Independent adjustment of stroke range and zero
- Adjustable amplification and damping
- Split range up to 4-fold possible
- Input signal from 3-15 psi (0.2-1 bar)
- Supply pressure up to 50 psi (3.5 bar)
- Low vibration effect in all directions
- Ambient temperature -40 to 176°F (-40 to 80°C)
- Protection class IP54 or IP65
- Explosion protection:
  - II 2 G EEx c (constructive safety) + accessories in
  - II 2 G EEx i according to ATEX
- Additional inputs/outputs (optional)
  - Position feedback 4 to 20 mA
  - Built-in independent inductive limit switches (2-/3 wire) or micro switches
- Accessories
  - Booster relay to minimize stroke time
  - Gauge manifold
- Gauges (optional)
  - External gauge manifolds
  - Integrated gauges
  - Indicating ranges:
    - Input: 0 to 23 psig (0 to 1.6 bar)
    - Output: 0 to 150 psig (0 to 10 bar)



### SRI990 Analog Positioner

The analog positioner SRI990 with analog input 4 to 20 mA is designed to control pneumatic valve actuators. The modular structure of this product line enables conversion from an analog to an "intelligent" positioner with HART, Fieldbus or FoxCom.

It offers an easy adjustment by means of switches and potentiometers.



#### Input

Two wire system

Reverse polarity protection: Built-in standard feature

Signal range: 4 to 20 mA

Characteristic of setpoint: linear

Operating range: 3 to 21.5 mA

Voltage: DC 6 to 36 V (unloaded circuit)

Load: 300 Ohms, 6 V at 20 mA

#### Supply

Supply air pressure: 20 to 50 psig (1.4 to 3.5 bar)

Supply air: according to IEC 654-2

#### Response characteristics

Sensitivity: <0.2% of travel span

Non-linearity: <±0.8% of travel span

Hysteresis: <0.5% of travel span

Temperature effect: <±0.5% / 10 K

Supply air dependence: <0.3% / 15 psi (1 bar)

Mechanical vibration:

10-60 Hz up to 0.14 mm,

60-500 Hz up to 2 g: <0.25% of travel span

### Features

- Ambient temperature -40 to 176°F (-40 to 80°C)
- Additional inputs/outputs (optional):
  - Position feedback 4 to 20 mA
  - Built-in independent inductive limit switches (2-/3 wire) or micro switches
- Accessories
  - Booster relay to minimize stroke time
  - Gauge manifold
- Configuration by means of switches and potentiometers
- Load 300 Ohms
- Low air consumption
- Supply air pressure up to 50 psi
- Single acting or double acting
- Mechanical travel indicator
- Reverse polarity protection and interlock diode
- Switch for pneumatic test
- Protection class IP 65 with ATEX and NEMA 4X with FM and CSA
- Explosion protection:
  - II 2 G EEx i/II 2 G EEx n (intrinsic safety) according to ATEX
  - Intrinsic safety according to FM and CSA
- Stainless steel housing for offshore or food and beverage applications

# Python® - 1100 Series Control Valve

## SRD991 Intelligent Positioner with HART, PROFIBUS PA, FOUNDATION Fieldbus H1 or FoxCom for EEx ia Intrinsically Safe Applications

The microprocessor controlled positioner SRD991 is designed to control pneumatic valve actuators and can be operated locally or by means of control systems (e.g. the Foxboro I/A Series System). The advanced diagnostic can be partially shown on the local LCD of the positioner or fully on a PC or a DCS workstation with a DTM based software (VALcare or Valve Monitor).

The positioner is available with different communication protocols. This includes versions with analog setpoint (4 to 20 mA) and superimposed HART- or FoxCom signal; digital with FoxCom protocol, or fieldbus communication according to PROFIBUS-PA and FOUNDATION fieldbus H1 according to IEC 1158-2 based on FISCO.

The SRD991 also has the capability to control a Partial Stroke Test(PST) that offers operators a tool to identify the trouble-proof function of ESD (Emergency Shut Down) valves.

### Features

#### Version "Intelligent"

- Autostart with self calibration
- Self diagnostic, status and diagnostic messages

#### Version "Intelligent with Communication"

- Communication HART, FOUNDATION Fieldbus H1, PROFIBUS-PA or FoxCom
- Configuration by means of local keys, Hand Held Terminal, PC or I/A Series system or with an infrared interface by means of IRCOM

#### Version "Intelligent without Communication"

- Input signal 4-20 mA

#### Applicable to all SRD991 Models:

- Supply air pressure up to 50 psig (3.4 bar)
- Single or double acting
- Protection class IP 65, NEMA 4X
- Explosion protection:
  - II 2 G EEx i / II 2 G EEx n (intrinsic safety) according to ATEX
  - Intrinsic safety according to FM and CSA
- Ambient temperature -40 to 176°F (-40 to 80°C)
- Display and Local User Interface:
  - Multilingual Full-Text Graphic LCD or LEDs
  - Status- and Diagnostic-Messages displayed on LCD
  - Easy configuration by means of 3 push buttons
- Mechanical travel indicator
- Suitable for safety applications up to SIL3
- Partial Stroke Test (PST) for Emergency Shut Down applications
- Infrared Interface for wireless communication
- Stainless steel housing for offshore or food and beverage applications



- Additional Inputs/outputs (optional):
  - 2 binary outputs (limits)
  - Position feedback 4 to 20 mA, 1 Alarm output
  - 2 binary inputs
  - Built-in independent inductive limit switches (2- 3-wire) or micro switches
  - Sensors for supply air pressure and output pressure
  - Binary Inputs/Outputs dedicated to SIS logic solvers
- Accessories
  - Booster relay to minimize stroke time
  - Gauge Manifold





## Armstrong® Python® - 1100 Series Control Valve

### 43AP Pressure Controller

- 4 to 400% proportional band
- 3-15 psi signal output
- 316 stainless steel spiral pressure element
- Enclosure meets IEC IP53 NEMA Type 3

### 43AP Temperature Controller

- 4 to 400% proportional band
- 15 Ft. capillary
- 316 stainless steel well with 6" insertion length
- Enclosure meets IEC IP53 NEMA Type 3

### Features

- Wide selection of measuring elements
- Wide choice of control modes
- Broad range of integral (reset) and derivative adjustments
- Power failures do not influence process driven indication
- Weatherproof construction
- Versatile mounting
- Internal bumpless automatic-manual transfer station

These instruments indicate and control pressure, temperature, vacuum and differential pressure. They provide process industries with a highly dependable and versatile group of instruments.

### Accuracy:

Input to pointer:  $\pm 0.5\%$  of span for qualified elements.  
Input to output: Depends on measuring element used.

### Repeatability:

0.2% of span

### Deadband:

0.1% of span

### Ambient Temperature Effect:

Maximum control point shift at midspan per 100°F (55°C) change within normal operating conditions is 1% of input span.

### Supply Pressure Effect:

Maximum control point shift at midspan per 1 psi (7 kPa) change within normal operating conditions is 0.2% of input span.



## Python® - 1100 Series Control Valve

### Foxboro/Eckardt Controllers

The 718C Series expands the capability of standard 1/8 DIN controllers with advanced features:

- Modbus serial communication to I/A Series for Windows NT, where data collection capabilities and remote operation are needed.
- Adaptive Auto-Tune for quick start ups
- Anti-Windup for keeping your batch process under control

The NEMA 4X faceplates allow these units to be used in applications where washdowns and dust conditions exist.

The Soft Start function prevents thermal shock.

Designed specifically for equipment manufacturers who need communications to data acquisition equipment, the light and compact (1/8 DIN size) is able to perform in the most demanding applications with easy yet reliable control.

The 718C Series start-up is as simple as:

- wiring the instrument
- configuring set points and alarm thresholds
- initiating the autotune function

Engineers, technicians and operators, skilled or unskilled in process control theory, can obtain perfect process control.

### Foxboro 718C Electric Controller

- For digital control with universal input and local set point. Installed in a fiberglass enclosure with a thermal strip and auto tune instructions.
- One (1) mA output, 3 relays, 2 digital inputs and auxiliary power supply for transmitters.
- No communication
- 24 Vdc, 110 AC, 240 AC power supply