PTV®
Solutions

# Pressure Reducing Valve PRV425 general situation

The PTV PRV425 is internally piloted piston-operated pressure reducing valves. It is pilot-controlled for accurate regulation of pressure under widely ranging flow. The internal-pilot design eliminates external components and piping. Internally piloted PRV425 valves are capable of larger capacity and greater accuracy than direct-acting valves. Internally piloted PRV425 valves are rated for dead-end service and have a 20:1 turn down ratio and an accuracy of ±0.5 Bar of set point.

It mainly composed of main valve and pilot valve. The main valve consists of valve seat, main valve disc, piston, cylinder sleeve, and spring. The piston valve consists of valve seat, plug, membrane, spring and adjusting spring. Set the outlet pressure through adjusting spring, sense the change of pressure of outlet with membrane, adjust the flow area of throttling part of main valve through open and close of pilot valve and drive the piston, to realize the function of reducing and regulating valve. The product is mainly applied on steam or fluid piping, to reduce and regulate the pressure.

Completely supported by piping, lightweight PRV425 valves install easily with NPT or flanged connections. A stainless steel diaphragm, hardened stainless steel working parts and integral removable strainer team up to provide higher performance over a long, trouble-free

Valves are equipped with a caged main valve assembly (separate shutoff surfaces and flow-control ports), piston valve rings for longer life, service life.

and an external adjusting screw with locking nut and cover. All working parts are renewable in-line.

## Internally Piloted

This type of PRV incorporates two valves-a pilot and main valve-in one unit. The pilot valve has a design similar to that of the direct-acting valve. The discharge from the pilot valve acts on top of a piston, which opens the main valve. This design makes use of inlet pressure in opening a large main valve than could otherwise be opened directly. As a result, there is greater capacity per line size and greater accuracy than with the direct-acting valve. As with direct-acting valves, the pressure is sensed internally, eliminating the need for an external sensing line.

## Main Difference between Pilot and Non Pilot Operated

**Direct Acting (Non-piloted)**

Used for small loads where extremely close pressure control is not needed.

Pros: Compact size, low price, easy to install.

Cons: Higher droop (variation from set pressure) than Pilot-operated PRV.

**Pilot-Operated (Internally piloted PRV425 series, externally piloted DP143 series)**

Used for larger loads where close pressure control is required

Pros: Close pressure control, fast response to load variation, may be used across a broader range of
flow rates than the direct acting types.

Cons: Larger size, higher price.

From the above characteristics, it can be seen that the function and applications of non-piloted direct acting PRVs differ substantially from those of pilot-operated PRVs.

**In short:**

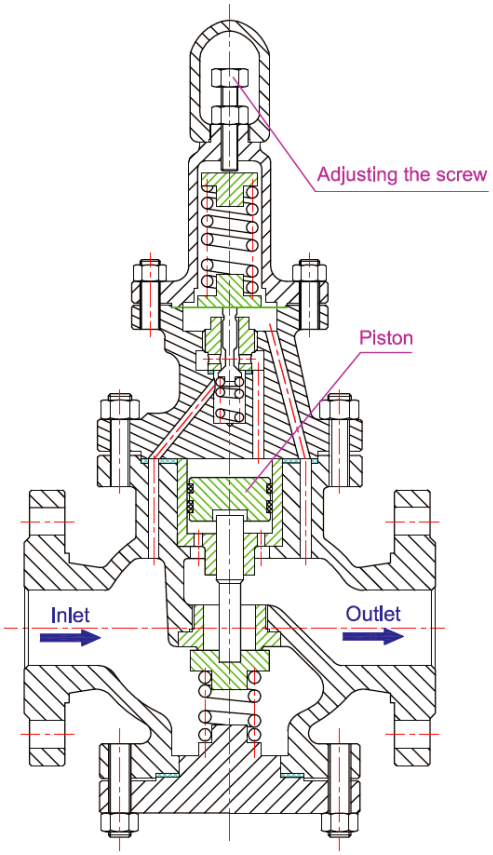
- Direct-operated valves are used when loads are small and some down - stream pressure droop may be accepted. They are generally used in light load services.
- Pilot-operated pressure reducing valves can respond quickly to varying load conditions while maintaining stable secondary pressure where precise pressure control is needed. They are generally intended for larger load applications..

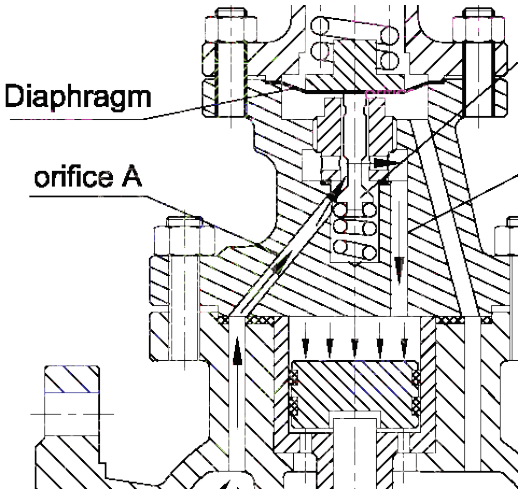
Typical Applications in a Steam-Using Plant:

- Small load applications such as sterilizers, unit heaters, humidifiers, and small process equipment may typically use a simple Direct Acting PRV for pressure reduction.
- In case of larger flows, such as steam distribution piping, loads may fluctuate greatly depending on the operational status of the recipient equipment. Such load variations and large capacity would call for the use of a Pilot-operated PRV to reduce pressure.
- Furthermore, the amount of steam used by certain equipment at start-up may differ significantly from the amount required during normal operation. Such wide variations may also necessitate the use of a Pilot-operated PRV for pressure reduction.

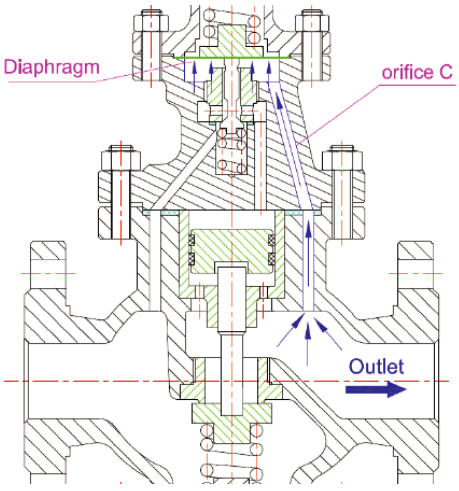
## How it works

When the pressure reducing valve is released from the factory, its adjusting spring is in an uncompressed state while its main valve and pilot valve disc are in the closed state. To use it, rotate the adjusting screw clockwise to compress the adjusting spring and make the diaphragm move down to open the pilot valve disc. The medium flows from the orifice A to the orifice B through the pilot valve seat and then into the area above the piston. Acted by the medium pressure, the piston moves down to drive the main valve disc to leave the main valve seat and make the medium flow to the outlet of the valve and meanwhile through the orifice C and into the area below the diaphragm. When the outlet pressure exceeds the set value, it will push the diaphragm upwards to compress the adjusting spring. Then the pilot valve disc will move in the closed direction to reduce the medium flowing to the area above the piston, and the pressure will drop as well; here the main valve disc will be pushed by the main valve disc's spring force to move upwards to reduce the clearance between the main valve's disc and seat while the medium flow will reduce as well and the outlet pressure will also drop to strike a new balance. Contrarily, when the outlet pressure is lower than the set value, the clearance between the main valve's disc and seat will increase and the medium flow will increase as well so that the outlet pressure will increase to strike a new balance.




Step2




Step3

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## Features:

A) **Self-acting using spring and piston operation** - no need for electrical supplies.

B) **Internally piloted piston-operated.**

C) **Self-aligning feature** allows the piston to move smoothly, resulting in accurate responsive control.

D) **Stable outlet pressure can be maintained,** even with fluctuations in upstream pressure or flow rate.

E) **Accurate control of pressure with one spring.**

F) **Stainless steel internals** for excellent durability and resistance to corrosion.

G) **Wide range of screwed and flanged** connections to match plant standards.

H) **Metal-to-metal seat**

### Performance Standard

1. Design & Manufacture standard as to: ASME PTC 25.3 / ASME B16.34
2. Face to Face dimension standard as to: MFR-STD
3. Flange dimension conforms as to: ASME B16.5 / BS EN 1092
   Threaded Standard as to: NPT : ASME B1.20.1
   BSP : ISO 7-2: 2000
4. Testing and inspection as to: API 598 / ASTM E 1008-2003
5. Pressure-temperature conforms as to: ASME B16.34
6. Anti Corrosion as per NACE MR-0175(2002) requirement

### Technical Data

1. Size range NPT: 1/2" ~ 2"
   RF: 1/2" ~ 16"
2. Body design conditions: 150LB / 300LB / PN16 / PN25 / PN40
3. Maximum inlet pressure: 300LB / PN40 : 50 Bar @ 40° C
   150LB / PN25 / PN16: 25 Bar @ 40°C
4. Maximum design temperature: 350°C@ 24 Bar
5. Minimum design temperature: -29° C
6. Outlet Pressure Range: 300LB / PN40 : ~20° 3Bar
   150LB / PN25 / PN16: 3~16 Bar
7. Maximum operating temperature: 325° C@ 24 Bar
   Maximum temperature instantaneous : 425°C
8. Outlet pressure deviations: ≤±0.5 Bar
9. Differential pressure between inlet/outlet: 2 Bar
10. Suitable Medium: Suitable for steam, gas, compressed air. etc

PTV ® Brand is replacing SBM-PTV™ from May 2023, which is made by Sino Base Metal Co., Ltd, Subsidiary of SBM group, 11C, No.1208 South Xizang Road, Shanghai, China Sino Base Metal Co., Ltd, reserves the right to change design/ specifications without further notices.

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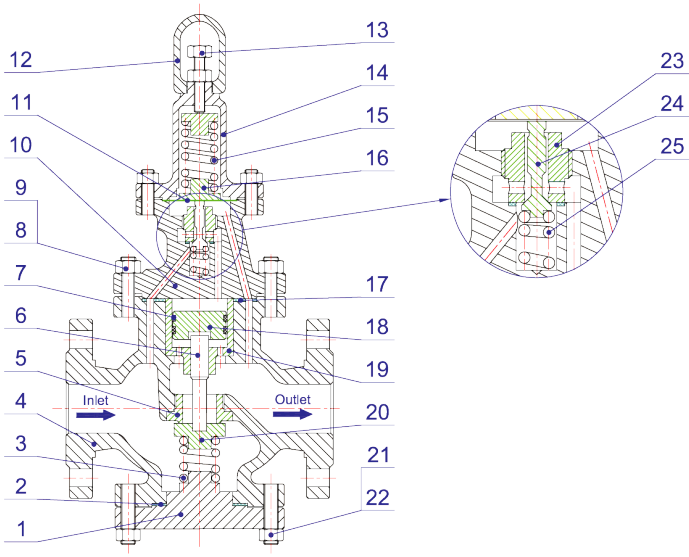
## Part List:

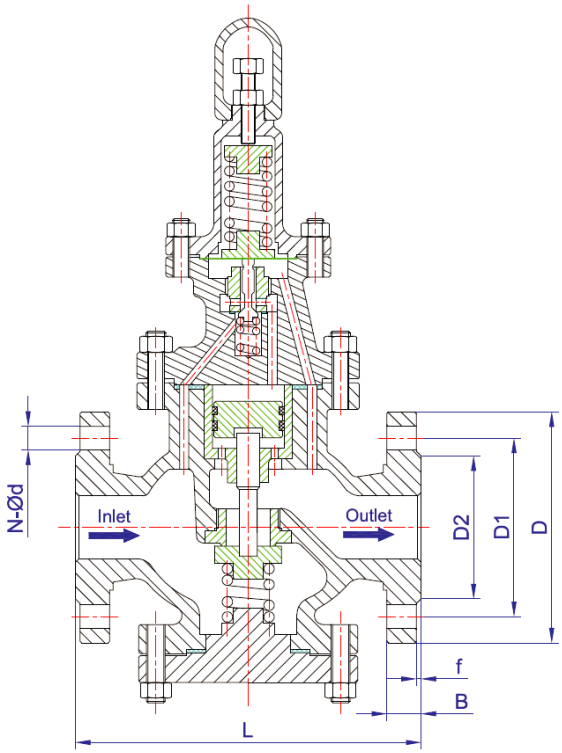
| No. | Part Name | Material | Standard |
|---|---|---|---|
| 1. | Bottom Cover | WCB | ASTM A216 |
| 2. | Bottom Gasket | SS316+Graphite | ASTM A276 / ASME B16.20a |
| 3. | Main Valve Spring | 60Si2Mn | EN 10089 :2002 |
| 4. | Main Valve Body | WCB | ASTM A216 |
| 5. | Main Valve Seat | SS410+Stellite.6 | ASTM A276 |
| 6. | Push rod | SS410 | ASTM A276 |
| 7. | Piston Ring | Ductile Iron K9 | ASTM A536 |
| 8. | Pilot Valve Housing Bolt | B7 | ASTM A193 |
| 9. | Pilot Valve Housing Nut | 2H | ASTM A194 |
| 10. | Pilot Valve Housing | WCB | ASTM A216 |
| 11. | Diaphragm | SS304 | ASTM A276 |
| 12. | Top Cap | PVC | MFR-STD |
| 13. | Adjusting Screw | B7 | ASTM A193 |
| 14. | Spring Chamber | WCB | ASTM A216 |
| 15. | Adjusting Spring | 60Si2Mn | EN 10089 :2002 |
| 16. | Bottom Spring Plate | A105 | ASTM A105 |
| 17. | Gasket | SS316+Graphite | ASTM A276 / ASME B16.20a |
| 18. | Piston | SS410 | ASTM A276 |
| 19. | Cylinder | SS410 | ASTM A276 |
| 20. | Main Valve Disc | SS410 | ASTM A276 |
| 21. | Bottom Bolt | B7 | ASTM A193 |
| 22. | Bottom Nut | 2H | ASTM A194 |
| 23. | Pilot Valve | SS304 | ASTM A276 |
| 24. | Pilot Valve Disc | SS304 | ASTM A276 |
| 25. | Pilot Valve Spring | 60Si2Mn | EN 10089 :2002 |




## Main Dimensions:

**Pressure Reducing Valve PRV425**
**Flanged ends RF ASME B16.5 300LB**

| NPS | L | D | D1 | D2 | B | n-Φd | f | Weight Kg |
|---|---|---|---|---|---|---|---|---|
| 1/2″ | 180 | Φ95 | Φ66.7 | Φ35 | 13 | 4-Φ16 | 2 | 13 |
| 3/4″ | 180 | Φ115 | Φ82.6 | Φ43 | 14.5 | 4-Φ19 | 2 | 13 |
| 1" | 200 | Φ125 | Φ88.9 | Φ51 | 16 | 4-Φ19 | 2 | 16 |
| 1 1/4" | 220 | Φ135 | Φ98.4 | Φ64 | 17.5 | 4-Φ19 | 2 | 26 |
| 1 1/2" | 240 | Φ155 | Φ114.3 | Φ73 | 19.5 | 4-Φ22 | 2 | 32 |
| 2" | 270 | Φ165 | Φ127 | Φ92 | 21 | 8-Φ19 | 2 | 42 |
| 2 1/2" | 300 | Φ190 | Φ149.2 | Φ105 | 24 | 8-Φ22 | 2 | 56 |
| 3" | 330 | Φ210 | Φ168.3 | Φ127 | 27 | 8-Φ22 | 2 | 71 |
| 4″ | 380 | Φ255 | Φ200 | Φ157 | 30.5 | 8-Φ22 | 2 | 80 |
| 5″ | 450 | Φ280 | Φ235 | Φ186 | 33.5 | 8-Φ22 | 2 | 130 |
| 6" | 500 | Φ320 | Φ269.9 | Φ216 | 35 | 12-Φ22 | 2 | 165 |
| 8" | 550 | Φ380 | Φ330.2 | Φ270 | 40 | 12-Φ25.5 | 2 | 220 |
| 10" | 650 | Φ445 | Φ387.4 | Φ324 | 46.5 | 16-Φ29 | 2 | 310 |
| 12" | 800 | Φ520 | Φ450.8 | Φ381 | 50 | 16-Φ32 | 2 | 495 |
| 14" | 850 | Φ585 | Φ514.4 | Φ413 | 52.5 | 20-Φ32 | 2 | 740 |
| 16" | 900 | Φ650 | Φ571.5 | Φ470 | 56 | 20-Φ35 | 2 | 950 |

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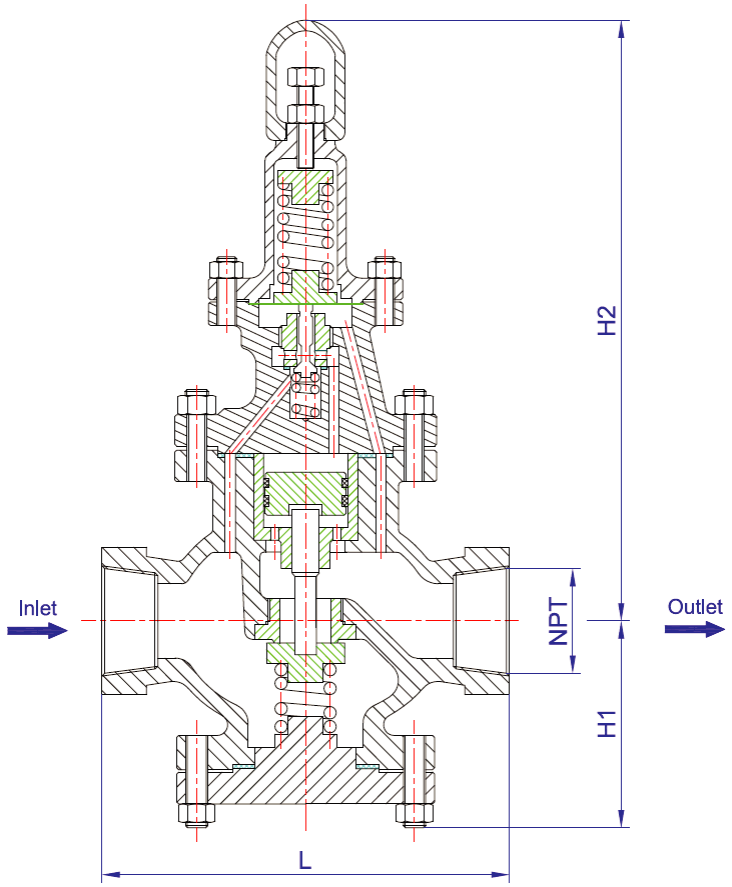
## Main Dimension of Pressure Reducing Valve PRV425

**Threaded ends NPT PN16 / PN25 / PN40**

| NPS | NPT | L | H1 | H2 | Weight (Kg) |
|---|---|---|---|---|---|
| 1/2″ | 1/2″ | 140 | 90 | 295 | 7.5 |
| 3/4″ | 3/4″ | 140 | 98 | 330 | 9 |
| 1" | 1" | 160 | 110 | 330 | 12.5 |
| 1 1/4" | 1 1/4" | 180 | 110 | 330 | 15 |
| 1 1/2" | 1 1/2" | 200 | 125 | 345 | 20 |
| 2" | 2" | 230 | 125 | 345 | 25 |




## SBM PTV Engineering Data

### CV Values of PRV425

| NPS | 2″ | 2,5″ | 3″ | 4″ | 5″ | 6″ | 8″ | 10″ | 12″ | 14″ | 16″ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CV | 1 | 2.5 | 4 | 6.5 | 9 | 16 | 25 | 36 | 64 | 100 | 140 |