

## RATIO PRESSURE REDUCING VALVES

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Philmac's ratio pressure reducing valves are designed to control service line pressure in fixed head water systems and have been doing so for over 40 years.

Their simple yet effective operation means they can protect downstream pipe work, fittings and appliances from the effects of excess water pressure. With a fixed non-adjustable ratio it means the valve does not require adjusting and is tamper proof.

Ratio valves are manufactured from high grade materials to provide reliable operation and a high level of corrosion resistance. Not only are spare parts available but these valves are backed by a full maintenance service.

Philmac's range of ratio valves are designed to handle situations where reliable, controlled high pressure operation is essential.

## APPLICATIONS

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**Agriculture:** Water tanks and troughs on high pressure systems.

**Plumbing:** Water supply for fire and potable water from top of buildings down.

**Mining:** Water supply down mineshafts.

## BENEFITS

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### Fast and Easy Installation

- **Minimum Space Required for Installation:** Ratio valves have a compact body design which makes them perfect for tight applications such as fire services. They can be installed in any orientation.
- **BSP Inlet Threads:** The Industrial and Plumbing sectors use British Standard Pipe (BSP) threads as a standard. Philmac also uses these thread types across the screwed ratio valve range to ensure compatibility with other threaded fittings and make installation simple.
- **Flanged Inlet/Outlet:** To make installation easy Philmac also offer a flanged ratio valve. The standard drill hole pattern is Table E, however to assist with different installations they are also available with DIN, ANSI 150, Table C/D/F/H, JIS or BS4504 Table II drill hole patterns. Other flange patterns can be supplied on request.
- **Serviceable:** The valves have been designed to be fully serviced and repair kits containing all the seals, o-rings and instructions are readily available. Philmac also offers a servicing facility where the valves are fully disassembled, cleaned, all parts are checked dimensionally and replaced as necessary. The valve is then reassembled with new seals and o-rings and tested to ensure it works at its designated ratio.

### Complete Security

- **Warranty:** For peace of mind the flanged ratio valves carry a five (5) year warranty on materials and workmanship when used with potable water.
- **Simple Sealing Action:** Because the valve relies on only one moving part it means high reliability and shutoff when required. There are no internal ports which can become blocked or springs that can become corroded.
- **Maintained Pressure:** Under no flow conditions the downstream pressure is maintained because the valve remains closed and it will not open until the downstream pressure drops when installed in a fixed head system.
- **Corrosion Resistant:** With a DZR brass body (screwed) or bronze body (flanged), 316 stainless steel seat and piston, DZR brass or gunmetal components, nitrile O-rings and seals ensures years of reliable operation.
- **Approvals:** All valves comply with Australian/New Zealand Standard 4020 which means the valves are suitable for use with drinking water.
- **Tamper Proof:** There are no external regulators or pilot tubes which can be tampered with so once the valve is installed it will continue to operate at its pre-set ratio.

### High Performance

- **Manufactured from DZR brass:** The brass components in Philmac screwed ratio valves are manufactured from dezincification resistant (DZR) brass. This means the brass is resistant in soil and water environments to corrosion involving the loss of zinc leaving a residue of spongy or porous copper.
- **Manufactured from Gunmetal:** The flanged ratio valves are manufactured from a cast gunmetal to provide overall strength in particular the flange of the valve.
- **High pressure shutoff:** Ratio pressure reducing valves are rated to a pressure of 3500 kPa (500 psi) or 35 bar (static shutoff) at 20° Celsius to meet the requirements of high pressure systems.
- **High Flow Rates:** Due to the internal design, when the valve is fully open it allows full flow of water.

### Complete Coverage

- **Wide range:** The range of ratio pressure reducing valves is comprehensive and includes screwed sizes from ½" to 2" (DN15 to DN50) and flanged sizes from 2" to 6" (DN50 to DN150). Some body sizes are available with different flange sizes (refer to the section on Dimensions).



## STANDARDS & TESTS

Philmac's range of ratio valves are designed to comply with the following standards and undertake a range of tests to ensure they comply with these standards.

### Standards

**AS/NZ 4020:** Testing of products for use in contact with drinking water.

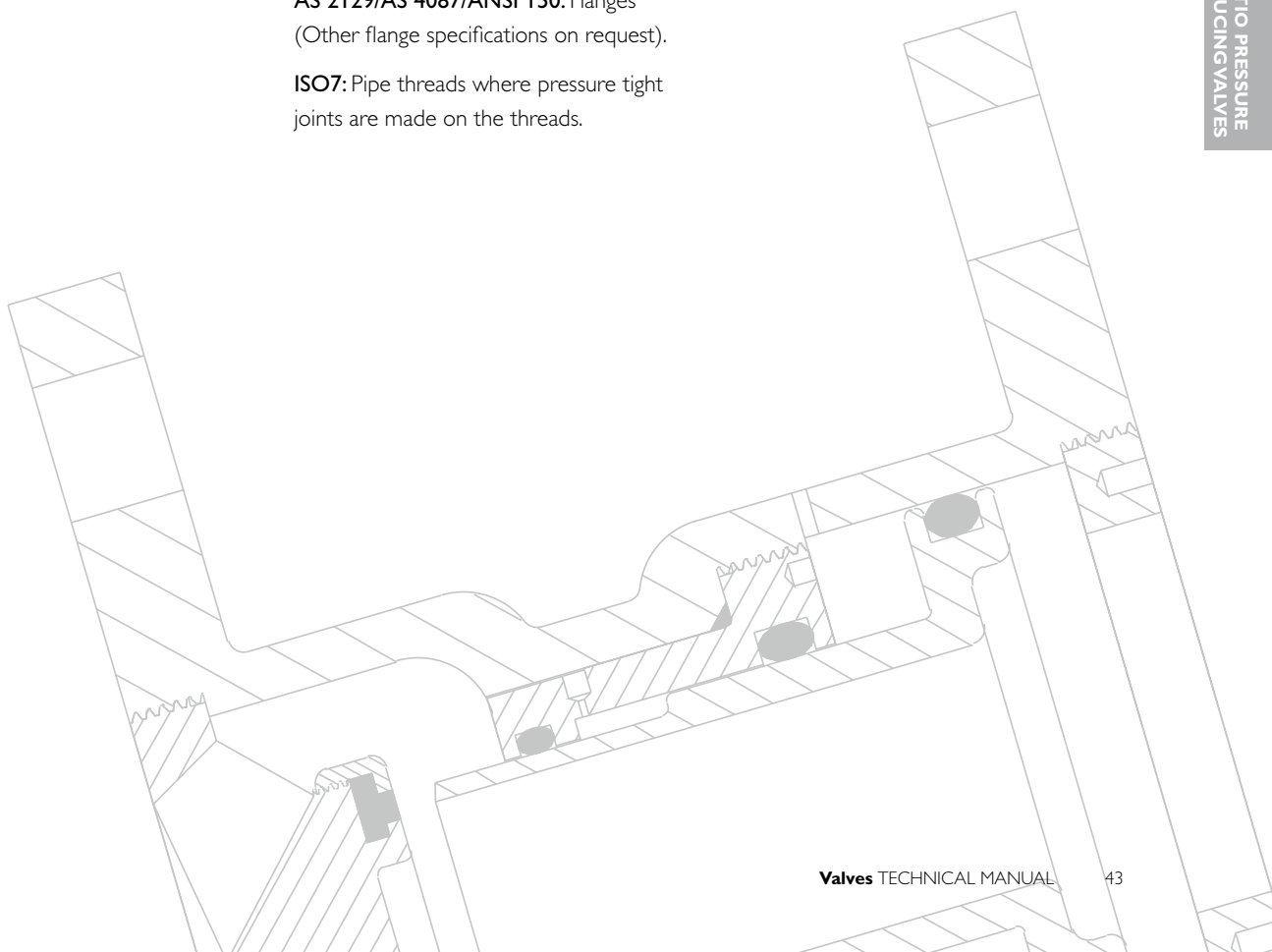
**AS 1722.1:** Pipe threads of Whitworth form part 1: sealing pipe threads..

**AS 2129/AS 4087/ANSI 150:** Flanges (Other flange specifications on request).

**ISO7:** Pipe threads where pressure tight joints are made on the threads.

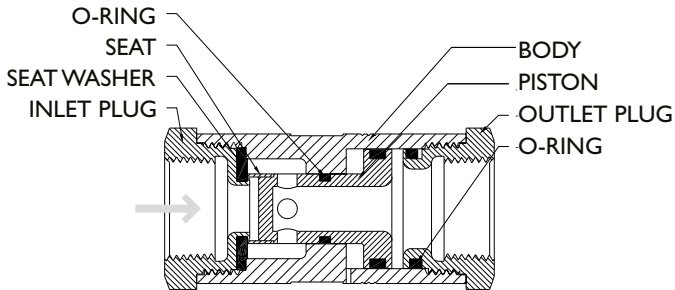
### Tests

**Shut Off Test:** Valves are tested for shut off against a hydrostatic water pressure of 3500 kPa (500 psi) or 35 bar.

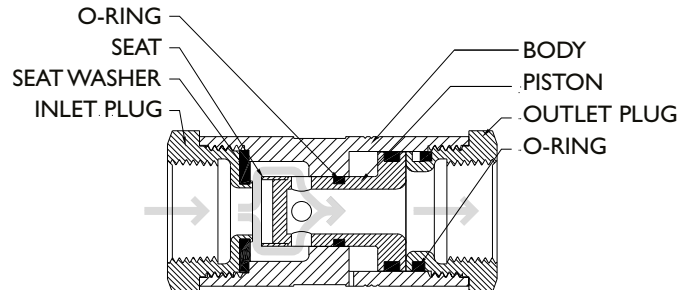


## RATIO PRESSURE REDUCING VALVES OPERATION & INSTALLATION INSTRUCTIONS

### CLOSED (No Flow)



### OPEN (Flow)



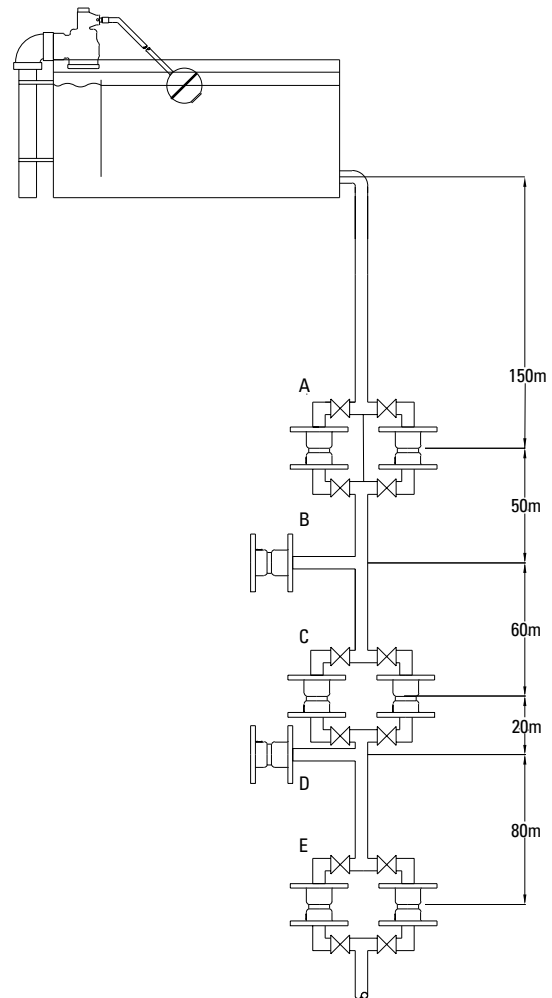
The valve operates on the principle of differing surface areas. In the example of a 2:1 screwed-ratio valve the upstream piston surface area is half that of the downstream surface area. Other ratios are obtained by altering the area relationship of the valve.

Under no flow conditions the piston is closed to ensure the downstream pressure does not exceed the prescribed ratio.

The schematic diagram shows an example installation and how ratio valves effectively reduce pressure to ensure the rating of pipework is not exceeded. Pressure after the valves will vary depending on ratio being used. Water is fed by gravity from a header tank into the system. Each flanged ratio valve should have an isolating valve installed both upstream and downstream to allow it to be removed for servicing.

From the tank to the first ratio valve the pressure will increase to approximately 1500 kPa at point A if we assume the tank is 3 metres high (150 m drop + 3 m tank height  $\times$  9.8). After the ratio valve the pressure will drop to 500 kPa (1500  $\div$  3) if we assume a 3:1 ratio is being used. Pressure will then build up to approximately 990 kPa (50 m  $\times$  9.8 plus the starting pressure of 500 kPa) at point B and 1580 kPa at point C as water moves down the pipe.

After point C the pressure will drop to approximately 395 kPa (1580  $\div$  4) if we assume a 4:1 ratio valve is being used. At point D the pressure will increase to approximately 590 kPa and approximately 1375 kPa at point E.



## RATIO PRESSURE REDUCING VALVES OPERATION & INSTALLATION INSTRUCTIONS

Valves must be installed according to the direction of flow as indicated on the valve. They can be installed vertically or horizontally but it is important that the breather hole is visible. It is critical that the breather hole kept free from obstructions and if buried the hole must be protected from blockage.

### Screwed Version



1. Apply PTFE tape or approved sealant to the thread ensuring sufficient is applied to ensure a watertight seal.



2. Screw into male thread by hand until firm.



3. Using a pipe wrench or multigrips on the hex end of the valve, screw it into the male thread until tight. Where necessary ensure the male thread is held stationary to avoid it from moving.

### Flanged Version



1. Ensure a gasket is used between the flange of the ratio valve and the flange to which it is to be fitted.

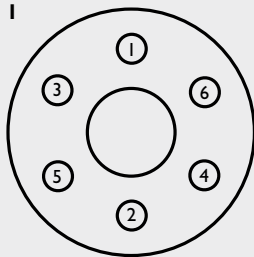


2. Fit the correct size and length bolts to each hole in the flange and hand tighten them.



3. Tighten the bolts with a spanner ensuring the bolts are torqued up correctly in an appropriate sequence.

FIGURE 1



**Note:** When assembling a flanged adaptor, position the gasket and loosely assemble the fitting. Tighten bolts gradually in sequence shown numerically in Figure 1, to ensure even compression around the flange. Ensure washers are used under bolt heads and nuts.

## SYSTEM DESIGN CONSIDERATIONS

**Minimum Inlet Pressure:** 200 kPa (29 psi) or 2 bar on screwed range and 300 kPa (43 psi) or 3 bar on flanged range

**Maximum Inlet Pressure:** 3500 kPa (500 psi) on 35 bar.

**Threads:** All threads on the screwed ratio valves are BSP with a Whitworth form.

**Flanges:** All flanges on the flanged ratio valves are drilled according to Table E. Dimensions as per AS2129. Other flange types are available on request including DIN, ANSI 150, Table C/D/F/H, JIS or BS4504 Table II.

**Sealing threads:** Philmac recommends sealing threads with PTFE tape. When being fitted to a metal thread an approved metal sealant can be used.

**Operating temperature:** Connection is cold water (less than 20°C) rated.

**Weathering:** All non-ferrous materials are protected from the affects of UV.

**Pressure Reduction:** The inlet pressure is reduced as per the ratio of the valve and will hold the downstream pressure to with +/- 5% of the inlet pressure.

**Ratios:** Screwed – 2:1 & 3:1  
Flanged – 3:2, 2:1, 3:1, 4:1 & 5:1

**Isolating valves:** An isolating valve should be installed both upstream and downstream of a ratio valve to allow it to be removed for servicing. Consideration should be given to installing two valves in parallel to allow one to be removed for servicing.

### Flow Rates\* (L/min) - Screwed

| Inlet Pressure (kPa) | Inlet Size |           |           |             |           |
|----------------------|------------|-----------|-----------|-------------|-----------|
|                      | ½" (DN15)  | ¾" (DN20) | 1" (DN25) | 1 ½" (DN40) | 2" (DN50) |
| 200                  | 25         | 30        | 75        | 375         | 530       |
| 300                  | 30         | 35        | 95        | 470         | 660       |
| 500                  | 40         | 45        | 125       | 605         | 850       |
| 1000                 | 55         | 65        | 175       | 660         | 1205      |
| 1500                 | 70         | 80        | 210       | 1050        | 1480      |
| 2000                 | 80         | 90        | 245       | 1215        | 1705      |
| 2500                 | 85         | 100       | 275       | 1355        | 1910      |
| 3000                 | 95         | 110       | 300       | 1485        | 2090      |
| 3500                 | 100        | 120       | 325       | 1605        | 2260      |

\* Theoretical maximum water flow rate when outlet is open ended

### Flow Rates\* (L/min) - Flanged

| Inlet Pressure (kPa) | Inlet Size |           |            |            |
|----------------------|------------|-----------|------------|------------|
|                      | 2" (DN50)  | 3" (DN80) | 4" (DN100) | 6" (DN150) |
| 300                  | 1350       | 3100      | 5650       | 13400      |
| 500                  | 1700       | 4000      | 7100       | 17500      |
| 1000                 | 2500       | 5600      | 10000      | 24800      |
| 1500                 | 3000       | 6900      | 12000      | 30000      |
| 2000                 | 3500       | 7900      | 14000      | 34700      |
| 2500                 | 3800       | 8800      | 15700      | 38700      |
| 3000                 | 4200       | 9700      | 17300      | 42500      |
| 3500                 | 4600       | 10500     | 18600      | 46000      |

\* Theoretical maximum water flow rate when outlet is open ended

## CHEMICAL RESISTANCE

Philmac's ratio pressure reducing valves are primarily designed to convey water. However there may be occasions where the water contains chemicals and/or alternative fluids need to be controlled. The following table is provided as a **guide only** for the compatibility of various chemicals and/or alternative fluids to Philmac ratio valves. The mixing of chemicals may affect the compatibility.

| Chemical                         | Ratio valve |
|----------------------------------|-------------|
| Acetic acid (10%)                | N           |
| Acetic acid (50%)                | N           |
| Alcohol (ethanol)                | N           |
| Ammonium nitrate                 | N           |
| Antifreeze                       | R           |
| Brine                            | N           |
| Calcium carbonate                |             |
| Calcium chloride                 | N           |
| Calcium nitrate                  |             |
| Calcium sulphate                 |             |
| Chlorine water                   | N           |
| Citric Acid                      | N           |
| Copper Sulphate >5%              | N           |
| Diesel (fuel)                    | R           |
| Ethyl alcohol (ethanol)          | N           |
| Hydrochloric acid (10%)          | N           |
| Hydrochloric acid (30%)          | N           |
| Kerosene                         | R           |
| Lubricating oils (not synthetic) | R           |
| Magnesium nitrate                |             |
| Magnesium sulphate               | R           |
| Mineral oils                     | R           |
| Nitric acid (10%)                | N           |
| Nitric acid (40%)                | N           |
| Olive oil                        |             |
| Orange juice                     |             |
| Petrol                           |             |
| Phosphoric acid (85%)            | N           |
| Drinking water                   | R           |
| Potassium chloride               | N           |
| Potassium nitrate                | R           |
| Potassium sulphate               | N           |
| Sodium bicarbonate               | N           |
| Sodium hypochlorite (<10%)       |             |
| Sulphuric acid (10%)             |             |
| Sulphuric acid (30%)             |             |
| Urea                             |             |
| Zinc nitrate                     |             |
| Zinc sulphate                    | R           |

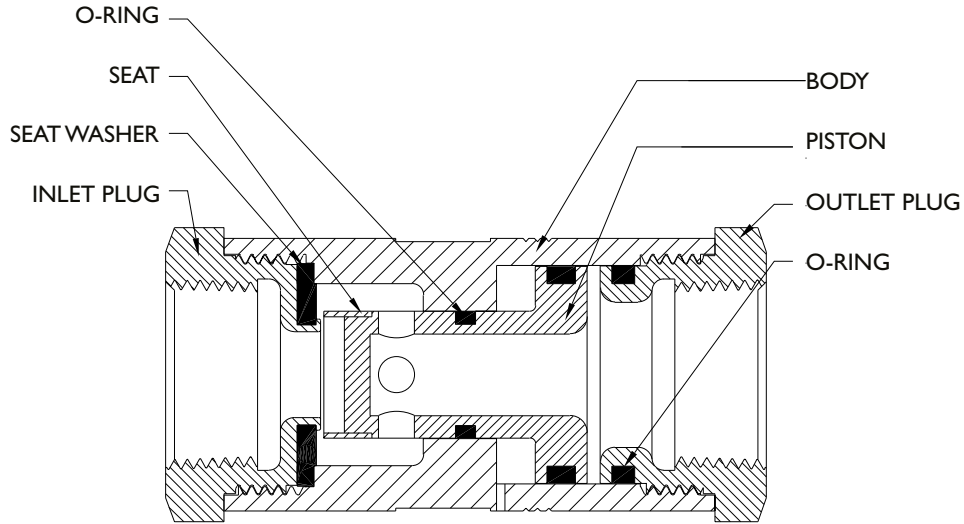
**N = Not Recommended**

**R = Resistant**

**Empty Cell = No data available**

Note recommendations based on fluids at 20° C or less

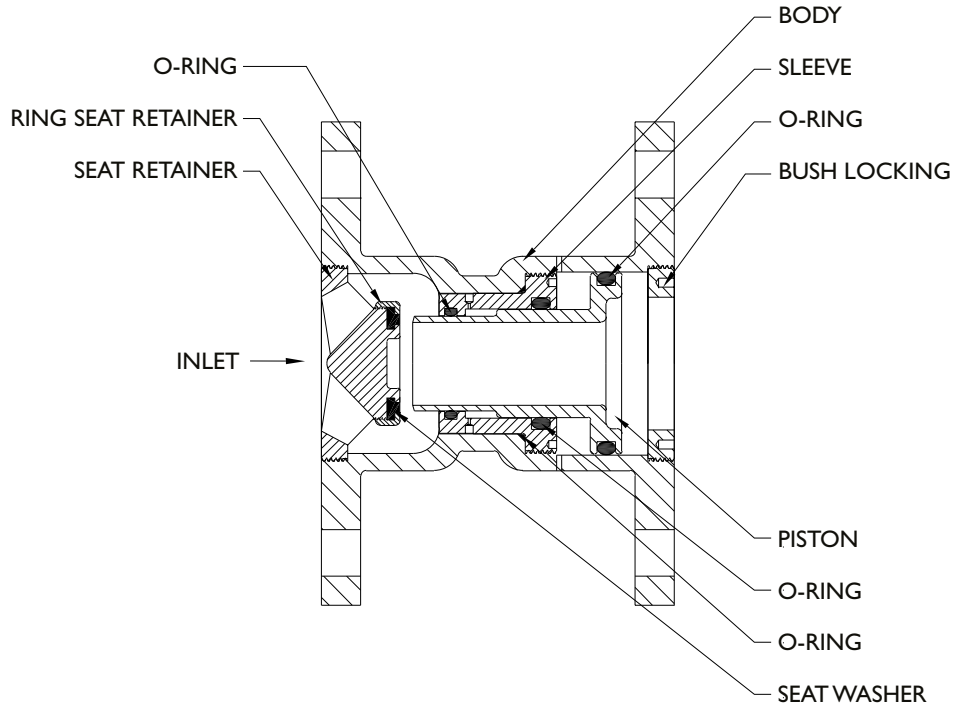
## RATIO PRESSURE REDUCING VALVES MATERIAL & COMPONENTS



### Screwed Ratio Valves

| Size | Nominal Size | Part Number | Ratio | Body      | Inlet Plug | Outlet Plug | Piston    | Seat   | Seat Seal      | O-Ring         |
|------|--------------|-------------|-------|-----------|------------|-------------|-----------|--------|----------------|----------------|
| ½"   | DN15         | 90222100    | 2:1   | DZR brass | DZR brass  | DZR brass   | DZR brass | 316 SS | Nitrile rubber | Nitrile rubber |
|      |              | 90223100    | 3:1   |           |            |             |           |        |                |                |
| ¾"   | DN20         | 90222200    | 2:1   | DZR brass | DZR brass  | DZR brass   | DZR brass | 316 SS | Nitrile rubber | Nitrile rubber |
|      |              | 90223200    | 3:1   |           |            |             |           |        |                |                |
| 1"   | DN25         | 90222300    | 2:1   | DZR brass | DZR brass  | DZR brass   | DZR brass | 316 SS | Nitrile rubber | Nitrile rubber |
|      |              | 90223300    | 3:1   |           |            |             |           |        |                |                |
| 1 ½" | DN40         | 90222500    | 2:1   | DZR brass | DZR brass  | DZR brass   | DZR brass | 316 SS | Nitrile rubber | Nitrile rubber |
|      |              | 90223500    | 3:1   |           |            |             |           |        |                |                |
| 2"   | DN50         | 90222600    | 2:1   | DZR brass | DZR brass  | DZR brass   | DZR brass | 316 SS | Nitrile rubber | Nitrile rubber |
|      |              | 90223600    | 3:1   |           |            |             |           |        |                |                |

## RATIO PRESSURE REDUCING VALVES MATERIAL & COMPONENTS



### Flanged Ratio Valves

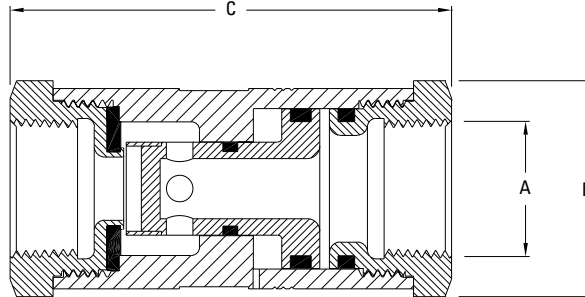
| Body Size | Flange Size | Table Pattern | Body         | Sleeve   | Piston  | Ring Seat Retainer | Bush Locking | Seat Retainer | Seat Seal      | O-ring         |
|-----------|-------------|---------------|--------------|----------|---------|--------------------|--------------|---------------|----------------|----------------|
| 2" (50)   | 2" (50)     | D/E           | Gunmetal LG2 | Gunmetal | 316 S/S | Gunmetal           | Gunmetal     | Gunmetal      | Nitrile rubber | Nitrile rubber |
| 2" (50)   | 2 ½" (65)   | D/E           | Gunmetal LG2 | Gunmetal | 316 S/S | Gunmetal           | Gunmetal     | Gunmetal      | Nitrile rubber | Nitrile rubber |
| 3" (80)   | 3" (80)     | D/E           | Gunmetal LG2 | Gunmetal | 316 S/S | Gunmetal           | Gunmetal     | Gunmetal      | Nitrile rubber | Nitrile rubber |
| 3" (80)   | 4" (100)    | E             | Gunmetal LG2 | Gunmetal | 316 S/S | Gunmetal           | Gunmetal     | Gunmetal      | Nitrile rubber | Nitrile rubber |
| 4" (100)  | 4" (100)    | E             | Gunmetal LG2 | Gunmetal | 316 S/S | Gunmetal           | Gunmetal     | Gunmetal      | Nitrile rubber | Nitrile rubber |
| 4" (100)  | 6" (150)    | E             | Gunmetal LG2 | Gunmetal | 316 S/S | Gunmetal           | Gunmetal     | Gunmetal      | Nitrile rubber | Nitrile rubber |
| 6" (150)  | 6" (150)    | E             | Gunmetal LG2 | Gunmetal | 316 S/S | Gunmetal           | Gunmetal     | Gunmetal      | Nitrile rubber | Nitrile rubber |

NOTE: Part numbers and ratios are not shown due to the number of variations available.

## RATIO PRESSURE REDUCING VALVES RANGE & DIMENSIONS

### Screwed Ratio Valve

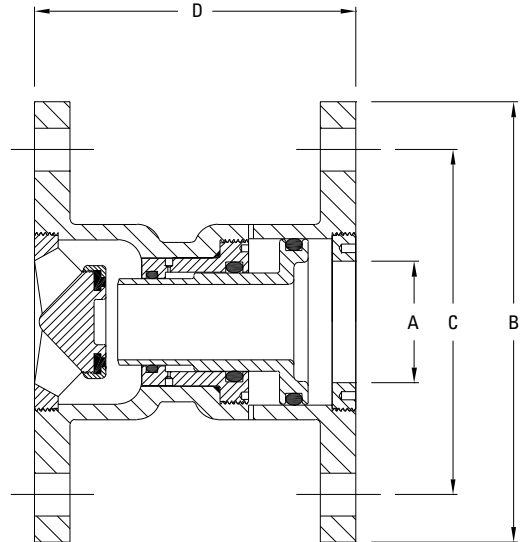
| Size (A) | Nominal Size | B   | C   |
|----------|--------------|-----|-----|
| ½"       | DN15         | 38  | 80  |
| ¾"       | DN20         | 45  | 96  |
| 1"       | DN25         | 51  | 107 |
| 1 ½"     | DN40         | 95  | 155 |
| 2"       | DN50         | 118 | 160 |



All dimensions in millimetres unless otherwise stated

### Flanged Ratio Valve

| Body Size (A) | Nominal Body Size | Flange Size | Nominal Flange Size | B*  | C*  | D   |
|---------------|-------------------|-------------|---------------------|-----|-----|-----|
| 2"            | DN50              | 2"          | 50                  | 150 | 114 | 135 |
| 2"            | DN50              | 2 ½"        | 65                  | 165 | 127 | 135 |
| 2"            | DN50              | 3"          | 80                  | 185 | 146 | 135 |
| 3"            | DN80              | 3"          | 80                  | 185 | 146 | 155 |
| 3"            | DN80              | 4"          | 100                 | 215 | 178 | 200 |
| 4"            | DN100             | 4"          | 100                 | 215 | 178 | 200 |
| 4"            | DN100             | 6"          | 150                 | 280 | 235 | 230 |
| 6"            | DN150             | 6"          | 150                 | 280 | 235 | 230 |



\* Dimensions based on a Table E flange configuration  
All dimensions in millimetres unless otherwise stated