Designed Network Solutions

ACV RATIO REDUCING VALVES

PATENT NUMBER: 2016/04949

T O T A L V A L V E S O L U T I O N S

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DNS ACV RATIO PRESSURE REDUCING VALVE (RPRV)

Ratio Pressure Reducing valves have been in use in the Mining Industry and some overseas countries in High Rise Buildings for many years. The concept of a Self actuated Pressure Reducing valve without pilots is new to the South African Water Industry, as well as the General SA Building industry. The fact that the valve is non-adjustable has often been seen as a reason to not utilize this valve in many applications, but when one considers if adjustability is really necessary and the many advantages offered by this valve, more and more users prefer the RPRV over standard Pilot Operated Pressure Reducing valves (POPRV).

Operation explained

The valve operates on the principle of different Surface areas between the inlet and outlet of the valve. This gets carefully calculated keeping in mind the dynamic effects of velocity and pressure drops over the area of the seat. The piston is affected by pressure forces on the differing areas and moves the piston either more open or more closed. When demand is zero the valve closes drop-tight.

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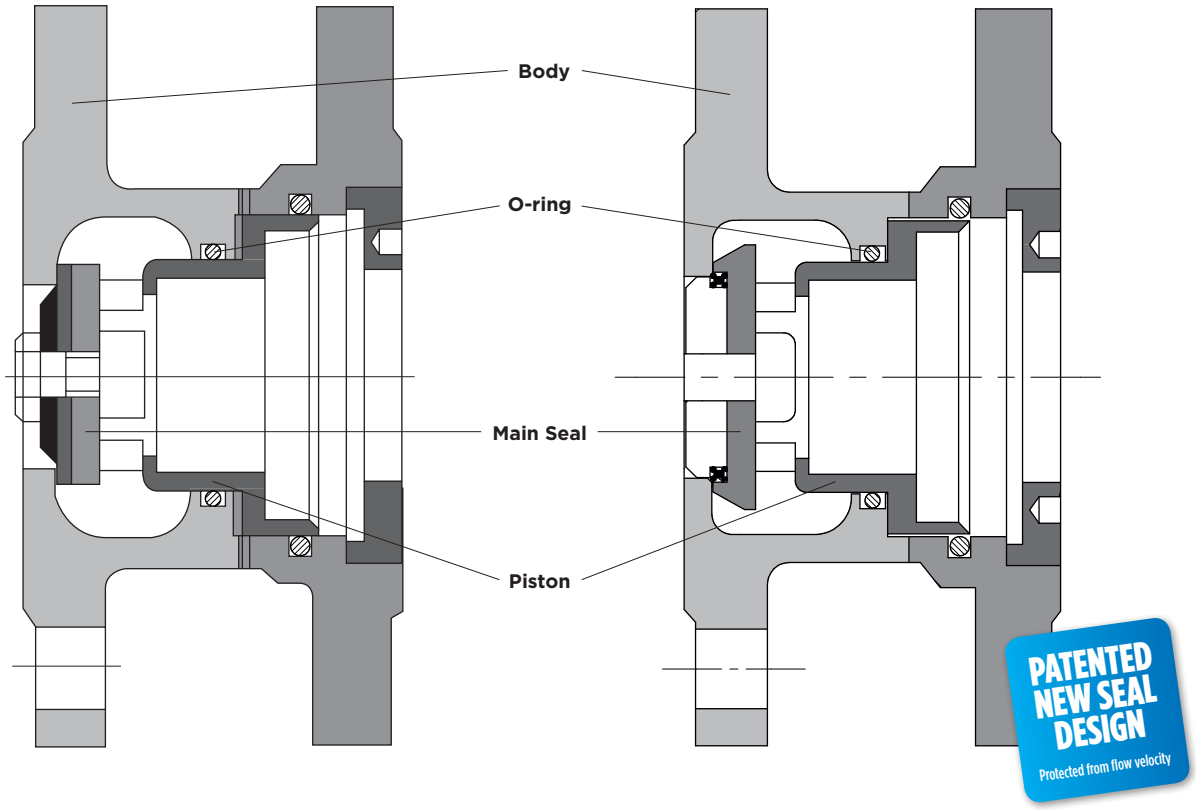

BENEFITS

Hydraulics Simplified

Because the Ratio Pressure Reducing Valve (RPRV) is of an inline Axial flow design, it has all the benefits of

- High Cavitation resistance (5:1 ratios available)
- Fast response – almost instantaneous response to demand changes
- High range-ability and can control down to very low flow rates

Due to these features the Ultra RPRV can operate in series with other control valves without experiencing instability, and also would not require bypass PRV's to cater for low flow periods. Sizing and application Engineering thus becomes simplified. If in doubt just install a line size RPRV in any position where pressure needs to be reduced without doing complicated sizing.

Fast and Easy installation

The RPRV has a compact design, which makes it ideal for tight spaces such as fire installations and plumbing in High Rise buildings. They can be installed in any orientation.

Complete security

- **Fixed Ratio.** No need for adjustments or calibration – the valve settings are fixed and cannot change with time.
- **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 or damaged.
- **Maintained Pressure.** Under no-flow conditions the downstream pressure is maintained because the valve will remain closed and will not open until the downstream pressure drops.
- **Ease of maintenance.** Can be handled by one person. This valve generally only needs servicing once every 3 to 5 years. Service kits include standard seals and O-rings, which are readily available.
- **Tamper proof.** There are no external regulators or pilot tubes, which can be tampered with.
- **Leakages** from Control tubing which is always a problem in buildings is eliminated
- No need to bleed air from control chamber.

High Performance

One moving part and only 2 O-ring seals and 1 main seal results in many years of trouble free operation without maintenance required.

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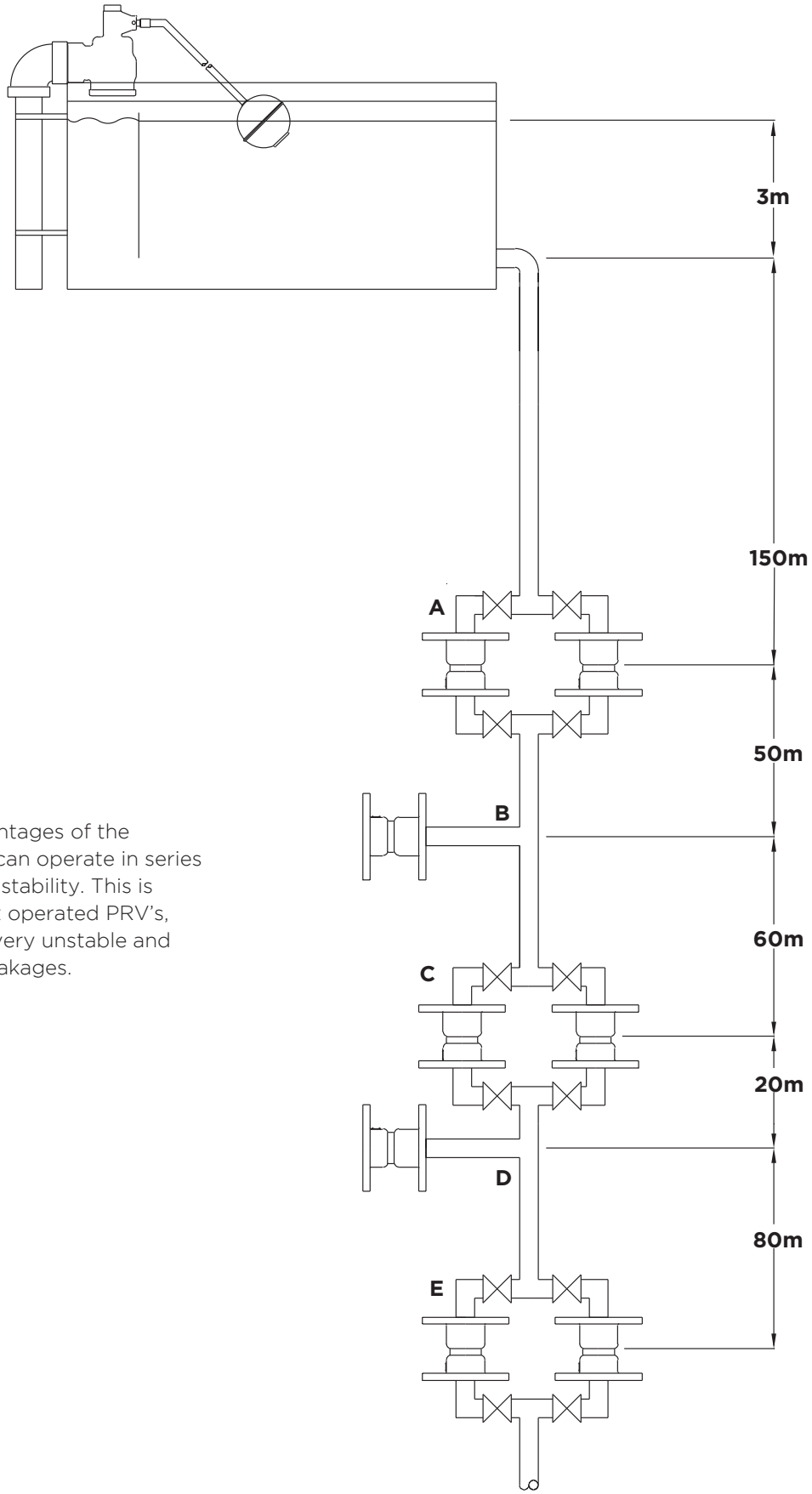
TYPICAL INSTALLATIONS IN HIGH RISE BUILDINGS AND MINE SHAFTS



One of the big advantages of the RRPRV is that they can operate in series without danger of instability. This is unlike standard Pilot operated PRV's, which can become very unstable and resulting in pipe breakages.

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DNS ACV RATIO REDUCING VALVE

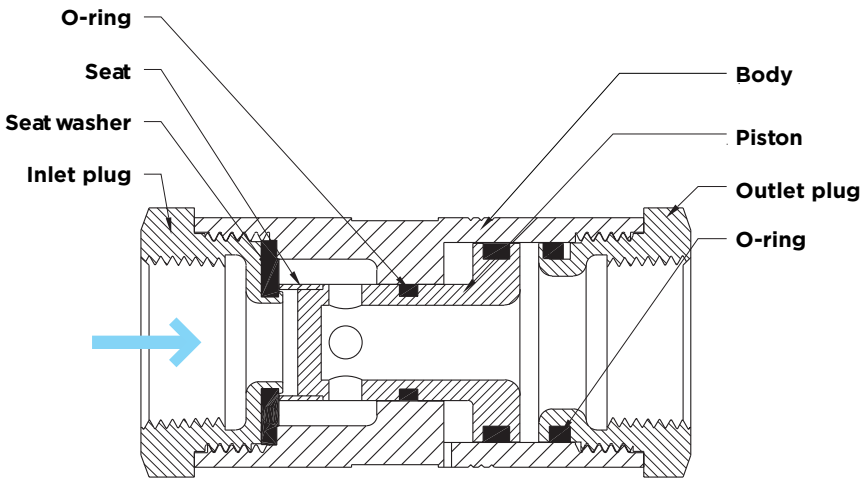
The DNS ACV Ratio Reducing valve consists of a Piston inside a body with no external piloting and which cannot be adjusted or tampered with. The valve simply reduces an upstream pressure to a downstream pressure in the Ratio chosen ie if upstream pressure is say 20bar you can reduce this pressure to 10bar by choosing a 2:1 Ratio Reducing valve or 20bar to 6.7bar by choosing a 3:1 Ratio Reducing valve. The Ratio Reducing valve is the simplest form of Pressure Reduction and if used in the right applications, will provide many years of problem free operation.

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.

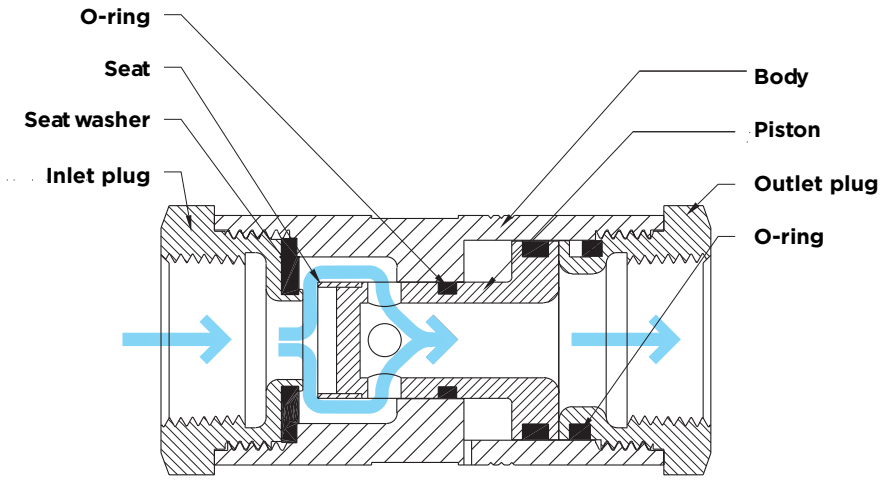
SMALL SIZE VALVES WITH SCREWED ENDS

Available in:
Sizes: 15mm, 20mm, 25mm, 32mm 40mm PN40 Rated

CLOSED (No Flow)



OPEN (Flow)



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LARGE SIZES WITH FLANGED ENDS

Available in:
Sizes: 50mm to 300mm
Pressure ratings: 16bar, 25bar, 40bar, 65bar, 100bar
Available Ratio's: 2:1, 3:1, 4:1, 5:1
and fractions if required
Accuracy: Approximately 10%

Size	L
50mm	80
80mm	110
100mm	120
150mm	160
200mm	200
250mm	250
300mm	300

Material of Construction Alternatives	
Body	Cast iron, WCB Steel, Stainless Steel
Piston	Brass, Stainless Steel
Main Seal	Buna N

*** L given is for 16bar valves**
For higher pressures L is longer by the increased flange thickness

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FLOW RATES (L/S) - SCREWED

	Inlet Pressure Bar	CV = ,03	CV = ,035	CV = ,08	CV = ,45	CV = ,624
		Thread Size				
		1/2" - 15mm	3/4" - 20mm	1" - 25mm	11/2" 40mm	2" - 50mm
Flow Rates in L/S These flow rates are theoretical when outlet is open ended	2	0,42	0,5	1,25	6,25	8,83
	3	0,5	0,58	1,58	7,83	11
	5	0,67	0,75	2,08	10,1	14,17
	10	0,92	1,1	2,92	11	20,1
	15	1,17	1,33	3,5	17,5	24,67
	20	1,34	1,5	4,1	20,25	28,42
	25	1,42	1,67	4,58	22,58	31,83
	30	1,58	1,83	5	24,75	34,83
	35	1,67	2	5,42	26,75	37,67
Max. recommended Continuous flow rate		1,1	2	3	7,5	13
Max. recommended Intermittent flow rate		1,6	2,8	4,4	11,3	17

FLOW RATES (L/S) - FLANGED

	Inlet Pressure Bar	CV = 1,26	Cv = 2,4	CV = 5,4	CV = 12,9	CV = 20,2	CV = 32,3	CV = 45,5
		Body Size NB						
		50mm	80mm	100mm	150mm	200mm	250mm	300mm
Flow Rates in L/S These flow rates are theoretical when outlet is open ended	3	22,5	51	94	223	349	559	788
	5	28,3	67	118	292	451	722	1017
	10	42	93	167	413	639	1021	1439
	15	50	115	200	500	782	1251	1762
	20	58	131	233	578	903	1445	2035
	25	63	147	262	645	1010	1615	2275
	30	70	161	288	708	1106	1769	2492
	35	77	175	310	767	1195	1911	2692
Max. recommended Continuous flow rate		13	30	50	114	200	310	440
Max. recommended Intermittent flow rate		17	36	63	145	250	380	545

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) 35 bar on screwed valves, and up to 100bar inlet pressures available on flanged valves only

Threads: Screwed ratio valves available with either BSP threads with a Whitworth form or NPT threads

Flanges: A comprehensivie range of flange drilling patterns are available. Valves are kept in stock undrilled and flanges drilled as per customer requirement

Operating temperature: Connection is cold water (less than 200C) 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 within +/- 10% of the required outlet pressure.

Ratios: Screwed – 2:1 & 3:1
Flanged – 1.5:1, 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.

Strainers: Although the Ratio Reducing valve is a lot less vulnerable to dirt particles, it is always a good idea to install a strainer upstream

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