Pressure Reducing and De-superheating Valves

Two-in-One Solution for Pressure and Temperature Reduction

For over six decades, Forbes Marshall has been building steam engineering and control instrumentation solutions that work for process industry. Today we have evolved into a leader in process efficiency and energy conservation through technology tie-ups and focused investments in manufacturing and research. Our joint ventures with the world's leading names enable us to deliver quality solutions in 14 countries. Forbes Marshall is probably the only company in the world to have extensive expertise in both steam and control instrumentation. The dual expertise has allowed us to engineer industry specific systems that focus on energy efficiency and utilities management for sectors as diverse as textiles, food processing, paper, power and chemicals.

We have also been adjudged one of India's top "25 Best Places to work - 2008" by Economic Times and the Great Places to Work Institute. Our teams are peopled by some of the finest engineers in the land. These highly trained professionals have developed innovative solutions and saved millions of rupees in process costs for our clients. Our business practices and processes have combined into a singular philosophy of being trusted partners who provide innovative solutions. It's a philosophy we are proud to live up to.

For decades, we have partnered with some of the best names in the control instrumentation industry such as Arca, Codel, Krohne and Shinkawa, to develop, design and supply innovative solutions for measurement and monitoring of process parameters. With a combination of specialist knowledge and the latest technology, we provide products and solutions to achieve optimum efficiency. Our products are a unique combination of hardware and software that make them reliable and accurate.

Forbes Marshall ranks amongst the world's leading suppliers of Combined PRDS valves. We specialize in designing and manufacturing such equipment for power, process and co-generation plants. Forbes Marshall has supplied more than 6000 combined Pressure Reducing and Desuperheating System since 1990.

How is it different from conventional pressure reducing and desuperheating?

Conventional method for pressure reducing and desuperheating of steam calls for pressure reducing valve followed by the desuperheater.

Forbes Marshall brings the most advanced method to reduce pressure and temperature of steam in a single unit called 'Combined PRDS. During the process of pressure reduction in the valve water is being injected simultaneously into a highly turbulent zone called the 'Vena Contracta' zone. This causes instantaneous evaporation of water for complete desuperheating.

PRDS Valve Series

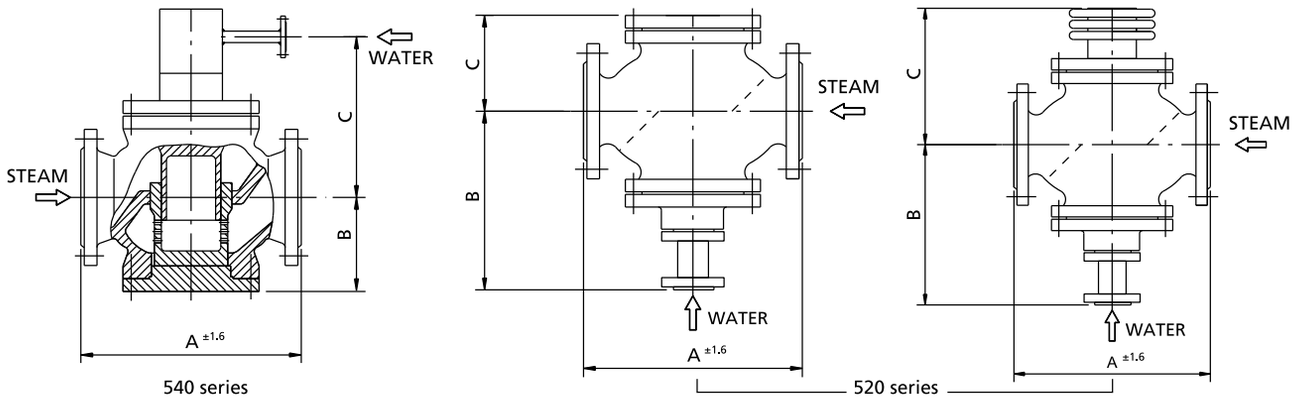
- Water entry from top of PRDS (540 series): For high steam pressure drop and high spray water quantity requirement.
- Water entry from bottom of PRDS (520 series):

  a. Through stem : For low steam pressure drop and high or low spray water quantity requirement.
  b. Through nozzle: For high steam pressure drop and low water quantity requirement (Available only in valve sizes 1" and 2").

Features

- Pressure reduction and desuperheating in a single valve
- Compact unit
- Immediate response to flow changes
- No waterhammer
- No water carryover problems
- Efficient mixing of spray water
- Compact design
- Reduces need for separate desuperheater which simplifies your system
- Reduces length of piping because of elimination of separate desuperheater
- Available in various types like water entry from top or bottom as per water quantity and pressure available at site
- Water is injected at the 'Vena Contracta' point which is the most turbulent zone causing complete atomization
- High turndown ratio possible
- Improved rate of heat transfer
- Easy maintenance
- Some designs don't contain a nozzle which avoids possibility of choking

Dimensions and Weight of Combined PRDS Valve



Combined PRDS Valve - water entry through top

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

Combined PRDS Valve - water entry through bottom

Sr	Ansi Class→	#150				#300				#600				#900				#1500			
	Valve Size (mm)↓	A	B	C	WT	A	B	C	WT	A	B	C	WT	A	B	C	WT	A	B	C	WT
1	15NB	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2	25NB	—	—	—	—	197	220	82	14	210	185	144	24	273	190	144	34	273	190	144	38
3	40NB	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4	50NB	—	—	—	—	267	252	120	37	286	260	132	51	375	194	132	62	—	—	—	—
5	80NB	—	—	—	—	317	262	141	58	337	255	196	91	—	—	—	—	—	—	—	—
6	100NB	—	—	—	—	368	273	151	79	394	335	228	161	—	—	—	—	—	—	—	—
7	150NB	—	—	—	—	473	361	203	144	508	348	275	330	—	—	—	—	—	—	—	—
8	200NB	—	—	—	—	568	355	240	217	—	—	—	—	—	—	—	—	—	—	—	—
9	250NB	—	—	—	—	708	425	313	467	—	—	—	—	—	—	—	—	—	—	—	—
10	300NB	—	—	—	—	775	555	390	867	—	—	—	—	—	—	—	—	—	—	—	—
11	350NB	—	—	—	—	928	633	457	1030	—	—	—	—	—	—	—	—	—	—	—	—
12	400NB	—	—	—	—	1057	672	508	1860	—	—	—	—	—	—	—	—	—	—	—	—

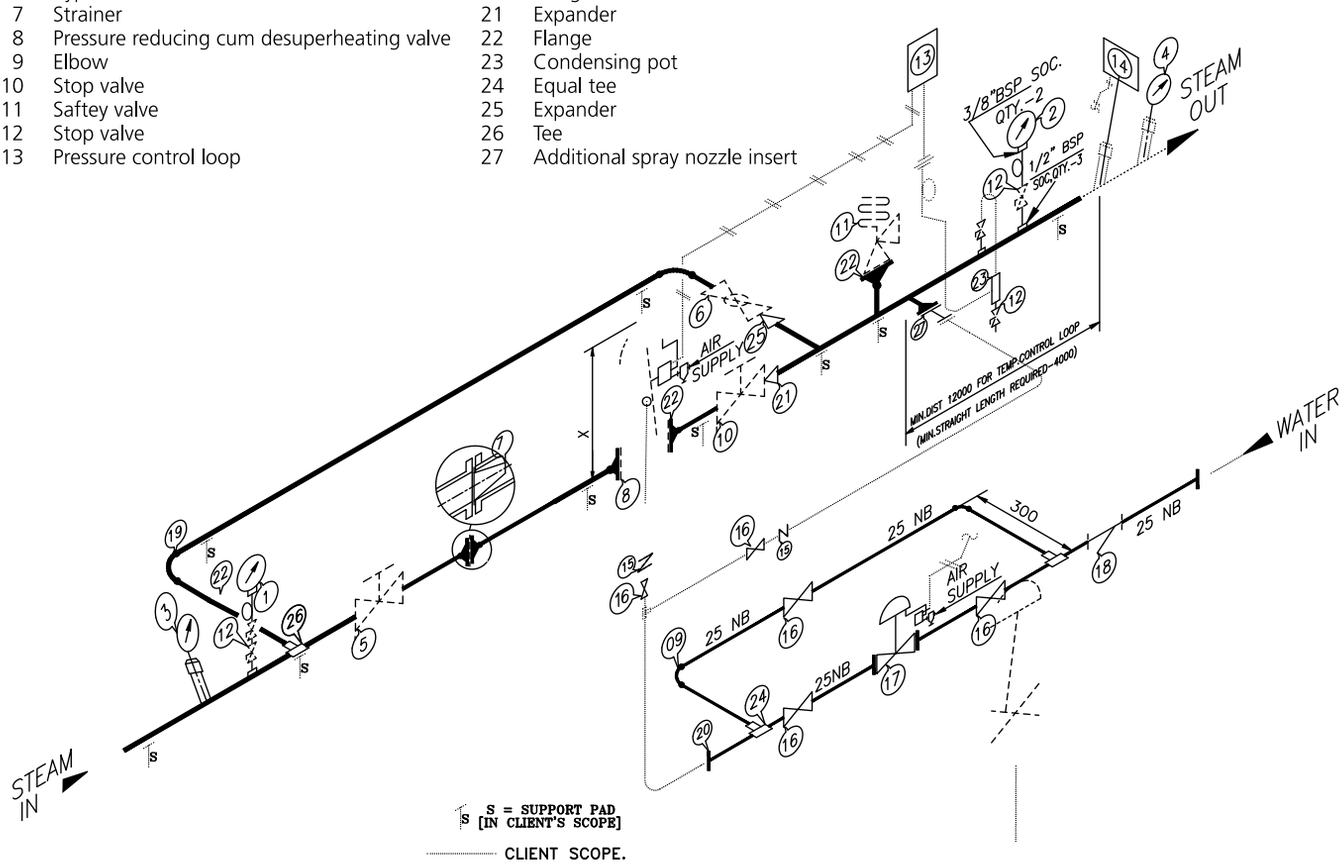
Notes:

- Dimensions are in mm
- Weight is in kgs
- Mentioned weight is of subassembly of PRDS. To calculate total weight please add actuator's weight from 'Actuator Catalog'
- Bottom entry through nozzle design is available only in 1" and 2" sizes

Pressure Reducing and Desuperheating Stations

We supply flange to flange Pressure Reducing and Desuperheating Stations with pressure control and temperature control instrumentation loop.

Pos.	Part Name
1	Pressure gauge
2	Pressure gauge
3	Dial thermometer
4	Dial thermometer
5	Stop valve
6	Bypass valve
7	Strainer
8	Pressure reducing cum desuperheating valve
9	Elbow
10	Stop valve
11	Saftey valve
12	Stop valve
13	Pressure control loop
14	Temprature control loop
15	Non-return valve (loose supply)
16	Stop valve
17	Water flow control valve
18	Strainer
19	Elbow
20	Flange
21	Expander
22	Flange
23	Condensing pot
24	Equal tee
25	Expander
26	Tee
27	Additional spray nozzle insert



Total PRDS System along with Control Loop

Recommendations for efficient working of PRDS Valves

- Minimum straight length at outlet should be 4 mtrs
- Minimum distance of Temperature Sensor from the point of water injection should be 10 to 12 mtrs
- Minimum distance of Pressure Sensor from PRDS Valve should be 1.5mtrs
- It is recommended that a strainer of 0.8 mm mesh before water control valve be installed
- Spray water should be very clean (equivalent to boiler feedwater)
- Instrument quality air is required

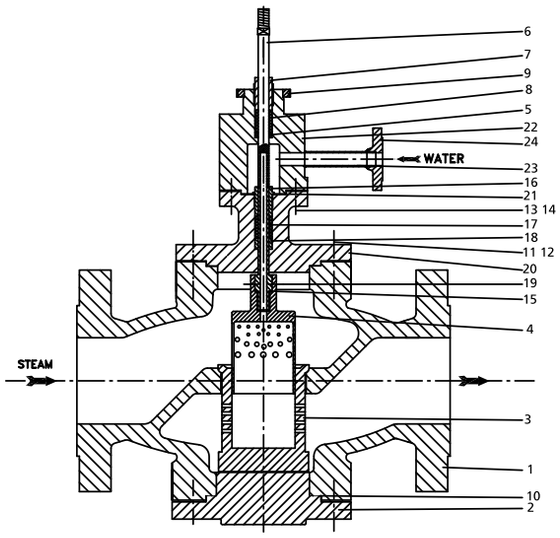
Minimum water pressure requirement for Combined PRDS:

- Top entry: Pw = [(P1+P2)/2] + 7 BAR
- Bottom entry through stem: Pw = P2 + 7
- Bottom entry through nozzle: Pw = [P1 / 2] + 7 BAR

Notes

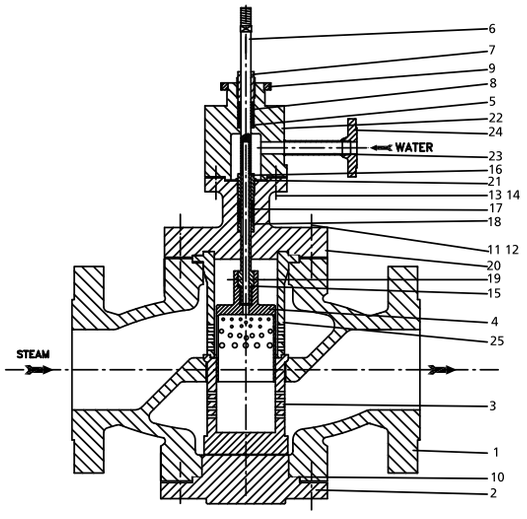
- Minimum controllable temperature is Saturation Temperature + 7°C
- The above are based on a specific set of parameters.These guidelines may change

Cross-sectional drawings of Combined PRDS



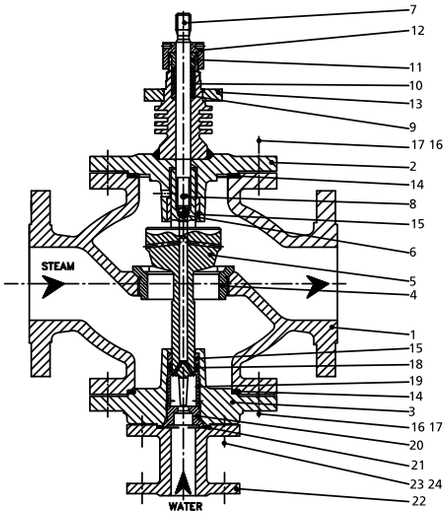
Top Entry PRDS valve (L2 Trim Design)

L. No.	Part Name
1.	Valve Body
2.	Bottom Flange
3.	Seat
4.	Plug
5.	Guide Bush
6.	Spindle
7.	Gland Nut
8.	Packing Set
9.	Slotted Nut
10.	Gasket
11.	Bolt
12.	Nut
13.	Nut
14.	Stud
15.	Gasket
16.	Cooling Water Seat
17.	Packing Set
18.	Guide Bush
19.	Lock Screw
20.	Intermediate Flange
21.	Gasket
22.	Water Chamber
23.	Pipe
24.	Flange S/W



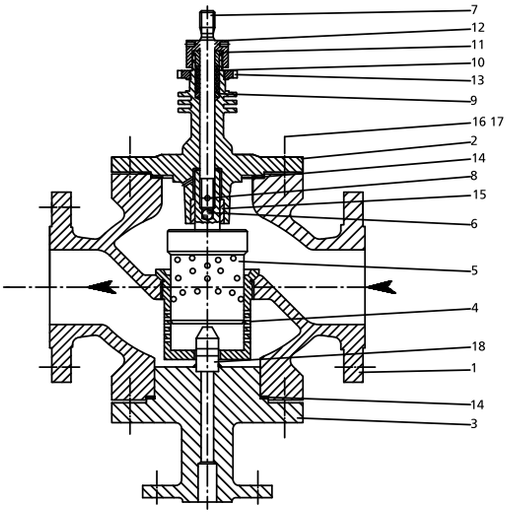
Top Entry PRDS valve (L3 Trim Design)

L. No.	Part Name
1.	Valve Body
2.	Bottom Flange
3.	Seat
4.	Plug
5.	Guide Bush
6.	Spindle
7.	Gland Nut
8.	Packing Set
9.	Slotted Nut
10.	Gasket
11.	Bolt
12.	Nut
13.	Nut
14.	Stud
15.	Gasket
16.	Cooling Water Seat
17.	Packing Set
18.	Guide Bush
19.	Lock Screw
20.	Intermediate Flange
21.	Gasket
22.	Water Chamber
23.	Pipe
24.	Flange S/W
25.	Sleeve



Bottom entry through stem PRDS Valve (Parabolic Trim Design)

L. No.	Part Name
1.	Valve Body
2.	Ext. Top Flange
3.	Bottom Flange
4.	Seat
5.	Plug
6.	Ball
7.	Spindle
8.	Spindle Dowell Pin
9.	Bottom Ring
10.	Gland Packaging Rings
11.	Gland Follower
12.	Gland Nut
13.	Slotted Nut
14.	Gasket
15.	Guide Brush
16.	Bilts
17.	Nuts
18.	Gland Packing Rings
19.	Sleeve
20.	Cooling Water Seat
21.	Gasket
22.	Cooling Water Flange
23.	Bolts
24.	Nuts



Bottom entry through stem PRDS Valve (L2Trim Design)

L. No.	Part Name
1.	Valve Body
2.	Ext. Top Flange
3.	Bottom Flange
4.	Seat
5.	Plug
6.	Ball
7.	Spindle
8.	Spindle Dowell Pin
9.	Bottom Ring
10.	Gland Packaging Rings
11.	Gland Follower
12.	Gland Nut
13.	Slotted Nut
14.	Gasket
15.	Guide Brush
16.	Nuts
17.	Stud
18.	Nozzle

Specifications

Body Material: Carbon steel, Alloy steel, others on request

Trim Material: SS 410 Nitrited, SS 431 Nitrited, SS 321 Nitrited

Trim Form: Parabolic, Perforated

Standard Characteristics: Linear, Equal %, modified on request

End Connections: Flanged to ANSI Standards, Butt weldable, Socket weldable

Bonnet: Standard, Extended (Cooling Finned), Water Cooled

Packing Material: Graphite

Rangeability: 40:1

Ordering Information

Process parameters needed for PRDS Valve Sizing (min/max)

- Steam Flow (Inlet) (kg/hr)
- Inlet Pressure [bar(g)]
- Outlet Pressure [bar(g)]
- Inlet Temperature (°C)
- Outlet Temperature (°C)
- Water Pressure [bar(g)]
- Water Temperature (°C)

Typical Applications

- Turbine Bypass
- Condensor Dump
- Main Steam Line
- Turbine Extraction
- Auxiliary PRDSH
- Deaerator Pegging
- Ejector and Gland Sealing

Modern Manufacturing Facility

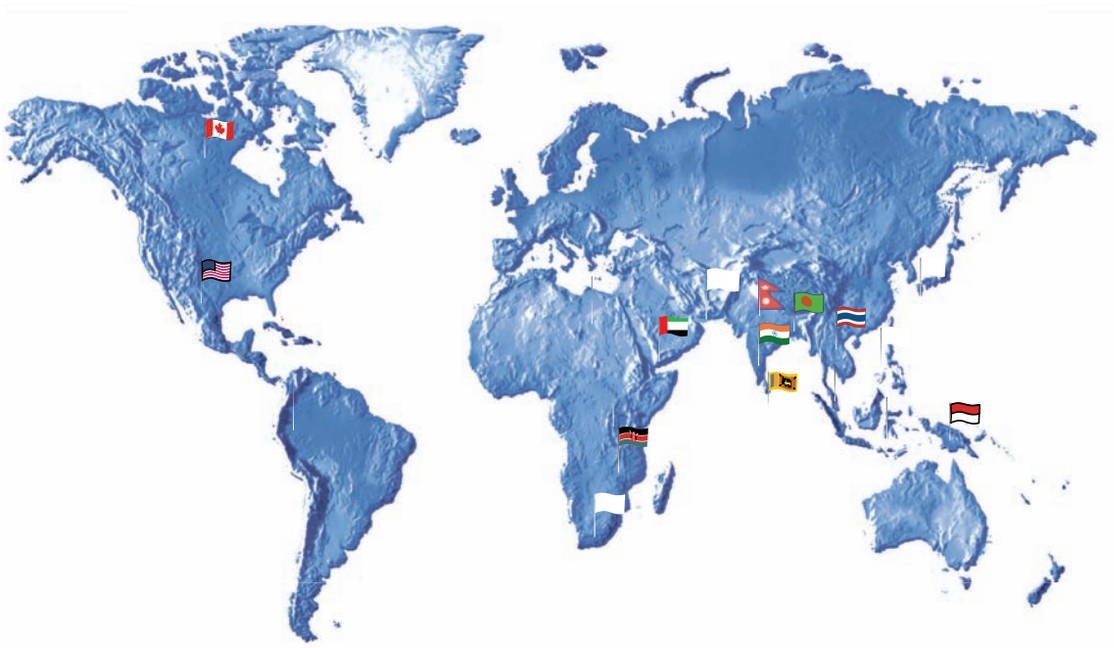
New Puma 400 CNC machine:
for better accuracy and finish

CNC Machine Shop

Vertical Turning Lathe:
for machining of bigger size valve bodies

Hydrotesting Rig

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



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