

# CSPRV

## Clean Steam Pressure Reducing Valve

### Description

The Forbes Marshall Clean Steam Pressure Reducing Valve, CSPRV, is an angle pattern self-draining sanitary pressure regulating valve of all 316 type stainless steel construction suitable for use on steam, water and gases. This has been designed in accordance with ASME BPE guidelines. It is available with hygienic sanitary clamp compatible connections and requires no external pressure sensing line. It has clean-in-place (CIP) and sterilize-in-place (SIP) capacity.

### Typical Applications Include

Clean steam, gas and liquid supplies to bioreactors, centrifuges, freeze dryers, sterilizers, autoclaves, process tank, humidifiers and culinary equipment.

### Valve Tightness

Valve tightness in accordance with VDI / VDE guidelines 2174 (leakage rate <0.05 of Kvs Value)

### Surface Finish

Internal wetted parts-Ra<0.5 µm electro-polished

### Features

- Self-draining and crevice free design
- Non-fluted stem, guided in non-wetted region
- FDA approved PTFE bonded viton diaphragm
- Mechanical stopper to prevent over stroking
- Dual clamp design, easy to dismantle for cleaning
- Oil and grease free wetted components

### Certification

This product is available with following certifications.

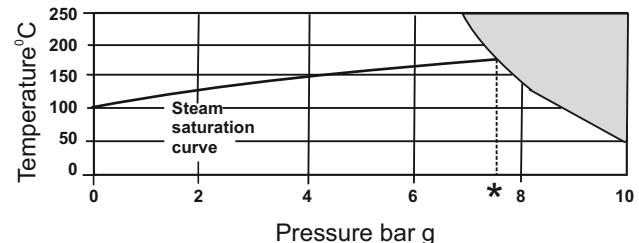
- EN10204 material certifications
- Internal surface finish
- FDA certificate for diaphragm

### Sizes and End Connections

DN15, 20, 25, 40 and 50

ISO 2852 & ASME BPE sanitary clamp compatible

### Operating Range



The product must not be used in this region

Note: For hygienic / sanitary clamp ends the maximum pressure / temperature may be restricted by the gasket or sanitary clamp used. Please consult Forbes Marshall.

\* Max operating pressure 7.6 bar (g)

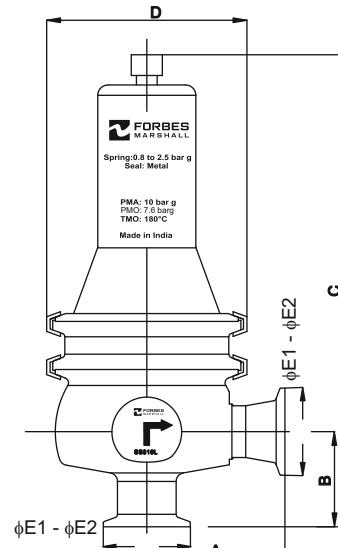


Fig 2

### Dimensions (approx) in mm

Size (DN)	A	B	C	D	ISO		ASME	Weight (kg)
					øE1	øE2		
15	83.5	105	324	118	25	25		2.5 Kg
20	70	55	273	118	34	25		3.8 Kg
25	80	55	273	118	50.5	50		4 Kg
40	80	65	289	118	50.5	50		4.3 Kg
50	80	75	305	118	64	63.5		5 Kg

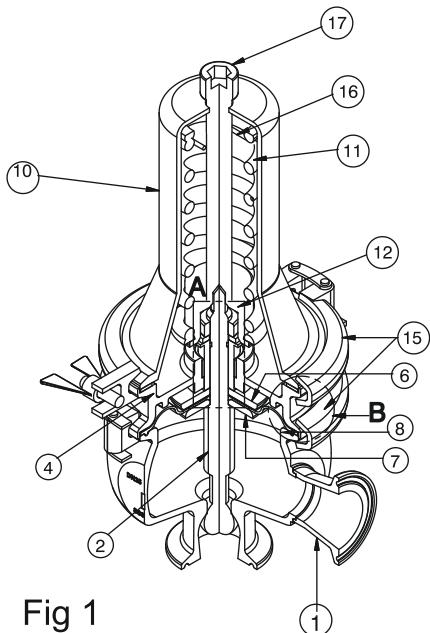
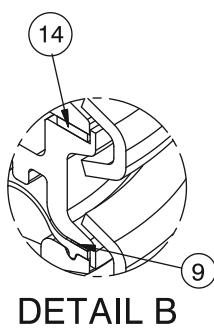
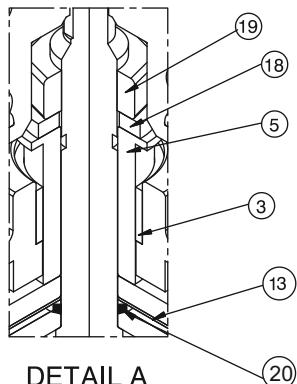


Fig 1



DETAIL B



DETAIL A

## Limiting Conditions

Inlet:PN10	
Outlet: see "pressure setting range" below	
Maximum design pressure	10 bar g @ 50 °C
Maximum design temperature	250 °C
Minimum design temperature	-10 °C
Maximum operating temperature	180 °C
Maximum operating pressure	DN 15-25) 7.6 bar g (DN 40-50) 6 bar g
Minimum operating temperature	-10 °C
Max. cold hydraulic test pressure	15 bar g

## Pressure Setting Range

Size	DN 15-50	
Inlet / Outlet rating	PN10	PN 10
Spring range	0.8-2.5 bar g	1-5 bar g
Maximum permitted outlet pressure = 1.5 times set pressure		

## How to Order

**Example :** 1 No. DN25 CSPRV direct acting clean steam pressure reducing valve having a pressure range of 0.8-2.5 bar g PN10 rating, FPM diaphragm and ISO 2852 sanitary clamp compatible connections.

## Installation Note

The CSPRV should always be fitted with the inlet vertical and the spring housing directly above the valve.

## Safety Information, Installation and Maintenance

For full details see the user manual supplied with the product.

## Materials

No. Part	Material	Standard
1 Body	Stainless Steel	ASTM A 276 SS 316L
2 Stem	Stainless Steel	ASTM A 276 SS 316L
3 Guide Bush	Stainless Steel	PTFE Coating
4 Adaptor	Stainless Steel	ASTM A 276 SS 316L
5 Step Bush	Stainless Steel	ASTM A 276 SS 316L
6 Upper Disc	Stainless Steel	ASTM A 276 SS 316L
7 Lower Disc	Stainless Steel	ASTM A 276 SS 316L
8 Diaphragm	Viton + PTFE	
9 Diaphragm		
Gasket	PTFE	
10 Spring Housing	Stainless Steel	ASTM A 351 CF8M
11 Spring		AISI 304
12 Spring Nut	Stainless Steel	ASTM A 276 SS 304
13 Disc washer	PTFE	
14 Gasket	PTFE	
15 Sanitary Clamp	Stainless Steel	SS316
16 Spring Clip		AISI 304
17 Allen Screw	Stainless Steel	BS6105 A4 70
18 Washer	Stainless Steel 304	
19 Nut	Stainless Steel 304	
20 Stem seal	PTFE	

## Available Spares (refer fig 1)

Stem	2
Diaphragm	8
Sanitary Clamp	15

## How to Order Spares

Always order spares by using the description given in the column headed 'Available Spares' and state the size, model and pressure range.

**Example:** 1 No. Diaphragm for a DN25 CSPRV direct acting clean steam pressure reducing valve having a pressure range of 0.8-2.5 bar g, PN10 rating and an FPM diaphragm.

## Kv Values

Valve Size (mm)	DN15	DN20	DN25	DN40	DN50
Maximum Kv	2.4	3.9	4.9	6.4	7.8

For conversion,

$$Cv (\text{UK}) = Kv \times 0.93$$

$$Cv (\text{US}) = Kv \times 1.156$$

## Recommended Fluid Velocities

Steam	Saturated	10 to 40 m/s
	Superheated	15 to 60 m/s
Gas	Up to 2 bar g	2 to 10 m/s
	above 2 bar g	5 to 40 m/s
Liquids		1 to 5 m/s

The required Kv can be calculated from the following formulae, where,

$\dot{m}_s$  = Steam mass flow(kg/h)

$V$  = Liquid Volume flow (m<sup>3</sup> / h)

$V_g$  = Gas flow at standard conditions : 0°C @ 1.013 bar a (m<sup>3</sup>/h)

$$X = \frac{P_1 - P_2}{P_1} \quad (\text{pressure drop factor})$$

$P_1$  = Upstream pressure (bar absolute)

$P_2$  = Downstream pressure (bar absolute)

$S$  = Specific gravity

$T$  = Absolute average gas temperature (Kelvin = °C + 273)

### Steam critical pressure drop $P_2 \leq 0.58 P_1$

$$Kv = \frac{\dot{m}_s}{12 P_1}$$

### Non-critical pressure drop $P_2 \geq 0.58 P_1$

$$Kv = \frac{\dot{m}_s}{12 P_1 \sqrt{1 - 5.67 (0.42 - x)^2}}$$

### Gas

$$Kv = \frac{\dot{V}_g}{287} \sqrt{\frac{ST}{(P_1 P_2)(P_1 + P_2)}}$$

### Liquid

$$Kv = \frac{\dot{V}}{P_1 - P_2} \sqrt{\frac{S}{P_1 - P_2}}$$

## Calculating the Kv and selecting a suitable valve

Using your maximum flowrate and smallest differential pressure ( $P_1 - P_2$ ), calculate the required Kv from one of the above formulae. **Max Kv = 1.3 x calculated Kv** (now refer the above table of max Kv for size selection)



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