DSCV

Direct Steam Converting Valve

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Direct Steam Converting Valve (DSCV)

The Direct Steam Converting Valve comes with the backing of the vast experience of ABB in developing high-pressure control valves as well as desuperheating equipment combined with an excellent track record of delivering the same as per customer specifications. The concept behind the Direct Steam Converting Valve is that of combining the dual functions of heat reduction and pressure reduction in one valve. The result of superior design and development, the DSCV incorporates several features into one distinctive product.

Key Applications

- HP Bypass Line
- LP Bypass Line
- Turbine Bypass Line
- Processed Steam Line
- Atomized Steam Line

(1) Concept and Structure

The DSCV is offered in three different models (viz.) GI, GⅢ and GV.
The basic design of the GI and GV valves incorporates an Angle structure while the GⅢ has a Globe structure. This offers the freedom of choosing an appropriate valve depending on the layout of the piping system. However, the concept behind the design as well as the performance of these models of valves is the same. The structure and general operating principles are detailed below :

1) Principle Behind Heat Reduction

The basic principle behind heat-reduction is that of using atomized steam. A portion of the main steam is diverted into an auxiliary line to be used as atomized steam. As soon as cooling water is sprayed into the main steam at high speed with atomized steam, the minute atomized droplets evaporate easily. As this process goes on, heat from main steam is transferred to the cooling water which consequently evaporates bringing down the temperature of the steam to a pre-determined level.

2) Principal Behind Pressure Reduction

Depending on the control signal level the plunger rises and portholes in the cage open gradually. As the steam passes through the inner valve, pressure drops to the required level.
In the case of DSCV-GV, usage of TANDEM trim ensures constant balance of pressure on both sides of the trim leading to lesser actuator force required and longer trim life.

3) Features of DSCV

◎Noise reduction

The multi-port cage can reduce noise by approx. 20 dBA as compared to the plug throttle. A diffuser plate installed on the outlet side can lower the decompression ratio thus reducing the noise level.
In case of DSCV GV, the multi stage can be selected as the measure to achieve noise reduction.

◎ Heat Reduction Efficiency

The cooling water, by means of atomized steam, gets converted into minute droplets and immediately evaporates achieving a uniform level of heat reduction. Further, the valve has a wide control range.

◎ Erosion Resistance

- In the case of the GⅠ Valve, a shroud protects against erosion caused by the collision of the cooling water with the steam at high speed within the inner walls of the body.
- In the case of the GⅢ and GⅤ valves, since the cooling water is sprayed against the atomized steam in the center of the body, the inner walls of the valve body are protected against erosion.

◎ Replaceable Inner Valve Parts

If by any chance there happens to be some erosion to the plunger, seat side of the cage etc. they can be easily repaired using appropriate tools after removing the bonnet.

◎ Pressure Seal Bonnet

In case of DSCV GⅤ, a pressure seal Bonnet is also applied to make the design more compact.

◎ Flexible End-Connection Sizes (GⅤ)

Since the GⅤ is made of forged metal, it offers the flexibility of having different sized end-connections as compared to the central module of the body.

〔2〕 Installation of Piping System

1) Direction of Fitting

In order to simplify the structural analysis, it is recommended that the Actuator be installed in a Vertical position. Further, providing hooks on the top portion of the valve will make it convenient to assemble or disassemble the Valve.

2) Piping layout to Down Stream

In order to reduce the noise generated during Pressure Reduction, it is more effective to make the downstream pipe as thick as possible. Towards the down-stream of the valve, a straight run of only 5-8 times the outer diameter of the valve body is typically required.

3) Location of Sensor Point

Please install pressure and temperature sensors at a distance of 6 M or more in a location with relatively stable flow beyond the outlet side of the valve. However, in order to handle situations like superheated steam temperature approaching the saturation temperature ($\Delta S<30℃$), or the temperature difference between the superheated steam temperature and the cooling water temperature being high ($\Delta T>200℃$), or the load fluctuation being heavy, please install sensors on down stream side at a distance longer than the range mentioned above.

4) Drain Removal

In case there is residual drain before steam flows through, a water hammer is created in the beginning of operation which can cause damage to the valve and piping system. Therefore, please make sure to install the drain valve in the place where the drain is likely to accumulate in the pipe.
If the installed position of the DSCV is not upright, then drain valve becomes necessary even within the valve itself. In such a scenario, kindly contact us. (In the GⅢ type, drain removal is offered as a standard feature).

5) Installation of Spray Water Control Valve

Please install the cooling water control valve in a location that is lower than the corresponding water inlet position in the DSCV. This is necessary to prevent the water inside the pipe in the region between the cooling water control valve and the DSCV from flowing into the DSCV when the cooling water control valve is fully closed.
Also, as the cooling water control valve moves to the fully closed position, there are chances of reverse flow of the decompressed steam through the cooling water pipe back into the cooling water control valve and so it is recommended that a Check Valve be installed at this location.
A strainer is sometimes used before the cooling water control valve to prevent clogging of the cooling water spray nozzle.

〔3〕 Notes on commissioning

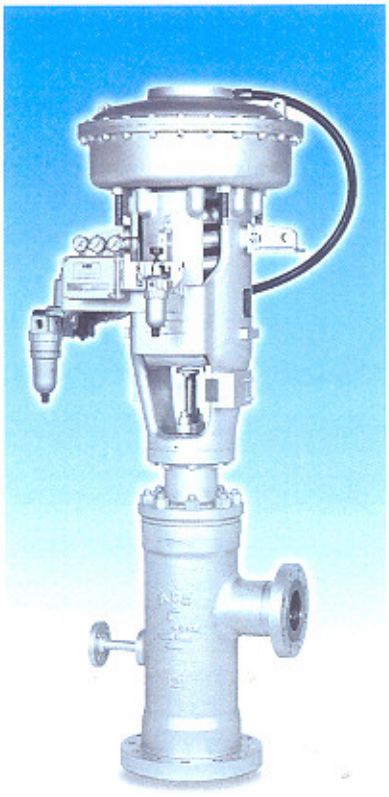
1) Flushing

After the DSCV has been installed with the piping system please flush out any welding refuse and any other foreign materials completely.

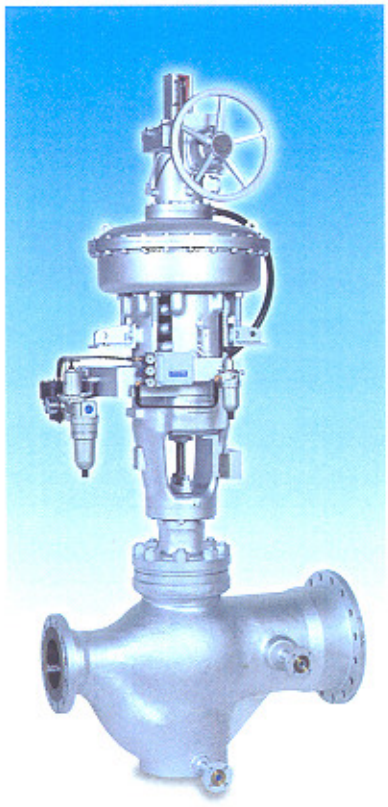
2) Additional Tightening

At the time of passing steam through the DSCV body for the first time, please additionally tighten the nuts of the Grand Packing and the Body and Bonnet parts. This is an effective way of preventing leaks from each part.

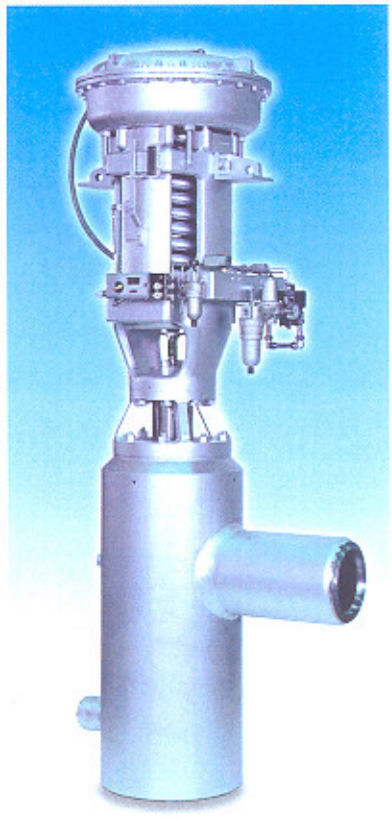
DSCV-GI



DSCV-GⅢ



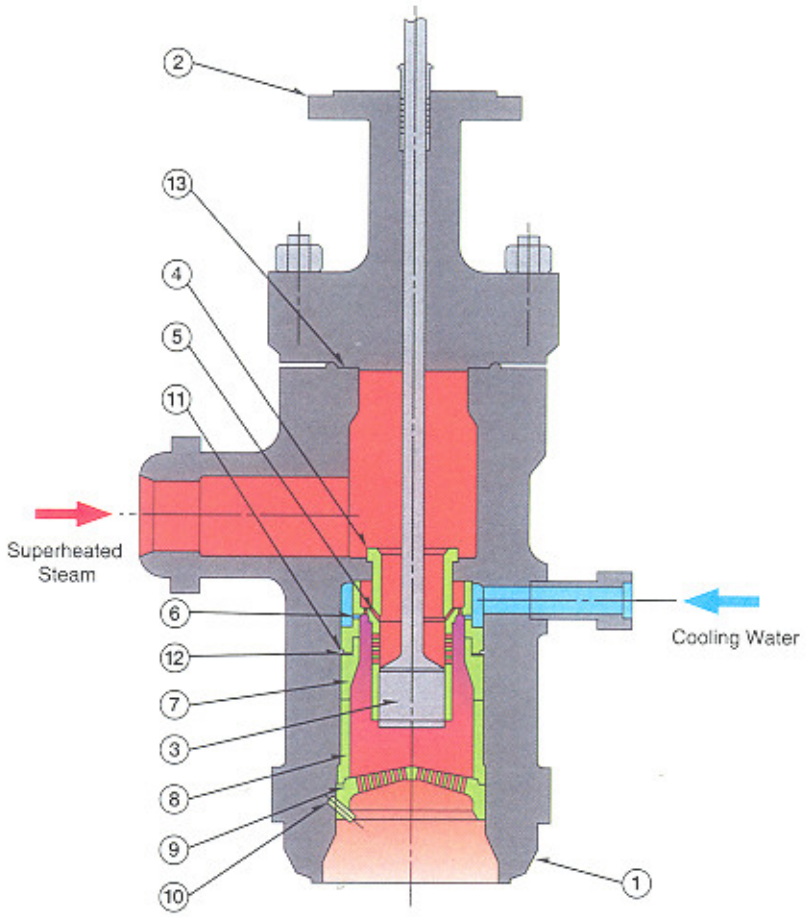
DSCV-GV



DSCV Specifications

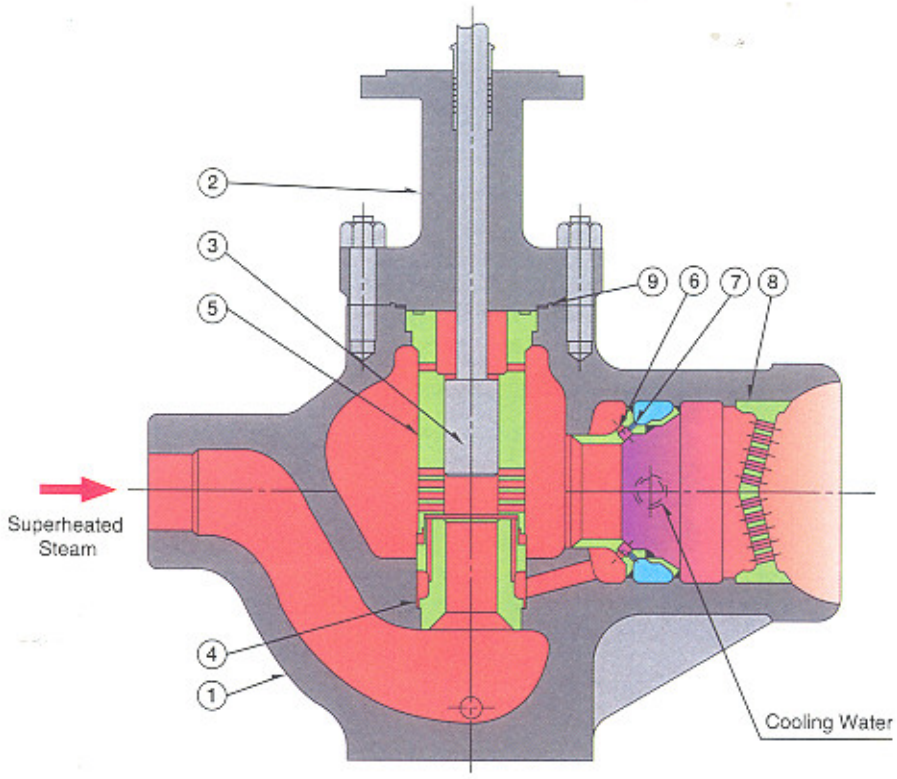
DSCV Type	GI	GⅢ	GV
Pressure Rating	ANSI Class 150～4500　JIS Class 5K～63K　Corresponding JPI Flange Option		
Connection Size (inch)	BW:2×4～8×18 FLG:2×4～8×16	BW:2×4～8×18 FLG:2×4～8×16	BW:3×8～22×32
Body Type	Angle	Globe	Angle
Body Material	ASTM A216WCB、A217WC6、A217WC9		ASTM A105、A182F11、 A182F22、A182F91
End-Connection Type	Weld Type、Flange Type		Weld Type
Bonnet Type	Bolted Bonnet		Bolted Bonnet or Pressure Seal
Trim Type	Multi-Port		Tandem・Multi-Port
Seat Leakage Class	ANSI FCI 70-2 ClassⅢ～Ⅴ		
Actuator	Diaphragm Type、Piston Type、Electro-mechanical Type、Electro-Hydraulic Type		
Spray Nozzle Type	Atomized Steam Spray Type		
Diffusion Plate	Internally Installed		Depends on Conditions Specified
Outlet Temperature	Saturation Temperature ＋ 6℃ or Higher		
Temp. Detection Range	6m. or Higher From Outlet (Depending on Conditions)		
CV Value	～500	～450	～3800

DSCV-GI Angle Type
(Cast Metal Body)

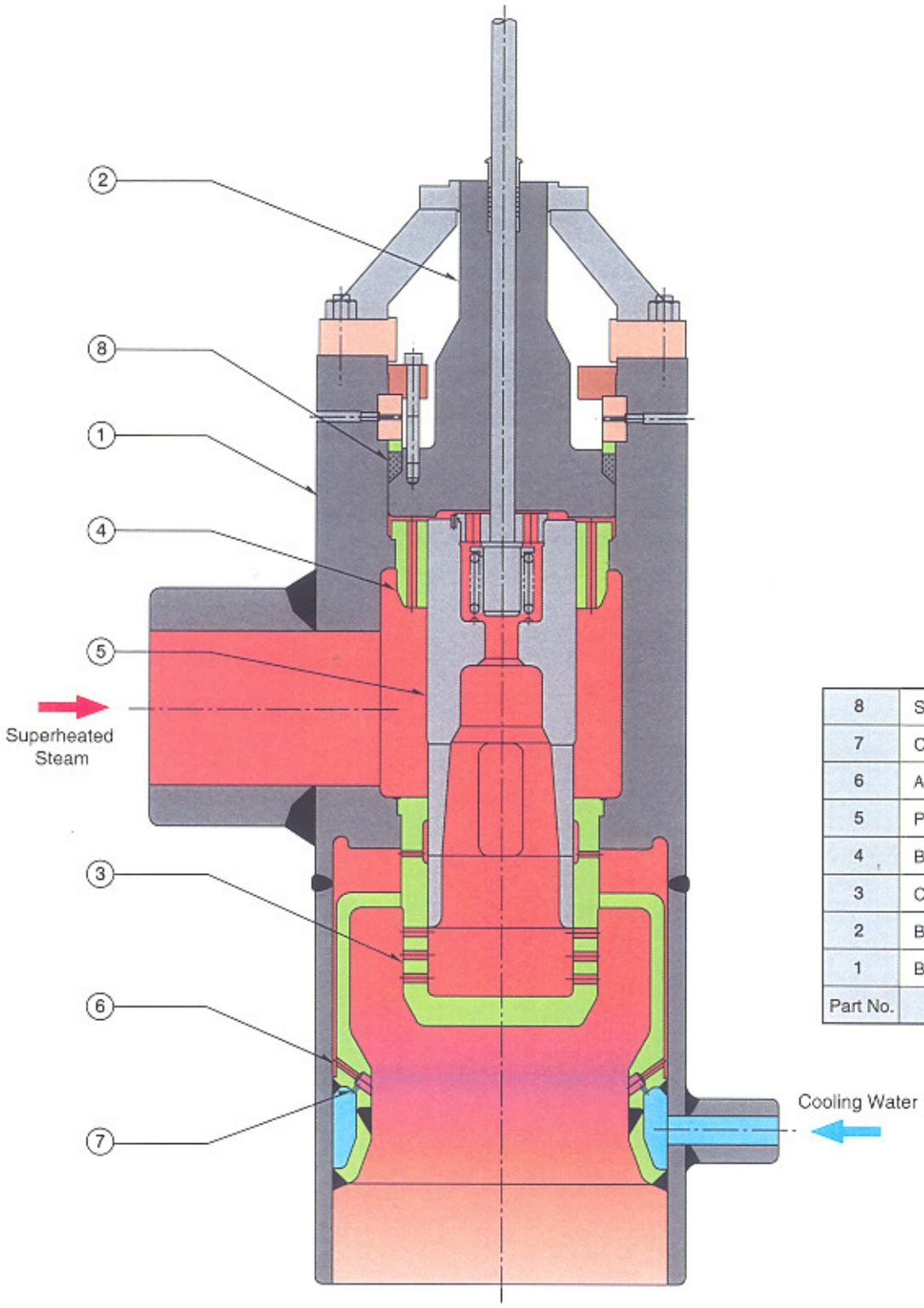


Part No.	Part Name
13	Gasket
12	Packing Plate
11	Seal Packing
10	Spring Pin
9	Diffuser Plate
8	Lower Shroud
7	Upper Shroud
6	Cooling Water Nozzle
5	Atomized Steam Nozzle
4	Cage
3	Plunger
2	Bonnet
1	Body

DSCV-GIII Globe Type
(Cast Metal Body)



Part No.	Part Name
9	Gasket
8	Diffuser Plate
7	Cooling Water Nozzle
6	Atomized Steam Nozzle
5	Cage
4	Seat Ring
3	Plunger
2	Bonnet
1	Body

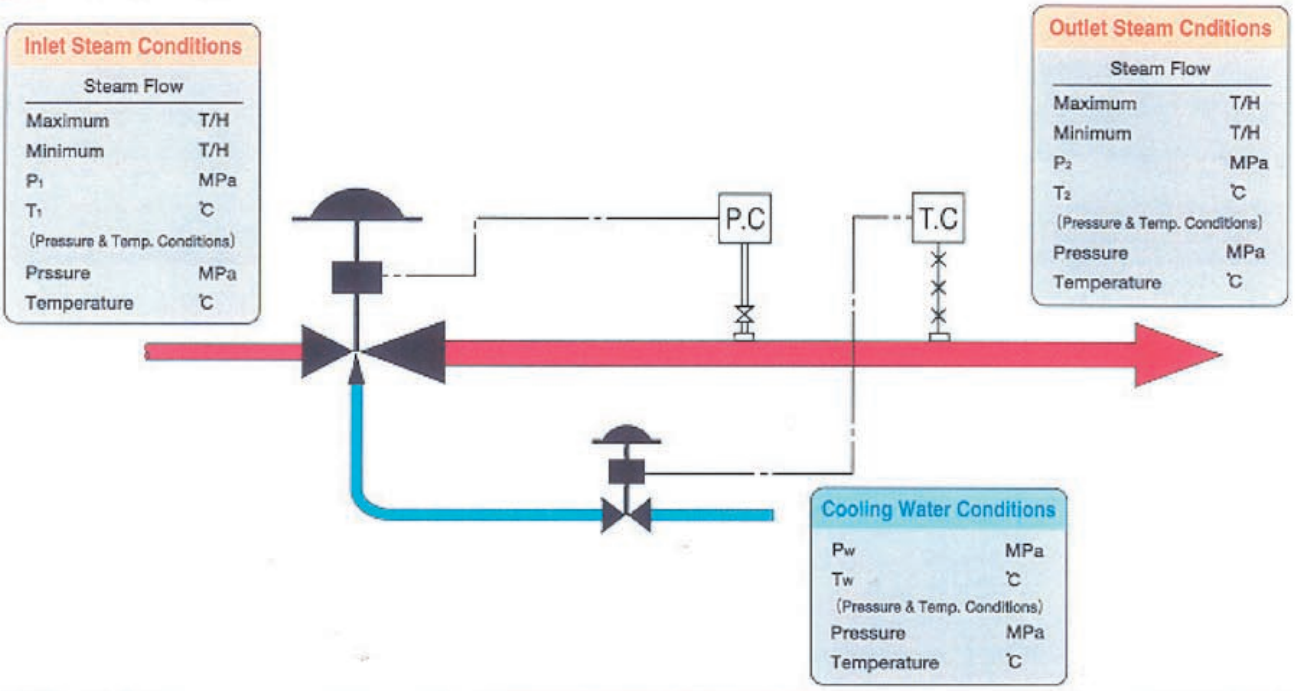


Part No.	Part Name
8	Seal Ring
7	Cooling Water Nozzle
6	Atomized Steam Nozzle
5	Plunger
4	Balancing Cylinder
3	Cage
2	Bonnet
1	Body

Data Required for DSCV Sizing

In order to help us select the DSCV that is most suitable for your process, kindly indicate the information required on the figure below

1 Flow Conditions



2	Application					
3	Body Style	☐Angle		☐Globe		
4	Size of Steam Piping	Inlet	B×Sch	Outlet	B×Sch	
5	End-Connection at DSCV Inlet	☐Flange		☐Weld		
6	End-Connection at DSCV Outlet	☐Flange		☐Weld		
7	Permissible Noise Level	dBA				
8	Speed of Valve Differential Motion	☐Fully Open	seconds	☐Fully Closed	seconds	
9	Input Signal	☐	MPa	☐	mA DC	
10	Supply Air Pressure／Electricity	☐	MPa／	V	HZ	
11	Direction of Steam Flow	☐Side→Bottom		☐Side→Top	☐Side→Side	
12	Desired Actuator Action:Air Fail	☐Open		☐Close	☐Lock	

For more information visit our website at: www.ccivalve.com

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