Process Automation

IMI CCI

LLPTM

Low Pressure Bypass Valve



Breakthrough engineering for a better world



Low pressure bypass valve for superior pressure and temperature control

Designed by IMI CCI, the LLP[™] low pressure bypass valve offers superior pressure reduction and temperature control, low noise and vibration, and fast response in a compact steam conditioning control valve.

The compact, comprehensive LLP[™] solution is available in both angle and globe body configurations, fitting easily into most existing piping arrangements. It can be installed in any orientation without requiring additional support for the upper structure.

Featuring an integrated spring-loaded spraywater nozzle desuperheating manifold at the valve outlet, the LLP™ minimises the downstream desuperheating distance, making it extremely compact for all types of low pressure steam conditioning applications, including advanced turbine bypassto-condenser applications with short pipe runs.

Key features and benefits

SIL certified design

Meeting the requirements of IEC 61508:2010 with parts that are suitable for use in safety-related systems performing safety functions

Pressurised Seat Trim[™] design Achieving repeatable Class V Shutoff in service and improved plant efficiency through elimination of lost steam

Pneumatic or hydraulic actuation

High performance, reliable, fast stroking pneumatic or hydraulic actuation with many years of documented service. Accurate control and resolution to less than one second stroke time with pneumatics

Small-Drilled-Hole Cage design Reducing noise levels to < 85 dBA

Low maintenance costs A quick change trim without any parts welded or screwed into the valve body

Rangeability

Up to 50:1 for system control and turbine temperature matching for greater turbine life

Excellent spraywater atomisation

For advanced turbine bypass-tocondenser applications with short piping runs

Lightweight, compact and flexible design

Easily fits into most existing piping arrangements in both globe and angle configurations

Extended trim life

Through the reduction of flow velocity and use of properly selected materials

Condensate drain connection

Option available upon request

Key features

Spring-Loaded Nozzle Desuperheating

The LLPTM valve features integral, spring-loaded water injection nozzles that optimise water injection across a wide range of flow rates at low pressures. With a rangeability of up to 50:1, these nozzles adjust the water flow as needed to achieve the fine droplet size required for atomisation. This design ensures the smallest possible water droplet size without steam assist.



The water-injection nozzle provides the smallest water droplet size possible

Pressurised Seat Pilot Plug Assembly

The LLP™ uses the IMI CCI Pressurised Seat Pilot Plug Assembly to provide repeatable ANSI/FCI 70-2 Class V Shutoff as a standard feature.

The design includes a pilot, main plug, and piston ring balance seal. The piston ring allows a small, controlled leak of pressure from the valve inlet to the bonnet cavity. When the control valve is closed and the pilot plug is seated, the piston ring enables controlled shutoff pressure to build in the bonnet cavity above the plug, ensuring exceptional shutoff. With the IMI CCI Pressurised Seat Pilot Plug Assembly, the actuator only needs to provide sufficient thrust to seat the pilot plug against the pilot seat in the main plug.

When a signal to open the control valve is received, the actuator lifts the stem, opening the pilot seat. The pilot rapidly exhausts the bonnet cavity pressure, balancing the plug assembly. As the stem continues to move in the opening direction, the shoulder on the stem engages the retaining plate on the main plug, lifting the main plug off the main seat. The actuator only needs to provide sufficient thrust to lift the balanced plug.



Pressurised seat pilot plug assembly provides shutoff of an unbalanced plug with the low actuator force requirements of a balanced plug

Accurate Control

IMI CCI's extensive history in developing advanced technology valves and actuation systems for severe service and safety-related applications has resulted in the most reliable actuation systems available today. For over 40 years, IMI CCI has supplied pneumatic and hydraulic actuation systems, establishing an extensive global installed base. Our pneumatic actuation systems can achieve stroke speeds of less than one second while maintaining precise resolution and control.

The choice between pneumatic and hydraulic actuation primarily depends on the valve design for the specific application and customer preference. The table below compares the factors influencing actuator selection.

Performance attribute	IMI CCI pneumatic actuator	IMI CCI hydraulic actuator
Stroke speed	Fast, less than 1 sec for trip mode less than 10 sec for modulation	Very fast, less than 0.5 sec
Resolution	Good, less than 1%	Very good, less than 0.1%
Thrust	Meets thrust requirements for pressurised seat valves	Meets thrust requirements for unbalanced valves
Reliability	Very reliable and robust	Very reliable and robust
Procurement cost	Inexpensive	Higher cost
Installation cost	Inexpensive	Higher cost
Maintenance	Easy, with medium skills	Requires higher skills for maintenance
Components	Low pressure, reliable accessories	High pressure, special accessories

Factors influencing actuator selection

Improve Plant Efficiency-Eliminate Lost Steam

During normal operation, any leakage past a turbine bypass valve means lost revenue.

- Steam that does not go through the turbine does not generate electricity or revenue for the plant.
- Money spent generating the steam is lost.
- Steam leaking past a valve seat could erode the seat and cause an increase in the leakage rate and maintenance downtime.
- Steam leaking past a valve to condenser could reduce the efficiency of the condenser by deteriorating the vacuum and raising the condenser temperature.
- The LLP™ comes standard with a pilot trim designed for ANSI/FCI 70-2 Class V Shutoff, providing dependable, repeatable shutoff and exceptional seat tightness for long periods with high pressure differentials.

Design features



Valve Performance Characteristics

(% Cv vs. % Stroke)

Valves are custom characterised to accommodate a wide range of variables.





Product specification

Design code	ASME B16.34
Body type	Globe / Angle
Trim type	1-Stage Drilled Hole Cage, Window Cage
Trim characteristic	Linear (standard), custom characterisation
End connection	Buttweld per ASME B16.25 maximum
Design temperature	Maximum 425 °C
Flow direction	Flow to Close (OTP)
Standard shutoff class	ANSI/FCI 70-2 Class V
Orientation for installation	Stem vertical / horizontal (cartridge trim type is used)
Standard actuator	Diaphragm actuator for 8″, 10″ trim, Piston actuator for 12″, 14″ trim



в

Angle configuration



Dimensions

Trim size	Body type	Pressure rating	Stroke	Inlet connection	Outlet connection	Dimension A	Dimension B
8″	Angle	150, 300, 600	100mm	8", 10"	10", 12"	353mm	345mm
10″	Angle	150, 300, 600	100mm	12", 14"	14", 16"	412mm	376mm
12"	Angle	150, 300, 600	203mm	14", 16"	14", 16"	500mm	595mm
14"	Angle	150, 300, 600	250mm	16", 18"	16", 18"	588.5mm	604.7mm
8″	Globe	150, 300	100mm	8″	8"	568mm	N/A
10″	Globe	150, 300	100mm	10″	10″	708mm	N/A
12"	Globe	150, 300	203mm	12"	12"	920mm	N/A
14"	Globe	150, 300	250mm	14"	14″	972mm	N/A

Standard materials

Item no.	Component name	Material specification	
1	Body	A216-WCB	
2	Bonnet	A216-WCB	
3	Bonnet spacer	A105 with Nitride	3
4	Cage	410SS + Heat Treated	
5	Main plug	410SS + Heat Treated	
6	Pilot plug	410SS + Heat Treated	
7	Stem	410SS + Heat Treated	
8	Seat	316SS	
9	Bolting (stud / nut)	A193-B7 / A194-2H	

Standard Cv table

Trim size	Body type	1-Stage Drilled Hole Cage	Window Cage
8″	Angle	320, 350, 360, 500, 580, 640, 690, 800	425, 870, 1030
10″	Angle	585, 650, 690, 750, 790, 830, 990	1030, 1200, 1410, 1600
12"	Angle	920, 1050, 1250, 1400, 1600, 1840, 2100, 2150	-
14"	Angle	1600, 1830, 2240, 2650	-
8″	Globe	310, 340, 350, 475, 540, 590, 625, 705	405, 750, 790
10″	Globe	565, 620, 665, 715, 750, 790, 910	940, 1030
12"	Globe	880, 1000, 1170, 1290, 1450, 1600	-
14"	Globe	1500, 1700, 2000, 2285	-

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