- Innovative principle of pressure reduction and throttling
- Energy efficiency, assurance(the best heat rate assurance)
- Solve application problems with circulatory convection disc mechanism
- Long service life, cost saving

Suzhou Delan Energy Science&Technology Co.,Ltd.

Add: No 566 Fangqiao Road ,Caohu Industrial Park,Xiangcheng Economic Development Zone,Suzhou,China

Tel: +86-512-65786108

Fax: +86-512-65786208

Web: www.delanvalve.cn

E-mail: delan@delanvalve.com

Delan 德兰调节阀

DELAN MJ2500 SERIES

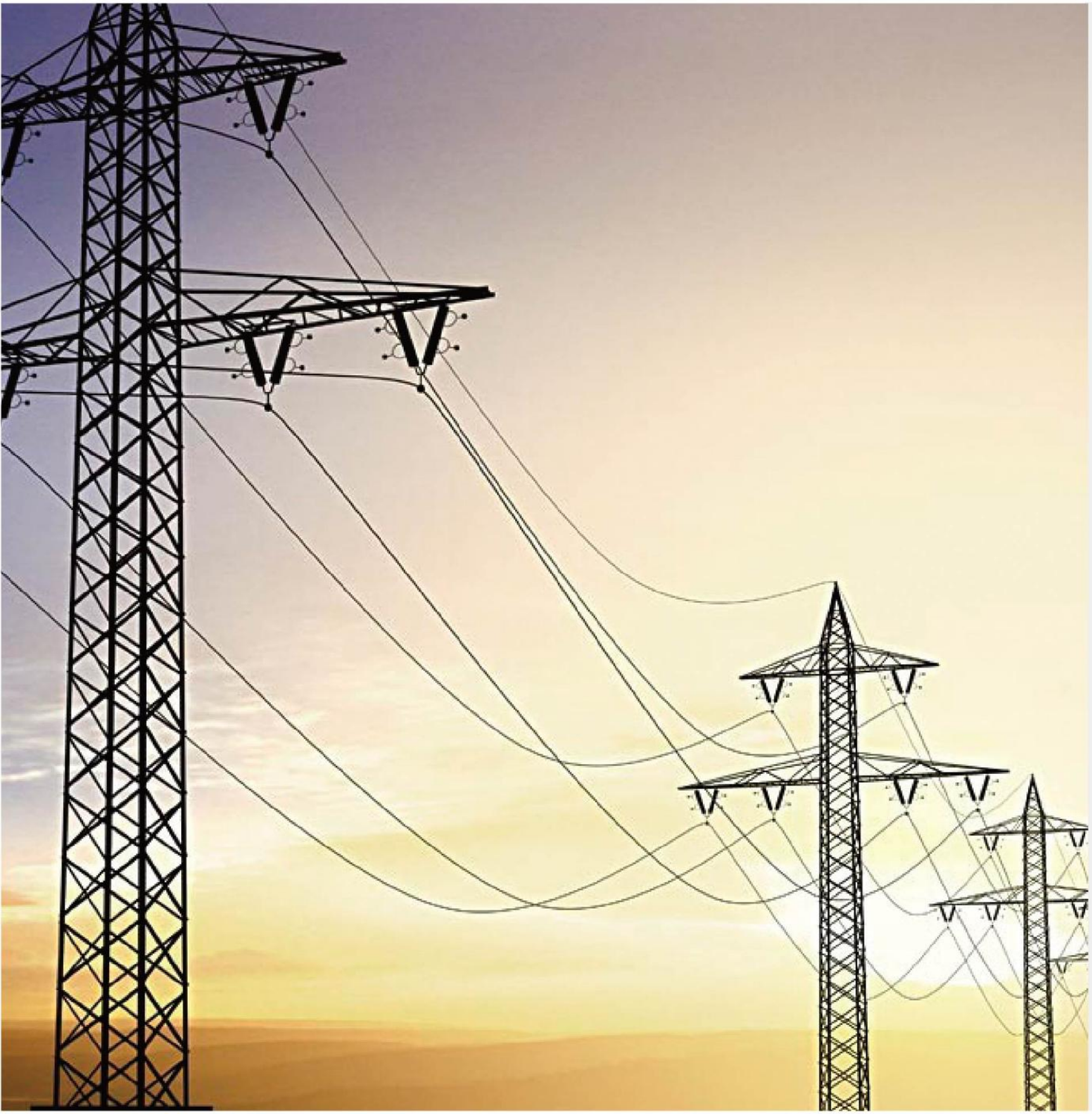
Delan 德兰调节阀

DELAN MJ2500 SERIES

Delan®

MJ2500 Series

Spray Water Control Valve



Delan 德兰调节阀

DELAN MJ2500 SERIES

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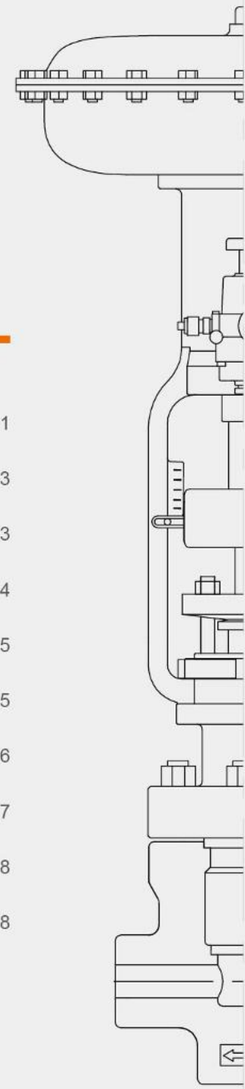

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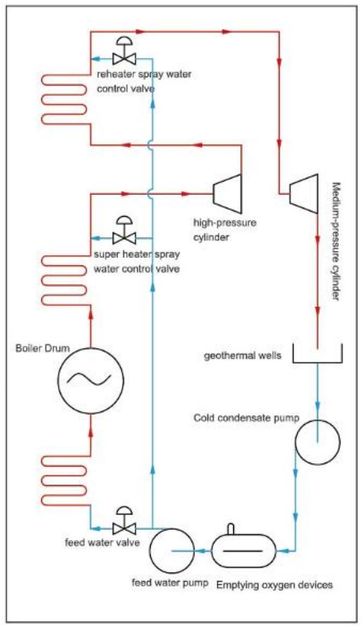
Typical Application

There are different load requirements in many power plants, and thus different steam temperature. Steam temperature control is of great importance for co-generation power plant' s safety, reliablity and efficient operation. Spray water control valve is used to maintain the desuperheating water flow for the main steam and reheat steam temperature control. They are one of the key components for accurate regulation of steam temperature. Excellent steam temperature control will be able to keep the throttle temperature at the set point and thus ensure the turbine' s efficient operation. Spray water contral valve can also be applied to the control of high pressure fluid in petroleum and chemical industry.

Requirements for spray water control valve

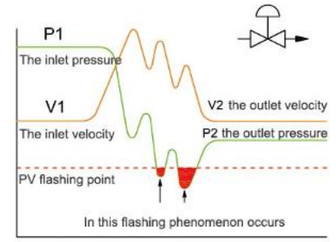
- Within the whole load range, provide the required spraying quantity precisely in accordance with the control circuit's requirement.
- When operating under the circumstance of high pressure drop (the highest pressure will be 32Mpa or 4641psi), there won't be any damage to the trim assembly.
- Reliable and stable operation
- Tight shutoff will prevent the valve or down stream facilities (such as turbine and high pressure pipe system) from damage.



Typical spray water system diagram

Consequences of spray water control valve's failure

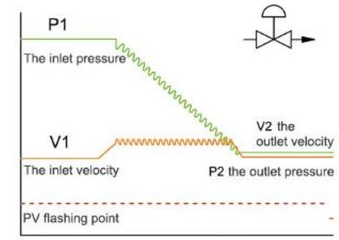
- Heat efficiency lose: due to the drop of throttle steam temperature caused by spray valve leakage, heat efficiency will be affected and extra heat will be needed for the boiler to keep the throttle steam temperature at the set point.
- Temperature contol: poor control of the steam temperature may also affect the high pressure steam pipe and turbine.
- When the pressure is higher than 12.4Mpa(1800psi), each temperature change of 19–22℃(34–40°F) would lead to 1% heat efficiency change.
- Higher maintenance cost: frequent replacement and maintenance will be needed due to the plug erosion damage.



general spray water valve
cavitation & flash phenomenon

Performance of spray water control valve's failure

- Erosion damage: duo to the plug stage deficiency or excessive operation speed.
- Fatigue rupture of the stem: usually caused by frequent stem vibration and fatigue rupture due to excessive plug operation speed.

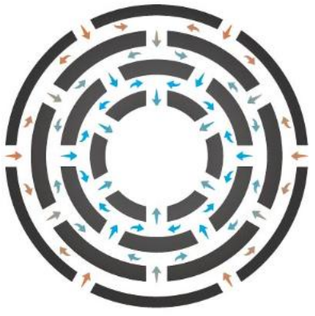


Cycle convection pressure-reducing structure to avoid cavitation and flashing phenomenon

Circulatory convection theory, multi-stage pressure reducing structure

Innovative design concept

- Circulatory convection structure control valve is a new generation of control valve for high pressure difference and anti-cavitation application which is developed from multiple orifice, anti-cavitation sleeve valve, multi-stage plug throttle control valve and labyrinth disc control valve. Circulatory convection disc, as the key component applies special structure and technology. Compared with the popular labyrinch disc, it has the similar appearance but rather different function and mechanism. Labyrinch disc has several independent and tortuous groove passages on the round disc, which can add resistance and reduce pressure gradually through a number of turns, and then prevent cavitation during the process of pressure reducing. Circulatory convection disc also has dozens of groove passages. Fluid makes their way from outer ring to inner ring through the Radial slot. During this process, a portion of the fluid devided while the other portion joined together. The hit, friction and swirl produced by the high speed molecule will consume a large volume of energy and reduce pressure more efficiently. It has a better pressure reducing, anti-cavitation, noise attenuation performance and longer service life compared with labyrinth disc.



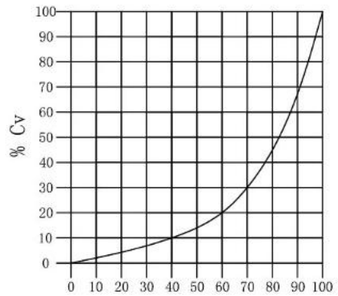
circulatory convection mechanism

Valve Characteristic

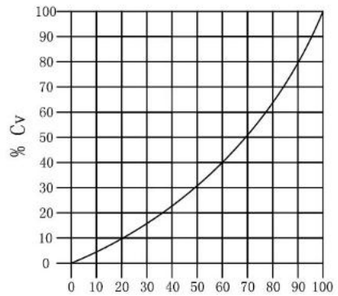
Table 1

	Valve characteristic	Multi level control disc	Competitive manufacturers
1	The principle of multi-stage pressure reduction structure effectively avoids cavitation and extends the service life.	■	□
2	The valve seat and core have good sealing performance, achieving zero leakage. Can ensure reliable and repeatable long-term closure under high pressure.	■	□
3	All valve components can be quickly disassembled and replaced, making maintenance convenient and reducing maintenance costs.	■	□
4	The temperature can be adjusted to a high ratio. Control small water spray flow during normal load, while providing larger water spray flow during low load.	■	□
5	We can customize equal percentage valve cores with long stroke and high actuator precision to adapt to the special situation of your factory and improve control.	■	□

Valves can be customed to be applied to a wider variation range (%Cv /% stroke)



% stroke equal percent

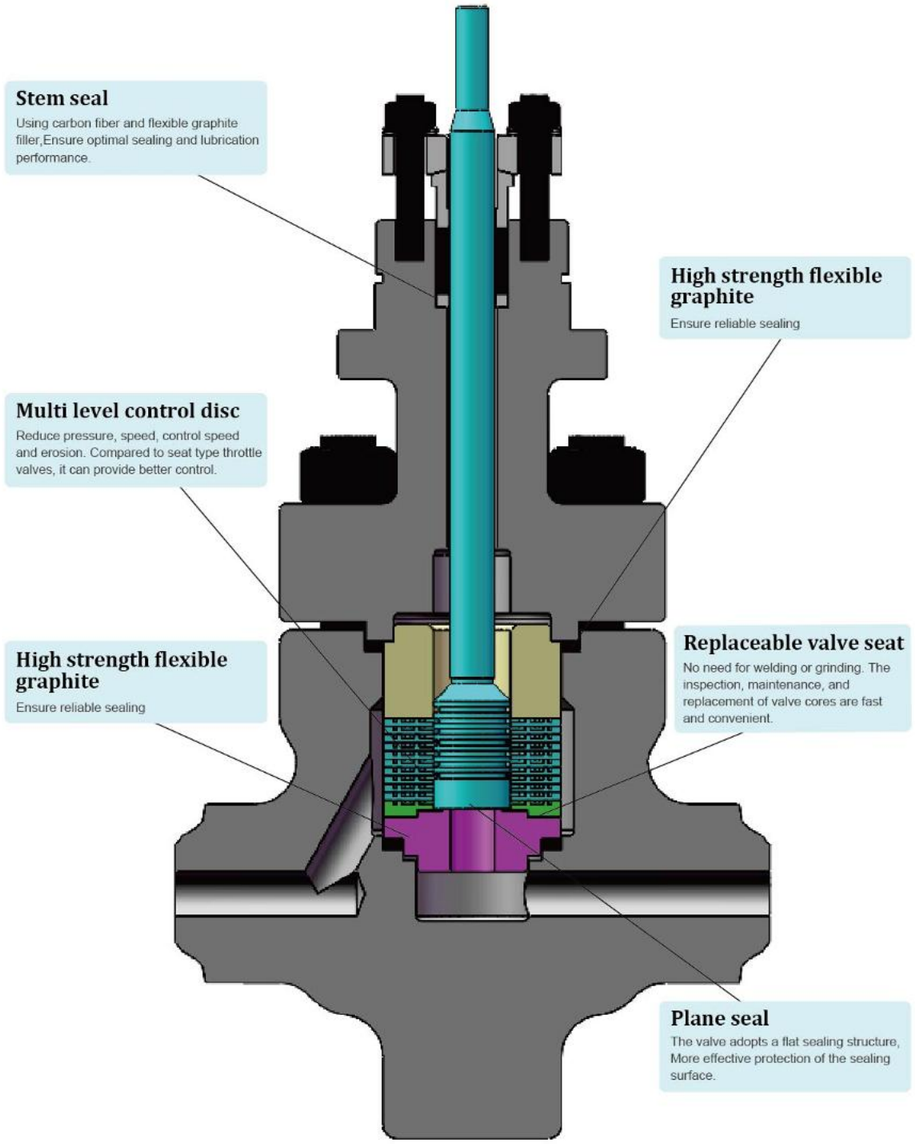


% improved stroke equal percent

Design Standards

- Design and manufature: ASME B16.34 JB/T 3595
- Check and test: JB/T 3595, MSS SP61
- Class of design: special, limited, standard
- End connection
  soket welding ends: ASME B16.11
  butt welding ends: ASME B16.25

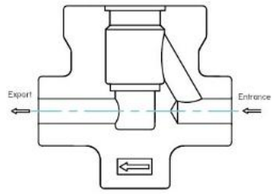
Anatomical Drawing



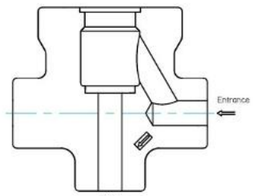
Technical Parameters

Table 2

Nominal diameter	3/4"～3"
Nominal pressure	ANSI 900Lb～2500Lb
Valve body type	Straight through and angled
Usage temperature	-29℃~425℃
Traffic characteristics	Standard - Equal Percentage
Flow coefficient, rated travel	See Table 5
Adjustable ratio	30:1~50:1
External dimensions and weight	See Table 4
Material Science	See Table 3
Leakage rate	Standard ANSI B16.104 V Optional ANSI B16.104 VI
Flow direction	flow to close
control signal	Switching control, 40-20mA DC Analog control
Power source	Electric: 380V three-phase, 220V single-phase Pneumatic: 0.4~0.7MPa
Executing Agency	Electric and pneumatic Both electric and pneumatic valves have handwheel mechanisms to ensure that they can be manually operated in the event of a loss of air or power, maintaining their regulating function.



straight-through way type

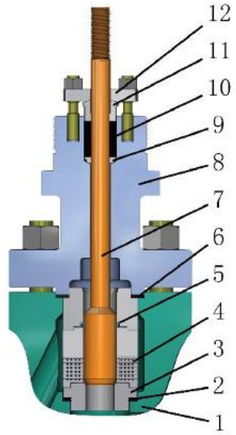


angle type

Material Table

Table 3

No	Name	Material	
1	valve body ③	A105/WCB	WC9/F22
2	Valve seat gasket	Flexible graphite+316	Flexible graphite+316
3	valve seat	304+stellite	F22+stellite
4	Disc components	401	F22
5	Elastic energy ② storage ring	PTFE	PTFE
6	Medium flange gasket	Flexible Stone Black+316	Flexible Stone Black+316
7	Valve stem ①	410+stellite	410+stellite
8	Valve cover	A105	F22
9	Packing pad	304	304
10	filler	Carbon fiber+flexible graphite	Carbon fiber+flexible graphite
11	Compression sleeve	304	304
12	Pressure plate	304	304



Material table

Note:

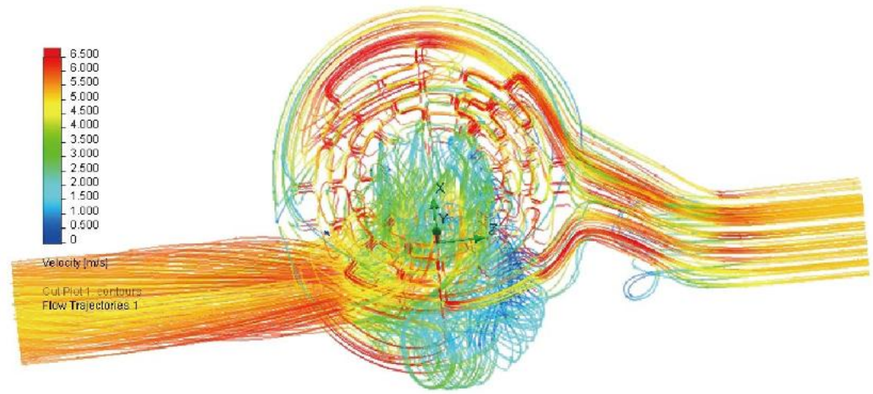
① The valve body and stem can be provided with other materials according to customer requirements;

② The standard NPS<2 "valve body structure is unbalanced and does not use elastic energy storage rings;

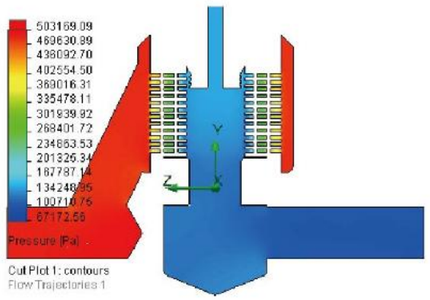
③ The standard NPS<2 "valve body is forged.

Engineering Tools

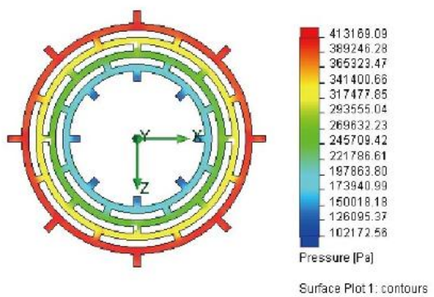
Suzhou Delan Energy Technology Co., Ltd. conducts detailed data analysis and actual testing and inspection of valves suitable for harsh working conditions. Our engineers continuously develop and test products to meet different industrial requirements, while providing comprehensive technical support for valves already in use. Our design engineers use professional engineering software such as AUTO CAD, SolidWorks, and Flow simulation to ensure that our products are designed to be the most complete and reliable.



Flow simulation for overall analysis of fluid velocity inside the valve

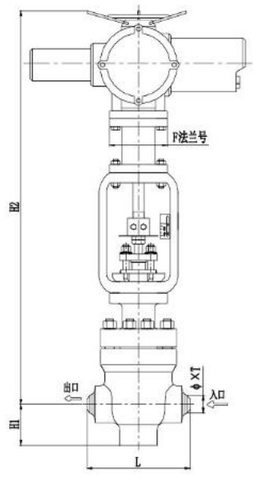


Flow simulation for overall analysis of fluid pressure inside the valve

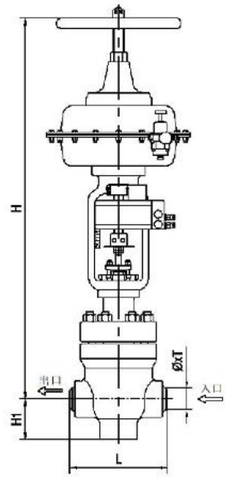


Flow simulation analysis of pressure drop at various levels of disc structure

Dimension and Weight



electric minimum flow valve



pneumatic straght-through way minimum flow valve

Table 4: Dimensions and Weight of Minimum Flow Valves for Standard NPS 3/4 "~ 6"

Nominal diameter		L	H	H1	F: Flange	H2	H3	φxT	weight
Inch	mm	(mm)	(mm)	(mm)		(mm)	(mm)		(KG)
3/4"	20	250	1050	950	F10	884	100	Configure according to user pipeline	80
1"	25	250	1050	950	F10	884	100		80
1-1/2"	40	250	1050	950	F10	884	100		80
2"	50	250	1135	1050	F14	1058	100		86
2-1/2"	65	400	1215	1125	F14	1158	90		140
3"	80	498	1255	1125	F14	1258	130		220
4"	100	575	1420	1290	F14	1332	168		340
6"	150	700	1502	1290	F14	1420	212		380

Performance Parameters

Table 5

Nominal diameter mm	20			25			32			40			50			65			80			100			150
Nominal pressure LB	CL150-2500																								
CV	1.6	2.5	4	1.6	2.5	4	4	6.3	10	4	6.3	10	6.3	10	16	10	16	25	16	25	40	40	63	100	100
Rated travel	38			38			38			38			51			51			51			51			76
Valve body structure	Straight through type, corner type																								
Flow direction	Flow type																								
Executing Agency	Electric or pneumatic actuator																								
control signal	Switching control, 4-20mA DC analog control																								
Power source	Electric: 380V three-phase, 220V single-phase; Pneumatic 0.4-0.7Mpa																								

Product Model

Table 6

Type	Size	Traffic characteristics	Pressure rating	Connection	Action form	Body Material
MJ	2"	E	15	F	1	C
MJ-Pneumatic	Metric: mm	E: Equal percentage	1=150LB	W: Butt welding	1: Positive effect	C: Carbon steel
KJ-Electric	Imperial: Inch	L: Linear	3=300LB	S: Socket welding	2: Reaction effect	V: Chromium molybdenum vanadium alloy steel
			6=600LB	F: Flanges	None: Electric valves do not have this item	
			9=900LB			
			15=1500LB			
			25=2500LB			