


Fujikin[®]



Diaphragm Type Mini Control Valves

MINUCON



 Internet
“Beyond the Flow”
of Things[®]



Fujikin Carp Group

We welcome customer feedback for all of our products and services.



MINUCON is the pneumatic operating control valves which concentrated the aggregate power of this craftsmanship of **Fujikin**® and was manufactured.

The precision of control and the certainty of the operation are suitable for precise flow control of various kinds of research experiments, process lines, etc.

Wide Cv Value selection range 0.0000015 - 5 is available.

Fujikin® satisfy flexibly the demand of all precise flow control of various kinds of research experimental devices, a process line, etc.

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MINUCON Line Up

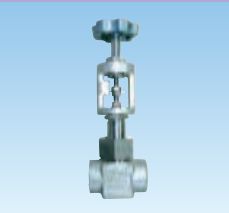
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Features

The High Sensitivity Diaphragm Type Actuator

Realizes outstanding control performance

Compact Design

Adopted the multi-spring system (M3 Type)



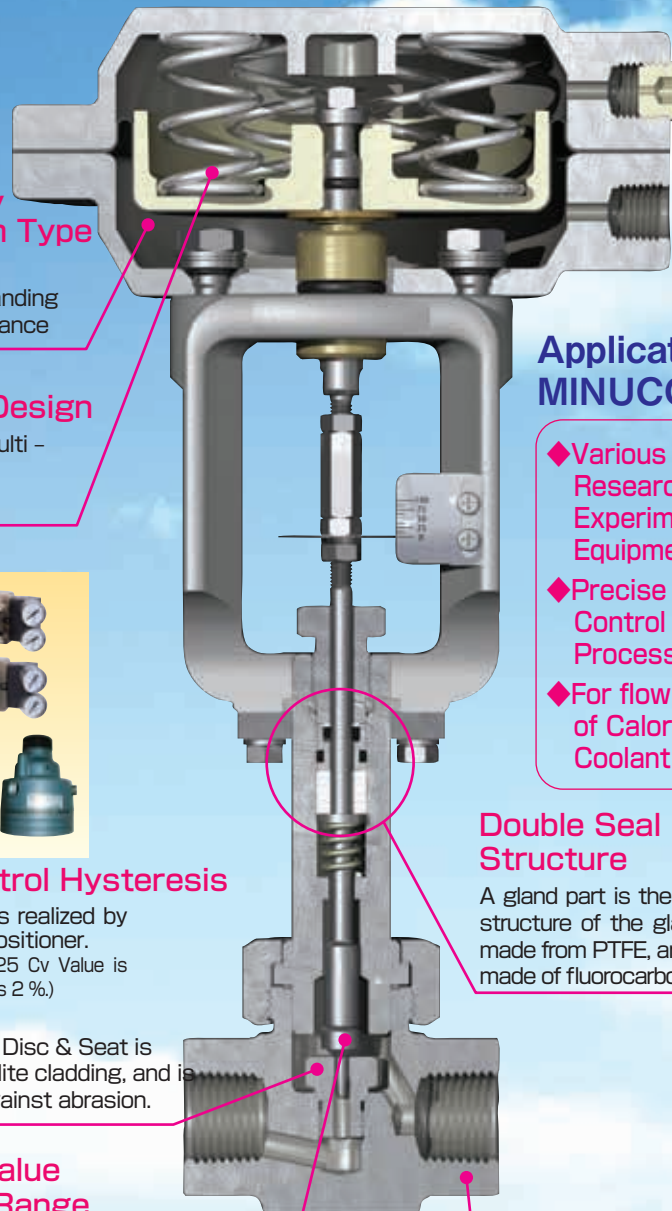
Close Control Hysteresis

1.5 % or less is realized by adoption of a positioner. (Less than 0.00025 Cv Value is less than hysteresis 2 %.)

The material of Disc & Seat is SUS316+Stellite cladding, and is excellent for against abrasion.

Wide Cv Value Selection Range

Stem & Disk are made by SUS316 + Stellite cladding, excellent for against abrasion. Wide range of Cv Value available, 0.0000015 to 5.



Application of MINUCON

- ◆ Various Research / Experiment Equipment
- ◆ Precise Fluid Control of Process Line
- ◆ For flow control of Calorie Meter Coolant

Double Seal Structure

A gland part is the double seal structure of the gland packing made from PTFE, and O - Rings made of fluorocarbon rubber.

Body made from forged Stainless steel body (SUSF316)




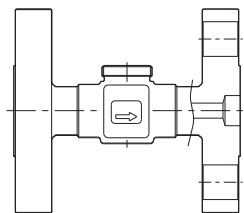
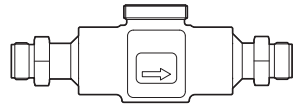
※ Please understand that a preliminary announcement may make use material, a size, etc. there be nothing by improvement of a product.

Specifications

Body

1 Body Types

- ◆Globe type is standard.
- ◆Standard material of body is SUS316.
- ◆KHK certified models available.

Connections	Female Thread (Rc)	Socket Weld	Flange (JIS)	Flange (ANSI, JPI)	Remarks (Please inquire for details.)
Sizes	1/4, 3/8, 1/2, 3/4, 1		10 A, 15 A 20 A, 25 A	15 A, 20 A, 25 A	UJR Fittings Type (Metal Gasket Type)
Operating prs. Pres. Class ※1	14.7 MPa, 29.4 MPa, 49 MPa		10 K, 20 K, 30 K 40 K, 63 K	150, 300 600, 900	
Form (Globe Type)					Powerful - Lok Fittings Type (Compression Rings Type)
				※2	

※1: Max. operating pressure is depending on the temperature. Please confirm the Pres. - Temp. Rating(P10).

※2: RF flange type or RJ flange type

2 Bonnet Types

- ◆All the wetted parts of standard are made from SUS316 and with union bonnet structure.
- ◆A gasket is a metal (made from SUS316) type.
- ◆With 0.7 or more Cv Value, when fluid is a liquid or steam, it becomes a stem with a guide. Moreover, all the products of the Cv Value 5 serve as a stem with a guide.
- ◆The high temperature type can respond to the fluid up to 500 °C with a fin.
- ◆Use at -253 °C (Liquid Hydrogen) is possible for a low temperature type with the extension structure which prevents fault cooling of the gland part.

Bonnet Types		Operating Temperature Ranges	
		Cv Value 0.7 or more	Cv Value 0.5 or less
Standard Types	PTFE Gland packing	-25 °C - + 150 °C	-50 °C - + 150 °C
	C-PTFE Gland packing	-25 °C - + 230 °C	-50 °C - + 230 °C
High Temperature Type (with Fin)		-25 °C - + 500 °C	-50 °C - + 500 °C
Low temperature Type (with Extension)		-253 °C - + 150 °C	

3 Gland Construction

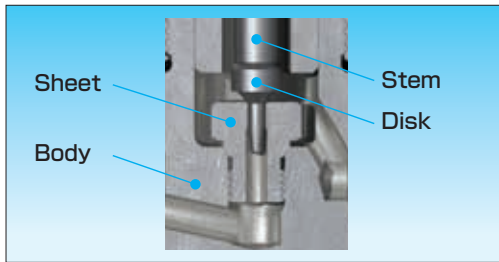
- ◆Although V - packing made from PTFE is a standard, it can respond also to double seal structure with O - Rings.
- ◆It can also be made the high temperature up to 230 °C by using packing made from PTFE (C - PTFE) containing carbon.
- ◆The valve for high temperature up to 230 °C can also be manufactured by using C-PTFE packing containing carbon.
- ◆Bellows sealing type is available (option, please refer to P8)

4 Oil - Free Specifications

- ◆It corresponds to oil - free oxygen specification as standard.
- ◆Although we can manufacture by oil - free specification (first - class oil - free) also we have applied fluoric grease to the thread part of a disk and sheet, and also a gasket thinly. Moreover, by the type which uses a grand part O - Rings, it has applied also to O - Rings thinly.

Disc & Seat

Disk and a Sheet have the structure threaded and connected to a body and a stem in each, and are exchangeable. (Except in the case of Cv Va)



Specifications

Material	SUS316+ Stellite cladding (standard)		
Flow Characteristics	EQ%	Linear	ON - OFF
Cv Value	0.0000015 - 5		5 - 0.25
Range - ability	Cv Value 0.00025 or over 20: 1 (standard) Cv Value 0.00015 or below 10: 1 (standard)		
Allowable Leak Rate	1×10 ⁻⁴ × Rated Cv Value		5×10 ⁻⁷ × Rated Cv Value

Actuator

- ◆ Since actuator of M3 and M2 type are a spring back type, when a air supply is lost a valve is full open or closed.
- ◆ The optimal actuator can be chosen from Cv Value, a working pressure range, and a use. Please refer P 12.

Positioner

- ◆ The precise control not more than hysteresis 1.5% F.S. or less becomes possible by adoption of Positioner. (Cv Value 0.00025 or less : 2 % F.S. or less)
- ◆ Please select from E/P and P/P Positioner according to application. Please refer P 8.
- ◆ EP Positioner applies to Explosion-proof construction (ExdIIBT6) as standard. Moreover, also to the Explosion - proof construction for Hydrogen (ExdIIB+H₂T6).

Fluid

- ◆ Inert Gases, such as Nitrogen, Helium, Air, and Carbon Dioxide, and Oxygen
- ◆ Flammable Gases (Hydrogen, Methane, Ethylene, etc.)
- ◆ Toxic gases (Carbon Monoxide, Butadiene, etc.)
- ◆ Water, Fuel Oil, a Liquefied Gas, etc.
- ◆ However, by the following fluid, you can not use.
 - Fluid which corrodes wetted parts (Body, Bonnet, Disk & Seat, Grand Part)
 - Fluid containing a solid or slurry
- ◆ Please refer to P8 of the special quality of the body materials.

Others

- ◆ We can corresponds also to options of Regulator, Limit-switch, Solenoid Valve, etc. Please refer P9.

Specifications

Actuator Types	M3 Type	M2 Type	UN Type
Drive Mechanism Actuation	Diaphragm Type Normal Open Type / Normal Close type		Manual Type
Actuator O.D. (mm)	φ146	φ220	φ68 (Hand Wheel)
Operating Pressure (KPa)			
EQ% · Linear	140 kPa / 240 kPa / 400 kPa / 20 - 100 kPa		
ON - OFF	100 kPa/200 kPa/400 kPa		
Drive Section Connection	Rc 1/4		
Materials			
Yoke	ADC12	AC2A	A5052
Cover	ADC12	AC2A	
Diaphragm	NBR (Fabric reinforced diaphragm)		
Hand Wheel			ADC12
Paint	Baking paint		
Yoke	Silver	Silver	Silver
Cover	Cobalt Blue	Cobalt Blue	
Max. Opr. Pres. (MPa)	49 MPa	110 MPa	49 MPa
Ambient Temperature Range	- 10 - 60 °C		
Rated Lift (mm)			
EQ% Linear	Cv Value 0.00015 or less	6 mm	
	Cv Value 0.00025 - 3	8 mm	
	Cv Value 5	10 mm	
	ON-OFF	5 mm	
Hysteresis			
Without Positioner Type	15 % F.S. or less		
With Positioner Type	1.5 % F.S. or less (Cv Value 0.00025 or less: 2 % F.S. or less)		
Lineality			
Without Positioner Type	15 % F.S. or less		
With Positioner Type	5 % F.S. or less		

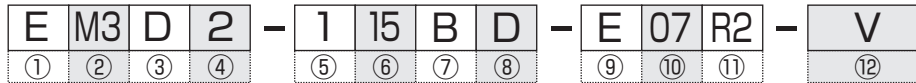
Ordering Numbers

Actuator

Valve

Cv Value & Characteristics

Accessories



Actuator

	①	②	③	④	Specifications
Positioner Type	non				Without Positioner
	P				Pneumatic Pneumatic Positioner
	E				Electro Pneumatic Positioner
	E1				ExdIB+H2T6X (Pressure-resistant & Explosion Proof for Hydrogen)
	E32				3730-2 Type with Self-Diagnostic Function, Intrinsically Safe Explosion Proof : ExiaIICT6
E33				3730-2 Type with Self-Diagnostic Function and HART® Communication	
E53				3730-2 Type with Self-Diagnostic Function, HART® Communication and Pressure/Explosion Proof: ExdIICT6	
Actuator Type	M2				M2 Type Actuator
	M3				M3 Type Actuator
	UN				UN Type (Manual Operate Type)
Actuation Type (Manual Type: Non)	D				Normal Open Type
	R				Normal Close Type
Operating Pres.: (without Positioner Type)	non				100 kPa (ON-OFF), 20 - 100 kPa / 140 kPa (EQ%, Linear)
Supply Pres.: (with Positioner Type)	2				200 kPa (ON-OFF), 240 kPa (EQ%, Linear)
	4				400 kPa
<Examples of the Ordering Number>					
◆M3D: M3 Type, Normal Open Type, Operating Pres.: 100 kPa					
◆E1M2R4: With EP Positioner Explosion Proof Type for Hydrogen, M2 Type, Normal Close Type, Supply Pres.: 400 kPa					
◆UN: Manual Type					

Valve

	⑤	⑥	⑦	⑧	Specification
Connection	1				Thread Globe Type
	2				Flange Globe Type
	3				Thread Angle Type
	4				Flange Angle Type
	5				Socket Weld Globe Type
	6				Socket Weld Angle Type
	7				Globe type with union type
	8				Angle Type with union type
	9				Globe Type with 2 Compression ring Fitting
	0				Angle Type with 2 Compression ring Fitting Type
Rating & Flange	15				14.7 MPa Type
	30				29.4 MPa Type
	50				49 MPa Type
	J1				JIS 10K
	J2				JIS 20K
	J3				JIS 30K
	J4				JIS 40K
	J6				JIS 63K
	A2				ANSI 150 (JPI 150)※
	A3				ANSI 300 (JPI 300)※
A6				ANSI 600 (JPI 600)※	
A9				ANSI 900 (JPI 900)※	
A15					
Construction of Gland & bonnet	non				V-Packing
	W				V-Packing + O-Ring
	B				Bellows Seal Type
	H				High Temperature Type
	C				Low Temperature Type
Sizes	B				1/4(8A)
	C				3/8(10A)
	D				1/2(15A)
	E				3/4(20A)
	F				1(25A)
<Example of Ordering Numbers >					
◆115B: Rc1/4, 14.7 MPa Type, V - Packing					
◆2JP3WHD: JPI300 15A RF Flange connection, V - Packing + O - Ring, High Temperature Type					

◆It may be indicated as #A and #B at the end of ordering number at the time of product shipment. This shows the change tracing of product specification.

Disc & Seat

	⑨	⑩	⑪	Written contents
Charac - teristic	O			ON - OFF
	E			EQ %
	L			Linear
Cv Value	01			The number 01 - 40 corresponding to Cv Value 5 - 0.0000015 is indicated. (Please refer to the following table.)
	40			
Rangeability	R1			R1 - R10 corresponding to 10:1 - 100:1 are indicated. (Please refer to the following table.)
	R10			
Please refer to the following table for the combination of the valve characteristic which can be manufactured, Cv Value, and rangeability. <One of example> ◆E15R4 - EQ %, Cv Value : 0.025 Rangeability: 40:1				

Cv Value, Cv No., Range - ability, the table of combination which can be manufactured.

Cv No.	Cv Value	EQ %, Linear									
		R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
01	5	10:1	20:1	30:1	40:1	50:1	60:1	70:1	80:1	90:1	100:1
02	3										
03	2										
04	1.5										
05	1										
06	0.7										
07	0.5										
08	0.35										
09	0.25										
10	0.15										
11	0.1										
12	0.07										
13	0.05										
14	0.035										
15	0.025										
16	0.015										
17	0.01										
18	0.007										
19	0.005										
20	0.0035										
21	0.0025										
22	0.0015										
23	0.001										
24	0.0007										
25	0.0005										
26	0.00035										
27	0.00025										
28	0.00015										
29	0.0001										
30	0.00007										
31	0.00005										
32	0.000035										
33	0.000025										
34	0.000015										
35	0.00001										
36	0.000007										
37	0.000005										
38	0.0000035										
39	0.0000025										
40	0.0000015										

■ : Can be manufactured

Disc & Seat

⑫	Specifications
AS	Regurator
L*	Limit Switch
V*	Solenoid Valve
***	Special Specifications (It expresses as the alphabet of three characters.)

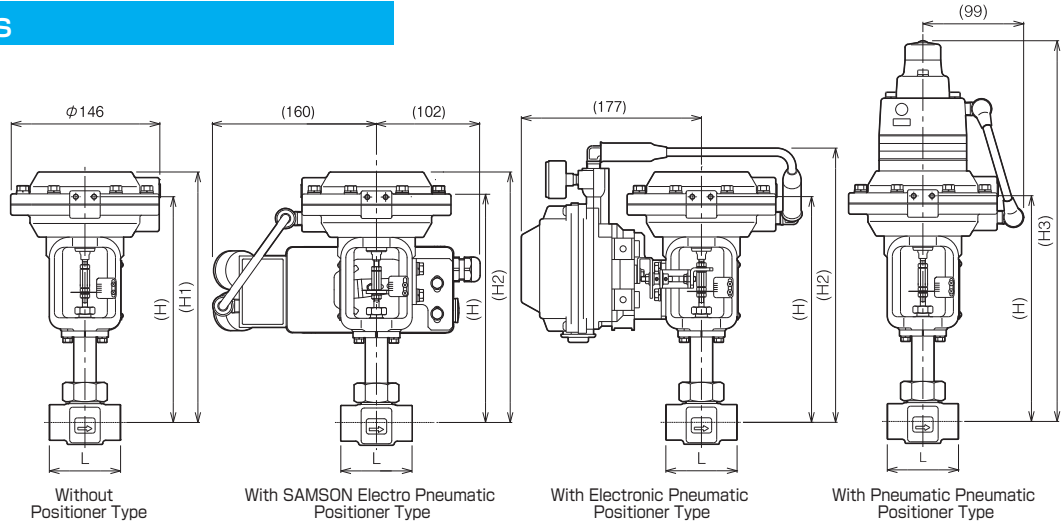
*The sign showing the accessories defined separately enters here.

Download the latest catalogue: <http://www.fujikin.co.jp/go/c13100>

■ Dimensions

M3 Types

Standard Types

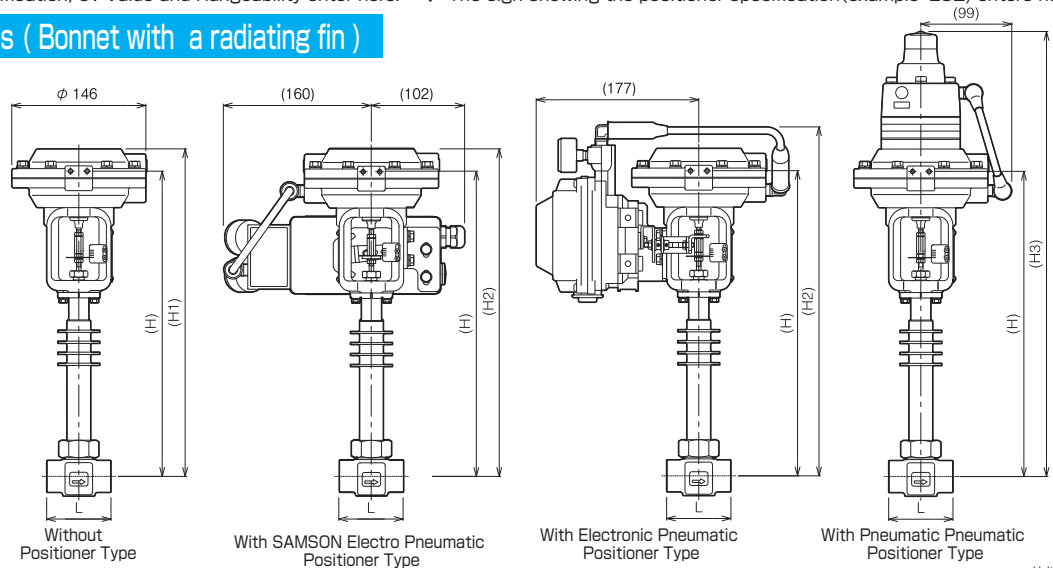
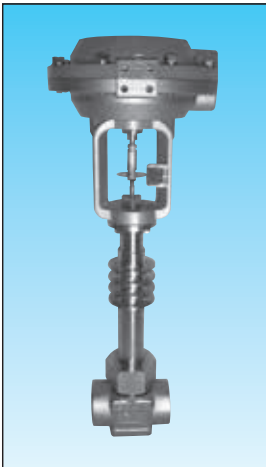


Unit: mm

Common Specifications					Without Positioner Types			With SAMSON Electro Pneumatic Positioner 3730 Type			With Electronic Pneumatic Positioner Types			With Pneumatic Pneumatic Positioner Types		
Body Types	Body Connections	Cv Value	Dimension (mm)		Ordering Numbers (Types)		Dimension (mm)	Ordering Numbers (Types)		Dimension (mm)	Ordering Numbers (Types)		Dimension (mm)	Ordering Numbers (Types)		Dimension (mm)
			H	L	Normal Open Types	Normal Close Types	H1	Normal Open Types	Normal Close Types	H2	Normal Open Types	Normal Close Types	H2	Normal Open Types	Normal Close Types	H3
14.7 MPa Type	Rc1/4-1/2	0.5 or less	222	70	M3D-115※	M3R-115※	246	E3*M3D-115※	E3*M3R-115※	246	EM3D-115※	EM3R-115※	270	PM3D-115※	PM3R-115※	374
	Rc1/4-1	0.7 or more	226	100			250			250			274			378
	SW1/4-1/2B	0.5 or less	222	90	M3D-515※	M3R-515※	246	E3*M3D-515※	E3*M3R-515※	246	EM3D-515※	EM3R-515※	270	PM3D-515※	PM3R-515※	374
	SW1/4-1B	0.7 or more	226	110			250			250			274			378
29.4 MPa Type	Rc1/4-1/2	0.5 or less	230	80	M3D-130※	M3R-130※	254	E3*M3D-130※	E3*M3R-130※	254	EM3D-130※	EM3R-130※	278	PM3D-130※	PM3R-130※	382
	Rc1/4-1	0.7 or more	231	100			255			255			279			383
	SW1/4-1/2B	0.5 or less	230	90	M3D-530※	M3R-530※	254	E3*M3D-530※	E3*M3R-530※	254	EM3D-530※	EM3R-530※	278	PM3D-530※	PM3R-530※	382
	SW1/4-1B	0.7 or more	231	110			255			255			279			383
49 MPa Type	Rc1/4-1/2	0.5 or less	235	100	M3D-150※	M3R-150※	260	E3*M3D-150※	E3*M3R-150※	260	EM3D-150※	EM3R-150※	283	PM3D-150※	PM3R-150※	388
	SW1/4-1/2B	0.5 or less	235	110	M3D-550※	M3R-550※	260	E3*M3D-550※	E3*M3R-550※	260	EM3D-550※	EM3R-550※	283	PM3D-550※	PM3R-550※	388

※: The sign showing the valve specification, Cv Value and Rangeability enter here. ※: The sign showing the positioner specification (example: E32) enters here.

High Temperature Types (Bonnet with a radiating fin)

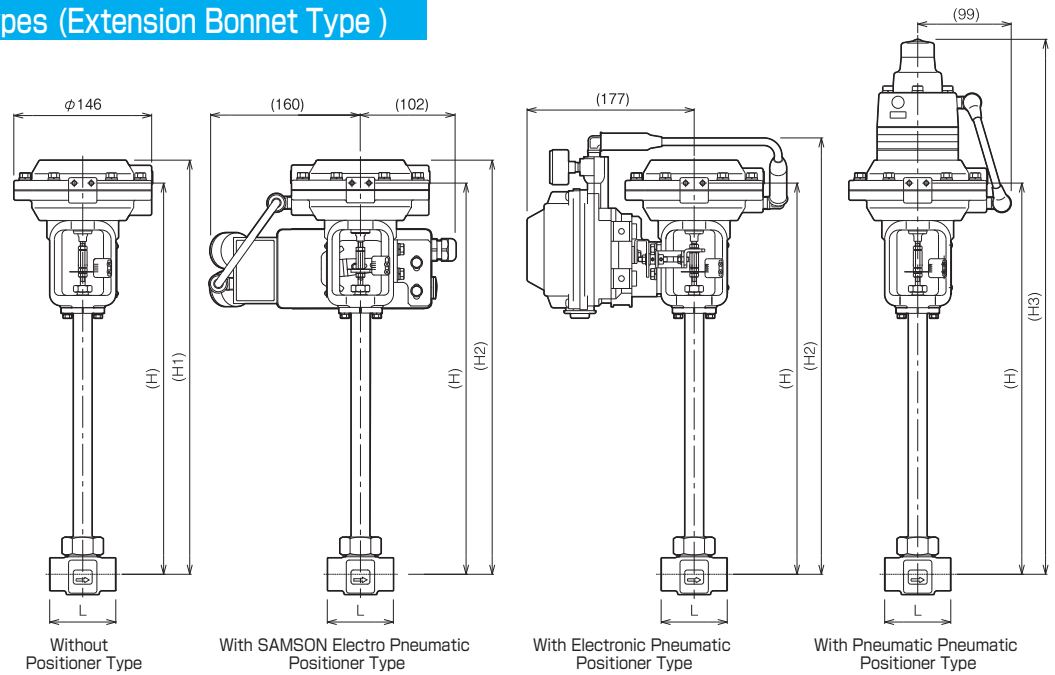
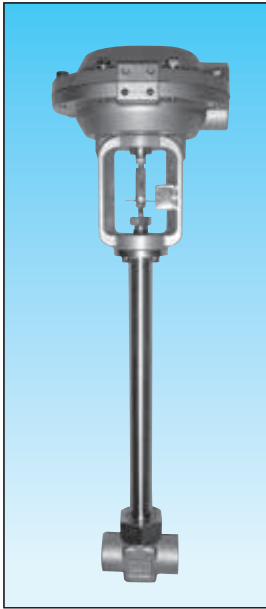


Unit: mm

Common Specifications					Without Positioner Types			With SAMSON Electro Pneumatic Positioner 3730 Type			With Electronic Pneumatic Positioner Types			With Pneumatic Pneumatic Positioner Types		
Body Types	Body Connections	Cv Value	Dimension (mm)		Ordering Numbers (Types)		Dimension (mm)	Ordering Numbers (Types)		Dimension (mm)	Ordering Numbers (Types)		Dimension (mm)	Ordering Numbers (Types)		Dimension (mm)
			H	L	Normal Open Types	Normal Close Types	H1	Normal Open Types	Normal Close Types	H2	Normal Open Types	Normal Close Types	H2	Normal Open Types	Normal Close Types	H3
14.7 MPa Type	Rc1/4-1/2	0.5 or less	332	70	M3D-115H※	M3R-115H※	356	E3*M3D-115H※	E3*M3R-115H※	356	EM3D-115H※	EM3R-115H※	380	PM3D-115H※	PM3R-115H※	484
	Rc1/4-1	0.7 or more	337	100			361			361			385			489
	SW1/4-1/2B	0.5 or less	332	90	M3D-515H※	M3R-515H※	356	E3*M3D-515H※	E3*M3R-515H※	356	EM3D-515H※	EM3R-515H※	380	PM3D-515H※	PM3R-515H※	484
	SW1/4-1B	0.7 or more	337	110			361			361			385			489
29.4 MPa Type	Rc1/4-1/2	0.5 or less	330	80	M3D-130H※	M3R-130H※	354	E3*M3D-130H※	E3*M3R-130H※	354	EM3D-130H※	EM3R-130H※	378	PM3D-130H※	PM3R-130H※	482
	Rc1/4-1	0.7 or more	342	100			366			366			390			494
	SW1/4-1/2B	0.5 or less	330	90	M3D-530H※	M3R-530H※	354	E3*M3D-530H※	E3*M3R-530H※	354	EM3D-530H※	EM3R-530H※	378	PM3D-530H※	PM3R-530H※	482
	SW1/4-1B	0.7 or more	342	110			366			366			390			494
49 MPa Type	Rc1/4-1/2	0.5 or less	312	100	M3D-150H※	M3R-150H※	336	E3*M3D-150H※	E3*M3R-150H※	336	EM3D-150H※	EM3R-150H※	360	PM3D-150H※	PM3R-150H※	464
	SW1/4-1/2B	0.5 or less	312	110	M3D-550H※	M3R-550H※	336	E3*M3D-550H※	E3*M3R-550H※	336	EM3D-550H※	EM3R-550H※	360	PM3D-550H※	PM3R-550H※	464

※: The sign showing the valve specification, Cv Value and Rangeability enter here. ※: The sign showing the positioner specification (example: E32) enters here.

Low Temperature Types (Extension Bonnet Type)

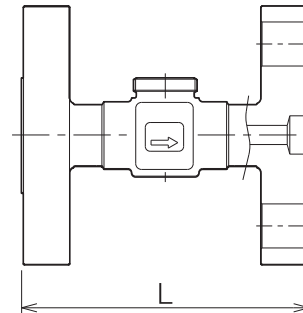
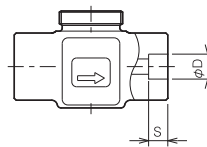


Common Specifications					Without Positioner Types		With SAMSON Electro Pneumatic Positioner 3730 Type				With Electronic Pneumatic Positioner Types			With Pneumatic Pneumatic Positioner Types		
Body Types	Body Connections	Cv Value	Dimension [mm]		Ordering Numbers (Types)		Ordering Numbers (Types)		Ordering Numbers (Types)		Ordering Numbers (Types)		Ordering Numbers (Types)		Ordering Numbers (Types)	
			H	L	Normal Open Types	Normal Close Types	Normal Open Types	Normal Close Types	Normal Open Types	Normal Close Types	Normal Open Types	Normal Close Types	Normal Open Types	Normal Close Types		
14.7 MPa Type	Rc1/4-1/2	0.5 or less	414	70	M3D-115C*	M3R-115C*	439	E3*M3D-115C*	E3*M3R-115C*	439	EM3D-115C*	EM3R-115C*	463	PM3D-115C*	PM3R-115C*	567
	Rc1/4-1	0.7 or more	419	100			443			443			467			571
	SW1/4-1/2B	0.5 or less	414	90	M3D-515C*	M3R-515C*	439	E3*M3D-515C*	E3*M3R-515C*	439	EM3D-515C*	EM3R-515C*	463	PM3D-515C*	PM3R-515C*	567
	SW1/4-1B	0.7 or more	419	110			443			443			467			571
29.4 MPa Type	Rc1/4-1/2	0.5 or less	417	80	M3D-130C*	M3R-130C*	442	E3*M3D-130C*	E3*M3R-130C*	442	EM3D-130C*	EM3R-130C*	466	PM3D-130C*	PM3R-130C*	570
	Rc1/4-1	0.7 or more	429	100			453			453			478			581
	SW1/4-1/2B	0.5 or less	417	90	M3D-530C*	M3R-530C*	442	E3*M3D-530C*	E3*M3R-530C*	442	EM3D-530C*	EM3R-530C*	466	PM3D-530C*	PM3R-530C*	570
	SW1/4-1B	0.7 or more	429	110			453			453			478			581
49 MPa Type	Rc1/4-1/2	0.5 or less	414	100	M3D-150C*	M3R-150C*	439	E3*M3D-150C*	E3*M3R-150C*	439	EM3D-150C*	EM3R-150C*	462	PM3D-150C*	PM3R-150C*	462
	SW1/4-1/2B	0.5 or less	414	110	M3D-550C*	M3R-550C*	439	E3*M3D-550C*	E3*M3R-550C*	439	EM3D-550C*	EM3R-550C*	462	PM3D-550C*	PM3R-550C*	462

Unit: mm
 *: The sign showing the valve specification, Cv Value and Rangeability enter here. *: The sign showing the positioner specification (example: E32) enters here.

SW (Socket Weld) Type Body

Sizes	D	S
1/4B	14.3	10
3/8B	17.8	13
1/2B	22.2	
3/4B	27.7	
1B	34.5	



Face to Face Dimensions for Flange Type Body

JIS Standard Flange

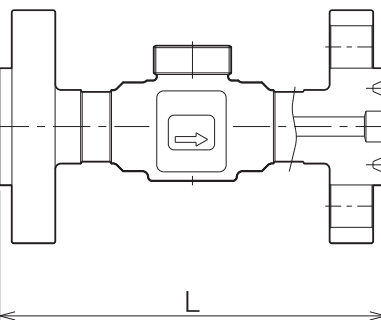
Cv Value	Nominal Pressure	RJ Flange Sizes			
		10A	15A	20A	25A
0.5 or less	10 K, 20 K, 30 K, 40 K, 63 K	150			
	10 K, 20 K	150			
0.7 or more	30 K	150		180	
	40 K, 63 K	150	180		

Flange Type Body (RF Type)

ANSI · JPI Standard Flange

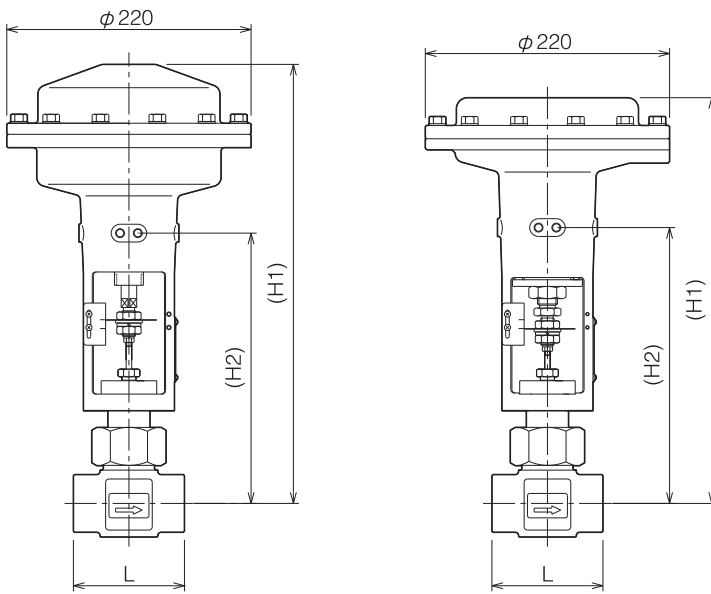
Cv Value	Classes	RF Flange Sizes			RJ Flange Sizes		
		15A	20A	25A	15A	20A	25A
0.5 or less	150, 300, 600	150					
	900, 1500	200					
0.7 or more	150	150					
	300	150			180		
	600	180					
	900, 1500	200					

Flange Type Body (RJ Type)



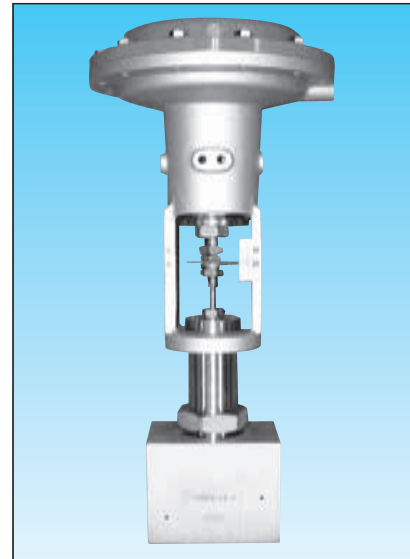
M2 Types

- ◆ The high power which can respond to ultra-high pressure as it boasts of the precision.



Normal Open Type

Normal Close Type



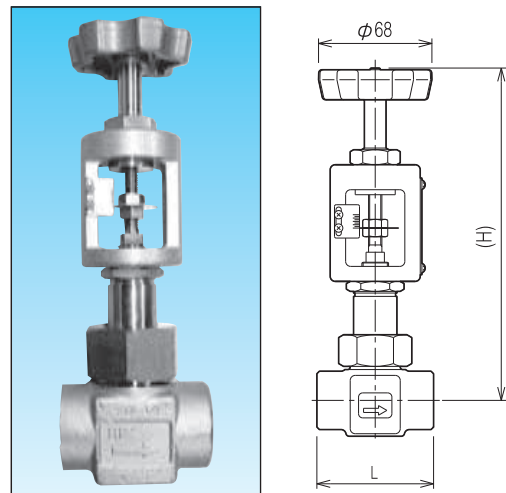
110 MPa Ultra-High Pres. Type
for VHydrogen Equipment

Actuation Types	Body Types	Body Connections	Cv Value	Ordering Numbers (Types)	Dimensions [mm]		
					H1	H2	L
Normal Open Types	14.7 Mpa Type	Rc1/4 - 1/2	0.5 or less	M2D - 115	396	244	70
		Rc1/4 - 1	0.7 or more		391	239	100
	29.4 MPa Type	Rc1/4 - 1/2	0.5 or less	M2D - 130	410	258	80
		Rc1/4 - 1	0.7 or more		396	244	100
Normal Close Types	14.7 MPa Type	Rc1/4 - 1/2	0.5 or less	M2R - 115	366	249	70
		Rc1/4 - 1	0.7 or more		361	244	100
	29.4 MPa Type	Rc1/4 - 1/2	0.5 or less	M2R - 130	379	262	80
		Rc1/4 - 1	0.7 or more		366	249	100
	49 MPa Type	Rc1/4 - 1/2	0.5 or less	M2R - 150	402	285	100
			0.7 or more				

- ◆ Available with P/P Positioner Type and E/P Positioner Type also.
- ◆ Available 110 MPa Ultra-High Pres Type also. Please do not hesitate to consult us.

UN Types (Manual Type)

- ◆ Ultra-precision flow control technology was harnessed in the manual valve.
- ◆ For pressure regulatings and flow control that is difficult by the conventional manual valve



Body Types	Body Connections	Cv Value	Ordering Numbers (Types)	Dimensions [mm]	
				H	L
14.7 Mpa Type	Rc1/4 - 1/2	0.5 or less	UN - 115	200	70
	Rc1/4 - 1	0.7 or more		205	100
29.4 MPa Type	Rc1/4 - 1/2	0.5 or less	UN - 130	213	80
	Rc1/4 - 1	0.7 or more		216	100
49 MPa Type	Rc1/4 - 1/2	0.5 or less	UN - 150	234	100

Options / Accessories

Materials of Wetted Parts

- ◆ Manufacture with the following materials can be also performed according to the fluid.
- ◆ Please consult to us also about other materials.

① Body

SUS316L, Nickel alloy (Hastelloy B-2, C-22, C-276 equivalent), Zirconium, Titanium, Titanium alloy

② Disc & Seat

Materials	Remarks
SUS316L	In 0.007 or less Cv value, it becomes correspondence at the Stellite
SUS630	For wear-proof at the time of cavitation generating.
Tungsten carbide + SUS316	(correspond for only 0.01 or more Cv value)
Nickel alloy	Correspond only for 0.01 or more Cv values.
Zirconium	
Titanium, Titanium alloy	

③ Gland packing

C-PTFE, PFA, or such combination packings

④ O-Rings

EPDM, HNBR, Kalreze®, etc.


Positioner

- ◆ Indispensable to the close control of a control valve. Please choose from Pneumatic Pneumatic (P/P) Positioner and Electronic Pneumatic (E/P) Positioner.
- ◆ When input an air signal to Pneumatic Pneumatic (P/P) Positioner, predetermined valve travel is obtained. Since this is a top mount type, it is space - saving.
- ◆ The valve operates according to an electric signal by Electronic Pneumatic (E/P) Positioner. There are Pressure-resistant & explosion-proof type, and Pressure-resistant & explosion-proof for hydrogen type
- ◆ A SMART Electro Pneumatic (E/P) Positioner (Intelligent E/P Positioner with Microprocessor) can also be chosen.

※1: Operating temperature of a positioner simple substance Ambient temperature range: -10-60 °C

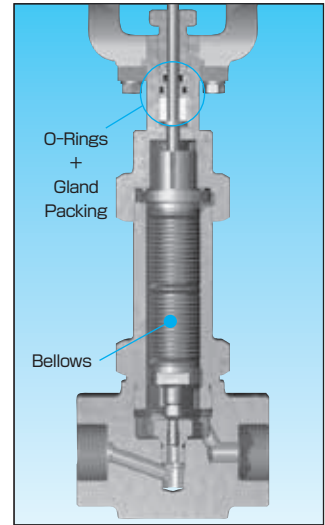
※2: When supply pressure 140 kPa, output pressure 50 %

※3: Please contact us, when there is a demand of operation speed (damping time constant).

	Supply air should supply the pure air Supply which removed oil and moisture. Moreover, please give as air supply where pressure was stabilized.
	Please keep in mind that degradation of seal material may become early if the dry Nitrogen gas instead of air supply is used.




Bellows Seal Type

- ◆ High reliable construction, bellows seal + gland packing + O-Rings
- ◆ One piece construction by welding stem and bellows.
- ◆ For the application of poison gases that needed severe control



	0.98 MPa Type	4.9 MPa Type
Design Pressure	0.98 MPa	4.9 MPa
Materials	SUS316L	Inconel 718

MINUCON Specification Sheet with Positioner

Items	Pneumatic Pneumatic (P/P) Positioner		Electronic Pneumatic (E/P) Positioner				
	SIEMENS		SAMSON AG		SSS Inc.		
Maker	SIEMENS		SAMSON AG		SSS Inc.		
Model	73N12F (NO Type)	73N-B1 (NC Type)	3730-2	3730-3	3731-3	XE151-SB4/F6 (Pressure - resistant & explosion - proof)	XE161-SB4/F6 (Pressure - resistant & explosion - proof for hydrogen)
Supply Pressure	140-400 kPa		140-400 kPa		140-400 kPa		
Input Signal	20-100 kPa		DC 4-20 mA		DC 4-20 mA (Input Impedance: 250Ω)		
Air Connection	1/4NPT		1/4NPT (Option: G1/4)		Rc1/4 (Option: Rc1/8)		
Electric wiring	-		M20×1.5	1/2NPT (Option: M20×1.5)	G1/2 (Option: 1/2NPT)		
Wiring connection system	-		Rigid Steel Conduits System	Packing Cable Gland System	Electric wire pipe system Resisting pressure packing system		
Ambient Temp. ※1	-40 - +82 °C		-20 - +80 °C	-40 - +80 °C	-20 - +60 °C		
Hysteresis	-		0.3% F.S. or less ※2		0.5 % F.S. ※2		
Sensitivity ※3	0.25 % F.S.		0.1 % F.S. ※2		0.2 % F.S. ※2		
Explosion Proof	-		available to Intrinsically Safe Explosion Proof : Exia II CT6 ※4	Non-explosion	Pressure/Explosion Proof : Exd II CT6	Pressure-resistant & explosion-proof Exd II BT6X	Pressure-resistant & explosion-proof for hydrogen Exd II BT + H ₂ T6X
Air Consumption ※2	7 NL/min.	17 NL/min. at Supply Pres. 140KPa and 63KPa Input Sig.	1.83 NL/min. regardless of supply air pressure		5 NL/min. at Supply Pres. 140KPa and 50% output pres.		
Weight	Approx. 1kg		Approx. 1kg	Approx. 2.5kg	Approx. 2.6kg		
Materials	Aluminium		Aluminium (External exposed area: Stainless Steel)		Aluminium (Special alumite treatment) Cover; PBT Resin (Glass fiber entered)		
Remarks	-		SMART Positioner (Intelligent E/P Positioner with Microprocessor) with Self-Diagnostic Function		-		
	-		with HART [®] Communication		-		
	-		Position Transmitter (Option)		-		
	-		with Inductive Limit Switch (Mechanical Switch) (Option)		-		
	-		with Software Limit Switch		with Software Limit Switch (Option)		
Appearance							

※2: Performance of only a positioner. ※3: Accuracy over the lift of a positioner.
 ※4: At the case without specification. Non-explosion type is also available.

Options / Accessories

Filter Regulator

- The air of your equipment is set as a supply pressure required for MINUCON.

		Maker · Model Numbers	
		SAMSON AG	SSS Inc.
Supply Pressure	240 kPa or less	4708-53	XR-104
	400 kPa		XR-108
Specifications	Ambient Temp. ※1	-25 - +80 °C	-25 - +80 °C
	Air Connection	1/4NPT	Rc 1/4 (Pres. Gauge: Rc 1/8)
	Filter Element	Polypropylene nonwoven (Filtration accuracy: 20μm)	Polypropylene nonwoven (Filtration accuracy: 5μm)
	Max. Supply Pres.	1.2 MPa	0.9 MPa
	Weight	0.48 Kg	0.26 Kg

※1: An operating temperature simple.
The ambient air temperature at the time of attaching to a valve will be -10 - +60 °C.



Solenoid Valve

- Supply air is made to supply for it air and exhaust electrically.
- Please indicate Explosion-proof structure and power supply specification at the time of an order.

Types

Maker: Kaneko Co

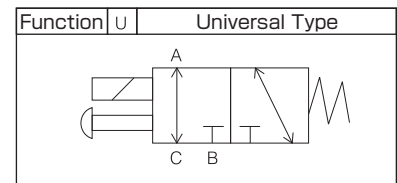
Explosion proof	Models	
	AC 100V	DC 24V
- (General Type)	M00U-8-A12PG	M00U-8-D12PG
d2G4	M00U-8-AE12PU	M00U-8-DE12PU
ExdIICT6	M00U-8-E22POA-SA	



Specification

Items	Contents
Fluid	Clean Air
Fluid Temperature	-20 - +60 °C
Ambient Temperature ※1	-20 - +60 °C
Operation Pressure	0-0.7 MPa
Air Connection	Rc 1/4
Cv Value	0.084

※1: An operating temperature simple.
The ambient air temperature at the time of attaching to a valve will be -10 - +60 °C.



JIS display sign

Limit Switches

- For detecting Open and Close of a valve by electric signal
- Roller lever type
- Conduits : G1/2
- Please indicate Explosion - proof structure and a use (full open detection, all the closed detection, and both - sides detection) at the time of an order.

Types

Maker: Yamatake Corp.

Explosion-proof Construction	Models
General·Water-proof	1LS19-JS
Exde II CT6	1LX7001-J



※ Please consult, us if there is attachment hope of apparatus other than a statement above.

■ Selection Guide

Please select due to below flow.

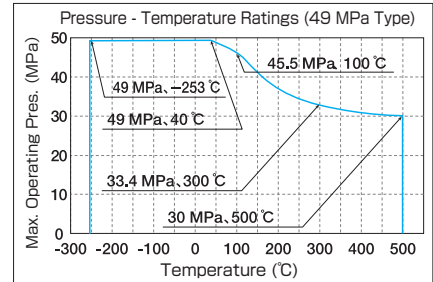
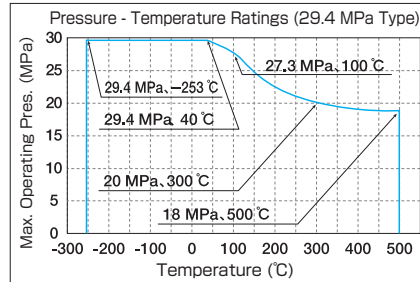
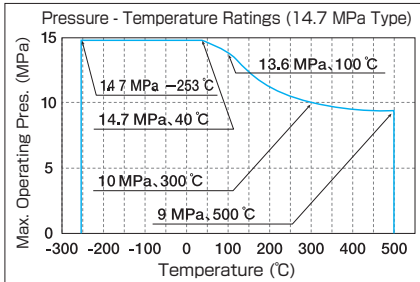
① Entry of the "MINUCON Detailed Order Sheet"

At first please enter the fluid conditions (fluid name, pressure, etc.), Gland seal conditions, Actuator specifications (Type of actuation, a painting color, etc.) to the "MINUCON Detailed Order Sheet" (P13). Please be sure to enter within the limit of a thick line.

② The check of Pressure - Temperature Rating

Check please whether it is rating within the limits of the applied standard which the conditions of pressure and temperature

- ◆ Threaded Type, Socket Weld Type, Union Type, Double Compression Fittings Type → Confirm please below Temperature - Pressure Rating diagram.
- ◆ Flange Connection → Confirm please Rating Table in each standard (JIS, JPI, ANSI).



③ Cv Value Calculation

For the operating conditions, calculate each Cv Value, max. Cv Value and min. Cv Value.

- ◆ What is the Cv Value?

Cv Value is one of the coefficients of flow capacity of valve, and by a JIS standard, It is determined as "the numerical value which expresses with US gal / min the flow of the spring water with a temperature of 60 degrees F (15 °C) which flows through a valve when pressure difference is 1LB(pound) / inch² (= 1 psi) in specific travel (travel range)."

Cv Value Calculation Formula

Fluids		Differential Pressure		Explanation Sign
		$P_2 > \frac{P_1}{2}$	$P_2 \leq \frac{P_1}{2}$	
Liquid	General	$Cv = 0.366 Q_L \sqrt{\frac{G_L}{P_1 - P_2}}$	same as left	Q_L [m ³ /h] Liquid Flow Rate Q_G [m ³ /h(normal)]: Gas Flow Rate in Normal condition (15 °C, 0.1013MPa abs.) Q_S [kg/h] Steam Flow Rate P_1 [MPa abs]: Inlet Pre.(abs) *2 P_2 [MPa abs]: Outlet Pres.(abs) *2 K_v : Viscosity correction coefficient *1 t [°C]: Fluid Temperature G_L : Liquid Gravity (H2O = 1) G_G : Gas Gravity (Air = 1) S [°C]: Superheat Degree of Steam
	High Viscosity *1	$Cv = 0.366 Q_L K_v \sqrt{\frac{G_L}{P_1 - P_2}}$	same as left	
Gas		$Cv = \frac{Q_G}{4140} \sqrt{\frac{G_G (273+t)}{(P_1 - P_2) P_2}}$	$Cv = \frac{Q_G}{2070 P_1} \sqrt{G_G (273+t)}$	
Steam	Saturated Vapor Steam	$Cv = \frac{Q_S}{197.8 \sqrt{(P_1 - P_2) P_2}}$	$Cv = \frac{Q_S}{98.91 P_1}$	
	Overheated Steam Steam	$Cv = \frac{Q_S}{197.8 \sqrt{(P_1 - P_2) P_2}} (1 + 0.0013S)$	$Cv = \frac{Q_S}{98.91 P_1} (1 + 0.0013S)$	

*1: In the case of 20 or more mPa·s of kinetic viscosity, and 0.01 or less calculation Cv Value, in a liquid, viscosity compensation calculation is required. Please ask us, when viscosity compensation is required fluid specification.

*2: Please give as pressure in the valve latest.

When calculated using the pressure in the point which is separated from a valve, a big error may be produced in a calculation result under the influence of the pressure loss of piping, etc.

WARNING



Cv Value calculation is a standard for valve selection, and please deal with it as a reference value. In fact, a calculation result and a difference may arise according to peculiar piping conditions, an operating condition, etc.

④ Selection of Characteristics

Select please EQ% or Linear or ON=OFF

◆ Linear (Straight line form flow characteristic)

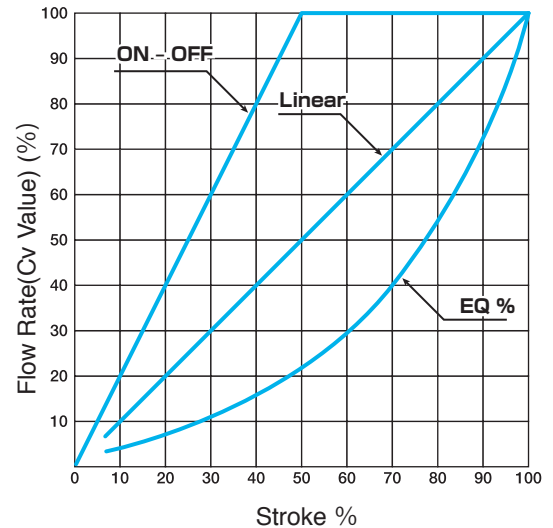
The characteristic that a flow rate (Cv Value) is proportional to a valve lift. A linear flow characteristic is known even if it sees the graph, but if the valve stroke increases 10%, Cv Value will also increase 10%. It is suitable for temperature control, open loop control, etc.

◆ EQ% (Equal ratio form flow characteristic)

The rate of change of the flow to change of a unit stroke leads all the strokes, and it is the fixed characteristic. For example, if range ability is 20:1, whenever the stroke of a valve increases 10%, a Cv Value will increase about 48% respectively, when every about 35% Range - ability is 50:1. It is suitable for pressure control, closed loop control, etc.

◆ ON - OFF

It is also called the quick open characteristic. Valve is the characteristic that it is begun from the start of a difference to pass a large flow, and the rating Cv Value can be secured by about 50 % of valve travel.



⑤ Determination of Rated Cv Value

The Rated Cv Value in consideration of a safety factor is selected from calculated maximum Cv Value. The maximum calculated Cv Value is multiplied by the safety ratio according to a valve characteristic.

- ① ON = OFF 2
- ② EQ % 1.5
- ③ Linear 1.2

(The maximum calculation Cv Value) x (safety factor) < (Rated Cv Value) - becoming Cv Value is selected. (Please refer to the right table for the Cv Value currently manufactured)

WARNING

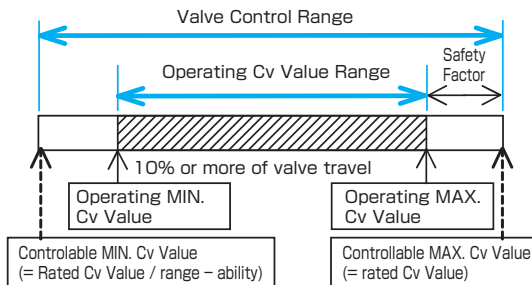
To the customer that selected Cv Value 0.007 or less

When Cv Value is 0.007 or less, since the diameter of a disk is 1mm or less, also in the case of a minutes metal piece, is bit between a disk and a sheet, and a disk may break as a result.

Please be sure to attach to piping by the side of the upper stream the filter which uses an element of 10 micrometers or less.

⑥ Selection of Range - ability

(Rated Cv Value) / (minimum calculated Cv Value) becomes necessary Range - ability in control. In the domain of not less than 10% of valve travel, it selects so that the minimum calculation Cv Value can be controlled. (Refer to the right table for the value of the Range - ability currently manufactured)



WARNING

MINUCON has the tolerance according to the plan Cv Value in each valve travel. When you determine Rated Cv Value, please select suitable margin.

Cv Value, Range - ability, the table of combination which can be manufactured

Cv No.	Cv Value	EQ %, Linear									
		R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
		10:1	20:1	30:1	40:1	50:1	60:1	70:1	80:1	90:1	100:1
01	5										
02	3										
03	2										
04	1.5										
05	1										
06	0.7										
07	0.5										
08	0.35										
09	0.25										
10	0.15										
11	0.1										
12	0.07										
13	0.05										
14	0.035										
15	0.025										
16	0.015										
17	0.01										
18	0.007										
19	0.005										
20	0.0035										
21	0.0025										
22	0.0015										
23	0.001										
24	0.0007										
25	0.0005										
26	0.00035										
27	0.00025										
28	0.00015										
29	0.0001										
30	0.00007										
31	0.00005										
32	0.000035										
33	0.000025										
34	0.000015										
35	0.00001										
36	0.000007										
37	0.000005										
38	0.0000035										
39	0.0000025										
40	0.0000015										

■ : Can be manufactured

⑦ Selection of actuator type

The required size of an actuator is determined by the operating pressure range and a selection Cv Value. It selects from a table "Cv Value and pressure which can be used."

Cv Value and Pressure can be used

◆ M3 Type Actuator

Unit [MPa]

Cv Value			0.035	0.05	0.35	0.7	1	1.5	2	3	5
			or less	0.25	0.5						
Without Positioner Types	ON - OFF Valve	Operating Pres.: 100 kPa	—	20	12	10	7	5	3	2	1
		Operating Pres.: 200 kPa	—	40	24	20	14	10	6	4	2
		Operating Pres.: 400 kPa	—	49	48	29.4	28	20	12	8	4
	Operating Pres. 20 -100 kPa	Inlet Pres. Max.	14.7	10	6	5	3.5	2.5	1.5	1	0.5
		Outlet Pres. Max.	6	6	6	5	3.5	2.5	1.5	1	0.5
With Positioner Types	Supply Pressure 140 kPa	Inlet Pres. Max.	22.5	15	9	7.5	5.3	3.8	2.3	1.5	0.75
		Outlet Pres. Max.	9	9	9	7.5	5.3	3.8	2.3	1.5	0.75
	Supply Pressure 240 kPa	Inlet Pres. Max.	45	30	18	15	10.5	7.5	4.5	3	1.5
		Outlet Pres. Max.	18	18	18	15	10.5	7.5	4.5	3	1.5
	Supply Pressure 400 kPa	Inlet Pres. Max.	49	49	36	29.4	21	15	9	6	3
		Outlet Pres. Max.	36	36	36	29.4	21	15	9	6	3

As for the operation pressure in type without positioner, in a low temperature type, in bellows seal type, we select 200 kPa or more.

As for supply pressure in type with positioner, we select 240 kPa or more.

◆ M2 Type Actuator

Unit [MPa]

Cv Value			0.035	0.05	0.35	0.7	1	1.5	2	3	5
			or less	0.25	0.5						
Without Positioner Types	ON - OFF Valve	Operating Pres: 200 kPa	—	80	48	29.4	28	20	12	8	4
		Operating Pres: 400 kPa	—	90.2	90.2	29.4	29.4	29.4	24	16	8
With Positioner Types	Supply Pressure 240 kPa	Inlet Pres. Max.	90.2	60	36	29.4	21	15	9	6	3
		Outlet Pres. Max.	36	36	36	29.4	21	15	9	6	3
	Supply Pressure 400 kPa	Inlet Pres. Max.	90.2	90.2	72	29.4	29.4	29.4	18	12	6
		Outlet Pres. Max.	72	72	72	29.4	29.4	29.4	18	12	6

⑧ Check of a Valve Connection Size

Please select a suitable valve connection size from the selected Cv Value, come out and check by the below table "Scope of Cv Value and valve connection size"

Scope of Cv Value and Valve Connection Size

The Cv Value which can be manufactured is as follows.

Valve Connection Sizes	1/4 (8A)	3/8 (10A)	1/2 (15A)	3/4 (20A)	1 (25A)
Cv Value	0.7 or less	1 or less	3 or less	3 or less	5 or less

⑨ Selection of Accessories and Options

Please select accessories and options needed, and refer P.8 and 9.



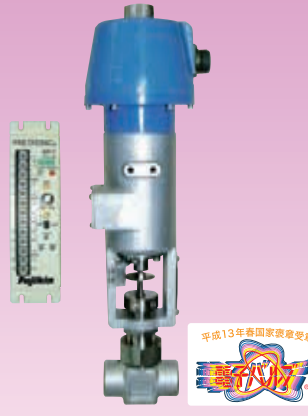
WARNING *Fujikin* shall bear no liability regarding product selection criteria or decisions, nor shall *Fujikin* be liable (including direct, special or consequential damages including, but not limited to, lost profits or income) in regard to any product which has been damaged by misuse, improper handling or accident, or as a result of service or modification by anyone other than an authorized employee or agent of *Fujikin*, or being subjected to use under conditions, or combinations of conditions, that are not compatible with that particular *Fujikin* product.

SR100



- ◆ Electronic Valves
- ◆ Proportional Solenoid Driven
- ◆ High-speed response
- ◆ Spring Back Mechanism

AR2000



- ◆ Electronic Valves
- ◆ Stepping Motor Driven
- ◆ High Resolution 2000:1 (F.S.)
- ◆ Explosion - Proof model (d2G4) also available

SR100E NEW



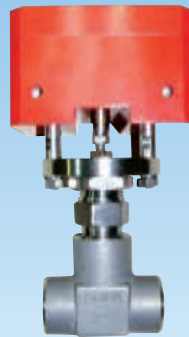
- ◆ Electronic Valves
- ◆ Proportional Solenoid Driven
- ◆ Stuffed hard the basic performance of SR100
- ◆ Spring Back Mechanism

COSMIX™



- ◆ Fine Ceramic Ball Valves
- ◆ Fine Ceramic Wetted Parts:
- ◆ Excellent Abrasion Resistance
- ◆ Excellent Corrosion Resistance

AP·APR Series



- ◆ High Pressure Cylinder Valves
- ◆ Compact Design
- ◆ Soft Sealing Type

PRE-UBV Series



- ◆ Electronic Ball Valves
- ◆ With a valve travel signal detection function

FCS® Thermal Series

FCST1000



- ◆ Multi Gas, Multi Range Mass Flow Controller Thermal Series
- ◆ Ultra Quick Response
- ◆ DeviceNet™ Communication

FCS® Thermal Series

FCST2000



- ◆ High Precision Mass Flow Controller Thermal Series
- ◆ Highly Efficient Sensor
- ◆ High Reliable Diaphragm Valve
- ◆ DeviceNet™ Communication

FCS® Pressure Series



- ◆ Flow Control System Pressure Series
- ◆ Control flow is not influence by supply pressure change.
- ◆ Response Time: 0.5 sec. or less
- ◆ DeviceNet™ Communication



Fujikin Carp Group



The Year 2013 Prime Minister's Prize
The 5th Monodzukuri Nippon Grand Award
Overseas Operation "Excellence Prize"

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CAT: No.131E-Y